A worldwide meta-analysis (1977–2020) of sediment core dating using fallout radionuclides including ^{137}Cs and ^{210}Pb$_{xs}$

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Abstract Dating recent sediment archives (<150 years) constitutes a prerequisite for environmental and climatic reconstructions. Radiocaesium (^{137}Cs) emitted during thermonuclear bomb testing (~1950−1980) and nuclear accidents, as well as the decrease of excess lead-210 (^{210}Pb$_{xs}$) with depth are often combined to establish sediment core chronology. Although these methods have been widely used during the last several decades, there is a lack of structured and comprehensive worldwide synthesis of fallout radionuclide analyses used for dating sediment cores in environmental and Earth sciences. The current literature overview was based on the compilation of 573 articles published between 1977 and 2020, reporting the collection of 1351 individual dating sediment cores (the dataset can be accessed at https://doi.pangaea.de/10.1594/PANGAEA.931493). This review was conducted in order to map the locations where ^{137}Cs fallout events were detected. These included the thermonuclear bomb testing peak in 1963, the Chernobyl accident in 1986, the Fukushima accident in 2011, and 24 additional events identified in 112 sites that led to local radioactive releases (e.g. Sellafield accidents, Chinese nuclear tests). When ^{210}Pb$_{xs}$ records were used along with ^{137}Cs data, detailed information on the ^{210}Pb$_{xs}$ age depth models were also synthesized. Multiple information including the core collection method, sediment properties, radionuclide analysis techniques and catchment characteristics were also compiled.

With the current growing number of studies analyzing sediment cores and the increasing interest in the deployment of sediment fingerprinting techniques including radionuclides as potential discriminant properties, this spatialized synthesis provides a unique worldwide compilation for characterizing fallout radionuclide sources and levels at the global scale. This synthesis provides in particular a referential of ^{137}Cs peak attribution for improving the sediment core dating and it outlines the main questions that deserve attention in future research as well as the regions where additional ^{137}Cs fallout investigations should be conducted in priority.

Keywords: caesium-137, unsupported lead-210, thermonuclear weapon tests, Chernobyl accident, Fukushima accident, sediment archives, source to sink

1. Introduction

Sedimentary sequences have received a growing interest as a support for conducting climatic and environmental reconstructions covering the 20th century period, which has been highly impacted by socio-environmental changes (Syvitski *et al.*, 2020). These natural archives provide a powerful and unique tool for reconstructing the trajectory, the magnitude and the resilience of terrestrial and aquatic ecosystems facing major environmental changes, climate forcing or contamination pressures (Dearing and Jones, 2003; Jaegler et al., 2019; Sabatier et al., 2014). These recent paleo-reconstructions were carried out in various environments such as lakes, alluvial plains, lagoons, estuaries or even the open ocean. Establishing an age depth model is the first prerequisite of any paleo-investigation based on these sediment archives. Fallout of short-lived radionuclides (caesium-137, lead-210) characterized by different half-lives ($T_{1/2}$) are particularly useful to derive this crucial temporal information.

Among these radionuclides, two complementary radioisotopes are classically analyzed. Caesium-137 (^{137}Cs) is used as a discrete time marker, which provides anchoring points after 1950. In contrast, the excess of lead-210 (^{210}Pb$_{xs}$) is used as a continuous time marker to reconstruct sedimentation rates for the last 100 to 150 years (e.g. Sanchez-Cabeza & Ruiz-Fernández, 2012; Bruel & Sabatier, 2020).

The ^{137}Cs is an artificial radionuclide ($T_{1/2} = 30.15$ years) produced by the global thermonuclear weapon tests that started in 1954 and whose fallout peaked in 1963 in the Northern Hemisphere. Furthermore, additional ^{137}Cs releases occurred in certain regions of the world (i.e., mainly in Europe and in the Northern Hemisphere (Appleby, 2001; Appleby et al., 1991) following the Chernobyl (1986) and the Fukushima Dai-ichi (2011) nuclear accidents. Other more local sources of ^{137}Cs releases have also been recorded. The Sellafield accidents (UK, 1957, 1974, 1981) and the radioactive releases from the Mayak weapon production plant (Russia, 1949, 1957) provide examples of these local sources (e.g. Madsen *et al.*, 2005). To identify unambiguously ^{137}Cs sources, complementary analyses of plutonium isotope signatures (Meusburger et al., 2020) or the detection of additional radionuclides including americium-241 (^{241}Am) can be conducted (Appleby et al., 1991). The use and limitations of ^{137}Cs for dating sediment sequences have been widely described in previous publications (Delaval et al., 2020; Klaminder et al., 2012; Miller and Heit, 1986).

In contrast to ^{137}Cs, ^{210}Pb is a natural radionuclide ($T_{1/2} = 22.3$ years), which is a decay product of the ^{238}U chain ($T_{1/2} = 4.5 \ 10^9$ years). ^{238}U decays through a series of nuclides (e.g., ^{226}Ra, ^{222}Rn). ^{222}Rn ($T_{1/2} = 3.82$ days) is a gas that partly remains in situ, forming "supported" ^{210}Pb, and that partly escapes to the atmosphere, forming "excess" ^{210}Pb (^{210}Pb$_{xs}$,) when falling back on the soil surface as a result of wet and dry fallout. The evolution of ^{210}Pb$_{xs}$ activities with depth in sediment cores follows an exponential decrease from which it is possible to calculate the sedimentation rates for the last 100-150 years. Several dating models were established in the literature in order to infer sediment ages from ^{210}Pb$_{xs}$ (Appleby and Oldfield, 1978; Bruel and Sabatier, 2020; Goldberg, 1963; Sanchez-Cabeza and Ruiz-Fernández, 2012) and several limitations to this method were also described (e.g. Binford, 1990).

Sediment core inventories are often reported for both radionuclides to compare the study location with a reference site. The "reference" core must be chosen not to be affected by post-depositional disturbance processes (e.g. erosion, accumulation) and must be located in the vicinity of the studied sediment core. Comparing the radionuclide inventories calculated in the sediment cores of interest with that found at a nearby reference site may provide information on sediment dynamics (e.g. through the calculation of erosion or accumulation rates).

Although both ^{137}Cs and ^{210}Pb$_{xs}$ activities were largely used to assign ages (often in years) to the succession of layers in sedimentary sequences, there is a lack of structured and comprehensive worldwide synthesis of

radionuclide fallout. Accordingly, the current literature overview was based on a Web of Science search with the objectives to: (1) identify the worldwide distribution of studies using these radionuclides for sediment dating, (2) identify the presence of discrete peaks of ^{137}Cs in these archives (attributed to global and regional fallout or to local sources) and the ages and activities associated with these peaks (3) characterize the ^{210}Pb$_{xs}$ models used for dating sediment archives when they were applied in combination with ^{137}Cs.

The overall goal of this synthesis is to build a worldwide referential and make it available to the scientific community sharing interests in sediment core dating or sediment source fingerprinting. It will also raise questions that should deserve attention in future research.

2. Literature overview

Journal articles using ^{137}Cs for dating sediment cores published in English language were extracted from the Thomson Reuters Web of Science database until 29 February 2020. The search words "^{137}Cs" and "sediment core" were used in combination. A total of 910 publications were found by the automatic literature searching tool starting from 1977. Soil science studies focusing on the depth distribution of ^{137}Cs in soils (Jagercikova et al., 2014), publications reporting ^{137}Cs measurements conducted on surface soil layers or deploying sediment fingerprinting approaches using ^{137}Cs as a diagnostic property (Evrard et al., 2020) were excluded from further analysis and removed from the database.

Among the remaining references, 573 publications were selected to feed a database including a total of 1351 individual dated sediment cores (Fig. 1) – (the database is freely downloadable from https://doi.pangaea.de/10.1594/PANGAEA.931493).

The database includes the following categories of information:

- Publication metadata (site name, authors information, DOI or permanent link, journal title, publication year, main processes studied, GPS coordinates, country)
- Sampling information (sampling year, core length, coring environment –e.g. lacustrine, coastal, floodplain –, corer type, corer diameter, subsampling increment, sediment compaction measured during the core collection)
- Catchment and lake characteristics (name, size, main land use in the drainage catchment, slope, elevation range)
- Description of the ^{137}Cs-related properties (surface activity, activity and sediment depth of the Fukushima, Chernobyl and 1963 peak fallout, total ^{137}Cs inventory in the core, ^{137}Cs inventory at a nearby reference site, sedimentation rate, detection of local releases)
- Description of the ^{210}Pb$_{xs}$-related properties (sedimentation rate, ^{210}Pb$_{xs}$ analysis technique, ^{210}Pb$_{xs}$ age model used, total ^{210}Pb$_{xs}$ inventory in the core, ^{210}Pb$_{xs}$ inventory at a nearby reference site)

In this meta-analysis, both ^{137}Cs and ^{210}Pb$_{xs}$ activities and inventories were systematically decay-corrected to 1 January 2020 to allow comparisons between cores.

2.1 Publication characteristics
Studies included in the database mainly provided dating of lacustrine sediment (47%) and coastal/bay/estuarine sequences (29%) and to a lesser extent, marine sediment (9%), floodplain/riverine sediment (8%), marsh/wetland/peatland sediment (4.5%) and lagoon sediment (2.5%). These studies where published in a large variety of journals (n=153) dealing mainly with geosciences, chemistry and environmental radioactivity. The most frequently encountered journals in the database are the Journal of Environmental Radioactivity (n=49), Science of the Total Environment (n=45), Estuarine, Coastal and Shelf Science (n=23), Environmental Science and Technology (n=22) and Marine Pollution Bulletin (n=16). The compiled articles were published between 1977 and 2020. The number of studies reporting the use of ^{137}Cs for dating sediment cores has significantly increased from the 1970s to 2020 (Fig. 2).

Studies compiled in the database mainly focus on contaminant/pollution-related topics (in 31% of the publications) followed by investigations of sedimentation rates (26%), monitoring of radionuclide concentrations in the environment (21%), paleo-environmental reconstructions (9%) and core chronology methods and limitations (3.5%). They were conducted in 63 different countries around the world. The countries with the highest number of studies are the United States of America (21%), China (10%), the United Kingdom (10%), France (6%) and Canada (5%). Most studies were conducted in Europe during the entire 1977-2020 period (with 43% of publications) followed by America (32%, respectively 28.4% for North America and 3.6% for South America), Asia (20%), Africa (3.5%) and Oceania (1.5%) – (Fig. 1). However, the proportion of publications per continent has largely changed during the 1977-2020 period. Virtually all publications were conducted in study sites located in Europe and North America during the 1977-1990 period (with 50 and 48.3% of studies, respectively) with only some marginal contributions from studies carried out in Asia (1.4%). Then, between 1990 and 2005, although Europe's (46%) and North America's (34%) dominant positions remained, the share of studies conducted in Asia increased (13%). Finally, among the 313 studies published between 2005 and 2020, only 35% of studies were carried out in Europe, followed closely by Asia (30%) and America (including 21 and 5.5% for North and South America, respectively) - (Fig. 1). This data compilation underlines the emergence of Asian publications during the last two decades whereas North American and European publications remained stable. In the absence of a large number of studies conducted in the Southern Hemisphere, the current compilation is mainly representative of observations made in the Northern Hemisphere.

2.2 Research design

Metadata and core collection:

As metadata is required to extend the data lifecycle and promote knowledge integration by the community, a minimum reporting guidelines has been recently suggested for short-lived radionuclides (Bruel and Sabatier, 2020; Courtney Mustaphi et al., 2019). Among them, the sampling year is one of the most important and it was reported in 92% of publications. On average, 5.5 years (standard deviation – SD: 3.5 years) occurred between the core collection in the field and the publication. Coring or site coordinates were provided in 45% of the publications. Alternatively, the site location was indicated on a map or the name of the location of interest (city, river, lake, area) was given in the publication text (52%). Only 3% of the publications did not provide any information about the sampling location.

The type of coring device used for sample collection was usually mentioned (81% of publications). In total, 32 different corer types were reported to have been used. Gravity corer is the most commonly used device (39%) followed by hand coring (9.6%), piston corer (8.7%), box-corer (8.2%) and vibra-corer (7.3%). Piston and gravity corers were mostly used in lacustrine studies (in 64 and 76% of the studies, respectively), a box corer was used in 81% of the marine and the coastal/estuarine studies. In contrast, a vibra-corer was mainly used in floodplain/riverine environments (44% of the studies). When the corer type is provided, the corer brand is only reported in 18.8% of the publications (the most cited brands are Uwitec, Kajac and Eijkelkamp in respectively 40, 10 and 6% of the articles reporting this information). Technical characteristics of the corer, as corer diameter or size are detailed in 44% of the studies (their mean diameter amounts to 8.6 cm (SD: 3.2 cm)).

Information about the drainage catchment (e.g. surface area), land use and lake characteristics are only reported in 20, 10 and 17.5% of the studies that investigated continental environments. When they were mentioned, the average catchment and water body (lake, pond, dam reservoir) surface areas reached on average 8330 km² (SD: 55,400 km², range: 0.045 to 525,000 km²) and 260 km² (SD: 1130 km², range: 0.0005 to 10,000 km²). These average values are likely overestimated because few studies provided the catchment metadata. To improve the inter-comparison between study sites in the future, we highly recommend the authors to provide systematically detailed information on the study site description.

Core subsampling and data availability:

Information about the total core length was present in 68% of the publications. This information was given in figures, tables or directly in the text. On average, the core length reached 0.85 m (SD: 1.8 m). The subsampling mode is detailed in 72% of the publications, with an average increment thickness of 2.1 cm (SD: 1.5 cm).

In 73% of the publications, the analytical method used to analyze $^{210}Pb_{xs}$ was provided. Alpha spectrometry was used in 33% of the studies whereas gamma spectrometry was used in the rest of the publications. As shown in Fig. 3, a shift between both analytical techniques was observed around 2005, due to the analytical developments made during this period and the improvement of gamma spectrometry potential at low energies, including at 46 keV, i.e. the gamma emission peak of ^{210}Pb.

In 60.5% of the studies, radionuclide data was provided in figures only, while in 30.7% of the articles they were reported in both figures and tables. Tables only were found in 1.3% of the publications. In 7.5% of the studies, radionuclide activities were not presented at all, only the dating results (i.e. estimated year of sediment deposition in the successive layers) were provided. The studies in which the detailed data is not reported could not be included to conduct study comparisons. We highly encourage futures studies to include at least the peak radionuclide activities in the text or, even better, the provide a table with the comprehensive radionuclide analysis results in the sediment archives.

3. Global radionuclide fallout synthesis

3.1. ^{137}Cs detection

The first appearance of ^{137}Cs in the deepest sediment layers was discussed in 14% of studies. In most of them, this fallout was attributed to the 1954-1955 period corresponding to the initial ubiquitous fallout of this radionuclide around the world (Evrard et al., 2020). As the ^{137}Cs fallout activities in 1954 remained relatively low and largely

(~75%) decayed since then, the first ^{137}Cs appearance found in depth in a sediment core likely corresponds to deposition that took place in 1955. It was detected at the average depth of 41 cm (SD:45 cm, range: 2 to 360 cm).

190 In some studies, conducted in both the northern (e.g. Canada) and Southern Hemispheres (e.g. South-Africa) the deepest fallout appearance in the core was nevertheless attributed to 1957 or 1958, without any further explanation in the text.

Fallout associated with the atmospheric nuclear tests (~1950 to ~1980, with a peak in 1963) was detected in 50.9% of the sediment cores (n=668) at a mean depth of 27.5 cm (SD: 36 cm, range: 1 to 286 cm) with an average activity

195 of 69.8 Bq kg^{-1} (SD: 91 Bq kg^{-1}, range: 0.8 to 473 Bq kg^{-1}) in the Northern Hemisphere and 11.7 Bq kg^{-1} (SD: 16 Bq kg^{-1}, range: 0.4 to 85 Bq kg^{-1}) in the Southern Hemisphere (Fig. 4). The year of maximal fallout was commonly attributed to 1963 in both the northern and Southern Hemispheres although studies conducted in the Southern Hemisphere attributed on several occasions the year 1964 (n=5) or 1965 (n=4) to this peak, to take into account the time needed for a full atmosphere homogenization.

200 The Chernobyl accident was identified by the publication authors in 20.5% of the sediment cores (n=278 sediment cores). This event was mainly recorded in Europe (77.7%), although it was also reported from cores collected in Asia (17.6%, mostly in the western part of the continent) as well as in Northern Africa (1.4%) – (Fig. 4). Surprisingly, a peak of radiocaesium was also attributed to this accident in cores from China (n=17), Eastern Asia, in North America (2.9%, Canada [n=4] and Mexico [n=3]) as well as in central Africa (Ghana [n=2]) or in Oceania

205 (Australia [n=1]). The average activity associated with this accidental fallout was 670 Bq kg^{-1} (SD: 5070 Bq kg^{-1}, range: 2.3 to 48,000 Bq kg^{-1}). The highest activities associated with the Chernobyl accident were detected in the vicinity of the nuclear plant, especially in Ukraine, where the highest activities were recorded, as well as in Sweden, Germany, Poland, Romania and in the Alps. The lowest activities attributed to this accident were mostly located in western Europe (e.g. United Kingdom) and in southeastern Europe (Greece, Turkey). On average, this

210 event was detected at a 30-cm depth (SD: 59 cm, range: 1 to 420 cm) in the sediment cores.
The discrimination between fallout that occurred in 1963 and after Chernobyl can be achieved through the analysis of $^{239+240}$Pu and ^{241}Am. Both radionuclides were respectively searched for in 12.7% and 11% of the sedimentary sequences compiled in this database. Accordingly, ^{241}Am was found in 30% of studies where the 1963 fallout alone was identified.

215 Finally, fallout associated with the Fukushima accident was identified in 1.9% of the sediment cores (n=26). This level was mainly detected in mainland Japan or along the Japanese eastern coast (Fig. 4) although it was also surprisingly identified in Mexican and Ghanaian sediment sequences. The average activity associated with this fallout was 1920 Bq kg^{-1} (SD: 7780 Bq kg^{-1}, range: 6 to 35,700 Bq kg^{-1}). This level was identified at an average depth of 1.8 cm (SD: 3 cm, range: 0.25 and 11.5 cm) in the sediment sequences.

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In addition to fallout attributed to the Fukushima and Chernobyl accidents and the atmospheric nuclear tests, 24 other local events that have released radionuclides into the environment were identified by the authors and listed in the current database (Table 1). Among these local events, emissions following the Sellafield Nuclear Plan accidents were observed in 40 sequences (3% of the sediment cores covered in the database), the fallout associated

225 with the Mayak Production Association (Russia) in 12 sediment cores (0.9%), the dumping of radioactive waste into the Kara Sea (Russia) in 8 sediment cores (0.6%), the Chinese Nuclear test fallout in 5 sediment archives (0.4%), the Mühlenberg Nuclear Power Plant (Switzerland) in 5 sediment cores, the Bugey and Crey-Malville

nuclear facilities (France) in 5 cores and the Indian Point Nuclear Plant in 4 sequences (New York State, USA).
Other events included releases from the Krasnoyarsk-26 site (Russia; n=4 cores), Rokkasho nuclear facilities

230   (Japan; n=3), La Hague nuclear fuel reprocessing plant (France; n=3), and the underwater nuclear weapons tests
conducted in Novaya Zemlya (Russia, n=3), (Fig.5 and Table 1).

As the calculation of radionuclide inventories required an estimation of the dry bulk density which is often lacking
in publications, ^{137}Cs inventories were only reported for 26% of the sediment cores. The average inventory in the

235   Northern Hemisphere was 30,890 Bq m^{-2} (SD: 359,000 Bq m^{-2}, range: 10 to 6,000,000 Bq m^{-2}, the highest value
was measured in Russia close to the Mayak site) compared to 990 Bq m^{-2} (SD: 1030 Bq m^{-2}, range: 205 to 3180
Bq m^{-2}) in the Southern Hemisphere. The high standard deviation observed in the Northern Hemisphere is mainly
due to the high inventories found in the vicinity of Chernobyl, Krasnoyarsk as well as the Mayak production site
(Fig. 6).

240   Inventories of ^{137}Cs at reference locations located nearby the sediment core collection site were provided in 7.7%
of the publications. The average reference inventory was 1610 Bq m^{-2} (SD: 2810 Bq m^{-2}, range: 268 to 24,000 Bq
m^{-2}) in the Northern Hemisphere. Only one inventory was reported in the Southern Hemisphere (360 Bq m^{-2}).
Information about sedimentation rates based on ^{137}Cs analyses was provided in 34.6% of the publications. The
1963 peak level was generally used for estimating this average sedimentation rate.

245   **3.2. Latitudinal distribution of ^{137}Cs in sediment cores**

The maximal activities associated with the atmospheric nuclear tests (activities generally attributed to 1963) were
recorded between the latitudinal bands comprised between 40 and 60°N, with an average activity of 90 and 117
Bq kg^{-1}, respectively. Values were not available for the bands located between 0-10°S, 50-60°S and 80-90°S. This
is consistent with the United Nations Scientific Committee of the Effects of Atomic Radiation (UNSCEAR, 2000)

250   compilations recording the highest inventories between 40 and 60°N for this event (inventories reached
respectively 1186 and 1383 Bq m²). Distribution of both databases were similar with a strong correlation
coefficient between inventories and activities (r²=0.87, *p*-value <0.05) – (Fig. 7).
Comparison between reference inventories of ^{137}Cs compiled in the current research and those from UNSCEAR
showed a lower correlation (r²=0.4, *p*-value <0.05). This poorer correlation is mostly due to the absence of

255   inventories reported between 10°N and 30°S and between 30 and 90°S. It can also be explained by the high
inventories recorded between 30° and 40°N, which are impacted by the high values measured in the vicinity of the
Mayak production site (Fig. 7).

3.3. ^{210}Pb$_{xs}$ detection and use

This natural radionuclide was often used in combination with ^{137}Cs in this database (in 64% of the studies). In

260   these publications, the core chronology based on ^{210}Pb$_{xs}$ was estimated with 7 different models (Constant Rate of
Supply (CRS) (Appleby and Oldfield, 1978), Constant Initial Concentration (CIC) (Pennington *et al.*, 1976),
Constant Flux Constant Sedimentation (CFCS) (Krishnaswamy et al., 1971), Periodic Flux model (PF) (Sanchez-
Cabeza et al., 2000), Constant Initial Concentration and Constant Sedimentation rate (CICCS) (He and Walling,
1996), Constant Rate of Accumulation (CRA) and Constant Initial Activity (CIA) (Robbins and Herche, 1993)).

265   Among the most employed tools, the CRS model (also referred to as CRSMV model in some publications) was

applied in 54% of the studies, the CIC model (also designed as CA model) in 23% of the articles and the CFCS model (also called CF, CSM, CFS or RSSM model with some of them including limited adaptations) in 20% of the publications. Sedimentation rate was detailed in 56.7% of publications using the $^{210}Pb_{xs}$ for establishing core chronology.

270   The $^{210}Pb_{xs}$ inventories were given in 11.7% of the studies and the inventories of this natural radionuclide at references sites were presented in only 4.1% of the studies. The average inventory in the Northern Hemisphere amounted to 6510 Bq m^{-2} (SD: 10,640 Bq m^{-2}, range: 20 to 96,000 Bq m^{-2}). Only one value was available in the Southern Hemisphere (2560 Bq m^{-2}). The average inventory at reference sites in the Northern Hemisphere was 1730 Bq.m^{-2} (SD: 760 Bq m^{-2}) with an average flux of 90 Bq m^{-2} yr^{-1} (SD: 100 Bq m^{-2} yr^{-1}). Corresponding

275   inventories at reference sites were not reported for the Southern Hemisphere and only one value of $^{210}Pb_{xs}$ flux was provided (39 Bq m^{-2} yr^{-1}).

3.4. Other radionuclides

In addition to ^{137}Cs and $^{210}Pb_{xs}$, other radionuclides were frequently detected in the sediment cores. Most of these additional radionuclides were analyzed in order to provide a discrimination between the different ^{137}Cs sources

280   including plutonium, americium, cobalt and strontium or to provide information on sediment dynamics over shorter periods (e.g. ^{7}Be, ^{228}Th). Among the 28 radionuclides frequently identified, the $^{239+240}Pu$ ratio and ^{241}Am activities were the most widely reported. The other reported radionuclides were beryllium isotopes (^{7}Be (1.7%), ^{8}Be (0.07%), ^{9}Be (0.07%), ^{10}Be (0.22%), ^{11}Be (0.07%)), bismuth (^{207}Bi (0.22%) ^{214}Bi (0.59%)) caesium (^{134}Cs (4.9%), cobalt (^{60}Co (1.4%)), neptunium (^{237}Np (0.15%)), plutonium (^{238}Pu (2.5%), ^{241}Pu (0.3%), ^{242}Pu (0.07%),

285   ^{243}Pu (0.07%)), potassium (^{40}K (1.5%)), radium (^{226}Ra (0.96%), ^{228}Ra (0.14%)), strontium (^{90}Sr (2.8%)), technetium (^{99}Tc (0.07%)), thorium (^{228}Th (0.3%), ^{232}Th (0.3%), ^{234}Th (0.37%)) and uranium (^{236}U (0.07%), ^{238}U (0.3%)). The ^{14}C was analyzed in 4.5% of the sediment cores. This isotope was exclusively analyzed by Accelerator Mass Spectrometry (AMS) in the articles included in the database for providing long term chronology.

4. Discussion

290   #### 4.1 General patterns of ^{137}Cs fallout

According to UNSCEAR (2000), 77% of the total worldwide fallout of ^{137}Cs is estimated to have occurred in the Northern Hemisphere. Previous studies have identified two main sources of ^{137}Cs in Europe, including the fallout associated with the thermonuclear weapon tests and that emitted by the Chernobyl accident (Meusburger et al., 2020). In the current database, ^{137}Cs deposition associated with above-ground nuclear tests was largely detected

295   across the European continent with a peak systematically assigned to 1963 (Fig. 4). This peak was described in the literature as the most reliable time marker worldwide (He and Walling, 1997). In addition, no technical problem was reported to detect the occurrence of fallout associated with the Chernobyl accident. This post-accidental fallout was identified in sediment cores across Europe from North to South (from Norway to Spain) and from West to East (from Ireland to Belarus). In certain areas as in western France, south-western England, Southern Spain,

300   Portugal or in Iceland, this post-accidental fallout was not detected (Fig. 4). This observation is in agreement with our previous knowledge on the spatial distribution of Chernobyl fallout across Europe (Evangeliou et al., 2016).

In some regions (e.g. Alps), the Chernobyl fallout appears to be highly heterogeneous and reflects the radioactive cloud pathway and the heterogeneous rainfall pattern after the catastrophe (Alric et al., 2013). In addition to the peaks associated with the Chernobyl accident and the global fallout, the current research has allowed to identify

305 nine local events in Europe that led to radionuclide releases and peaks in sediment sequences. The Sellafield/Windscale releases (1957, 1974, 1975, 1981, 1985) were the most often detected in European sequences (identified in the United Kingdom, along Greenland coasts and in the Baltic Sea) – (e.g. Perner *et al.*, 2010).

In North America, the 1963 peak was often detected in sediment cores (e.g. Van Metre *et al.*, 2004; Corcoran *et*

310 *al.*, 2018) – (Fig. 4). Five local events were also identified in addition to this peak with a limited spatial extent as in the vicinity of the Savannah River Site (1964), (Lewis et al., 2000), the Indian Point Energy Center (1971-1975), (Bopp et al., 1982), the Oak Ridge National Laboratory (Sobocinski, 1990), the Peach Bottom Atomic Power Station (McLean and Summers, 1990) and the Hanford Plutonium Production Center (1944-1970), (Beasley and Jennings, 1984).

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Asia and more specifically China proved to be the most complex region of the world for identifying the sources of the discrete peaks of ^{137}Cs. The ^{137}Cs peaks identified in parts of China (e.g. Xinjiang, Guangdong, Guizhou provinces - (Bai et al., 2002; Chen et al., 2014)) were associated with Chinese above-ground nuclear tests conducted during the 1960-1970s. In addition, several studies conducted in the northwest and the southeast of

320 China (Xinjiang, Yunnan and adjacent areas) proposed that the uppermost ^{137}Cs peak found in lacustrine sediment cores may be attributed to the Chernobyl fallout in 1986. In Chinese cores, fallout associated with the Chernobyl accident was even detected more frequently than the Chinese nuclear tests. It was detected in the Tibetan plateau (e.g. Lake Ngoring – Zhang *et al.*, 2014), in the headwaters of the Yellow river, as well as in cores collected in lower reaches of this river, in its delta (Wu et al., 2015) and along the Yellow Sea coastline (Sun et al., 2012). This

325 event was also often identified in several lacustrine deposits of southeastern China (e.g. Yunnan Province) - (Zeng & Wu, 2009; Chen *et al.*, 2014; Wang *et al.*, 2018). On the contrary, it was almost never detected in the central and northeastern parts of China (it was only reported in the Miyun reservoir, north of Beijing; Xia *et al.*, 2015). However, whether this/these peak(s) should be attributed to the Chinese nuclear tests, Russian tests or the Chernobyl accident remains debated in the scientific community. Nevertheless, the current literature review shows

330 that a ^{137}Cs peak in a lacustrine sediment core was never attributed to the Chernobyl accident in a vast region comprised between the eastern part of Turkey and China. Accordingly, it is very unlikely that the attribution of a ^{137}Cs peak to the Chernobyl fallout in Chinese cores is meaningful. As these events took place ~10 years apart, future research should incorporate the use of additional tracers that may unambiguously discriminate both sources of radionuclides in this region. Plutonium (^{240}Pu/^{239}Pu) or caesium (^{135}Cs/^{137}Cs) atom ratios may provide good

335 candidates to achieve this type of discrimination (Bu et al., 2015; Zhu et al., 2020).

Further to the East, lacustrine and marine sedimentary sequences studied in Japan allowed to identify three main sources of ^{137}Cs. The first local ^{137}Cs source detected in Japan was attributed to the atomic bomb peak in 1945 in the Nagasaki area (Mahara and Kudo, 1995). The peak associated with the atmospheric nuclear tests in 1963 was then largely recorded across the entire Japanese peninsula (e.g. Lu & Matsumoto, 2009; Hosono *et al.*, 2016)

340 whereas the fallout associated with the Fukushima accident was mainly identified in the vicinity of the Fukushima NPP, in particular in lacustrine sediments of the Miyagi, Fukushima and Ibaraki Prefectures (Cao et al., 2017;

Jaegler et al., 2019; Minoura et al., 2014), as well as in sediment samples collected along the Pacific coast off the Fukushima prefecture (e.g. Black & Buesseler, 2014) – (Fig. 4).

According to UNSCEAR (2000), only 23% of the total ^{137}Cs fallout is estimated to have occurred in the Southern

345 Hemisphere. In contrast to what was reported for the Northern Hemisphere, few studies using both ^{137}Cs and ^{210}Pb$_{xs}$ for dating sediment archives were found in this part of the world. This is mainly the case for Africa and Oceania. Studies available in the Southern Hemisphere reported the occurrence of a single peak attributed to the thermonuclear tests. However, no consensus was shared in the literature to assign a single year to this peak. Several authors have attributed the year 1963 (e.g. Chile, Antarctica - Urrutia *et al.*, 2007; Christ *et al.*, 2015) to this peak

350 as in the Northern Hemisphere, whereas other authors dated this peak to 1964 (e.g. Chile - Elbert *et al.*, 2013) or even 1965 (e.g. in Chile, Argentina, South Africa or in the Kerguelen Island - Arnaud *et al.*, 2006; Kastner *et al.*, 2010; Boardman & Foster, 2011; Ficetola *et al.*, 2018). This shift of 1 to 2 years in the assigned year for the thermonuclear bomb fallout peak between the Northern and Southern Hemispheres can be attributed to the time required for the mixing of air masses from both Hemispheres and the occurrence of significant ^{137}Cs fallout transfer

355 to the Southern Hemisphere. However, this question remains debated and additional sedimentary sequences should be collected in the future to improve the assignation of this peak (Guevara and Arribére, 2007) and sediment core dating in the Southern Hemisphere.

4.2. Limitations of the currently published ^{137}Cs research

This worldwide database also underlines the unexpected detection of ^{137}Cs sources in certain regions of the world.

360 In China, a large number of studies claim to have detected Chernobyl fallout whereas more local sources of ^{137}Cs attributed to the Chinese and Russian nuclear tests conducted in Lop Nor and Semipalatinsk, respectively, are not considered as a potential origin (Huang et al., 2019; Zhao et al., 2020). The potential impact of these tests should be investigated more thoroughly. On the contrary, the attribution of a peak to the Chernobyl fallout should be avoided without clear isotopic evidence, as the associated fallout was not observed in a vast region that extends

365 from the Ural Mountains/Eastern Turkey to China. For example, in a lacustrine sediment core collected in Mexico, the occurrence of ^{137}Cs was attributed to both Chernobyl (Méndez-García et al., 2014) and Fukushima accidents (Caballero et al., 2020). This remains to be confirmed as other studies conducted nearby these areas did not record these ^{137}Cs sources. They only recorded fallout associated with the global bomb peak in 1963 (e.g. Hansen, 2012). A similar finding is made in Ghana where both fallout sources associated with Fukushima and Chernobyl accidents

370 were recorded in the Amisa and Sakumo River estuaries (Mahu et al., 2016) whereas no single ^{137}Cs peak could be identified in sediment collected in the nearby Volta and Pra River estuaries (Klubi et al., 2017). In North America, ^{137}Cs fallout attributed to Chernobyl was identified in Canada, in the Vermillon Lake (Schindler and Kamber, 2013), as well as in the North Lake in the United States (Hardaway et al. 1998). The attribution of ^{137}Cs peaks to Chernobyl in Mexico, North America, Africa should be taken with great caution in view of the

375 observations made in the current literature compilation and our knowledge of the post-accidental fallout dispersion (Evangeliou et al., 2016).

These very likely incorrect assignments could instead have been induced by the occurrence of some local ^{137}Cs sources or by various processes that may affect the distribution of ^{137}Cs in sediment cores. For example, soil erosion was detected in various studies as one of the major process complicating the ^{137}Cs peak identification in

380 the core. This process may have induced an incorrect assignation through the sudden delivery of sediment with

higher ^{137}Cs levels (Foucher et al., 2019; Swales et al., 2002) or in contrast lower levels of ^{137}Cs in some sediment layers that may be delivered by subsoil sources, sheltered from atmospheric fallout and depleted in this radioisotope (Foster et al., 2005). Furthermore, earlier deposits of ^{137}Cs on ice and snow were reported to have increased the ^{137}Cs activity in a sediment sequence of Antarctica after ice melting (Sanders et al., 2010). On the

385 contrary, certain storm events and the associated flood deposits can lead to the dilution of the ^{137}Cs signal (Gu et al., 2011). In addition to these natural and anthropogenic processes that may lead to an increase or a decrease of the ^{137}Cs activity along sedimentary sequences, a large number of studies included in the current database reported the occurrence of post-depositional processes. Among them, bioturbation and post-depositional mobility/diffusion may disturb the temporal profile of radionuclides with depth along the core and dilute their concentrations

390 (Benninger et al., 1998; Larsen et al., 2010; Matter et al., 2010). Finally, in some studies, this intense sediment mixing led to the impossibility to establish a chronology, typically when no discrete peak was clearly detected (Eades et al., 2002) or when inconsistent peaks were observed. The frequency of the occurrence of these mixing processes in sediment sequences is difficult to estimate as the analyses of cores that cannot be dated remain often unpublished.

395 **4.3 Main recommendations for future studies**

Overall, this literature review has demonstrated the frequent lack of metadata in publications dealing with sediment core dating and analysis. Accordingly, we highly recommend the authors of future studies to provide detailed information about the reservoir/coring site characteristics, the catchment properties (when relevant) as well as on the coring methodology. In the current synthesis, raw radionuclide data were only provided in tables or in a

400 reusable format in 30.7% of the publications. To extend the short-lived radionuclide data lifecycle (Bruel and Sabatier, 2020; Courtney Mustaphi et al., 2019; Wilkinson et al., 2016) and allow more frequent inter-comparisons between sites and methodologies, we strongly encourage the authors to systematically provide the detailed radionuclide analysis results in tables associated with the publication or in open access data repositories.

Most of the studies covered in the current compilation were conducted in the Northern Hemisphere. This synthesis

405 therefore highlights a massive lack of studies in the South Hemisphere in general, and in Africa in particular. As these regions of the world have been undergoing major anthropogenic changes and pressures since the mid-20th century, this should be further explored and investigated through the analysis of sediment cores. The achievement of more studies in the Southern Hemisphere will contribute to improve our knowledge of nuclear fallout-related events in the southern half of the world where no consensus has been reached at this stage regarding the attribution

410 of a single year to the ^{137}Cs fallout peak.

Finally, the current meta-analysis suggests the potential occurrence of errors in peak attributions in certain regions of the world. To avoid any dating and subsequent interpretation errors in the reconstructions (e.g. contamination) based on the analysis of these archives, we strongly recommend the analysis of complementary tracers that may discriminate ^{137}Cs sources unambiguously.

415 **5. Conclusions**

A unique meta-analysis of the sediment core dating research using radionuclides was conducted for the 1977–2020 period. This literature overview provides a worldwide referential to help the scientific community reaching a

consensus for dating recent sedimentary archives by identifying the ^{137}Cs peak(s) that may be found in various regions and environments across the globe. This study documents the occurrence of three main sources of ^{137}Cs that are the most widely detected in sediment cores (nuclear weapon tests, Chernobyl and Fukushima accidents), as well as 24 additional local releases of ^{137}Cs, which have been synthetized here. The correct attribution of these sources may improve the establishment of core chronology or the validation of ^{210}Pb$_{xs}$ age models. Nevertheless, this meta-analysis outlines the complexity to discriminate between some of these ^{137}Cs sources and the necessity to use additional tools such as plutonium and caesium isotopic ratios to provide an unambiguous distinction between potential sources and avoid any dating errors. This review also highlights the low proportion of paleo-reconstructions conducted in the Southern Hemisphere in general, and in Africa and Oceania in particular, compared to what has been published for the Northern Hemisphere. It also underlines the necessity to improve the identification of the maximal period of ^{137}Cs emissions after the thermonuclear tests in the Southern Hemisphere by collecting a larger number of sediment archives across wider areas.

Overall, this meta-analysis demonstrates the effectiveness of using the ^{137}Cs and ^{210}Pb$_{xs}$ activities for dating sediment cores and reconstructing environmental changes and their impacts over the 20th century. In the future, authors are encouraged to share their data including the radionuclide activities measured in the successive sediment layers and the associated metadata in their publications.

Data availability

Data are available on the PANGAEA repository at https://doi.pangaea.de/10.1594/PANGAEA.931493 (Foucher et al., 2021)

Author contribution

A.F and O.E contributed to the data set compilation. A.F, PA.C, P.S and O.E participated to the results discussion and drafted the main manuscript.

Competing interest

The authors declare that they have no conflict of interest

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References

Alric, B., Jenny, J. P., Berthon, V., Arnaud, F., Pignol, C., Reyss, J. L., Sabatier, P. and Perga, M. E.: Local
forcings affect lake zooplankton vulnerability and response to climate warming, Ecology, doi:10.1890/12-
450 1903.1, 2013.

Appleby, P. G.: Tracking Environmental Change Using Lake Sediments. Volume 1: Basin Analysis, Coring, and
Chronological Techniques., 2001.

Appleby, P. G. and Oldfield, F.: The calculation of lead-210 dates assuming a constant rate of supply of
unsupported210Pb to the sediment, Catena, 5(1), 1–8, doi:10.1016/S0341-8162(78)80002-2, 1978.

455 Appleby, P. G., Richardson, N. and Nolan, P. J.: 241Am dating of lake sediments, Hydrobiologia,
doi:10.1007/BF00050929, 1991.

Arnaud, F., Magand, O., Chapron, E., Bertrand, S., Boës, X., Charlet, F. and Mélières, M. A.: Radionuclide
dating (210Pb, 137Cs, 241Am) of recent lake sediments in a highly active geodynamic setting (Lakes Puyehue
and Icalma-Chilean Lake District), Sci. Total Environ., doi:10.1016/j.scitotenv.2005.08.013, 2006.

460 Bai, Z. G., Wan, G. J., Huang, R. G. and Liu, T. S.: A comparison on the accumulation characteristics of 7Be
and 137Cs in lake sediments and surface soils in western Yunnan and central Guizhou, China, Catena, 49(3),
253–270, doi:10.1016/S0341-8162(02)00004-8, 2002.

Beasley, T. M. and Jennings, C. D.: The inventories of plutonium-239, -240, americium-241, cesium-137, and
cobalt-60 in Columbia River sediments from Hanford to the Columbia River Estuary, Environ. Sci. Technol.,
465 18(3), 207–212, doi:10.1021/es00121a014, 1984.

Benninger, L. K., Suayah, I. B. and Stanley, D. J.: Manzala lagoon, Nile delta, Egypt: Modern sediment
accumulation based on radioactive tracers, Environ. Geol., doi:10.1007/s002540050270, 1998.

Binford, M. W.: Calculation and uncertainty analysis of 210Pb dates for PIRLA project lake sediment cores, J.
Paleolimnol., doi:10.1007/BF00219461, 1990.

470 Black, E. E. and Buesseler, K. O.: Spatial variability and the fate of cesium in coastal sediments near Fukushima,
Japan, Biogeosciences, 11(18), 5123–5137, doi:10.5194/bg-11-5123-2014, 2014.

Boardman, J. and Foster, I. D. L.: The potential significance of the breaching of small farm dams in the
Sneeuberg region, South Africa, J. Soils Sediments, 11(8), 1456–1465, doi:10.1007/s11368-011-0425-5, 2011.

Bopp, R. F., Simpson, H. J., Olsen, C. R., Trier, R. M. and Kostyk, N.: Chlorinated hydrocarbons and
475 radionuclide chronologies in sediments of the Hudson River and estuary, New York, Environ. Sci. Technol.,
16(10), 666–676, doi:10.1021/es00104a008, 1982.

Bruel, R. and Sabatier, P.: serac: an R package for ShortlivEd RAdionuclide chronology of recent sediment
cores, J. Environ. Radioact., 225, 106449, doi:10.1016/j.jenvrad.2020.106449, 2020.

Bu, W., Ni, Y., Guo, Q., Zheng, J. and Uchida, S.: Pu isotopes in soils collected downwind from Lop Nor:
480 Regional fallout vs. global fallout, Sci. Rep., doi:10.1038/srep12262, 2015.

Caballero, M., Mora, L., Muñoz, E., Escolero, O., Bonifaz, R., Ruiz, C. and Prado, B.: Anthropogenic influence
on the sediment chemistry and diatom assemblages of Balamtetik Lake, Chiapas, Mexico, Environ. Sci. Pollut.
Res., 27(14), 15935–15943, doi:10.1007/s11356-019-04581-9, 2020.

Cao, L., Ishii, N., Zheng, J., Kagami, M., Pan, S., Tagami, K. and Uchida, S.: Vertical distributions of Pu and
485 radiocesium isotopes in sediments from Lake Inba after the Fukushima Daiichi Nuclear Power Plant accident:
Source identification and accumulation, Appl. Geochemistry, 78, 287–294,
doi:10.1016/j.apgeochem.2017.01.012, 2017.

Chen, B., Zheng, Z., Huang, K., Zheng, Y., Zhang, G., Zhang, Q. and Huang, X.: Radionuclide dating of recent
sediment and the validation of pollen-environment reconstruction in a small watershed reservoir in southeastern
490   China, Catena, 115, 29–38, doi:10.1016/j.catena.2013.11.010, 2014.

Christ, A. J., Talaia-Murray, M., Elking, N., Domack, E. W., Leventer, A., Lavoie, C., Brachfeld, S., Yoo, K. C.,
Gilbert, R., Jeong, S. M., Petrushak, S., Wellner, J., Balco, G., Brachfeld, S., de Batist, M., Domack, E., Gordon,
A., Haran, A., Henriet, J. P., Huber, B., Ishman, S., Jeong, S., King, M., Lavoie, C., Leventer, A., McCormick,
M., Mosley-Thompson, E., Pettit, E., Scambos, T., Smith, C., Thompson, L., Truffer, M., van Dover, C., Vernet,
495   M., Wellner, J., Yu, K. and Zagorodnov, V.: Late Holocene glacial advance and ice shelf growth in Barilari Bay,
Graham Land, West Antarctic Peninsula, Bull. Geol. Soc. Am., 127(1–2), 297–315, doi:10.1130/B31035.1,
2015.

Corcoran, M., Sherif, M. I., Smalley, C., Li, A., Rockne, K. J., Giesy, J. P. and Sturchio, N. C.: Accumulation
rates, focusing factors, and chronologies from depth profiles of 210Pb and 137Cs in sediments of the Laurentian
500   Great Lakes, J. Great Lakes Res., 44(4), 693–704, doi:10.1016/j.jglr.2018.05.013, 2018.

Courtney Mustaphi, C. J., Brahney, J., Aquino-López, M. A., Goring, S., Orton, K., Noronha, A., Czaplewski, J.,
Asena, Q., Paton, S. and Panga Brushworth, J.: Guidelines for reporting and archiving 210Pb sediment
chronologies to improve fidelity and extend data lifecycle, Quat. Geochronol.,
doi:10.1016/j.quageo.2019.04.003, 2019.

505   Dearing, J. A. and Jones, R. T.: Coupling temporal and spatial dimensions of global sediment flux through lake
and marine sediment records, Glob. Planet. Change, 39(1–2), 147–168, doi:http://dx.doi.org/10.1016/S0921-
8181(03)00022-5, 2003.

Delaval, A., Duffa, C. and Radakovitch, O.: A review on cesium desorption at the freshwater-seawater interface,
J. Environ. Radioact., 218, 106255, doi:10.1016/j.jenvrad.2020.106255, 2020.

510   Eades, L. J., Farmer, J. G., MacKenzie, A. B., Kirika, A. and Bailey-Watts, A. E.: Stable lead isotopic
characterisation of the historical record of environmental lead contamination in dated freshwater lake sediment
cores from northern and central Scotland, Sci. Total Environ., doi:10.1016/S0048-9697(02)00026-8, 2002.

Elbert, J., Wartenburger, R., von Gunten, L., Urrutia, R., Fischer, D., Fujak, M., Hamann, Y., Greber, N. D. and
Grosjean, M.: Late Holocene air temperature variability reconstructed from the sediments of Laguna Escondida,
515   Patagonia, Chile (45°30'S), Palaeogeogr. Palaeoclimatol. Palaeoecol., 369, 482–492,
doi:10.1016/j.palaeo.2012.11.013, 2013.

Evangeliou, N., Hamburger, T., Talerko, N., Zibtsev, S., Bondar, Y., Stohl, A., Balkanski, Y., Mousseau, T. A.
and Møller, A. P.: Reconstructing the Chernobyl Nuclear Power Plant (CNPP) accident 30 years after. A unique
database of air concentration and deposition measurements over Europe, Environ. Pollut.,
520   doi:10.1016/j.envpol.2016.05.030, 2016.

Evrard, O., Chaboche, P.-A., Ramon, R., Foucher, A. and Laceby, J. P.: A global review of sediment source
fingerprinting research incorporating fallout radiocesium (137Cs), Geomorphology, 362, 107103,
doi:10.1016/j.geomorph.2020.107103, 2020.

Ficetola, G. F., Poulenard, J., Sabatier, P., Messager, E., Gielly, L., Leloup, A., Etienne, D., Bakke, J., Malet, E.,
525   Fanget, B., Støren, E., Reyss, J.-L., Taberlet, P. and Arnaud, F.: DNA from lake sediments reveals long-term
ecosystem changes after a biological invasion, Sci. Adv., 4(5), eaar4292, doi:10.1126/sciadv.aar4292, 2018.

Foster, I. D. L., Boardman, J., Keay-Bright, J. and Meadows, M. E.: Land degradation and sediment dynamics in

the South African Karoo, in IAHS-AISH Publication., 2005.

530   Foucher, A., Evrard, O., Chabert, C., Cerdan, O., Lefèvre, I., Vandromme, R. and Salvador-Blanes, S.: Erosional response to land abandonment in rural areas of Western Europe during the Anthropocene: A case study in the Massif-Central, France, Agric. Ecosyst. Environ., 284, doi:10.1016/j.agee.2019.106582, 2019.

Foucher, A., Chaboche, P.-A., Sabatier, P. and Evrard, O.: Global review of 137Cs and 210Pbxs fallout used for dating sediment cores, PANGAEA, doi:10.1594/PANGAEA.931493, 2021.

Goldberg, E. .: Proceeding of a symposium on radioactive dating, in Geochronology with Pb-210., 1963.

535   Gu, J., Chen, Z. and Salem, A.: Post-Aswan dam sedimentation rate of lagoons of the Nile Delta, Egypt, Environ. Earth Sci., doi:10.1007/s12665-011-0983-2, 2011.

Guevara, S. R. and Arribére, M.: Comment on the article "Radionuclide dating (Pb-210, Cs-137, Am-241) of recent lake sediments in a highly active geodynamic setting (Lakes Puyehue and Icalma-Chilean Lake District)," Sci. Total Environ., doi:10.1016/j.scitotenv.2007.05.006, 2007.

540   Hansen, A. M.: Lake sediment cores as indicators of historical metal(loid) accumulation - A case study in Mexico, Appl. Geochemistry, 27(9), 1745–1752, doi:10.1016/j.apgeochem.2012.02.010, 2012.

He, Q. and Walling, D. E.: Use of fallout Pb-210 measurements to investigate longer-term rates and patterns of overbank sediment deposition on the floodplains of lowland rivers, Earth Surf. Process. Landforms, doi:10.1002/(SICI)1096-9837(199602)21:2<141::AID-ESP572>3.0.CO;2-9, 1996.

545   He, Q. and Walling, D. E.: The distribution of fallout Cs-137 and Pb-210 in undisturbed and cultivated soils, Appl. Radiat. Isot., 1997.

Hosono, T., Alvarez, K. and Kuwae, M.: Lead isotope ratios in six lake sediment cores from Japan Archipelago: Historical record of trans-boundary pollution sources, Sci. Total Environ., 559, 24–37, doi:10.1016/j.scitotenv.2016.03.138, 2016.

550   Huang, Y., Tims, S. G., Froehlich, M. B., Pan, S., Fifield, L. K., Pavetich, S. and Koll, D.: The 240Pu/239Pu atom ratio in Chinese soils, Sci. Total Environ., 678, 603–610, doi:10.1016/j.scitotenv.2019.04.251, 2019.

Jaegler, H., Pointurier, F., Diez-Fernández, S., Gourgiotis, A., Isnard, H., Hayashi, S., Tsuji, H., Onda, Y., Hubert, A., Laceby, J. P. and Evrard, O.: Reconstruction of uranium and plutonium isotopic signatures in sediment accumulated in the Mano Dam reservoir, Japan, before and after the Fukushima nuclear accident,

555   Chemosphere, doi:10.1016/j.chemosphere.2019.03.064, 2019.

Jagercikova, M., Cornu, S., Le Bas, C. and Evrard, O.: Vertical distributions of 137Cs in soils: a meta-analysis, J. Soils Sediments, doi:10.1007/s11368-014-0982-5, 2014.

Kastner, S., Enters, D., Ohlendorf, C., Haberzettl, T., Kuhn, G., Lücke, A., Mayr, C., Reyss, J. L., Wastegård, S. and Zolitschka, B.: Reconstructing 2000years of hydrological variation derived from laminated proglacial

560   sediments of Lago del Desierto at the eastern margin of the South Patagonian Ice Field, Argentina, Glob. Planet. Change, 72(3), 201–214, doi:10.1016/j.gloplacha.2010.04.007, 2010.

Klaminder, J., Appleby, P., Crook, P. and Renberg, I.: Post-deposition diffusion of 137Cs in lake sediment: Implications for radiocaesium dating, Sedimentology, doi:10.1111/j.1365-3091.2012.01343.x, 2012.

Klubi, E., Abril, J. M., Nyarko, E., Laissaoui, A. and Benmansour, M.: Radioecological assessment and

565   radiometric dating of sediment cores from dynamic sedimentary systems of Pra and Volta estuaries (Ghana) along the Equatorial Atlantic, J. Environ. Radioact., doi:10.1016/j.jenvrad.2017.08.001, 2017.

Krishnaswamy, S., Lal, D., Martin, J. M. and Meybeck, M.: Geochronology of lake sediments, Earth Planet. Sci.

Lett., doi:10.1016/0012-821X(71)90202-0, 1971.

Larsen, J., Appleby, P. G., Christensen, G. N., Berg, T. and Eide, I.: Historical and geographical trends in

570   sediment chronology from lakes and marine sites along the Norwegian Coast, Water. Air. Soil Pollut.,

doi:10.1007/s11270-009-0099-4, 2010.

Lewis, G. P., Taylor, B. E., Pinder, J. E. and Dixon, P. M.: Apparent decline of the sediment 137Cs inventory of

an abandoned reactor cooling reservoir: Export or uncertainty?, J. Environ. Radioact., 49(3), 293–306,

doi:10.1016/S0265-931X(99)00127-7, 2000.

575   LU, X. and MATSUMOTO, E.: Implications of excess 210Pb and 137Cs in sediment cores from Mikawa Bay,

Japan, J. Environ. Sci., 21(5), 707–712, doi:10.1016/S1001-0742(08)62328-1, 2009.

Madsen, A. T., Murray, A. S., Andersen, T. J., Pejrup, M. and Breuning-Madsen, H.: Optically stimulated

luminescence dating of young estuarine sediments: a comparison with 210Pb and 137Cs dating, Mar. Geol.,

214(1–3), 251–268, doi:10.1016/j.margeo.2004.10.034, 2005.

580   Mahara, Y. and Kudo, A.: Plutonium released by the Nagasaki A-bomb: Mobility in the environment, Appl.

Radiat. Isot., doi:10.1016/0969-8043(95)00161-6, 1995.

Mahu, E., Nyarko, E., Hulme, S., Swarzenski, P., Asiedu, D. K. and Coale, K. H.: Geochronology and historical

deposition of trace metals in three tropical estuaries in the Gulf of Guinea, Estuar. Coast. Shelf Sci., 177, 31–40,

doi:10.1016/j.ecss.2016.05.007, 2016.

585   Matter, M., Anselmetti, F. S., Jordanoska, B., Wagner, B., Wessels, M. and Wüest, A.: Carbonate sedimentation

and effects of eutrophication observed at the Kališta subaquatic springs in Lake Ohrid (Macedonia),

Biogeosciences, doi:10.5194/bg-7-3755-2010, 2010.

McLean, R. I. and Summers, J. K.: Evaluation of transport and storage of 60Co, 134Cs, 137Cs and 65Zn by river

sediments in the lower susquehanna river, Environ. Pollut., 63(2), 137–153, doi:10.1016/0269-7491(90)90064-J,

590   1990.

Méndez-García, C., Renteria-Villalobos, M., García-Tenorio, R. and Montero-Cabrera, M. E.: Uranium series

isotopes concentration in sediments at San Marcos and Luis L. Leon reservoirs, Chihuahua, Mexico, ,

1607(February), 83–92, doi:10.1063/1.4890707, 2014.

Van Metre, P., Wilson, J., Fuller, C., Callender, E. and Mahler, B.: Collection, Analysis, and Age-Dating of

595   Sediment Cores From 56 U.S. Lakes and Reservoirs Sampled by the U.S. Geological Survey, 1992–2001, U.S.

Geol. Surv. Sci. Investig. Rep. 2004–5184, 2004.

Meusburger, K., Evrard, O., Alewell, C., Borrelli, P., Cinelli, G., Ketterer, M., Mabit, L., Panagos, P., van Oost,

K. and Ballabio, C.: Plutonium aided reconstruction of caesium atmospheric fallout in European topsoils, Sci.

Rep., doi:10.1038/s41598-020-68736-2, 2020.

600   Miller, K. M. and Heit, M.: A time resolution methodology for assessing the quality of lake sediment cores that

are dated by 137Cs, Limnol. Oceanogr., doi:10.4319/lo.1986.31.6.1292, 1986.

Minoura, K., Yamada, T., Hirano, S. ichi and Sugihara, S.: Movement of radiocaesium fallout released by the

2011 Fukushima nuclear accident, Nat. Hazards, 73(3), 1843–1862, doi:10.1007/s11069-014-1171-y, 2014.

PENNINGTON, W., CAMBRAY, R. S., EAKINS, J. D. and HARKNESS, D. D.: Radionuclide dating of the

605   recent sediments of Blelham Tarn, Freshw. Biol., doi:10.1111/j.1365-2427.1976.tb01617.x, 1976.

Perner, K., Leipe, T., Dellwig, O., Kuijpers, A., Mikkelsen, N., Andersen, T. J. and Harff, J.: Contamination of

arctic Fjord sediments by Pb-Zn mining at Maarmorilik in central West Greenland, Mar. Pollut. Bull.,

doi:10.1016/j.marpolbul.2010.01.019, 2010.

Robbins, J. A. and Herche, L. R.: Models and uncertainty in 210 Pb dating of sediments , SIL Proceedings,
610   1922-2010, doi:10.1080/03680770.1992.11900096, 1993.

Sabatier, P., Poulenard, J., Fanget, B., Reyss, J.-L., Develle, A.-L., Wilhelm, B., Ployon, E., Pignol, C.,
Naffrechoux, E., Dorioz, J.-M., Montuelle, B. and Arnaud, F.: Long-term relationships among pesticide
applications, mobility, and soil erosion in a vineyard watershed, Proc. Natl. Acad. Sci. , 111(44), 15647–15652,
doi:10.1073/pnas.1411512111, 2014.

615   Sanchez-Cabeza, J. A. and Ruiz-Fernández, A. C.: 210Pb sediment radiochronology: An integrated formulation
and classification of dating models, Geochim. Cosmochim. Acta, doi:10.1016/j.gca.2010.12.024, 2012.

Sanchez-Cabeza, J. A., Ani-Ragolta, I. and Masqué, P.: Some considerations of the 210Pb constant rate of
supply (CRS) dating model, Limnol. Oceanogr., doi:10.4319/lo.2000.45.4.0990, 2000.

Sanders, C. J., Santos, I. R., Patchineelam, S. R., Schaefer, C. and Silva-Filho, E. V.: Recent 137Cs deposition in
620   sediments of Admiralty Bay, Antarctica, J. Environ. Radioact., doi:10.1016/j.jenvrad.2010.02.006, 2010.

Schindler, M. and Kamber, B. S.: High-resolution lake sediment reconstruction of industrial impact in a world-
class mining and smelting center, Sudbury, Ontario, Canada, Appl. Geochemistry, 37, 102–116,
doi:10.1016/j.apgeochem.2013.07.014, 2013.

Sobocinski, R. W.: Sediment transport in a small stream based on 137 Cs inventories of the bedload fraction,
625   Water Resour. Res., 26(6), 1177–1187, doi:10.1029/90WR00239, 1990.

Sun, Q., Liu, D., Liu, T., Di, B. and Wu, F.: Temporal and spatial distribution of trace metals in sediments from
the northern Yellow Sea coast, China: Implications for regional anthropogenic processes, Environ. Earth Sci.,
doi:10.1007/s12665-011-1277-4, 2012.

Swales, A., Williamson, R. B., Van Dam, L. F., Stroud, M. J. and McGlone, M. S.: Reconstruction of urban
630   stormwater contamination of an estuary using catchment history and sediment profile dating, Estuaries,
doi:10.1007/BF02696048, 2002.

Syvitski, J., Waters, C. N., Day, J., Milliman, J. D., Summerhayes, C., Steffen, W., Zalasiewicz, J., Cearreta, A.,
Gałuszka, A., Hajdas, I., Head, M. J., Leinfelder, R., McNeill, J. R., Poirier, C., Rose, N. L., Shotyk, W.,
Wagreich, M. and Williams, M.: Extraordinary human energy consumption and resultant geological impacts
635   beginning around 1950 CE initiated the proposed Anthropocene Epoch, Commun. Earth Environ.,
doi:10.1038/s43247-020-00029-y, 2020.

UNSCEAR: Sources and Effects of Ionizing Radiation, United Nations Scientific Committee on the Effects of
Atomic Radiation UNSCEAR 2000 Report to the General Assembly, with Scientific Annexes., 2000.

Urrutia, R., Araneda, A., Cruces, F., Torres, L., Chirinos, L., Treutler, H. C., Fagel, N., Bertrand, S., Alvial, I.,
640   Barra, R. and Chapron, E.: Changes in diatom, pollen, and chironomid assemblages in response to a recent
volcanic event in Lake Galletué (Chilean Andes), Limnologica, doi:10.1016/j.limno.2006.09.003, 2007.

Wang, X., Yang, H., Gu, Z., Zhang, M. and Yang, B.: A century of change in sediment accumulation and trophic
status in Lake Fuxian, a deep plateau lake of Southwestern China, J. Soils Sediments, doi:10.1007/s11368-017-
1871-5, 2018.

645   Wilkinson, M. D., Dumontier, M., Aalbersberg, Ij. J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten,
J.-W., da Silva Santos, L. B., Bourne, P. E., Bouwman, J., Brookes, A. J., Clark, T., Crosas, M., Dillo, I.,
Dumon, O., Edmunds, S., Evelo, C. T., Finkers, R., Gonzalez-Beltran, A., Gray, A. J. G., Groth, P., Goble, C.,

Grethe, J. S., Heringa, J., 't Hoen, P. A. ., Hooft, R., Kuhn, T., Kok, R., Kok, J., Lusher, S. J., Martone, M. E.,
Mons, A., Packer, A. L., Persson, B., Rocca-Serra, P., Roos, M., van Schaik, R., Sansone, S.-A., Schultes, E.,
650   Sengstag, T., Slater, T., Strawn, G., Swertz, M. A., Thompson, M., van der Lei, J., van Mulligen, E., Velterop, J.,
Waagmeester, A., Wittenburg, P., Wolstencroft, K., Zhao, J. and Mons, B.: The FAIR Guiding Principles for
scientific data management and stewardship, Sci. Data, 3(1), 160018, doi:10.1038/sdata.2016.18, 2016.
Wu, X., Bi, N., Kanai, Y., Saito, Y., Zhang, Y., Yang, Z., Fan, D. and Wang, H.: Sedimentary records off the
modern Huanghe (Yellow River) delta and their response to deltaic river channel shifts over the last 200 years, J.
655   Asian Earth Sci., doi:10.1016/j.jseaes.2015.04.028, 2015.
Xia, X., Wu, Q., Zhu, B., Zhao, P., Zhang, S. and Yang, L.: Analyzing the contribution of climate change to
long-term variations in sediment nitrogen sources for reservoirs/lakes, Sci. Total Environ., 523, 64–73,
doi:10.1016/j.scitotenv.2015.03.140, 2015.
ZENG, H. A. and WU, J. L.: Sedimentary Records of Heavy Metal Pollution in Fuxian Lake, Yunnan Province,
660   China: Intensity, History, and Sources, Pedosphere, 19(5), 562–569, doi:10.1016/S1002-0160(09)60150-8, 2009.
Zhang, H., Shan, B., Ao, L., Tang, W. and Wen, S.: Past atmospheric trace metal deposition in a remote lake
(Lake Ngoring) at the headwater areas of Yellow River, Tibetan Plateau, Environ. Earth Sci., 72(2), 399–406,
doi:10.1007/s12665-013-2960-4, 2014.
Zhao, X., Qiao, J. and Hou, X.: Plutonium isotopes in Northern Xinjiang, China: Level, distribution, sources and
665   their contributions, Environ. Pollut., 265, 114929, doi:10.1016/j.envpol.2020.114929, 2020.
Zhu, L., Xu, C., Hou, X., Qiao, J., Zhao, Y. and Liu, G.: Determination of Ultratrace Level 135Cs and
135Cs/137Cs Ratio in Small Volume Seawater by Chemical Separation and Thermal Ionization Mass
Spectrometry, Anal. Chem., doi:10.1021/acs.analchem.0c00688, 2020.

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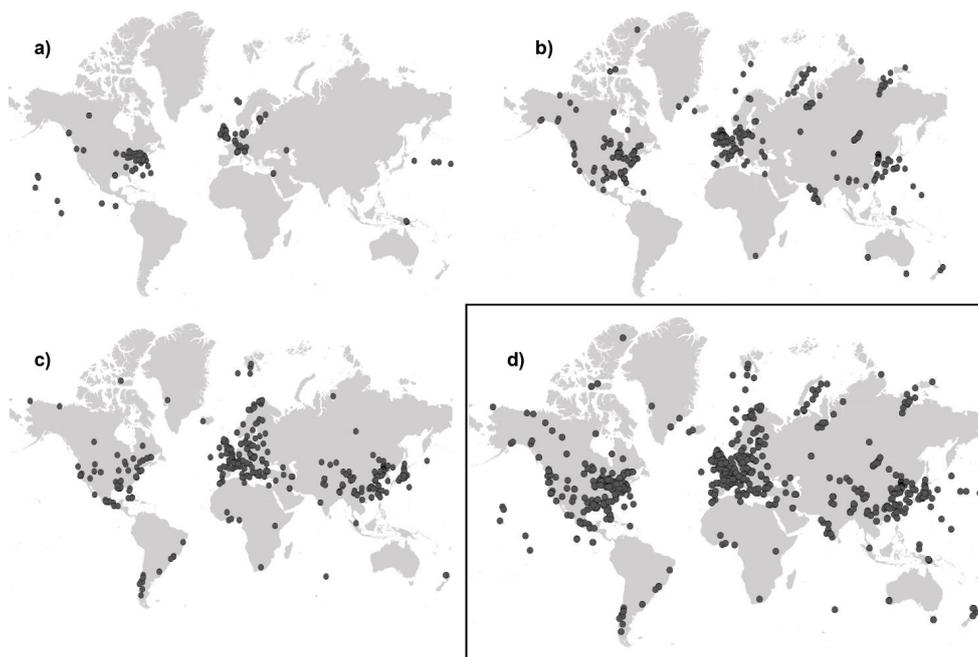
Fig. 1 - Location of the sediment cores included in the database. A) Sediment cores described in articles published between 1977 and 1990, B) between 1990 and 2005 and C) between 2005 and 2020. D) Full database of sediment cores compiled in the current research.

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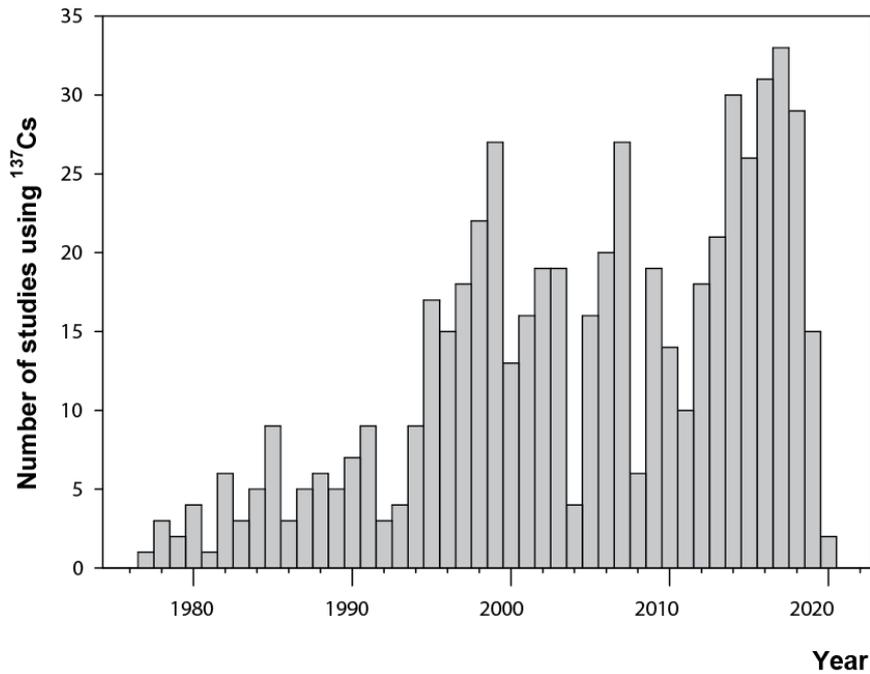
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Fig. 2 - Evolution of the number of studies using ¹³⁷Cs for dating sediment sequences between 1977 and 2020.

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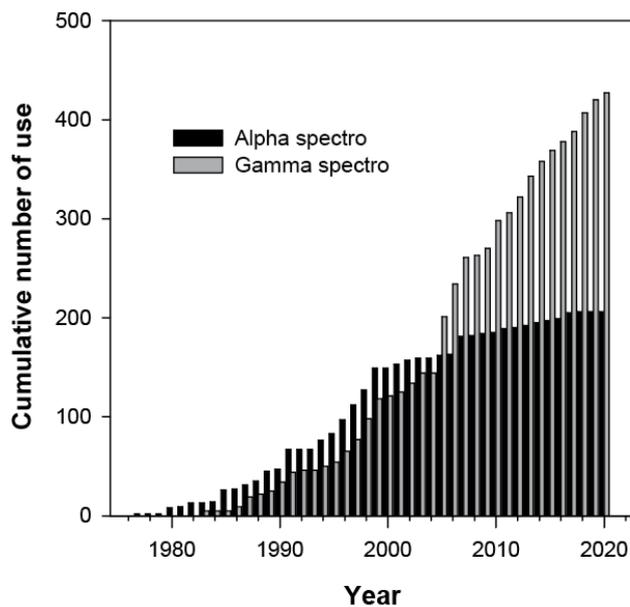
Fig. 3 - Evolution of the cumulative number of studies using alpha spectrometry and gamma spectrometry for analysing $^{210}Pb_{xs}$ in sediment sequences between 1977 and 2020.

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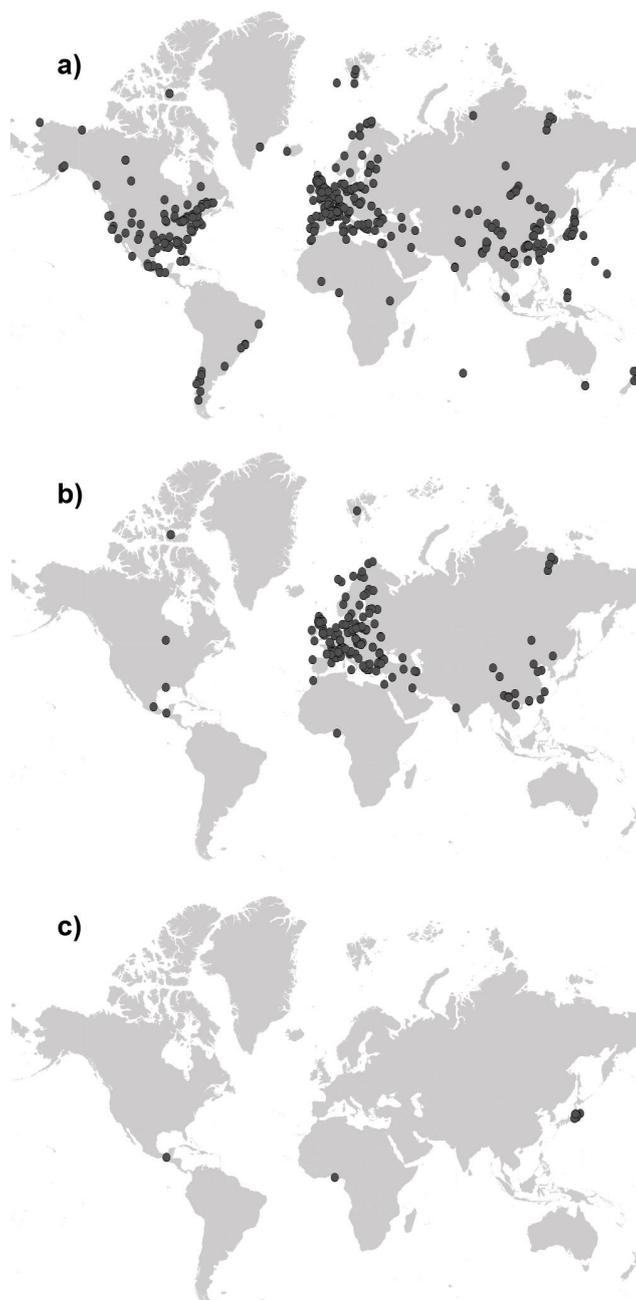


Fig. 4 – Identification of fallout peaks attributed (a) to the atmospheric nuclear tests, (b) the Chernobyl accident and (c) to the Fukushima accident in the sediment cores.

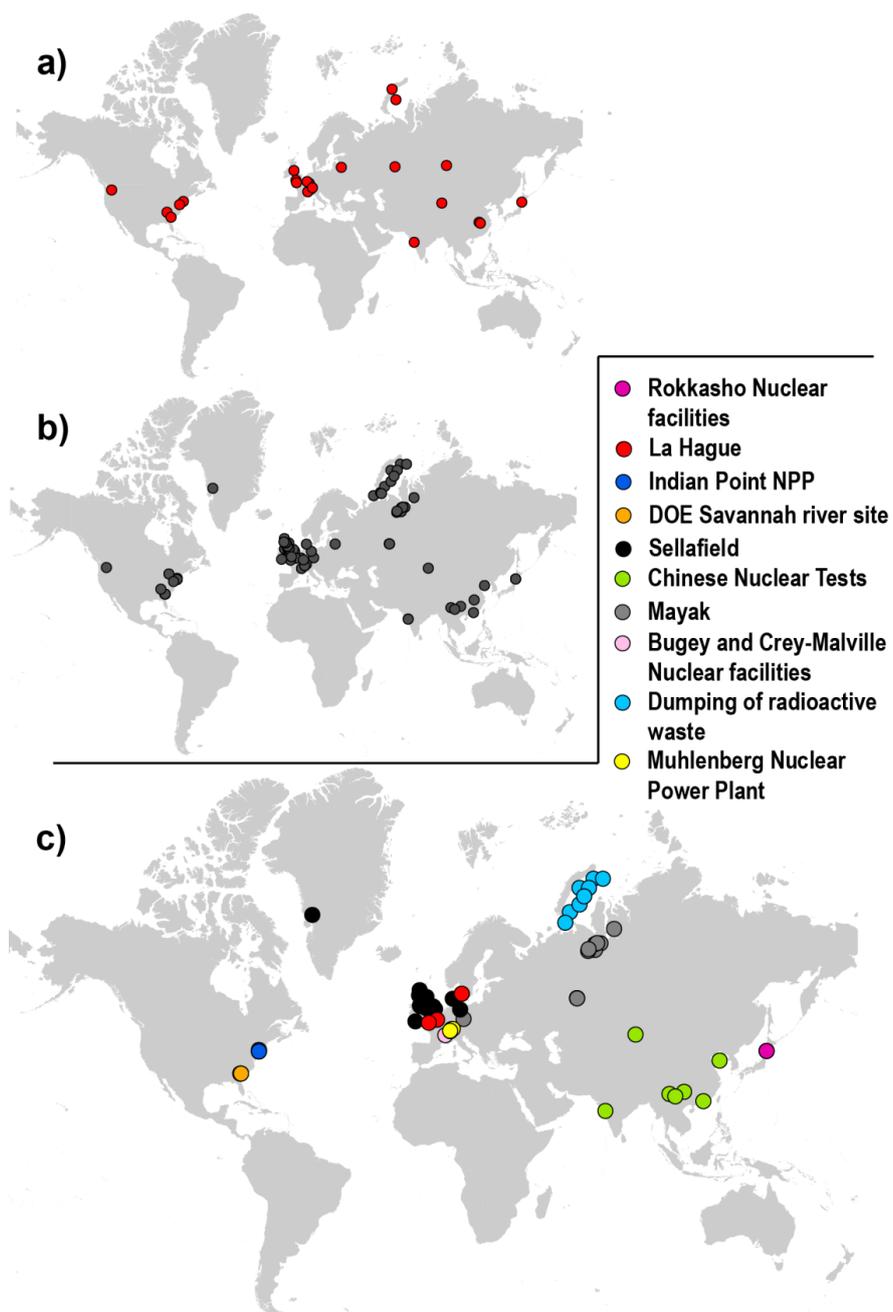



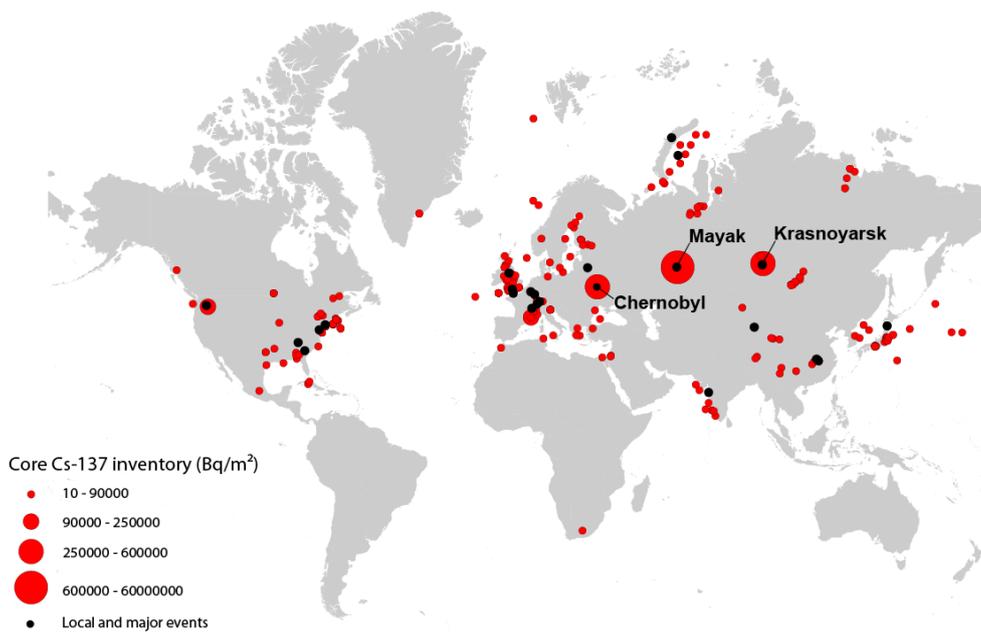
Fig. 5 - ^{137}Cs **activity levels attributed to local radioactive releases (a) local sources identified in the literature (b) releases associated with these events detected in sediment cores (c) some examples of events attribution detected in sediment cores**

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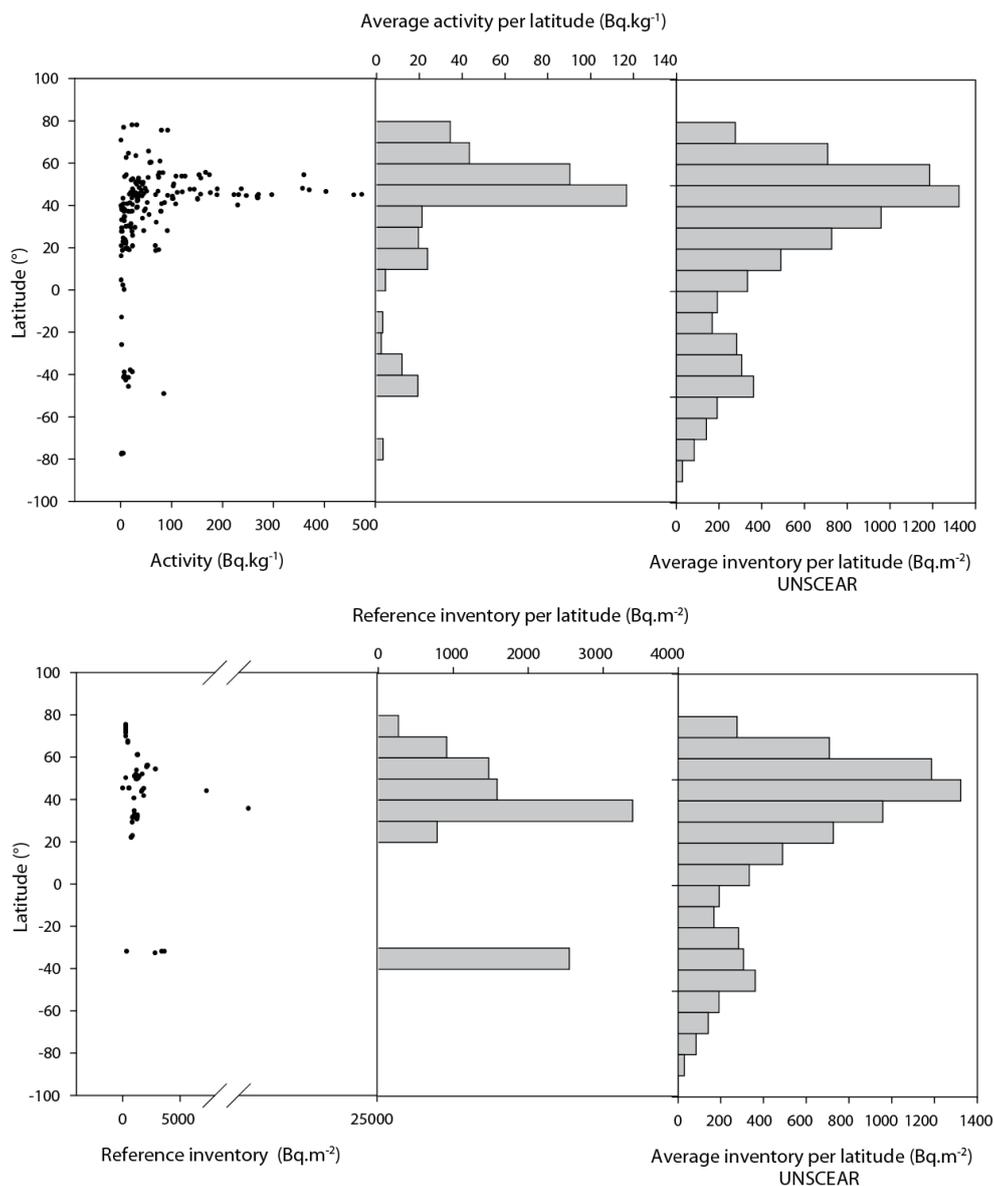
Fig. 6 - ¹³⁷Cs inventory in the sediment cores covered in the database and location of some of the main sources of ¹³⁷Cs

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Fig. 7 – a) Comparison of latitudinal distribution of ¹³⁷Cs activities associated with the atmospheric nuclear tests. From left to right, individual data collected in sediment cores, average activity per latitude as derived from the current database and average inventory distribution per latitudinal band as derived from the UNSCEAR database. b) Comparison of latitudinal distribution of ¹³⁷Cs baseline inventories. From left to right, individual data collected in

730 **sediment cores, average inventory per latitudinal band provided by the database and the average inventory distribution per latitudinal band as from the UNSCEAR database**

Release event and location	Country of release	Number of detection	Year of attribution
Sellafield (UK)	United Kingdom, Ireland, Sweden, Denmark, Germany	43	1957, 1974, 1975, 1981, 1985
Oak Ridge National Laboratory (USA)	United States of America	1	NA
Mühlenberg nuclear power plant (Switzerland)	Switzerland	4	1976, 1978, 1982
Mayak production association (URSS)	Russia, Czech Republic	12	1949, 1957
Bugey and Crey-Malville nuclear facilities (France)	France	4	NA
Chinese Nuclear Tests (China)	China, India	8	1974, 1975, 1976, 1986
DoE Savannah River Site (USA)	United States of America	3	1964
Dumping of Radioactive Waste (Russia)	Russia	8	1955, 1957
Indian Point NPP (USA)	United States of America	5	1970-1975
Cattenom NPP (France)	France	1	NA
Hongsha nuclear power plan (China)	China	1	NA
Daye power station (China)	China	1	1996
Hanford plutonium production (USA)	United States of America	1	1944-1970
Atomic Energy Establishment at Winfrith in Dorset (UK)	United Kingdom	1	1975, 1980-81
Krasnoyarsk-26 (URSS)	Russia	4	1958 - 2009
Bhabha Atomic research centre (India)	India	1	NA
Rokkasho nuclear facilities (Japan)	Japan	3	NA
Peach Bottom Atomic Power Station (USA)	United States of America	1	1975 to 1986
La Hague (France)	France, Sweden	3	1970, 1971
Chooz nuclear plant (France)	Belgium	2	1970s
The Ignalina Nuclear Power Plant (Lituania)	Lithuania	1	1984-2010
Bezneau NPP (Switzerland)	Switzerland	1	1971
Underwater nuclear weapons tests conducted at Novaya Zemlya (URSS)	Russia	3	1955, 1957

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Table 1. Details on the local events that were shown to have released radionuclides into the environment (NA = not attributed; NPP = Nuclear Power Plant; DoE = US Department of Energy)

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Appendix A: List of references in the dataset

Ab Razak, I.A., **Li, A.** and **Christensen, E.R.** (1996) Association of PAHs PCBs, 137Cs, and 210Pb with clay, silt, and organic carbon in sediments. In: *Water Science and Technology*, 34, 29–35.

Aba, A., **Uddin, S.**, **Bahbahani, M.** and **Al-Ghadban, A.** (2014) Radiometric dating of sediment records in Kuwait's marine area. *J. Radioanal. Nucl. Chem.*, **301**, 247–255.

Abraham, J.P., **Whicker, F.W.**, **Hinton, T.G.** and **Rowan, D.J.** (2000) Inventory and spatial pattern of 137Cs in a pond: A comparison of two survey methods. *J. Environ. Radioact.*, **51**, 157–171.

Abril, J.M. and **García-León, M.** (1994) The integrated atmospheric flux effect in a radiogeochronological model. *J. Environ. Radioact.*, **24**, 65–79.

Abril, J.M., **San Miguel, E.G.**, **Ruiz-Canovas, C.**, **Casas-Ruiz, M.** and **Bolívar, J.P.** (2018) From floodplain to aquatic sediments: Radiogeochronological fingerprints in a sediment core from the mining impacted Sancho Reservoir (SW Spain). *Sci. Total Environ.*, **631**–**632**, 866–878.

Affouri, A., **Dezileau, L.** and **Kallel, N.** (2017) Extreme flood event reconstruction spanning the last century in the El Bibane Lagoon (southeastern Tunisia): a multi-proxy approach. *Clim. Past*, **13**, 711–727.

Alabdullah, J., **Michel, H.**, **Barci, V.**, **Féraud, G.** and **Barci-Funel, G.** (2013) Spatial and vertical distributions of natural and anthropogenic radionuclides and cesium fractionation in sediments of the Var river and its tributaries (southeast France). *J. Radioanal. Nucl. Chem.*, **298**, 25–32.

Albrecht, A., **Reichert, P.**, **Beer, J.** and **Lück, A.** (1995) Evaluation of the importance of reservoir sediments as sinks for reactor-derived radionuclides in riverine systems. *J. Environ. Radioact.*, **28**, 239–269.

Albrecht, A., **Reiser, R.**, **Lück, A.**, **Stoll, J.M.A.** and **Giger, W.** (1998) Radiocesium dating of sediments from lakes and reservoirs of different hydrological regimes. *Environ. Sci. Technol.*, **32**, 1882–1887.

Alexandrin, M.Y., **Darin, A. V.**, **Kalugin, I.A.**, **Dolgova, E.A.**, **Grachev, A.M.** and **Solomina, O.N.** (2018) Annual Sedimentary Record From Lake Donguz-Orun (Central Caucasus) Constrained by High Resolution SR-XRF Analysis and Its Potential for Climate Reconstructions. Front Earth Sci. doi: 10.3389/feart.2018.00158

Alhajji, E., **Ismail, I.M.**, **Al-Masri, M.S.**, **Salman, N.**, **Al-Haleem, M.A.** and **Doubal, A.W.** (2014) Sedimentation rates in the lake Qattinah using 210Pb and 137Cs as geochronometer. *Geochronometria*, **41**, 81–86.

Ali, A.A., **Ghaleb, B.**, **Garneau, M.**, **Asnong, H.** and **Loisel, J.** (2008) Recent peat accumulation rates in minerotrophic peatlands of the Bay James region, Eastern Canada, inferred by 210Pb and 137Cs radiometric techniques. *Appl. Radiat. Isot.*, **66**, 1350–1358.

Alonso-Hernandez, C.M., **Diaz-Asencio, M.**, **Munoz-Caravaca, A.**, **Delfanti, R.**, **Papucci, C.**, **Ferretti, O.** and **Crovato, C.** (2006) Recent changes in sedimentation regime in Cienfuegos Bay, Cuba, as inferred from 210Pb and 137Cs vertical profiles. *Cont. Shelf Res.*, **26**, 153–167.

Alonso-Hernández, C.M., **Garcia-Moya, A.**, **Tolosa, I.**, **Diaz-Asencio, M.**, **Corcho-Alvarado, J.A.**, **Morera-Gomez, Y.** and **Fanelli, E.** (2017) Tracing organic matter sources in a tropical lagoon of the Caribbean Sea. *Cont. Shelf Res.*, **148**, 53–63.

Al-Qasmi, H., **Law, G.T.W.**, **Fifield, L.K.** and **Livens, F.R.** (2016) Origin of artificial radionuclides in soil and sediment from North Wales. *J. Environ. Radioact.*, **151**, 244–249.

785 **Álvarez-Iglesias, P.** and **Rubio, B.** (2009) Geochemistry of marine sediments from inner Ría de Vigo (NW Spain). *J. Radioanal. Nucl. Chem.*, **281**, 247–251.

Álvarez-Iglesias, P., **Quintana, B.**, **Rubio, B.** and **Pérez-Arlucea, M.** (2007) Sedimentation rates and trace metal input history in intertidal sediments from San Simón Bay (Ría de Vigo, NW Spain) derived from 210Pb and 137Cs chronology. *J. Environ. Radioact.*, **98**, 229–250.

790 **Ambers, R.K.R.** (2001) Using the sediment record in a western Oregon flood-control reservoir to assess the influence of storm history and logging on sediment yield. *J. Hydrol.*, **244**, 181–200.

Anderson, N.J. and **Odgaard, B. V.** (1994) Recent palaeolimnology of three shallow Danish lakes. *Hydrobiologia*, **275**–**276**, 411–422.

Andersson, M., **Bogen, J.**, **Ottesen, R.T.** and **Bønsnes, T.E.** (2015) Polychlorinated Biphenyls in Urban Lake
795 Sediments and Migration Potential from Urban Stormwater in Bergen, Norway. *J. Environ. Eng.*, **141**, 04015028.

Andrews, J.E., **Samways, G.** and **Shimmield, G.B.** (2008) Historical storage budgets of organic carbon, nutrient and contaminant elements in saltmarsh sediments: Biogeochemical context for managed realignment, Humber Estuary, UK. *Sci. Total Environ.*, **405**, 1–13.

800 **Angeli, J.L.F.**, **Venturini, N.**, **Ferreira, P.A. de L.** and **Figueira, R.C.L.** (2016) Recent sedimentation rates in the Caravelas estuary (Bahia, Brazil) using unsupported 210Pb and 137Cs modeling. Radiochim Acta. doi: 10.1515/ract-2015-2503

Anisfeld, S.C., **Tobin, M.J.** and **Benoit, G.** (1999) Sedimentation rates in flow-restricted and restored salt marshes in Long Island Sound. *Estuaries*, **22**, 231–244.

805 **Anjum, R.**, **Gao, J.**, **Tang, Q.**, **He, X.**, **Zhang, X.**, **Long, Y.**, **Shi, Z.** and **Wang, M.** (2017) Linking sedimentary total organic carbon to 210Pbex chronology from Changshou Lake in the Three Gorges Reservoir Region, China. *Chemosphere*, **174**, 243–252.

Appleby, P.G. (2004) Environmental change and atmospheric contamination on Svalbard: Sediment chronology. *J. Paleolimnol.*, **31**, 433–443.

810 **Appleby, P.G.**, **Dearing, J.A.** and **Oldfield, F.** (1985) Magnetic studies of erosion in a Scottish lake catchment. 1. Core chronology and correlation. *Limnol. Oceanogr.*, **30**, 1144–1153.

Appleby, P.G., **Flower, R.J.**, **Mackay, A.W.** and **Rose, N.L.** (1998) Paleolimnological assessment of recent environmental change in Lake Baikal: Sediment chronology. *J. Paleolimnol.*, **20**, 119–133.

Appleby, P.G., **Haworth, E.Y.**, **Michel, H.**, **Short, D.B.**, **Laptev, G.** and **Piliposian, G.T.** (2003) The transport
815 and mass balance of fallout radionuclides in Blelham Tarn, Cumbria (UK). J. Paleolimnol. 29:459–473.

Appleby, P.G., **Richardson, N.**, **Nolan, P.J.** and **Oldfield, F.** (1990) Radiometric dating of the United Kingdom SWAP sites. *Philos. Trans. - R. Soc. London, B*, **327**, 233–238.

Arnaud, F., **Magand, O.**, **Chapron, E.**, **Bertrand, S.**, **Boës, X.**, **Charlet, F.** and **Mélières, M.A.** (2006) Radionuclide dating (210Pb, 137Cs, 241Am) of recent lake sediments in a highly active geodynamic
820 setting (Lakes Puyehue and Icalma-Chilean Lake District). *Sci. Total Environ.*, **366**, 837–850.

Ashwood, T.L. and **Olsen, C.R.** (1988) Pearl Harbor bombing attack. A contamination legacy revealed in the sedimentary record. *Mar. Pollut. Bull.*, **19**, 68–71.

Astakhov, A.S., **Dar'in, A. V.**, **Kalugin, I.A.** and **Aksentov, K.I.** (2019) Reconstructing the Frequency of Catastrophic Floods on the Western Coast of the Sea of Japan Based on Sedimentary Proxy. *Russ.*
825 *Meteorol. Hydrol.*, **44**, 62–70.

Aston, S.R. and **Rae, J.E.** (1982) The deposition of windscale radiocaesium in the Wyre estuary and the measurement of sedimentation rates. *Mar. Environ. Res.*, **7**, 83–90.

Audry, S., **Schäfer, J.**, **Blanc, G.** and **Jouanneau, J.M.** (2004) Fifty-year sedimentary record of heavy metal pollution (Cd, Zn, Cu, Pb) in the Lot River reservoirs (France). *Environ. Pollut.*, **132**, 413–426.

830   **Bábek, O.**, **Kielar, O.**, **Lenďáková, Z.**, **Mandlíková, K.**, **Sedláček, J.** and **Tolaszová, J.** (2020) Reservoir deltas and their role in pollutant distribution in valley-type dam reservoirs: Les Království Dam, Elbe River, Czech Republic. Catena. doi: 10.1016/j.catena.2019.104251

Baeza, A., **Guillén, J.**, **Ontalba Salamanca, M.Á.**, **Rodríguez, A.** and **Ager, F.J.** (2009) Radiological and multi-element analysis of sediments from the Proserpina reservoir (Spain) dating from Roman times. *J.*
835   *Environ. Radioact.*, **100**, 866–874.

Bai, Z.G., **Wan, G.J.**, **Huang, R.G.** and **Liu, T.S.** (2002) A comparison on the accumulation characteristics of 7Be and 137Cs in lake sediments and surface soils in western Yunnan and central Guizhou, China. *Catena*, **49**, 253–270.

Bao, K., **Xia, W.**, **Lu, X.** and **Wang, G.** (2010) Recent atmospheric lead deposition recorded in an ombrotrophic
840   peat bog of Great Hinggan Mountains, Northeast China, from 210Pb and 137Cs dating. *J. Environ. Radioact.*, **101**, 773–779.

Bao, K., **Wang, G.**, **Xing, W.** and **Shen, J.** (2015) Accumulation of organic carbon over the past 200 years in alpine peatlands, northeast China. *Environ. Earth Sci.*, **73**, 7489–7503.

Barker, P.A., **Pates, J.M.**, **Payne, R.J.** and **Healey, R.M.** (2005) Changing nutrient levels in Grasmere, English
845   Lake District, during recent centuries. *Freshw. Biol.*, **50**, 1971–1981.

Barlas Şimşek, F. and **Çağatay, M.N.** (2018) Late Holocene high resolution multi-proxy climate and environmental records from Lake Van, eastern Turkey. *Quat. Int.*, **486**, 57–72.

Barra, R., **Cisternas, M.**, **Suarez, C.**, **Araneda, A.**, **Piñones, O.** and **Popp, P.** (2004) PCBs and HCHs in a salt-marsh sediment record from South-Central Chile: Use of tsunami signatures and 137Cs fallout as
850   temporal markers. *Chemosphere*, **55**, 965–972.

Barra, R., **Cisternas, M.**, **Urrutia, R.**, **Pozo, K.**, **Pacheco, P.**, **Parra, O.** and **Focardi, S.** (2001) First report on chlorinated pesticide deposition in a sediment core from a small lake in central Chile. *Chemosphere*, **45**, 749–757.

Barra, R., **Popp, P.**, **Quiroz, R.**, **Treutler, H.C.**, **Araneda, A.**, **Bauer, C.** and **Urrutia, R.** (2006) Polycyclic
855   aromatic hydrocarbons fluxes during the past 50 years observed in dated sediment cores from Andean mountain lakes in central south Chile. In: *Ecotoxicology and Environmental Safety*, 63, 52–60.

Baskaran, M., **Bianchi, T.S.** and **Filley, T.R.** (2017) Inconsistencies between 14C and short-lived radionuclides-based sediment accumulation rates: Effects of long-term remineralization. *J. Environ. Radioact.*, **174**, 10–16.

860   **Baskaran, M.**, **Nix, J.**, **Kuyper, C.** and **Karunakara, N.** (2014) Problems with the dating of sediment core using excess 210Pb in a freshwater system impacted by large scale watershed changes. *J. Environ. Radioact.*, **138**, 355–363.

Battiston, G.A., **Degetto, S.**, **Gerbasi, R.**, **Sbrignadello, G.** and **Tositti, L.** (1988) The use of 210Pb and 137Cs in the study of sediment pollution in the Lagoon of Venice. *Sci. Total Environ.*, **77**, 15–23.

865   **Battiston, G.A.**, **Degetto, S.**, **Gerbasi, R.** and **Sbrignadello, G.** (1989) Determination of sediment composition and chronology as a tool for environmental impact investigations. *Mar. Chem.*, **26**, 91–100.

Baumann, J., Chaumillon, E., Schneider, J.L., Jorissen, F., Sauriau, P.G., Richard, P., Bonnin, J. and Schmidt, S. (2017) Contrasting sediment records of marine submersion events related to wave exposure, Southwest France. *Sediment. Geol.*, **353**, 158–170.

870   Beasley, T.M., Carpenter, R. and Jennings, C.D. (1982) Plutonium, 241Am and 137Cs ratios, inventories and vertical profiles in Washington and Oregon continental shelf sediments. *Geochim. Cosmochim. Acta*, **46**, 1931–1946.

Beasley, T.M. and Jennings, C.D. (1984) Inventories of 239,240pu, 241Am, 137Cs, and 60Co in Columbia River Sediments from Hanford to the Columbia River Estuary. *Environ. Sci. Technol.*, **18**, 207–212.

875   Begy, R.C., Simon, H., Kelemen, S. and Preoteasa, L. (2018) Investigation of sedimentation rates and sediment dynamics in Danube Delta lake system (Romania) by 210Pb dating method. *J. Environ. Radioact.*, **192**, 95–104.

Begy, R.C., Simon, H. and Reizer, E. (2015) Efficiency testing of Red Lake protection dam on Rosu stream by 210Pb method. *J. Radioanal. Nucl. Chem.*, **303**, 2539–2545.

880   Bellucci, L.G., Frignani, M., Cochran, J.K., Albertazzi, S., Zaggia, L., Cecconi, G. and Hopkins, H. (2007) 210Pb and 137Cs as chronometers for salt marsh accretion in the Venice Lagoon - links to flooding frequency and climate change. *J. Environ. Radioact.*, **97**, 85–102.

Bellucci, L.G., Giuliani, S., Romano, S., Albertazzi, S., Mugnai, C. and Frignani, M. (2012) An integrated approach to the assessment of pollutant delivery chronologies to impacted areas: Hg in the augusta bay 885   (Italy). *Environ. Sci. Technol.*, **46**, 2040–2046.

Ben Slimane, A., Raclot, D., Evrard, O., Sanaa, M., Lefèvre, I., Ahmadi, M., Tounsi, M., Rumpel, C., Ben Mammou, A. and Le Bissonnais, Y. (2013) Fingerprinting sediment sources in the outlet reservoir of a hilly cultivated catchment in Tunisia. *J. Soils Sediments*, **13**, 801–815.

Benmoussa, T., Amrouni, O., Dezileau, L., Mahé, G. and Abdeljaouad, S. (2018) The sedimentological 890   changes caused by human impact at the artificial channel of Medjerda-River (Coastal zone of Medjerda, Tunisia). *Proc. Int. Assoc. Hydrol. Sci.*, **377**, 77–81.

Bennett, S.J., Cooper, C.M., Ritchie, J.C., Dunbar, J.A., Allen, P.M., Caldwell, L.W. and McGee, T.M. (2002) Assessing sedimentation issues within aging flood control reservoirs in Oklahoma. *J. Am. Water Resour. Assoc.*, **38**, 1307–1322.

895   Benninger, L.K., Suayah, I.B. and Stanley, D.J. (1998) Manzala lagoon, Nile delta, Egypt: Modern sediment accumulation based on radioactive tracers. *Environ. Geol.*, **34**, 183–193.

Benoit, G. and Rozan, T.F. (2001) 210Pb and 137Cs dating methods in lakes: A retrospective study. J. Paleolimnol. 25:455–465.

Benoit, G., Rozan, T.F., Patton, P.C. and Arnold, C.L. (1999) Trace metals and radionuclides reveal sediment 900   sources and accumulation rates in Jordan Cove, Connecticut. *Estuaries*, **22**, 65–80.

Bera, G., Yeager, K.M. and Shiller, A.M. (2018) Whether hurricane Katrina impacted trace metal and dioxin depositional histories in marshes of St. Louis Bay, Mississippi. *Sci. Total Environ.*, **624**, 517–529.

Beurskens, J.E.M., Mol, G.A.J., Barreveld, H.L., van Munster, B. and Winkels, H.J. (1993) Geochronology of priority pollutants in a sedimentation area of the rhine river. *Environ. Toxicol. Chem.*, **12**, 1549–1566.

905   Bigler, C. and Hall, R.I. (2003) Diatoms as quantitative indicators of July temperature: A validation attempt at century-scale with meteorological data from northern Sweden. *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, **189**, 147–160.

Bihari, Á., **Karlik, M.**, **Mîndrescu, M.**, **Szalai, Z.**, **Grădinaru, I.** and **Kern, Z.** (2018) Fallout isotope chronology of the near-surface sediment record of Lake Bolătău. *J. Environ. Radioact.*, **181**, 32–41.

910   **Black, E.E.** and **Buesseler, K.O.** (2014) Spatial variability and the fate of cesium in coastal sediments near Fukushima, Japan. *Biogeosciences*, **11**, 5123–5137.

Boardman, J. and **Foster, I.D.L.** (2011) The potential significance of the breaching of small farm dams in the Sneeuberg region, South Africa. *J. Soils Sediments*, **11**, 1456–1465.

Bol'shiyanov, D.Y., **Bakunov, N.A.** and **Makarov, A.S.** (2014) 137Cs in sediments of deep lakes. *Lithol.*
915   *Miner. Resour.*, **49**, 177–183.

Bonino, G., **Castagnoli, G.C.**, **Callegari, E.** and **Zhu, G.M.** (1993) Radiometric and tephroanalysis dating of recent Ionian Sea cores. *Nuovo Cim. C*, **16**, 155–162.

Bopp, R.F., **Simpson, H.J.**, **Olsen, C.R.**, **Trier, R.M.** and **Kostyk, N.** (1982) Chlorinated Hydrocarbons and Radionuclide Chronologies in Sediments of the Hudson River and Estuary, New York. *Environ. Sci.*
920   *Technol.*, **16**, 666–676.

Borghuis, A.M., **Steenhuisen, F.**, **Brown, J.E.** and **Sickel, M.** (2002) A "weighted" 137Cs inventory calculation of Reservoir 11, Mayak P.A., Russia with the novel use of remotely sensed information and sample data in a GIS. *Sci. Total Environ.*, **291**, 155–165.

Botwe, B.O., **Abril, J.M.**, **Schirone, A.**, **Barsanti, M.**, **Delbono, I.**, **Delfanti, R.**, **Nyarko, E.** and **Lens, P.N.L.**
925   (2017) Settling fluxes and sediment accumulation rates by the combined use of sediment traps and sediment cores in Tema Harbour (Ghana). *Sci. Total Environ.*, **609**, 1114–1125.

Botwe, B.O., **Abril, J.M.**, **Schirone, A.**, **Barsanti, M.**, **Delbono, I.**, **Delfanti, R.**, **Nyarko, E.** and **Lens, P.N.L.**
(2017) Settling fluxes and sediment accumulation rates by the combined use of sediment traps and sediment cores in Tema Harbour (Ghana). *Sci. Total Environ.*, **609**, 1114–1125.

930   **Boyd, B.M.** and **Sommerfield, C.K.** (2016) Marsh accretion and sediment accumulation in a managed tidal wetland complex of Delaware Bay. *Ecol. Eng.*, **92**, 37–46.

Brack, K. and **Stevens, R.L.** (2001) Historical pollution trends in a disturbed, estuarine sedimentary environment, SW Sweden. *Environ. Geol.*, **40**, 1017–1029.

Bravo, A.G., **Loizeau, J.L.**, **Ancey, L.**, **Ungureanu, V.G.** and **Dominik, J.** (2009) Historical record of mercury
935   contamination in sediments from the Babeni Reservoir in the Olt River, Romania. Environ Sci Pollut Res Int. doi: 10.1007/s11356-008-0057-5

Brenner, M., **Whitmore, T.J.** and **Schelske, C.L.** (1996) Paleolimnological evaluation of historical trophic state conditions in hypereutrophic Lake Thonotosassa, Florida, USA. Hydrobiologia 331:143–152.

Brown, J.E., **McDonald, P.**, **Parker, A.** and **Rae, J.E.** (1999) The vertical distribution of radionuclides in a
940   Ribble Estuary saltmarsh: Transport and deposition of radionuclides. *J. Environ. Radioact.*, **43**, 259–275.

Budakoglu, M., **Abdelnasser, A.**, **Karaman, M.** and **Kumral, M.** (2015) The rare earth element geochemistry on surface sediments, shallow cores and lithological units of Lake Acigöl basin, Denizli, Turkey. *J. Asian Earth Sci.*, **111**, 632–662.

Buesseler, K.O. and **Benitez, C.R.** (1994) Determination of mass accumulation rates and sediment radionuclide
945   inventories in the deep Black Sea. *Deep. Res. Part I*, **41**, 1605–1615.

Buesseler, K.O. and **Sholkovitz, E.R.** (1987) The geochemistry of fallout plutonium in the North Atlantic: I. A pore water study in shelf, slope and deep-sea sediments. *Geochim. Cosmochim. Acta*, **51**, 2605–2622.

Buffoni, G., **Schirone, A.** and **Delfanti, R.** (2020) A numerical investigation for dating 210Pbex and 137Cs vertical profiles in a coastal area: The Eastern Ligurian Sea, Italy. J Environ Radioact. doi: 10.1016/j.jenvrad.2019.106122

Bush, B., **Shane, L.A.**, **Wahlen, M.** and **Brown, M.P.** (1987) Sedimentation of 74 PCB congeners in the upper Hudson River. *Chemosphere*, **16**, 733–744.

C. R. Olsen, H. J. Simpson, R.F.B. (1978) A Geochemical Analysis of the Sediments and Sedimentation in the Hudson Estuary. SEPM J Sediment Res. doi: 10.1306/212F7496-2B24-11D7-8648000102C1865D

C., C.-G. and **M., R.** (2001) Using sediment chemistry to determine the impact of treated wastewater discharge on a natural wetland in New Zealand. *Environ. Geol.*, **40**, 1411–1423.

Caballero, M., **Mora, L.**, **Muñoz, E.**, **Escolero, O.**, **Bonifaz, R.**, **Ruiz, C.** and **Prado, B.** (2020) Anthropogenic influence on the sediment chemistry and diatom assemblages of Balamtetik Lake, Chiapas, Mexico. *Environ. Sci. Pollut. Res.*, **27**, 15935–15943.

Callaway, J.C., **DeLaune, R.D.** and **Patrick, W.H.** (1996) Chernobyl 137Cs used to determine sediment accretion rates at selected northern European coastal wetlands. *Limnol. Oceanogr.*, **41**, 444–450.

Callaway, J.C., **Delaune, R.D.** and **Patrick, W.H.** (1998) Heavy metal chronologies in selected coastal wetlands from Northern Europe. *Mar. Pollut. Bull.*, **36**, 82–96.

Canuel, E.A., **Lerberg, E.J.**, **Dickhut, R.M.**, **Kuehl, S.A.**, **Bianchi, T.S.** and **Wakeham, S.G.** (2009) Changes in sediment and organic carbon accumulation in a highly-disturbed ecosystem: The Sacramento-San Joaquin River Delta (California, USA). *Mar. Pollut. Bull.*, **59**, 154–163.

Cao, L., **Ishii, N.**, **Zheng, J.**, **Kagami, M.**, **Pan, S.**, **Tagami, K.** and **Uchida, S.** (2017) Vertical distributions of Pu and radiocesium isotopes in sediments from Lake Inba after the Fukushima Daiichi Nuclear Power Plant accident: Source identification and accumulation. *Appl. Geochemistry*, **78**, 287–294.

Carnero-Bravo, V., **Merino-Ibarra, M.**, **Ruiz-Fernández, A.C.**, **Sanchez-Cabeza, J.A.** and **Ghaleb, B.** (2015) Sedimentary record of water column trophic conditions and sediment carbon fluxes in a tropical water reservoir (Valle de Bravo, Mexico). *Environ. Sci. Pollut. Res.*, **22**, 4680–4694.

Carroll, J., **Williamson, M.**, **Lerche, I.**, **Karabanov, E.** and **Williams, D.F.** (1999) Geochronology of Lake Baikal from 210Pb and 137Cs radioisotopes. *Appl. Radiat. Isot.*, **50**, 1105–1119.

Catallo, W.J., **Schlenker, M.**, **Gambrell, R.P.** and **Shane, B.S.** (1995) Toxic Chemicals and Trace Metals from Urban and Rural Louisiana Lakes: Recent Historical Profiles and Toxicological Significance. *Environ. Sci. Technol.*, **29**, 1436–1445.

Cearreta, A., **Irabien, M.J.**, **Ulibarri, I.**, **Yusta, I.**, **Croudace, I.W.** and **Cundy, A.B.** (2002) Recent salt marsh development and natural regeneration of reclaimed areas in the Plentzia Estuary, n. Spain. *Estuar. Coast. Shelf Sci.*, **54**, 863–886.

Cenci, R., **Muntau, H.** and **Baudo, R.** (1991) Mercury deposition fflstory of pallanza bay, lake maggiore, Italy. *Environ. Technol. (United Kingdom)*, **12**, 705–712.

Chamutiová, T., **Hamerlík, L.**, **Szarlowicz, K.**, **Pipík, R.**, **Starek, D.**, **Šporka, F.**, **Přidalová, M.**, **Sochuliaková, L.** and **Bitušík, P.** (2018) Historical development of three man-made reservoirs in a mining region: A story told by subfossil chironomids. J Limnol. doi: 10.4081/jlimnol.2018.1798

Chanton, J.P., **Martens, C.S.** and **Kipphut, G.W.** (1983) Lead-210 sediment geochronology in a changing coastal environment. *Geochim. Cosmochim. Acta*, **47**, 1791–1804.

Chapron, E., **Faïn, X.**, **Magand, O.**, **Charlet, L.**, **Debret, M.** and **Mélières, M.A.** (2007) Reconstructing recent environmental changes from proglacial lake sediments in the Western Alps (Lake Blanc Huez, 2543 m a.s.l., Grandes Rousses Massif, France). *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, **252**, 586–600.

Charmasson, S., **Radakovitch, O.**, **Arnaud, M.**, **Bouisset, P.** and **Pruchon, A.S.** (1998) Long-core profiles of 137Cs, 134Cs, 60Co and 210Pb in sediment near the Rhone River (northwestern Meiterranean Sea). *Estuaries*, **21**, 367–378.

Chen, B., **Zheng, Z.**, **Huang, K.**, **Zheng, Y.**, **Zhang, G.**, **Zhang, Q.** and **Huang, X.** (2014) Radionuclide dating of recent sediment and the validation of pollen-environment reconstruction in a small watershed reservoir in southeastern China. *Catena*, **115**, 29–38.

Chen, X., **Qiao, Q.**, **McGowan, S.**, **Zeng, L.**, **Stevenson, M.A.**, **Xu, L.**, **Huang, C.**, **Liang, J.** and **Cao, Y.** (2019) Determination of geochronology and sedimentation rates of shallow lakes in the middle Yangtze reaches using 210Pb, 137Cs and spheroidal carbonaceous particles. *Catena*, **174**, 546–556.

Chen, Z., **Salem, A.**, **Xu, Z.** and **Zhang, W.** (2010) Ecological implications of heavy metal concentrations in the sediments of Burullus Lagoon of Nile Delta, Egypt. *Estuar. Coast. Shelf Sci.*, **86**, 491–498.

Chi, K.H., **Luo, S.**, **Kao, S.J.** and **Lee, T.Y.** (2013) Sources and deposition fluxes of PCDD/Fs in a high-mountain lake in central Taiwan. *Chemosphere*, **91**, 150–156.

Chiarenzelli, J.R., **Alexander, C.**, **Isley, A.**, **Scrudato, R.**, **Pagano, J.** and **Ramirez, W.** (2001) Polychlorinated biphenyls in nonaccumulating, century-old sediments: Sources, signatures, and mechanism of introduction. *Environ. Sci. Technol.*, **35**, 2903–2908.

Chiarenzelli, J., **Alexander, C.**, **Scrudato, R.**, **Pagano, J.**, **Falanga, L.**, **Connor, B.** and **Milligan, M.** (2002) Anomalous concentrations and chlorination of polychlorinated biphenyls in sediment downwind of Lake Ontario. *J. Great Lakes Res.*, **28**, 674–687.

Chiba, T., **Endo, K.**, **Sugai, T.**, **Haraguchi, T.**, **Kondo, R.** and **Kubota, J.** (2016) Reconstruction of Lake Balkhash levels and precipitation/evaporation changes during the last 2000 years from fossil diatom assemblages. *Quat. Int.*, **397**, 330–341.

Chmura, G.L. and **Kosters, E.C.** (1994) Storm Deposition and 137Cs Accumulation in Fine-grained Marsh Sediments of the Mississippi Delta Plain. *Estuar. Coast. Shelf Sci.*, **39**, 33–44.

Christ, A.J., **Talaia-Murray, M.**, **Elking, N.**, **Domack, E.W.**, **Leventer, A.**, **Lavoie, C.**, **Brachfeld, S.**, **Yoo, K.C.**, **Gilbert, R.**, **Jeong, S.M.**, **Petrushak, S.**, **Wellner, J.**, **Balco, G.**, **Brachfeld, S.**, **de Batist, M.**, **Domack, E.**, **Gordon, A.**, **Haran, A.**, **Henriet, J.P.**, **Huber, B.**, **Ishman, S.**, **Jeong, S.**, **King, M.**, **Lavoie, C.**, **Leventer, A.**, **McCormick, M.**, **Mosley-Thompson, E.**, **Pettit, E.**, **Scambos, T.**, **Smith, C.**, **Thompson, L.**, **Truffer, M.**, **van Dover, C.**, **Vernet, M.**, **Wellner, J.**, **Yu, K.** and **Zagorodnov, V.** (2015) Late Holocene glacial advance and ice shelf growth in Barilari Bay, Graham Land, West Antarctic Peninsula. *Bull. Geol. Soc. Am.*, **127**, 297–315.

Christensen, E.R. and **Karls, J.F.** (1996) Unmixing of lead, 137Cs, and PAH records in lake sediments using curve fitting with first-and second-order corrections. *Water Res.*, **30**, 2543–2558.

Christensen, E.R. and **Klein, R.J.** (1991) "Unmixing" of 137Cs, Pb, Zn, and Cd Records in Lake Sediments. *Environ. Sci. Technol.*, **25**, 1627–1637.

Cisternas, M., **Araneda, A.**, **Mart�nez, P.** and **P�rez, S.** (2001) Effects of historical land use on sediment yield from a lacustrine watershed in central Chile. *Earth Surf. Process. Landforms*, **26**, 63–76.

Clifton, R.J. and **Hamilton, E.I.** (1982) The application of radioisotopes in the study of estuarine sedimentary processes. *"Estuarine, Coast. Shelf Sci.*, **14**, 433–446.

1030 **Cochran, J.K.**, **Hirschberg, D.J.**, **Wang, J.** and **Dere, C.** (1998) Atmospheric deposition of metals to coastal waters (Long Island Sound, New York U.S.A.): Evidence from saltmarsh deposits. *Estuar. Coast. Shelf Sci.*, **46**, 503–522.

Cochran, J.K. (1985) Particle mixing rates in sediments of the eastern equatorial Pacific: Evidence from 210Pb, 239,240Pu and 137Cs distributions at MANOP sites. *Geochim. Cosmochim. Acta*, **49**, 1195–1210.

1035 **CONNOR, D.**, **HINTON, T.** and **BELL, C.** (1997) Variance partitioning as a guide for sampling and comparing spatial distributions of Hg and 137Cs in sediments. *Sci. Total Environ.*, **206**, 167–176.

Conrad, C.F., **Fugate, D.**, **Daus, J.**, **Chisholm-Brause, C.J.** and **Kuehl, S.A.** (2007) Assessment of the historical trace metal contamination of sediments in the Elizabeth River, Virginia. *Mar. Pollut. Bull.*, **54**, 385–395.

1040 **Corcoran, M.**, **Sherif, M.I.**, **Smalley, C.**, **Li, A.**, **Rockne, K.J.**, **Giesy, J.P.** and **Sturchio, N.C.** (2018) Accumulation rates, focusing factors, and chronologies from depth profiles of 210Pb and 137Cs in sediments of the Laurentian Great Lakes. *J. Great Lakes Res.*, **44**, 693–704.

Covelli, S., **Langone, L.**, **Acquavita, A.**, **Piani, R.** and **Emili, A.** (2012) Historical flux of mercury associated with mining and industrial sources in the Marano and Grado Lagoon (northern Adriatic Sea). *Estuar.*
1045 *Coast. Shelf Sci.*, **113**, 7–19.

Coxon, T.M., **Odhiambo, B.K.** and **Giancarlo, L.C.** (2016) The impact of urban expansion and agricultural legacies on trace metal accumulation in fluvial and lacustrine sediments of the lower Chesapeake Bay basin, USA. *Sci. Total Environ.*, **568**, 402–414.

Cruces, F., **Urrutia, R.**, **Parra, O.**, **Araneda, A.**, **Treutler, H.**, **Bertrand, S.**, **Fagel, N.**, **Torres, L.**, **Barra, R.**
1050 and **Chirinos, L.** (2006) Changes in diatom assemblages in an Andean lake in response to a recent volcanic event. *Arch. fur Hydrobiol.*, **165**, 23–35.

Cuellar-Martinez, T., **Ruiz-Fernández, A.C.**, **Sanchez-Cabeza, J.A.** and **Alonso-Rodríguez, R.** (2017) Sedimentary record of recent climate impacts on an insular coastal lagoon in the Gulf of California. *Quat. Sci. Rev.*, **160**, 138–149.

1055 **Cundy, A.B.**, **Croudace, I.W.**, **Thomson, J.** and **Lewis, J.T.** (1997) Reliability of salt marshes as "geochemical recorders" of pollution input: A case study from contrasting estuaries in southern England. *Environ. Sci. Technol.*, **31**, 1093–1101.

Cundy, A.B., **Croudace, I.W.**, **Warwick, P.E.**, **Oh, J.S.** and **Haslett, S.K.** (2002) Accumulation of COGEMA-La Hague-derived reprocessing wastes in French salt marsh sediments. *Environ. Sci. Technol.*, **36**, 4990–
1060 4997.

Davis, A., **De Curnou, P.** and **Eary, L.E.** (1997) Discriminating between sources of arsenic in the sediments of a tidal waterway, Tacoma, Washington. *Environ. Sci. Technol.*, **31**, 1985–1991.

Dayal, R., **Okubo, A.**, **Duedall, I.W.** and **Ramamoorthy, A.** (1979) Radionuclide redistribution mechanisms at the 2800-m Atlantic nuclear waste disposal site. Deep Sea Res Part A, Oceanogr Res Pap. doi:
1065 10.1016/0198-0149(79)90002-5

De Cort, G., **Verschuren, D.**, **Ryken, E.**, **Wolff, C.**, **Renaut, R.W.**, **Creutz, M.**, **Van der Meeren, T.**, **Haug, G.**, **Olago, D.O.** and **Mees, F.** (2018) Multi-basin depositional framework for moisture-balance reconstruction during the last 1300 years at Lake Bogoria, central Kenya Rift Valley. *Sedimentology*, **65**, 1667–1696.

1070 **de Lima Ferreira, P.A.**, **Siegle, E.**, **Schettini, C.A.F.**, **de Mahiques, M.M.** and **Figueira, R.C.L.** (2015) Statistical validation of the model of diffusion-convection (MDC) of 137Cs for the assessment of recent sedimentation rates in coastal systems. *J. Radioanal. Nucl. Chem.*, **303**, 2059–2071.

Dearing, J.A. (1987) Lake sediments used to quantify the erosional response to land use change in southern Sweden. *Oikos,* **50**, 60–78.

1075   Debret, M., Chapron, E., Desmet, M., Rolland-Revel, M., Magand, O., Trentesaux, A., Bout-Roumazeille, V., Nomade, J. and Arnaud, F. (2010) North western Alps Holocene paleohydrology recorded by flooding activity in Lake Le Bourget, France. *Quat. Sci. Rev.*, **29**, 2185–2200.

Denommee, K.C., Bentley, S.J. and Harazim, D. (2018) Mechanisms of muddy clinothem progradation on the Southwest Louisiana Chenier Plain inner shelf. *Geo-Marine Lett.*, **38**, 273–285.

1080   Dhivert, E., Grosbois, C., Coynel, A., Lefèvre, I. and Desmet, M. (2015) Influences of major flood sediment inputs on sedimentary and geochemical signals archived in a reservoir core (Upper Loire Basin, France). *CATENA*, **126**, 75–85.

Di Gregorio, D.E., Fernández Niello, J.O., Huck, H., Somacal, H. and Curutchet, G. (2007) 210Pb dating of sediments in a heavily contaminated drainage channel to the La Plata estuary in Buenos Aires, Argentina.
1085   *Appl. Radiat. Isot.*, **65**, 126–130.

Díaz-Asencio, M., Alonso-Hernández, C.M., Bolanos-Álvarez, Y., Gómez-Batista, M., Pinto, V., Morabito, R., Hernández-Albernas, J.I., Eriksson, M. and Sanchez-Cabeza, J.A. (2009) One century sedimentary record of Hg and Pb pollution in the Sagua estuary (Cuba) derived from 210Pb and 137Cs chronology. *Mar. Pollut. Bull.*, **59**, 108–115.

1090   Dincer Kırman, Z., Sericano, J.L., Wade, T.L., Bianchi, T.S., Marcantonio, F. and Kolker, A.S. (2016) Composition and depth distribution of hydrocarbons in Barataria Bay marsh sediments after the Deepwater Horizon oil spill. *Environ. Pollut.*, **214**, 101–113.

DOMINIK, J., MANGINI, A. and MÜLLER, G. (1981) Determination of recent deposition rates in Lake Constance with radioisotopic methods. *Sedimentology*, **28**, 653–677.

1095   Dong, X., Sayer, C.D., Bennion, H., Maberly, S.C., Yang, H. and Battarbee, R.W. (2016) Identifying sediment discontinuities and solving dating puzzles using monitoring and palaeolimnological records. *Front. Earth Sci.*, **10**, 621–633.

Druffel, E.R.M., Williams, P.M., Livingston, H.D. and Koide, M. (1984) Variability of natural and bomb-produced radionuclide distributions in abyssal red clay sediments. *Earth Planet. Sci. Lett.*, **71**, 205–214.

1100   Du, P. and Walling, D.E. (2012) Using 210Pb measurements to estimate sedimentation rates on river floodplains. *J. Environ. Radioact.*, **103**, 59–75.

Duliu, O.G., Dinescu, L.C., Dinescu, M.C., Dorcioman, R.D., Mihãilescu, N.G. and Vanghelie, I.S. (1996) Some considerations concerning 137Cs vertical profile in the Danube Delta: Matita lake core. *Sci. Total Environ.*, **188**, 9–14.

1105   Durham, R.W. and Oliver, B.G. (1983) History of Lake Ontario Contamination from the Niagara River by Sediment Radiodating and Chlorinated Hydrocarbon Analysis. *J. Great Lakes Res.*, **9**, 160–168.

Eades, L.J., Farmer, J.G., MacKenzie, A.B., Kirika, A. and Bailey-Watts, A.E. (2002) Stable lead isotopic characterisation of the historical record of environmental lead contamination in dated freshwater lake sediment cores from northern and central Scotland. *Sci. Total Environ.*, **292**, 55–67.

1110   Edgington, D.N., Klump, J.V., Robbins, J.A., Kusner, Y.S., Pampura, V.D. and Sandimirov, I. V. (1991) Sedimentation rates, residence times and radionuclide inventories in Lake Baikal from 137Cs and 210Pb in sediment cores. *Nature*, **350**, 601–604.

Eisenreich, S.J., Capel, P.D., Robbins, J.A. and Bourbonniere, R. (1989) Accumulation and diagenesis of chlorinated hydrocarbons in lacustrine sediments. *Environ. Sci. Technol.*, **23**, 1116–1126.

1115   **Elbert, J.**, **Wartenburger, R.**, **von Gunten, L.**, **Urrutia, R.**, **Fischer, D.**, **Fujak, M.**, **Hamann, Y.**, **Greber, N.D.** and **Grosjean, M.** (2013) Late Holocene air temperature variability reconstructed from the sediments of Laguna Escondida, Patagonia, Chile (45°30'S). *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, **369**, 482–492.

   Eleftheriou, G., **Tsabaris, C.**, **Papageorgiou, D.K.**, **Patiris, D.L.**, **Androulakaki, E.G.** and **Pappa, F.K.**
1120   (2018) Radiometric dating of sediment cores from aquatic environments of north-east Mediterranean. *J. Radioanal. Nucl. Chem.*, **316**, 655–671.

   ENGSTROM, D.R., **SWAIN, E.B.** and **KINGSTON, J.C.** (1985) A palaeolimnological record of human disturbance from Harvey's Lake, Vermont: geochemistry, pigments and diatoms. *Freshw. Biol.*, **15**, 261–288.

1125   **Erickson, M.J.**, **Barnes, C.R.**, **Henderson, M.R.**, **Romagnoli, R.** and **Firstenberg, C.E.** (2007) Geomorphology-Based Interpretation of Sedimentation Rates from Radiodating, Lower Passaic River, New Jersey, USA. *Integr. Environ. Assess. Manag.*, **3**, 166.

   Evans, J.E., **Levine, N.S.**, **Roberts, S.J.**, **Gottgens, J.F.** and **Newman, D.M.** (2002) Assessment using GIS and sediment routing of the proposed removal of Ballville Dam, Sandusky River, Ohio. *J. Am. Water Resour.*
1130   *Assoc.*, **38**, 1549–1565.

   Farmer, J.G., **MacKenzie, A.B.**, **Graham, M.C.**, **Macgregor, K.** and **Kirika, A.** (2015) Development of recent chronologies and evaluation of temporal variations in Pb fluxes and sources in lake sediment and peat cores in a remote, highly radiogenic environment, Cairngorm Mountains, Scottish Highlands. *Geochim. Cosmochim. Acta*, **156**, 25–49.

1135   **Fedotov, A.P.**, **Phedorin, M.A.**, **Enushchenko, I. V.**, **Vershinin, K.E.**, **Melgunov, M.S.** and **Khodzher, T. V.** (2012) A reconstruction of the thawing of the permafrost during the last 170years on the Taimyr Peninsula (East Siberia, Russia). *Glob. Planet. Change*, **98–99**, 139–152.

   Ferreira, P.A. de L., **Figueira, R.C.L.**, **Siegle, E.**, **Asp Neto, N.E.**, **Martins, C. de C.**, **Schettini, C.A.F.**, **Maciel, P.M.**, **García-Rodriguez, F.** and **Mahiques, M.M. de** (2016) Using a cesium-137 (137 Cs)
1140   sedimentary fallout record in the South Atlantic Ocean as a supporting tool for defining the Anthropocene. *Anthropocene*, **14**, 34–45.

   Findlay, D.L., **Kling, H.J.**, **Rönicke, H.** and **Findlay, W.J.** (1998) A paleolimnological study of eutrophied Lake Arendsee (Germany). *J. Paleolimnol.*, **19**, 41–54.

   Foster, I.D.L., **Dearing, J.A.**, **Simpson, A.**, **Carter, A.D.** and **Appleby, P.G.** (1985) Lake catchment based
1145   studies of erosion and denudation in the merevale catchment, Warwickshire, U.K. *Earth Surf. Process. Landforms*, **10**, 45–68.

   Foster, I.D.L. and **Lees, J.A.** (1999) Changing headwater suspended sediment yields in the LOIS catchments over the last century: A paleolimnological approach. *Hydrol. Process.*, **13**, 1137–1153.

   Foucher, A., **Evrard, O.**, **Chabert, C.**, **Cerdan, O.**, **Lefèvre, I.**, **Vandromme, R.** and **Salvador-Blanes, S.**
1150   (2019) Erosional response to land abandonment in rural areas of Western Europe during the Anthropocene: A case study in the Massif-Central, France. *Agric. Ecosyst. Environ.*, **284**, 106582.

   Foucher, A., **Evrard, O.**, **Huon, S.**, **Curie, F.**, **Lefèvre, I.**, **Vaury, V.**, **Cerdan, O.**, **Vandromme, R.** and **Salvador-Blanes, S.** (2020) Regional trends in eutrophication across the Loire river basin during the 20th century based on multi-proxy paleolimnological reconstructions. Agric Ecosyst Environ. doi:
1155   10.1016/j.agee.2020.107065

   Fox, M.E. and **Joshi, S.R.** (1984) The Fate of Pentachlorophenol in the Bay of Quinte, Lake Ontario. *J. Great Lakes Res.*, **10**, 190–196.

Francescangeli, F., **Armynot du Chatelet, E.**, **Billon, G.**, **Trentesaux, A.** and **Bouchet, V.M.P.** (2016) Palaeo-ecological quality status based on foraminifera of Boulogne-sur-Mer harbour (Pas-de-Calais, Northeastern France) over the last 200 years. *Mar. Environ. Res.*, **117**, 32–43.

Frielinghaus, M. (1998) Soil translocation by water erosion from agricultural cropland into wet depressions (morainic kettle holes). *Soil Tillage Res.*, **46**, 23–30.

Frignani, M., **Bellucci, L.G.**, **Favotto, M.** and **Albertazzi, S.** (2003) Polycyclic aromatic hydrocarbons in sediments of the Venice Lagoon. In: *Hydrobiologia*, 494, 283–290.

Frignani, M., **Bellucci, L.G.**, **Carraro, C.** and **Favotto, M.** (2001) Accumulation of polychlorinated dibenzo-p-dioxins and dibenzofurans in sediments of the Venice Lagoon and the industrial area of Porto Marghera. *Mar. Pollut. Bull.*, **42**, 544–553.

Frignani, M., **Bellucci, L.G.**, **Favotto, M.** and **Albertazzi, S.** (2005) Pollution historical trends as recorded by sediments at selected sites of the Venice Lagoon. *Environ. Int.*, **31**, 1011–1022.

Frignani, M., **Bellucci, L.G.**, **Langone, L.** and **Muntau, H.** (1997) Metal fluxes to the sediments of the northern Venice Lagoon. *Mar. Chem.*, **58**, 275–292.

Fuller, C.C., **Van Geen, A.**, **Baskaran, M.** and **Anima, R.** (1999) Sediment chronology in San Francisco Bay, California, defined by 210Pb, 234Th, 137Cs, and 239,240Pu. *Mar. Chem.*, **64**, 7–27.

Fung, Y.S. and **Lo, C.K.** (1997) Determination of heavy metal profiles in dated sediment cores from Sai Kung Bay, Hong Kong. *Environ. Int.*, **23**, 317–335.

Gäbler, H.E. and **Suckow, A.** (2003) Chronology of anthropogenic heavy-metal fluxes and Pb isotope ratios derived from radiometrically dated lake sediments in northern Germany. *Water. Air. Soil Pollut.*, **144**, 243–262.

Gallagher, D., **Mcgee, E.J.**, **Mitchell, P.I.**, **Alfimov, V.**, **Aldahan, A.** and **Possnert, G.** (2005) Retrospective search for evidence of the 1957 Windscale fire in NE Ireland using 129I and other long-lived nuclides. *Environ. Sci. Technol.*, **39**, 2927–2935.

Garcia-Ordiales, E., **Cienfuegos, P.**, **Roqueñí, N.**, **Covelli, S.**, **Flor-Blanco, G.**, **Fontolan, G.** and **Loredo, J.** (2019) Historical accumulation of potentially toxic trace elements resulting from mining activities in estuarine salt marshes sediments of the Asturias coastline (northern Spain). *Environ. Sci. Pollut. Res.*, **26**, 3115–3128.

Garcia-Orellana, J., **Pates, J.M.**, **Masqué, P.**, **Bruach, J.M.** and **Sanchez-Cabeza, J.A.** (2009) Distribution of artificial radionuclides in deep sediments of the Mediterranean Sea. *Sci. Total Environ.*, **407**, 887–898.

Gehrels, W.R., **Marshall, W.A.**, **Gehrels, M.J.**, **Larsen, G.**, **Kirby, J.R.**, **Eiríksson, J.**, **Heinemeier, J.** and **Shimmield, T.** (2006) Rapid sea-level rise in the North Atlantic Ocean since the first half of the nineteenth century. Holocene 16:949–965.

Gerlach, M.J., **Engelhart, S.E.**, **Kemp, A.C.**, **Moyer, R.P.**, **Smoak, J.M.**, **Bernhardt, C.E.** and **Cahill, N.** (2017) Reconstructing Common Era relative sea-level change on the Gulf Coast of Florida. *Mar. Geol.*, **390**, 254–269.

Gerritse, R.G., **Wallbrink, P.J.** and **Murray, A.S.** (1998) Accumulation of phosphorus and heavy metals in the Peel-Harvey Estuary in Western Australia: Results of a preliminary study. *Estuar. Coast. Shelf Sci.*, **47**, 679–693.

Gharibreza, M., **Raj, J.K.**, **Yusoff, I.**, **Othman, Z.**, **Tahir, W.Z.W.M.** and **Ashraf, M.A.** (2013) Sedimentation rates in Bera Lake (Peninsular Malaysia) using 210Pb and 137Cs radioisotopes. *Geosci. J.*, **17**, 211–220.

1200   **Gobeil, C.**, **Tessier, A.** and **Couture, R.M.** (2013) Upper mississippi pb as a mid-1800s chronostratigraphic marker in sediments from seasonally anoxic lakes in eastern canada. *Geochim. Cosmochim. Acta*, **113**, 125–135.

Goff, J.R., **Whitehead, N.E.** and **Ditchburn, R.G.** (1998) 210Pb chronology from Wellington Harbour, New Zealand. *New Zeal. J. Mar. Freshw. Res.*, **32**, 181–186.

1205   **Greiner, M.** and **Hershner, C.** (1998) Analysis of wetland total phosphorus retention and watershed structure. *Wetlands*, **18**, 142–149.

Grenfell, H.R., **Hayward, B.W.**, **Nomura, R.** and **Sabaa, A.T.** (2012) A foraminiferal proxy record of 20th century sea-level rise in the Manukau Harbour, New Zealand. *Mar. Freshw. Res.*, **63**, 370–384.

1210   **Grousset, F.E.**, **Jouanneau, J.M.**, **Castaing, P.**, **Lavaux, G.** and **Latouche, C.** (1999) A 70 year record of contamination from industrial activity along the Garonne River and its tributaries (SW France). *Estuar. Coast. Shelf Sci.*, **48**, 401–414.

Gu, J., **Chen, Z.** and **Salem, A.** (2011) Post-Aswan dam sedimentation rate of lagoons of the Nile Delta, Egypt. *Environ. Earth Sci.*, **64**, 1807–1813.

Gu, S.H., **Kralovec, A.C.**, **Christensen, E.R.** and **Van Camp, R.P.** (2003) Source apportionment of PAHs in
1215   dated sediments from the Black River, Ohio. *Water Res.*, **37**, 2149–2161.

Guan, Y., **Zang, S.** and **Xiao, H.** (2014) The vertical variation of nutrients in a sediment core of Delong Lake reveals the anthropogenic effect. *Ecotoxicology*, **23**, 480–485.

Guan, Y., **Sun, S.**, **Sun, S.**, **Wang, H.**, **Ruan, X.**, **Liu, Z.**, **Terrasi, F.**, **Gialanella, L.** and **Shen, H.** (2018) Distribution and sources of plutonium along the coast of Guangxi, China. *Nucl. Instruments Methods Phys.*
1220   *Res. Sect. B Beam Interact. with Mater. Atoms*, **437**, 61–65.

Guerra, R., **Pasteris, A.**, **Righi, S.** and **Ok, G.** (2019) Historical record of polychlorinated biphenyls (PCBs) in the continental shelf of the Korea Strait. *Chemosphere*, **237**, 124438.

Guilizzoni, P., **Massaferro, J.**, **Lami, A.**, **Piovano, E.L.**, **Guevara, S.R.**, **Formica, S.M.**, **Daga, R.**, **Rizzo, A.** and **Gerli, S.** (2009) Palaeolimnology of Lake Hess (Patagonia, Argentina): Multi-proxy analyses of short
1225   sediment cores. *Hydrobiologia*, **631**, 289–302.

Gulin, S.B. (2000) Recent changes of biogenic carbonate deposition in anoxic sediments of the Black Sea: Sedimentary record and climatic implication. *Mar. Environ. Res.*, **49**, 319–328.

GUPPY, S.F. and **HAPPEY-WOOD, C.M.** (1978) Chemistry of sediments from two linked lakes in North Wales. *Freshw. Biol.*, **8**, 401–413.

1230   **Guyard, H.**, **Chapron, E.**, **St-Onge, G.**, **Anselmetti, F.S.**, **Arnaud, F.**, **Magand, O.**, **Francus, P.** and **Mélières, M.-A.** (2007) High-altitude varve records of abrupt environmental changes and mining activity over the last 4000 years in the Western French Alps (Lake Bramant, Grandes Rousses Massif). *Quat. Sci. Rev.*, **26**, 2644–2660.

Hamilton, T.F., **Ballestra, S.**, **Baxter, M.S.**, **Gastaud, J.**, **Osvath, I.**, **Parsi, P.**, **Povinec, P.P.** and **Scott, E.M.**
1235   (1994) Radiometric investigations of Kara Sea sediments and preliminary radiological assessment related to dumping of radioactive wastes in the Arctic Seas. *J. Environ. Radioact.*, **25**, 113–134.

Hancock, G.J., **Leslie, C.**, **Everett, S.E.**, **Tims, S.G.**, **Brunskill, G.J.** and **Haese, R.** (2011) Plutonium as a chronomarker in Australian and New Zealand sediments: A comparison with 137Cs. *J. Environ. Radioact.*, **102**, 919–929.

1240   **Hanna, A.J.M.**, **Allison, M.A.**, **Bianchi, T.S.**, **Marcantonio, F.** and **Goff, J.A.** (2014) Late Holocene sedimentation in a high Arctic coastal setting: Simpson Lagoon and Colville Delta, Alaska. *Cont. Shelf Res.*, **74**, 11–24.

Hansen, A.M. (2012) Lake sediment cores as indicators of historical metal(loid) accumulation - A case study in Mexico. *Appl. Geochemistry*, **27**, 1745–1752.

1245   **Hansson, S. V.**, **Kaste, J.M.**, **Olid, C.** and **Bindler, R.** (2014) Incorporation of radiometric tracers in peat and implications for estimating accumulation rates. *Sci. Total Environ.*, **493**, 170–177.

Hardaway, C., **Sheu, W.J.**, **Meriwether, J.R.**, **Sneddon, J.** and **Beck, J.N.** (1998) The Effect of Diagenetic Processes on the Radiochronology of Soft Sediments Using 210Pb and 137Cs. *Microchem. J.*, **58**, 127–134.

1250   **Hasholt, B.**, **Walling, D.E.** and **Owens, P.N.** (2000) Sedimentation in arctic proglacial lakes: Mittivakkat Glacier, south-east Greenland. *Hydrol. Process.*, **14**, 679–699.

Hausmann, S., **Lotter, A.F.**, **van Leeuwen, J.F.N.**, **Ohlendorf, C.**, **Lemcke, G.**, **Grönlund, E.** and **Sturm, M.** (2002) Interactions of climate and land use documented in the varved sediments of Seebergsee in the Swiss Alps. *Holocene*, **12**, 279–289.

1255   **He, Q.**, **Walling, D.E.** and **Owens, P.N.** (1996) Interpreting the 137Cs profiles observed in several small lakes and reservoirs in southern England. *Chem. Geol.*, **129**, 115–131.

He, Q. and **Walling, D.E.** (1996) Rates of Overbank Sedimentation on the Floodplains of British Lowland Rivers Documented Using Fallout 137 Cs. *Geogr. Ann. Ser. A, Phys. Geogr.*, **78**, 223.

1260   **Heldal, H.E.**, **Varskog, P.** and **Foyn, L.** (2002) Distribution of selected anthropogenic radionuclides (137Cs, 238Pu, 239,240Pu and 241Am) in marine sediments with emphasis on the Spitsbergen-Bear Island area. *Sci. Total Environ.*, **293**, 233–245.

Hermanson, M.H. (1991) Chronology and Sources of Anthropogenic Trace Metals in Sediments from Small, Shallow Arctic Lakes. *Environ. Sci. Technol.*, **25**, 2059–2064.

Hermanson, M.H., **Christensen, E.R.**, **Buser, D.J.** and **Chen, L.M.** (1991) Polychlorinated Biphenyls in Dated
1265   Sediment Cores from Green Bay and Lake Michigan. *J. Great Lakes Res.*, **17**, 94–108.

Higgins, S.A., **Jaffe, B.E.** and **Fuller, C.C.** (2007) Reconstructing sediment age profiles from historical bathymetry changes in San Pablo Bay, California. *Estuar. Coast. Shelf Sci.*, **73**, 165–174.

Ho, H.H., **Swennen, R.**, **Cappuyns, V.**, **Vassilieva, E.**, **Neyens, G.**, **Rajabali, M.** and **Tran, T. Van** (2013)
1270   Geogene Versus Anthropogene Origin of Trace Metals in Sediments in Cua Luc Estuary and Ha Long Bay, Vietnam. *Estuaries and Coasts*, **36**, 203–219.

Ho, H.H., **Swennen, R.**, **Cappuyns, V.**, **Vassilieva, E.**, **Neyens, G.**, **Rajabali, M.** and **Van Tran, T.** (2013) Assessment on Pollution by Heavy Metals and Arsenic Based on Surficial and Core Sediments in the Cam River Mouth, Haiphong Province, Vietnam. *Soil Sediment Contam. An Int. J.*, **22**, 415–432.

Hong, G.H., **Lee, S.H.**, **Kim, S.H.**, **Chung, C.S.** and **Baskaran, M.** (1999) Sedimentary fluxes of 90Sr, 137Cs,
1275   239,240Pu and 210Pb in the East Sea (Sea of Japan). In: *Science of the Total Environment*, 237–238, 225–240.

Hongve, D., **Blakar, I.A.** and **Brittain, J.E.** (1995) Radiocaesium in the sediments of Øvre Heimdalsvatn, a Norwegian subalpine lake. *J. Environ. Radioact.*, **27**, 1–11.

1280 **Horvatinčić, N.**, **Sironić, A.**, **Barešić, J.**, **Bronić, I.K.**, **Nikolov, J.**, **Todorović, N.**, **Hansman, J.** and **Krmar, M.** (2014) Isotope analyses of the lake sediments in the Plitvice Lakes, Croatia. *Cent. Eur. J. Phys.*, **12**, 707–713.

Hosono, T., **Alvarez, K.** and **Kuwae, M.** (2016) Lead isotope ratios in six lake sediment cores from Japan Archipelago: Historical record of trans-boundary pollution sources. *Sci. Total Environ.*, **559**, 24–37.

1285 **Hou, X.L.**, **Fogh, C.L.**, **Kucera, J.**, **Andersson, K.G.**, **Dahlgaard, H.** and **Nielsen, S.P.** (2003) Iodine-129 and Caesium-137 in Chernobyl contaminated soil and their chemical fractionation. *Sci. Total Environ.*, **308**, 97–109.

Huang, C., **Zhang, L.**, **Li, Y.**, **Lin, C.**, **Huang, T.**, **Zhang, M.**, **Zhu, A. xing**, **Yang, H.** and **Wang, X.** (2018) Carbon and nitrogen burial in a plateau lake during eutrophication and phytoplankton blooms. *Sci. Total Environ.*, **616**–**617**, 296–304.

1290 **Hughes, A.O.**, **Olley, J.M.**, **Croke, J.C.** and **Webster, I.T.** (2009) Determining floodplain sedimentation rates using 137Cs in a low fallout environment dominated by channel- and cultivation-derived sediment inputs, central Queensland, Australia. *J. Environ. Radioact.*, **100**, 858–865.

Huh, C.A. and **Chen, H.Y.** (1999) History of lead pollution recorded in East China Sea sediments. *Mar. Pollut. Bull.*, **38**, 545–549.

1295 **Hülse, P.** and **Bentley, S.J.** (2012) A 210Pb sediment budget and granulometric record of sediment fluxes in a subarctic deltaic system: The Great Whale River, Canada. *Estuar. Coast. Shelf Sci.*, **109**, 41–52.

Huntley, S.L., **Bonnevie, N.L.** and **Wenning, R.J.** (1995) Polycyclic aromatic hydrocarbon and petroleum hydrocarbon contamination in sediment from the Newark Bay estuary, New Jersey. *Arch. Environ. Contam. Toxicol.*, **28**, 93–107.

1300 **Huntley, S.L.**, **Carlson-Lynch, H.**, **Johnson, G.W.**, **Paustenbach, D.J.** and **Finley, B.L.** (1998) Identification of historical PCDD/F sources in Newark Bay Estuary subsurface sediments using polytopic vector analysis and radioisotope dating techniques. *Chemosphere*, **36**, 1167–1185.

Hutchinson, S.M. and **Prandle, D.** (1994) Siltation in the Saltmarsh of the Dee Estuary Derived from 137Cs Analysis of Shallow Cores. *Estuar. Coast. Shelf Sci.*, **38**, 471–478.

1305 **Hutri, K.L.**, **Mattila, J.**, **Ikäheimonen, T.T.** and **Vartti, V.P.** (2013) Artificial radionuclides 90Sr and 241Am in the sediments of the Baltic Sea: Total and spatial inventories and some temporal trends. *Mar. Pollut. Bull.*, **70**, 210–218.

Irizuki, T., **Ito, H.**, **Sako, M.**, **Yoshioka, K.**, **Kawano, S.**, **Nomura, R.** and **Tanaka, Y.** (2015) Anthropogenic impacts on meiobenthic Ostracoda (Crustacea) in the moderately polluted Kasado Bay, Seto Inland Sea, 1310 Japan, over the past 70 years. *Mar. Pollut. Bull.*, **91**, 149–159.

Irlweck, K. (1985) Depth distribution of137cesium,90strontium and210lead in sediments of lake Mondsee, Austria. *J. Radioanal. Nucl. Chem. Lett.*, **93**, 115–124.

Ishii, Y. and **Hori, K.** (2016) Formation and infilling of oxbow lakes in the Ishikari lowland, northern Japan. *Quat. Int.*, **397**, 136–146.

1315 **Jaakkola, T.**, **Tolonen, K.**, **Huttunen, P.** and **Leskinen, S.** (1983) The use of fallout 137Cs and 239,240Pu for dating of lake sediments. In: *Paleolimnology*, *Springer Netherlands*, Dordrecht, 15–19.

Jaegler, H., **Pointurier, F.**, **Diez-Fernández, S.**, **Gourgiotis, A.**, **Isnard, H.**, **Hayashi, S.**, **Tsuji, H.**, **Onda, Y.**, **Hubert, A.**, **Laceby, J.P.** and **Evrard, O.** (2019) Reconstruction of uranium and plutonium isotopic signatures in sediment accumulated in the Mano Dam reservoir, Japan, before and after the Fukushima 1320 nuclear accident. *Chemosphere*, **225**, 849–858.

Jenns, N., Heppell, C.M., Burt, T.P., Walden, J. and Foster, I.D.L. (2002) Investigating contemporary and historical sediment inputs to Slapton Higher Ley: An analysis of the robustness of source ascription methods when applied to lake sediment data. *Hydrol. Process.*, **16**, 3467–3486.

Jha, S.K., Chavan, S.B., Pandit, G.G. and Sadasivan, S. (2003) Geochronology of Pb and Hg pollution in a coastal marine environment using global fallout 137Cs. In: *Journal of Environmental Radioactivity*, *Elsevier Ltd*, 69, 145–157.

Jia, X., Luo, W., Wu, X., Wei, H., Wang, B., Phyoe, W. and Wang, F. (2017) Historical record of nutrients inputs into the Xin'an Reservoir and its potential environmental implication. *Environ. Sci. Pollut. Res.*, **24**, 20330–20341.

Johnson-Pyrtle, A. and Scott, M.R. (2001) Distribution of 137Cs in the Lena River Estuary-Laptev Sea system. *Mar. Pollut. Bull.*, **42**, 912–926.

Johnson-Pyrtle, A., Scott, M.R., Laing, T.E. and Smol, J.P. (2000) 137Cs distribution and geochemistry of Lena River (Siberia) drainage basin lake sediments. *Sci. Total Environ.*, **255**, 145–159.

Jordan, P., Rippey, B. and John Anderson, N. (2002) The 20th century whole-basin trophic history of an inter-drumlin lake in an agricultural catchment. *Sci. Total Environ.*, **297**, 161–173.

Joshi, S.R. (1985) Recent sedimentation rates and 210Pb fluxes in Georgian Bay and Lake Huron. *Sci. Total Environ.*, **41**, 219–233.

Joshi, S.R. and Fox, M.E. (1985) The210Pb and137Cs profiles in sediment cores from Bay of Quinte, Lake Ontario. *J. Radioanal. Nucl. Chem. Artic.*, **90**, 207–215.

Joshi, S.R. and McNeely, R. (1988) Detection of fallout155Eu and207Bi in a210Pb-dated lake sediment core. *J. Radioanal. Nucl. Chem. Artic.*, **122**, 183–191.

Joshi, S.R. and Mudroch, A. (1988) Direct determination of geochronologically useful radionuclides in sediments by low-energy photon analysis. *Nucl. Inst. Methods Phys. Res. A*, **263**, 529–536.

Jouanneau, J.-M., Castaing, P., Grousset, F., Buat-Ménard, P. and Pedemay, P. (1999) Enregistrement sédimentaire et chronologie (137Cs) d'une contamination en cadmium dans l'estuaire de la Gironde (France). *Comptes Rendus l'Académie des Sci. - Ser. IIA - Earth Planet. Sci.*, **329**, 265–270.

Kada, J. and Heit, M. (1992) The inventories of anthropogenic Ph, Zn, As, Cd, and the radionuclides 137Cs and excess 210Pb in lake sediments of the Adirondack region, USA. *Hydrobiologia*, **246**, 231–241.

Kadlec, R.H. and Robbins, J.A. (1984) Sedimentation and sediment accretion in Michigan coastal wetlands (U.S.A.). *Chem. Geol.*, **44**, 119–150.

Kaplan, D.I., Hinton, T.G. and Knox, A.S. (2005) Cesium-137 partitioning to wetland sediments and uptake by plants. *J. Radioanal. Nucl. Chem.*, **264**, 393–399.

Karlsen, A.W., Cronin, T.M., Ishmans, S.E., Willard, D.A., Kerhin, R., Holmes, C.W. and Marot, M. (2000) Historical trends in Chesapeake Bay dissolved oxygen based on benthic foraminifera from sediment cores. *Estuaries*, **23**, 488–508.

Kastner, S., Enters, D., Ohlendorf, C., Haberzettl, T., Kuhn, G., Lücke, A., Mayr, C., Reyss, J.L., Wastegård, S. and Zolitschka, B. (2010) Reconstructing 2000years of hydrological variation derived from laminated proglacial sediments of Lago del Desierto at the eastern margin of the South Patagonian Ice Field, Argentina. *Glob. Planet. Change*, **72**, 201–214.

Katajisto, T. (1996) Copepod eggs survive a decade in the sediments of the Baltic Sea. *Hydrobiologia*, **320**, 153–159.

Kato, H., **Onda, Y.** and **Tanaka, Y.** (2010) Using 137Cs and 210Pbex measurements to estimate soil redistribution rates on semi-arid grassland in Mongolia. *Geomorphology*, **114**, 508–519.

1365 **Kempf, P.**, **Moernaut, J.**, **Van Daele, M.**, **Vermassen, F.**, **Vandoorne, W.**, **Pino, M.**, **Urrutía, R.**, **Schmidt, S.**, **Garrett, E.** and **De Batist, M.** (2015) The sedimentary record of the 1960 tsunami in two coastal lakes on Isla de Chiloé, south central Chile. *Sediment. Geol.*, **328**, 73–86.

Kenney, W.F., **Brenner, M.**, **Arnold, T.E.**, **Curtis, J.H.** and **Schelske, C.L.** (2016) Sediment cores from shallow lakes preserve reliable, informative paleoenvironmental archives despite hurricane-force winds. *Ecol. Indic.*, **60**, 963–969.

1370 **Ketterer, M.E.**, **Wetzel, W.C.**, **Layman, R.R.**, **Matisoff, G.** and **Bonniwell, E.C.** (2000) Isotopic studies of sources of uranium in sediments of the Ashtabula River, Ohio, U.S.A. *Environ. Sci. Technol.*, **34**, 966–972.

KHALILI VAVDARE, S., **SEDGHI, H.** and **SARRAF, A.** (2019) DETERMINATION OF SEDIMENTATION RATE IN ANZALI LAGOON OF NORTHERN IRAN USING 137Cs TRACER TECHNIQUE. *Appl. Ecol. Environ. Res.*, **17**, 1337–1347.

1375 **Khan, N.S.**, **Vane, C.H.**, **Engelhart, S.E.**, **Kendrick, C.** and **Horton, B.P.** (2019) The application of δ13C, TOC and C/N geochemistry of mangrove sediments to reconstruct Holocene paleoenvironments and relative sea levels, Puerto Rico. Mar Geol. doi: 10.1016/j.margeo.2019.105963

Kim, G., **Hussain, N.**, **Chureh, T.M.** and **Carey, W.L.** (1997) The fallout isotope 207Bi in a Delaware salt marsh: a comparison with 210Pb and 137Cs as a geochronological tool. *Sci. Total Environ.*, **196**, 31–41.

1380 **Klaminder, J.**, **Appleby, P.**, **Crook, P.** and **Renberg, I.** (2012) Post-deposition diffusion of 137Cs in lake sediment: Implications for radiocaesium dating. *Sedimentology*, **59**, 2259–2267.

Kleeberg, A., **Neyen, M.**, **Schkade, U.K.**, **Kalettka, T.** and **Lischeid, G.** (2016) Sediment cores from kettle holes in NE Germany reveal recent impacts of agriculture. *Environ. Sci. Pollut. Res.*, **23**, 7409–7424.

1385 **Klubi, E.**, **Abril, J.M.**, **Nyarko, E.**, **Laissaoui, A.** and **Benmansour, M.** (2017) Radioecological assessment and radiometric dating of sediment cores from dynamic sedimentary systems of Pra and Volta estuaries (Ghana) along the Equatorial Atlantic. *J. Environ. Radioact.*, **178–179**, 116–126.

Kotti, F., **Dezileau, L.**, **Mahé, G.**, **Habaieb, H.**, **Bentkaya, M.**, **Dieulin, C.** and **Amrouni, O.** (2018) Etude de l'impact des barrages sur la réduction des transports sédimentaires jusqu'à la mer par approche paléohydrologique dans la basse vallée de la Medjerda. *Proc. Int. Assoc. Hydrol. Sci.*, **377**, 67–76.

1390 **Kralj, D.**, **Romic, D.**, **Romic, M.**, **Cukrov, N.**, **Mlakar, M.**, **Kontrec, J.**, **Barisic, D.** and **Sirac, S.** (2016) Geochemistry of stream sediments within the reclaimed coastal floodplain as indicator of anthropogenic impact (River Neretva, Croatia). *J. Soils Sediments*, **16**, 1150–1167.

Krom, M.D., **Carbo, P.**, **Clerici, S.**, **Cundy, A.B.** and **Davies, I.M.** (2009) Sources and timing of trace metal contamination to sediments in remote sealochs, N.W. Scotland. *Estuar. Coast. Shelf Sci.*, **83**, 239–251.

1395 **Kudo, A.**, **Mahara, Y.**, **Santry, D.C.**, **Suzuki, T.**, **Miyahara, S.**, **Sugahara, M.**, **Zheng, J.** and **Garrec, J.P.** (1995) Plutonium mass balance released from the Nagasaki A-Bomb and the applicability for future environmental research. *Appl. Radiat. Isot.*, **46**, 1089–1098.

Kumar, A., **Rout, S.**, **Chopra, M.K.**, **Mishra, D.G.**, **Singhal, R.K.**, **Ravi, P.M.** and **Tripathi, R.M.** (2014) Modeling of 137Cs migration in cores of marine sediments of Mumbai Harbor Bay. *J. Radioanal. Nucl. Chem.*, **301**, 615–626.

1400 **Kumata, H.**, **Sanada, Y.**, **Takada, H.** and **Ueno, T.** (2000) Historical trends of N-cyclohexyl-2-benzothiazolamine, 2-(4- morpholinyl)benzothiazole, and other anthropogenic contaminants in the urban reservoir sediment core. *Environ. Sci. Technol.*, **34**, 246–253.

1405   **Kurz, A.Y.**, **Blum, J.D.**, **Washburn, S.J.** and **Baskaran, M.** (2019) Changes in the mercury isotopic composition of sediments from a remote alpine lake in Wyoming, USA. *Sci. Total Environ.*, **669**, 973–982.

Laissaoui, A., **Mas, J.L.**, **Hurtado, S.**, **Ziad, N.**, **Villa, M.** and **Benmansour, M.** (2013) Radionuclide activities and metal concentrations in sediments of the Sebou Estuary, NW Morocco, following a flooding event. *Environ. Monit. Assess.*, **185**, 5019–5029.

1410   **Laissaoui, A.**, **Mejjad, N.**, **Ziad, N.**, **Ait Bouh, H.**, **El Hammoumi, O.**, **Benkdad, A.** and **Fekri, A.** (2018) Evidence for a recent increase in delivery of atmospheric 210Pb to Oualidia lagoon, coastal Morocco. Environ Monit Assess. doi: 10.1007/s10661-018-7046-z

Lan, B., **Zhang, D.** and **Yang, Y.** (2018) Lacustrine sediment chronology defined by 137Cs, 210Pb and 14C and the hydrological evolution of Lake Ailike during 1901–2013, northern Xinjiang, China. *Catena*, **161**, 104–112.

1415   **Larsen, J.**, **Appleby, P.G.**, **Christensen, G.N.**, **Berg, T.** and **Eide, I.** (2010) Historical and geographical trends in sediment chronology from lakes and marine sites along the Norwegian Coast. *Water. Air. Soil Pollut.*, **206**, 237–250.

Latour, D., **Salençon, M.-J.**, **Reyss, J.-L.** and **Giraudet, H.** (2007) SEDIMENTARY IMPRINT OF MICROCYSTIS AERUGINOSA (CYANOBACTERIA) BLOOMS IN GRANGENT RESERVOIR
1420   (LOIRE, FRANCE). *J. Phycol.*, **43**, 417–425.

Latuso, K.D., **Keim, R.F.**, **King, S.L.**, **Weindorf, D.C.** and **DeLaune, R.D.** (2017) Sediment deposition and sources into a Mississippi River floodplain lake; Catahoula Lake, Louisiana. *Catena*, **156**, 290–297.

Lavrieux, M., **Schubert, C.J.**, **Hofstetter, T.**, **Eglinton, T.I.**, **Hajdas, I.**, **Wacker, L.** and **Dubois, N.** (2017) From medieval land clearing to industrial development: 800 years of human-impact history in the Joux
1425   Valley (Swiss Jura). *Holocene*, **27**, 1443–1454.

Lee, S. V. and **Cundy, A.B.** (2001) Heavy metal contamination and mixing processes in sediments from the Humber Estuary, Eastern England. *Estuar. Coast. Shelf Sci.*, **53**, 619–636.

Lee, S.H., **Povinec, P.P.**, **Chisholm, J.R.M.**, **Levy, I.**, **Miquel, J.C.** and **Oh, J.S.** (2017) Distribution of natural and anthropogenic radionuclides in northwest Mediterranean coastal sediments. *J. Environ. Radioact.*, **172**,
1430   145–159.

Lehu, R., **Lallemand, S.**, **Ratzov, G.**, **Babonneau, N.**, **Hsu, S.K.**, **Lin, A.T.** and **Dezileau, L.** (2016) An attempt to reconstruct 2700 years of seismicity using deep-sea turbidites offshore eastern Taiwan. *Tectonophysics*, **692**, 309–324.

LENT, R. (1997) MERCURY ACCUMULATION IN DEVILS LAKE, NORTH DAKOTA – EFFECTS OF
1435   ENVIRONMENTAL VARIATION IN CLOSED-BASIN LAKES ON MERCURY CHRONOLOGIES. *Water. Air. Soil Pollut.*, **98**, 275–296.

Lent, R.M., **Lyons, W.B.**, **Showers, W.J.** and **Johannesson, K.H.** (1995) Late holocene paleoclimatic and paleobiologic records from sediments of Devils Lake, North Dakota. *J. Paleolimnol.*, **13**, 193–207.

Lewis, G.P., **Taylor, B.E.**, **Pinder, J.E.** and **Dixon, P.M.** (2000) Apparent decline of the sediment 137Cs
1440   inventory of an abandoned reactor cooling reservoir: Export or uncertainty? *J. Environ. Radioact.*, **49**, 293–306.

Li, A., **Beek, T. aus der**, **Schubert, M.**, **Yu, Z.**, **Schiedek, T.** and **Schüth, C.** (2019) Sedimentary archive of Polycyclic Aromatic Hydrocarbons and perylene sources in the northern part of Taihu Lake, China. *Environ. Pollut.*, **246**, 198–206.

1445 **Li, A.**, **Ab Razak, I.A.**, **Ni, F.**, **Gin, M.F.** and **Christensen, E.R.** (1998) Polycyclic aromatic hydrocarbons in the sediments of the Milwaukee Harbor Estuary, Wisconsin, U.S.A. *Water. Air. Soil Pollut.*, **101**, 417–434.

Li, C., **Le Roux, G.**, **Sonke, J.**, **van Beek, P.**, **Souhaut, M.**, **Van der Putten, N.** and **De Vleeschouwer, F.** (2017) Recent 210Pb, 137Cs and 241Am accumulation in an ombrotrophic peatland from Amsterdam Island (Southern Indian Ocean). *J. Environ. Radioact.*, **175–176**, 164–169.

1450 **Li, H.C.**, **Wang, J.**, **Sun, J.J.**, **Chou, C.Y.**, **Li, H.K.**, **Xia, Y.Y.**, **Zhao, H.Y.**, **Yang, Q.N.** and **Kashyap, S.** (2019) Study of Jinchuan Mire in NE China I: AMS 14C, 210Pb and 137Cs dating on peat cores. *Quat. Int.*, **528**, 9–17.

Li, K., **Liu, E.**, **Zhang, E.**, **Li, Y.**, **Shen, J.** and **Liu, X.** (2017) Historical variations of atmospheric trace metal pollution in Southwest China: Reconstruction from a 150-year lacustrine sediment record in the Erhai
1455 Lake. *J. Geochemical Explor.*, **172**, 62–70.

Liang, K., **Hu, X.**, **Li, S.**, **Huang, C.** and **Tang, Y.** (2014) Anthropogenic effect on deposition dynamics of lake sediments based on 137Cs and 210Pbex techniques in Jiuzhaigou National Nature Reserve, China. *Chinese Geogr. Sci.*, **24**, 180–190.

Liao, H., **Bu, W.**, **Zheng, J.**, **Wu, F.** and **Yamada, M.** (2014) Vertical Distributions of Radionuclides (
1460 239+240 Pu, 240 Pu/ 239 Pu, and 137 Cs) in Sediment Cores of Lake Bosten in Northwestern China. *Environ. Sci. Technol.*, **48**, 3840–3846.

Lin, T., **Qin, Y.**, **Zheng, B.**, **Li, Y.**, **Zhang, L.** and **Guo, Z.** (2012) Sedimentary record of polycyclic aromatic hydrocarbons in a reservoir in Northeast China. *Environ. Pollut.*, **163**, 256–260.

Lirer, F., **Sprovieri, M.**, **Ferraro, L.**, **Vallefuoco, M.**, **Capotondi, L.**, **Cascella, A.**, **Petrosino, P.**, **Insinga, D.D.**, **Pelosi, N.**, **Tamburrino, S.** and **Lubritto, C.** (2013) Integrated stratigraphy for the Late Quaternary
1465 in the eastern Tyrrhenian Sea. *Quat. Int.*, **292**, 71–85.

Liu, S., **Narentuya**, **Xia, B.**, **Chu, G.** and **Tian, M.** (2012) Using 210Pb uns and 137Cs to date recent sediment cores from the Badain Jaran Desert, Inner Mongolia, China. *Quat. Geochronol.*, **12**, 30–39.

Liu, Z., **Pan, S.**, **Yin, Y.**, **Ma, R.**, **Gao, J.**, **Xia, F.** and **Yang, X.** (2013) Reconstruction of the historical
1470 deposition environment from 210Pb and 137Cs records at two tidal flats in China. *Ecol. Eng.*, **61**, 303–315.

Liu, Z., **Zheng, J.**, **Pan, S.** and **Gao, J.** (2013) Anthropogenic plutonium in the North Jiangsu tidal flats of the Yellow Sea in China. *Environ. Monit. Assess.*, **185**, 6539–6551.

Livingston, H.D. and **Bowen, V.T.** (1979) Pu and137Cs in coastal sediments. *Earth Planet. Sci. Lett.*, **43**, 29–
1475 45.

Lo, C.K. and **Fung, Y.S.** (1992) Heavy metal pollution profiles of dated sediment cores from hebe haven, Hong Kong. *Water Res.*, **26**, 1605–1619.

Loizeau, J.L., **Dominik, J.**, **Luzzi, T.** and **Vernet, J.P.** (1997) Sediment core correlation and mapping of sediment accumulation rates in Lake Geneva (Switzerland, France) using volume magnetic susceptibility.
1480 *J. Great Lakes Res.*, **23**, 391–402.

Loso, M., **Finney, B.**, **Johnson, R.** and **Sinnott, R.** (2017) Evaluating evidence for historical anadromous Salmon runs in Eklutna Lake, Alaska. *Arctic*, **70**, 259–272.

Lotter, A.F., **Sturm, M.**, **Teranes, J.L.** and **Wehrli, B.** (1997) Varve formation since 1885 and high-resolution varve analyses in hypertrophic Baldeggersee (Switzerland). *Aquat. Sci.*, **59**, 304–325.

1485   **LU, X.** and **MATSUMOTO, E.** (2009) Implications of excess 210Pb and 137Cs in sediment cores from
       Mikawa Bay, Japan. *J. Environ. Sci.*, **21**, 707–712.

LU, X. and **MATSUMOTO, E.** (2009) Implications of excess 210Pb and 137Cs in sediment cores from
       Mikawa Bay, Japan. *J. Environ. Sci.*, **21**, 707–712.

1490   **Lukšiene, B.**, **Maceika, E.**, **Tarasiuk, N.**, **Koviazina, E.**, **Filistovič, V.**, **Buivydas, Š.** and **Puzas, A.** (2014) On
       peculiarities of vertical distribution of 239,240Pu, 238Pu and 137Cs activity concentrations and their ratios
       in lake sediments and soils. *J. Radioanal. Nucl. Chem.*, **300**, 277–286.

M. Fox, W., **S. Johnson, M.**, **Jones, S.R.**, **Leah, R.T.** and **Copplestone, D.** (1999) The use of sediment cores
       from stable and developing salt marshes to reconstruct historical contamination profiles in the Mersey
       Estuary, UK. *Mar. Environ. Res.*, **47**, 311–329.

1495   **Ma, L.**, **Wu, J.** and **Abuduwaili, J.** (2013) Climate and environmental changes over the past 150 years inferred
       from the sediments of Chaiwopu Lake, central Tianshan Mountains, northwest China. *Int. J. Earth Sci.*,
       102, 959–967.

Macdonald, R.W., **Macdonald, D.M.**, **O'Brien, M.C.** and **Gobeil, C.** (1991) Accumulation of heavy metals
       (Pb, Zn, Cu, Cd), carbon and nitrogen in sediments from Strait of Georgia, B.C., Canada. *Mar. Chem.*, **34**,
1500   109–135.

MacKenzie, A.B., **Cook, G.T.**, **McDonald, P.** and **Jones, S.R.** (1998) The influence of mixing timescales and
       re-dissolution processes on the distribution of radionuclides in northeast Irish Sea sediments. *J. Environ.
       Radioact.*, **39**, 35–53.

Mackenzie, A.B. and **Scott, R.D.** (1982) Radiocaesium and plutonium in intertidal sediments from southern
1505   Scotland. *Nature*, **299**, 613–616.

MacKenzie, A., **Webber, S.**, **Watts, A.** and **Tonks, A.** (2016) Historical deposits of Alexandrium catenella
       resting cysts in the sediments of Queen Charlotte Sound, New Zealand. *New Zeal. J. Mar. Freshw. Res.*,
       50, 195–208.

Madsen, A.T., **Murray, A.S.**, **Andersen, T.J.**, **Pejrup, M.** and **Breuning-Madsen, H.** (2005) Optically
1510   stimulated luminescence dating of young estuarine sediments: a comparison with 210Pb and 137Cs dating.
       Mar. Geol., **214**, 251–268.

Mahara, Y. and **Kudo, A.** (1995) Plutonium released by the Nagasaki A-bomb: Mobility in the environment.
       Appl. Radiat. Isot., **46**, 1191–1201.

Mahu, E., **Nyarko, E.**, **Hulme, S.**, **Swarzenski, P.**, **Asiedu, D.K.** and **Coale, K.H.** (2016) Geochronology and
1515   historical deposition of trace metals in three tropical estuaries in the Gulf of Guinea. *Estuar. Coast. Shelf
       Sci.*, **177**, 31–40.

Marčiulioniene, D., **Mažeika, J.**, **Lukšiene, B.**, **Jefanova, O.**, **Mikalauskiene, R.** and **Paškauskas, R.** (2015)
       Anthropogenic radionuclide fluxes and distribution in bottom sediments of the cooling basin of the
       Ignalina Nuclear Power Plant. *J. Environ. Radioact.*, **145**, 48–57.

1520   **Marsdem, O.J.**, **Abrahamsen, L.**, **Brayan, N.D.**, **Day Philip, J.**, **Fifield, K.**, **Gent, C.**, **Goodal, P.S.**, **Morris,
       K.** and **Livens, F.R.** (2006) Transport and accumulation of actinide elements in the near-shore
       environment: Field and modelling studies. *Sedimentology*, **53**, 237–248.

Martinez, A., **Schnoebelen, D.J.** and **Hornbuckle, K.C.** (2016) Polychlorinated biphenyl congeners in
       sediment cores from the Upper Mississippi River. *Chemosphere*, **144**, 1943–1949.

1525 **Martins, C.C.**, **Bícego, M.C.**, **Mahiques, M.M.**, **Figueira, R.C.L.**, **Tessler, M.G.** and **Montone, R.C.** (2010) Depositional history of sedimentary linear alkylbenzenes (LABs) in a large South American industrial coastal area (Santos Estuary, Southeastern Brazil). *Environ. Pollut.*, **158**, 3355–3364.

Martins, V., **Figueira, R.C.L.**, **França, E.J.**, **Ferreira, P.A. de L.**, **Martins, P.**, **Santos, J.F.**, **Dias, J.A.**, **Laut, L.L.M.**, **Monge Soares, A.M.**, **Silva, E.F. da** and **Rocha, F.** (2012) Sedimentary processes on the NW
1530 Iberian Continental Shelf since the Little Ice Age. *Estuar. Coast. Shelf Sci.*, **102**–**103**, 48–59.

Matisoff, G. (2017) Activities and geochronology of 137Cs in lake sediments resulting from sediment resuspension. *J. Environ. Radioact.*, **167**, 222–234.

Matsuoka, K. (1999) Eutrophication process recorded in dinoflagellate cyst assemblages - A case of Yokohama Port, Tokyo Bay, Japan. *Sci. Total Environ.*, **231**, 17–35.

1535 **Matter, M.**, **Anselmetti, F.S.**, **Jordanoska, B.**, **Wagner, B.**, **Wessels, M.** and **Wüest, A.** (2010) Carbonate sedimentation and effects of eutrophication observed at the Kališta subaquatic springs in Lake Ohrid (Macedonia). *Biogeosciences*, **7**, 3755–3767.

Matthai, C., **Birch, G.F.**, **Jenkinson, A.** and **Heijnis, H.** (2001) Physical resuspension and vertical mixing of sediments on a high energy continental margin (Sydney, Australia). *J. Environ. Radioact.*, **52**, 67–89.

1540 **McDonald, C.P.** and **Urban, N.R.** (2007) Sediment radioisotope dating across a stratigraphic discontinuity in a mining-impacted lake. *J. Environ. Radioact.*, **92**, 80–95.

McLean, R.I. and **Summers, J.K.** (1990) Evaluation of transport and storage of 60Co, 134Cs, 137Cs and 65Zn by river sediments in the lower susquehanna river. *Environ. Pollut.*, **63**, 137–153.

McMinn, A., **Hallegraeff, G.M.**, **Thomson, P.**, **Jenkinson, A. V.** and **Heijnis, H.** (1997) Cyst and
1545 radionucleotide evidence for the recent introduction of the toxic dinoflagellate Gymnodinium catenatum into Tasmanian waters. *Mar. Ecol. Prog. Ser.*, **161**, 165–172.

Meena, N.K., **Prakasam, M.**, **Bhushan, R.**, **Sarkar, S.**, **Diwate, P.** and **Banerji, U.** (2017) Last-five-decade heavy metal pollution records from the Rewalsar Lake, Himachal Pradesh, India. Environ Earth Sci. doi: 10.1007/s12665-016-6303-0

1550 **Melieres, M.A.**, **Pourchet, M.**, **Pinglot, J.F.**, **Bouchez, R.** and **Piboule, M.** (1988) Chernobyl 134Cs, 137Cs, and 210Pb in high mountain lake sediment: Measurements and modeling of mixing process. *J. Geophys. Res.*, **93**, 7055–5061.

Méndez-García, C., **Renteria-Villalobos, M.**, **García-Tenorio, R.** and **Montero-Cabrera, M.E.** (2014) Uranium series isotopes concentration in sediments at San Marcos and Luis L. Leon reservoirs,
1555 Chihuahua, Mexico. *American Institute of Physics*, 83–92.

Miao, A., **Chu, Z.** and **Li, Y.** (2016) Three Gorges Dam controls sediment coarsening of the mud patch on the inner East China Sea shelf. *J. Ocean Univ. China*, **15**, 414–422.

Michelutti, N., **Blais, J.M.**, **Liu, H.**, **Keatley, B.E.**, **Douglas, M.S.V.**, **Mallory, M.L.** and **Smol, J.P.** (2008) A test of the possible influence of seabird activity on the 210Pb flux in high Arctic ponds at Cape Vera,
1560 Devon Island, Nunavut: Implications for radiochronology. *J. Paleolimnol.*, **40**, 783–791.

Miguel, S., **Bolívar, J.P.** and **García-Tenorio, R.** (2003) Mixing, sediment accumulation and focusing using 210Pb and 137Cs. *J. Paleolimnol.*, **29**, 1–11.

Miller, H., **Croudace, I.W.**, **Bull, J.M.**, **Cotterill, C.J.**, **Dix, J.K.** and **Taylor, R.N.** (2014) A 500 Year Sediment Lake Record of Anthropogenic and Natural Inputs to Windermere (English Lake District) Using
1565 Double-Spike Lead Isotopes, Radiochronology, and Sediment Microanalysis. *Environ. Sci. Technol.*, **48**, 7254–7263.

Milzer, G., **Giraudeau, J.**, **Schmidt, S.**, **Eynaud, F.** and **Faust, J.** (2014) Qualitative and quantitative reconstructions of surface water characteristics and recent hydrographical changes in the Trondheimsfjord, central Norway. *Clim. Past*, **10**, 305–323.

1570   **Mîndrescu, M.**, **Németh, A.**, **Grădinaru, I.**, **Bihari, Á.**, **Németh, T.**, **Fekete, J.**, **Bozsó, G.** and **Kern, Z.** (2016) Bolătău sediment record - Chronology, microsedimentology and potential for a high resolution multimillennial paleoenvironmental proxy archive. *Quat. Geochronol.*, **32**, 11–20.

Zeng, L., **Ning, D.**, **Xu, L.**, **Mao, X.** and **Chen, X.** (2015) Sedimentary Evidence of Environmental Degradation in Sanliqi Lake, Daye City (A Typical Mining City, Central China). *Bull. Environ. Contam. Toxicol.*, **95**, 1575   317–324.

Minoura, K., **Yamada, T.**, **Hirano, S. ichi** and **Sugihara, S.** (2014) Movement of radiocaesium fallout released by the 2011 Fukushima nuclear accident. *Nat. Hazards*, **73**, 1843–1862.

Miralles, J., **Radakovitch, O.**, **Cochran, J.K.**, **Véron, A.** and **Masqué, P.** (2004) Multitracer study of anthropogenic contamination records in the Camargue, Southern France. *Sci. Total Environ.*, **320**, 63–72.

1580   **Mitchell, P.I.**, **Condren, O.M.**, **Leon Vintro, L.** and **McMahon, C.A.** (1999) Trends in plutonium, americium and radiocaesium accumulation and long- term bioavailability in the western Irish Sea mud basin. *J. Environ. Radioact.*, **44**, 223–251.

M�ller, G., **Dominik, J.**, **Reuther, R.**, **Malisch, R.**, **Schulte, E.**, **Acker, L.** and **Irion, G.** (1980) Sedimentary record of environmental pollution in the Western Baltic Sea. *Naturwissenschaften*, **67**, 595–600.

1585   **Moon, D.S.**, **Hong, G.H.**, **Kim, Y. Il**, **Baskaran, M.**, **Chung, C.S.**, **Kim, S.H.**, **Lee, H.J.**, **Lee, S.H.** and **Povinec, P.P.** (2003) Accumulation of anthropogenic and natural radionuclides in bottom sediments of the Northwest Pacific Ocean. *Deep. Res. Part II Top. Stud. Oceanogr.*, **50**, 2649–2673.

Morellón, M., **Anselmetti, F.S.**, **Ariztegui, D.**, **Brushulli, B.**, **Sinopoli, G.**, **Wagner, B.**, **Sadori, L.**, **Gilli, A.** and **Pambuku, A.** (2016) Human-climate interactions in the central Mediterranean region during the last 1590   millennia: The laminated record of Lake Butrint (Albania). *Quat. Sci. Rev.*, **136**, 134–152.

Morris, J.L., **Derose, R.J.** and **Brunelle, A.R.** (2015) Long-term landscape changes in a subalpine spruce-fir forest in central Utah, USA. For Ecosyst. doi: 10.1186/s40663-015-0057-0

Morris, K., **Butterworth, J.C.** and **Livens, F.R.** (2000) Evidence for the remobilization of Sellafield waste radionuclides in an intertidal salt marsh, West Cumbria, U.K. *Estuar. Coast. Shelf Sci.*, **51**, 613–625.

1595   **Mundschenk, H.** (1996) Occurrence and behaviour of radionuclides in the Moselle river - Part IV: Deposition of radioactive particulate matter in high-sedimentation areas. *J. Environ. Radioact.*, **32**, 193–212.

Navas, A., **López-Vicente, M.**, **Gaspar, L.**, **Palazón, L.** and **Quijano, L.** (2014) Establishing a tracer-based sediment budget to preserve wetlands in Mediterranean mountain agroecosystems (NE Spain). *Sci. Total Environ.*, **496**, 132–143.

1600   **Navas, A.**, **Valero-Garcés, B.**, **Gaspar, L.** and **Palazón, L.** (2011) Radionuclides and stable elements in the sediments of the Yesa Reservoir, Central Spanish Pyrenes. *J. Soils Sediments*, **11**, 1082–1098.

Navratil, O., **Evrard, O.**, **Esteves, M.**, **Ayrault, S.**, **Lefèvre, I.**, **Legout, C.**, **Reyss, J.L.**, **Gratiot, N.**, **Nemery, J.**, **Mathys, N.**, **Poirel, A.** and **Bonté, P.** (2012) Core-derived historical records of suspended sediment origin in a mesoscale mountainous catchment: The River Bléone, French Alps. *J. Soils Sediments*, **12**, 1605   1463–1478.

Ndzangou, S.O., **Richer-Laflèche, M.** and **Houle, D.** (2005) Sources and Evolution of Anthropogenic Lead in Dated Sediments from Lake Clair, Québec, Canada. *J. Environ. Qual.*, **34**, 1016–1025.

Neumann, T., **Stögbauer, A.**, **Walpersdorf, E.**, **Stüben, D.** and **Kunzendorf, H.** (2002) Stable isotopes in recent sediments of Lake Arendsee, NE Germany: Response to eutrophication and remediation measures. *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, **178**, 75–90.

Nie, Y., **Xu, L.**, **Liu, X.** and **Emslie, S.D.** (2016) Radionuclides in ornithogenic sediments as evidence for recent warming in the Ross Sea region, Antarctica. *Sci. Total Environ.*, **557**–**558**, 248–256.

Nikitina, D.L., **Kemp, A.C.**, **Horton, B.P.**, **Vane, C.H.**, **van de Plassche, O.** and **Engelhart, S.E.** (2014) Storm erosion during the past 2000years along the north shore of Delaware Bay, USA. *Geomorphology*, **208**, 160–172.

Nyberg, J., **Kuijpers, A.**, **Malmgren, B.A.** and **Kunzendorf, H.** (2001) Late Holocene changes in precipitation and hydrography recorded in marine sediments from the northeastern Caribbean Sea. *Quat. Res.*, **56**, 87–102.

Oenema, O. and **DeLaune, R.D.** (1988) Accretion rates in salt marshes in the Eastern Scheldt, South-west Netherlands. *Estuar. Coast. Shelf Sci.*, **26**, 379–394.

Oguri, K., **Harada, N.** and **Tadai, O.** (2012) Excess 210Pb and 137Cs concentrations, mass accumulation rates, and sedimentary processes on the Bering Sea continental shelf. *Deep. Res. Part II Top. Stud. Oceanogr.*, **61**–**64**, 193–204.

Oldfield, F., **Appleby, P.G.** and **Thompson, R.** (1980) Palaeoecological Studies of Lakes in the Highlands of Papua New Guinea: I. The Chronology of Sedimentation. *J. Ecol.*, **68**, 457.

Oldfield, F., **Richardson, N.**, **Appleby, P.G.** and **Yu, L.** (1993) 241Am and 137Cs activity in fine grained saltmarsh sediments from parts of the N.E. Irish sea shoreline. *J. Environ. Radioact.*, **19**, 1–24.

Oldfield, F., **Wake, R.**, **Boyle, J.**, **Jones, R.**, **Nolan, S.**, **Gibbs, Z.**, **Appleby, P.**, **Fisher, E.** and **Wolff, G.** (2003) The late-Holocene history of Gormire Lake (NE England) and its catchment: A multiproxy reconstruction of past human impact. *Holocene*, **13**, 677–690.

Olszewski, G., **Andersson, P.**, **Lindahl, P.** and **Eriksson, M.** (2018) On the distribution and inventories of radionuclides in dated sediments around the Swedish coast. *J. Environ. Radioact.*, **186**, 142–151.

Omokheyeke, O., **Sikoki, F.D.**, **Laissaoui, A.**, **Akpuluma, D.**, **Onyagbodor, P.O.**, **Benkdad, A.** and **Benmansour, M.** (2014) Sediment geochronology and spatio-temporal and vertical distributions of radionuclides in the Upper Bonny Estuary (South Nigeria). *Geochronometria*, **41**, 369–376.

O'Reilly, J., **León Vintró, L.**, **Mitchell, P.I.**, **Donohue, I.**, **Leira, M.**, **Hobbs, W.** and **Irvine, K.** (2011) 210Pb-dating of a lake sediment core from Lough Carra (Co. Mayo, western Ireland): Use of paleolimnological data for chronology validation below the 210Pb dating horizon. *J. Environ. Radioact.*, **102**, 495–499.

Owens, P.N. and **Walling, D.E.** (2002) Changes in sediment sources and floodplain deposition rates in the catchment of the River Tweed, Scotland, over the last 100 years: The impact of climate and land use change. *Earth Surf. Process. Landforms*, **27**, 403–423.

Owens, P.N., **Walling, D.E.**, **He, Q.**, **Shanahan, J.** and **Foster, I.D.L.** (1997) Utilisation d'une technique de mesure par le césium-137 pour l'établissement du bilan sédimentaire du bassin versant "Start", dans le Devon (Royaume-Uni). *Hydrol. Sci. J.*, **42**, 405–423.

Owens, P.N., **Walling, D.E.** and **Leeks, G.J.L.** (1999) Use of floodplain sediment cores to investigate recent historical changes in overbank sedimentation rates and sediment sources in the catchment of the River Ouse, Yorkshire, UK. *Catena*, **36**, 21–47.

Page, M.J., **Trustrum, N.A.** and **DeRose, R.C.** (1994) A high resolution record of storm-induced erosion from lake sediments, New Zealand. *J. Paleolimnol.*, **11**, 333–348.

1650   **Papaefthymiou, H.**, **Athanasopoulos, D.**, **Papatheodorou, G.**, **Iatrou, M.**, **Geraga, M.**, **Christodoulou, D.**, **Kordella, S.**, **Fakiris, E.** and **Tsikouras, B.** (2013) Uranium and other natural radionuclides in the sediments of a Mediterranean fjord-like embayment, Amvrakikos Gulf (Ionian Sea), Greece. *J. Environ. Radioact.*, **122**, 43–54.

        Pappa, F.K., **Tsabaris, C.**, **Patiris, D.L.**, **Eleftheriou, G.**, **Ioannidou, A.**, **Androulakaki, E.G.**, **Kokkoris, M.**
1655   and **Vlastou, R.** (2019) Temporal investigation of radionuclides and heavy metals in a coastal mining area at Ierissos Gulf, Greece. *Environ. Sci. Pollut. Res.*, **26**, 27457–27469.

        Parry, L.E., **Charman, D.J.** and **Blake, W.H.** (2013) Comparative dating of recent peat deposits using natural and anthropogenic fallout radionuclides and Spheroidal Carbonaceous Particles (SCPs) at a local and landscape scale. *Quat. Geochronol.*, **15**, 11–19.

1660   **Parsons, M.J.**, **Long, D.T.** and **Yohn, S.S.** (2010) Assessing the natural recovery of a lake contaminated with Hg using estimated recovery rates determined by sediment chronologies. *Appl. Geochemistry*, **25**, 1676–1687.

        Parsons, M.L., **Dortch, Q.**, **Turner, R.E.** and **Rabalais, N.R.** (2006) Reconstructing the development of eutrophication in Louisiana salt marshes. In: *Limnology and Oceanography*, *American Society of*
1665   *Limnology and Oceanography Inc.*, 51, 534–544.

        Pavlova, P.A., **Zennegg, M.**, **Anselmetti, F.S.**, **Schmid, P.**, **Bogdal, C.**, **Steinlin, C.**, **Jäggi, M.** and **Schwikowski, M.** (2016) Release of PCBs from Silvretta glacier (Switzerland) investigated in lake sediments and meltwater. *Environ. Sci. Pollut. Res.*, **23**, 10308–10316.

        Pawłowska, J., **Zajączkowski, M.**, **Szczuciński, W.**, **Zaborska, A.**, **Kucharska, M.**, **Jernas, P.E.** and
1670   **Forwick, M.** (2017) The influence of Coriolis force driven water circulation on the palaeoenvironment of Hornsund (S Spitsbergen) over the last century. Boreas 46:737–749.

        Pedersen, J.B.T., **Bartholdy, J.** and **Christiansen, C.** (2007) 137Cs in the Danish Wadden Sea: contrast between tidal flats and salt marshes. *J. Environ. Radioact.*, **97**, 42–56.

        Pempkowiak, J. (1991) Enrichment factors of heavy metals in the Southern Baltic surface sediments dated with
1675   210Pb and 137Cs. *Environ. Int.*, **17**, 421–428.

        Pempkowiak, J., **Kozuch, J.** and **Szymelfenig, M.** (1996) Meiobenthic organisms as indicators of mixing processes in the Baltic surface sediments. *Mar. Ecol.*, **17**, 175–179.

        Pempkowiak, J., **Piotrowska-Szypryt, M.** and **Kozuch, J.** (1998) Rates of diagenetic changes of humic substances in Baltic surface sediments. In: *Environment International*, *Elsevier Sci Ltd*, 24, 589–594.

1680   **Pempkowiak, J.**, **Tylmann, W.**, **Staniszewski, A.** and **Gołebiewski, R.** (2006) Lignin depolymerization products as biomarkers of the organic matter sedimentary record in 210Pb-137Cs-dated lake sediments. *Org. Geochem.*, **37**, 1452–1464.

        Perner, K., **Leipe, T.**, **Dellwig, O.**, **Kuijpers, A.**, **Mikkelsen, N.**, **Andersen, T.J.** and **Harff, J.** (2010) Contamination of arctic Fjord sediments by Pb-Zn mining at Maarmorilik in central West Greenland. *Mar.*
1685   *Pollut. Bull.*, **60**, 1065–1073.

        Petit, D., **Thomas, M.** and **Lamberts, L.** (1987) Origin of heavy metal fluxes to the Meuse river in southern Belgium using 210Pb-dated water-meadow sediments. *J. Environ. Radioact.*, **5**, 303–316.

        Pfahl, S., **Sirocko, F.**, **Seelos, K.**, **Dietrich, S.**, **Walter, A.** and **Wernli, H.** (2009) A new windstorm proxy from lake sediments: A comparison of geological and meteorological data from western Germany for the period
1690   1965-2001. J Geophys Res Atmos. doi: 10.1029/2008JD011643

Pinder, J.E., **Bowling, J.W.**, **Lide, R.F.** and **Beatty, L.M.** (1995) The distribution of 137Cs in sediments of the littoral zone of a former reactor cooling pond. *J. Environ. Radioact.*, **28**, 57–71.

Pourchet, M., **Pinglot, J.F.** and **Mélières, M.A.** (1989) Cesium 137 and lead 210 in alpine lake sediments: Measurements and modeling of mixing processes. *J. Geophys. Res.*, **94**, 12761.

1695 **Pratte, S.**, **Bao, K.**, **Shen, J.**, **De Vleeschouwer, F.** and **Le Roux, G.** (2019) Centennial records of cadmium and lead in NE China lake sediments. *Sci. Total Environ.*, **657**, 548–557.

Putyrskaya, V., **Klemt, E.**, **Röllin, S.**, **Astner, M.** and **Sahli, H.** (2015) Dating of sediments from four Swiss prealpine lakes with 210Pb determined by gamma-spectrometry: Progress and problems. *J. Environ. Radioact.*, **145**, 78–94.

1700 **Qiang, M.**, **Chen, F.**, **Zhang, J.**, **Zu, R.**, **Jin, M.**, **Zhou, A.** and **Xiao, S.** (2007) Grain size in sediments from Lake Sugan: A possible linkage to dust storm events at the northern margin of the Qinghai-Tibetan Plateau. *Environ. Geol.*, **51**, 1229–1238.

Rada, R.G., **Wiener, J.G.**, **Bailey, P.A.** and **Powell, D.E.** (1990) Recent influxes of metals into Lake Pepin, a natural lake on the Upper Mississippi River. *Arch. Environ. Contam. Toxicol.*, **19**, 712–716.

1705 **Radakovitch, O.**, **Charmasson, S.**, **Arnaud, M.** and **Bouisset, P.** (1999) 210Pb and caesium accumulation in the Rhone delta sediments. *Estuar. Coast. Shelf Sci.*, **48**, 77–92.

Rai, S.P., **Kumar, V.** and **Kumar, B.** (2007) Sedimentation rate and pattern of a Himalayan foothill lake using 137Cs and 210Pb. *Hydrol. Sci. J.*, **52**, 181–191.

Rasmussen, P. and **John Anderson, N.** (2005) Natural and anthropogenic forcing of aquatic macrophyte
1710 development in a shallow Danish lake during the last 7000 years. *J. Biogeogr.*, **32**, 1993–2005.

Reavie, E.D., **Smol, J.P.**, **Carignan, R.** and **Lorrain, S.** (1998) Diatom paleolimnology of two fluvial lakes in the St. Lawrence River: A reconstruction of environmental changes during the last century. *J. Phycol.*, **34**, 446–456.

Reavie, E.D., **Robbins, J.A.**, **Stoermer, E.F.**, **Douglas, M.S.**, **Emmert, G.E.**, **Morehead, N.R.** and **Mudroch,**
1715 **A.** (2005) Paleolimnology of a fluvial lake downstream of Lake Superior and the industrialized region of Sault Saint Marie. *Can. J. Fish. Aquat. Sci.*, **62**, 2586–2608.

Reyss, J.L., **Mangeret, A.**, **Courbet, C.**, **Bassot, S.**, **Alcalde, G.**, **Thouvenot, A.** and **Guillevic, J.** (2016) Estimation of sedimentation rates based on the excess of radium 228 in granitic reservoir sediments. *J. Environ. Radioact.*, **162–163**, 8–13.

1720 **Ribeiro Guevara, S.**, **Rizzo, A.**, **Sánchez, R.** and **Arribére, M.** (2003) 210Pb fluxes in sediment layers sampled from Northern Patagonia lakes. *J. Radioanal. Nucl. Chem.*, **258**, 583–595.

Richardson, K.N.D., **Hatten, J.A.** and **Wheatcroft, R.A.** (2018) 1500 years of lake sedimentation due to fire, earthquakes, floods and land clearance in the Oregon Coast Range: geomorphic sensitivity to floods during timber harvest period. *Earth Surf. Process. Landforms*, **43**, 1496–1517.

1725 **Rizzo, S.**, **Basile, S.**, **Caruso, A.**, **Cosentino, C.**, **Tranchina, L.** and **Brai, M.** (2009) Dating of a sediment core by 210Pbex method and Pb pollution chronology in the Palermo Gulf (Italy). *Water. Air. Soil Pollut.*, **202**, 109–120.

Robbins, J.A., **Edgington, D.N.** and **Kemp, A.L.W.** (1978) Comparative 210Pb, 137Cs, and pollen geochronologies of sediments from Lakes Ontario and Erie. *Quat. Res.*, **10**, 256–278.

1730 **Robbins, J.A.**, **Krezoski, J.R.** and **Mozley, S.C.** (1977) Radioactivity in sediments of the Great Lakes: Post-depositional redistribution by deposit-feeding organisms. *Earth Planet. Sci. Lett.*, **36**, 325–333.

Robbins, J.A. and Jasinski, A.W. (1995) Chernobyl fallout radionuclides in Lake Sniardwy, Poland. *J. Environ. Radioact.*, **26**, 157–184.

1735   Romano, E., Bergamin, L., Croudace, I.W., Ausili, A., Maggi, C. and Gabellini, M. (2015) Establishing geochemical background levels of selected trace elements in areas having geochemical anomalies: The case study of the Orbetello lagoon (Tuscany, Italy). *Environ. Pollut.*, **202**, 96–103.

Rosen, M.R. and Van Metre, P.C. (2010) Assessment of multiple sources of anthropogenic and natural chemical inputs to a morphologically complex basin, Lake Mead, USA. *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, **294**, 30–43.

1740   Rostan, J.C., Juget, J. and Brun, A.M. (1997) Sedimentation rates measurements in former channels of the upper Rhone river using Chernobyl 137Cs and 134Cs as tracers. *Sci. Total Environ.*, **193**, 251–262.

Rowell, H.C., Bopp, R.F., Peng, F., Velinsky, D.J. and Bloomfield, J.A. (2015) Annually laminated sediments from Onondaga Lake, New York (USA) provide a basis for high-resolution studies of lake degradation and recovery. *J. Paleolimnol.*, **53**, 107–121.

1745   Rowell, H.C., Bopp, R.F., Peng, F., Velinsky, D.J. and Bloomfield, J.A. (2015) Annually laminated sediments from Onondaga Lake, New York (USA) provide a basis for high-resolution studies of lake degradation and recovery. *J. Paleolimnol.*, **53**, 107–121.

Ruiz-Fernández, A.C., Hillaire-Marcel, C., de Vernal, A., Machain-Castillo, M.L., Vásquez, L., Ghaleb, B., Aspiazu-Fabián, J.A. and Páez-Osuna, F. (2009) Changes of coastal sedimentation in the Gulf of
1750   Tehuantepec, South Pacific Mexico, over the last 100 years from short-lived radionuclide measurements. *Estuar. Coast. Shelf Sci.*, **82**, 525–536.

Ruiz-Fernandez, A.C., Hillaire-Marcel, C., Ghaleb, B., Paez-Osuna, F. and Soto-Jimenez, M. (2001) Isotopic constraints (210Pb, 228Th) on the sedimentary dynamics of contaminated sediments from a subtropical coastal lagoon (NW Mexico). *Environ. Geol.*, **41**, 74–89.

1755   Ruiz-Fernández, A.C., Páez-Osuna, F., Urrutia-Fucugauchi, J. and Preda, M. (2005) 210Pb geochronology of sediment accumulation rates in Mexico City Metropolitan Zone as recorded at Espejo de los Lirios lake sediments. *Catena*, **61**, 31–48.

Ruiz-Fernandez, A.C. (2014) Chronology of recent sedimentation and geochemical characteristics of sediments in Alvarado Lagoon, Veracruz (southwestern gulf of Mexico). *Ciencias Mar.*, **40**, 291–303.

1760   Ruiz-Fernández, A.C., Maanan, M., Sanchez-Cabeza, J.A., Bernal, L.H.P., Mendoza, P.L. and Limoges, A. (2014) Cronología de la sedimentación reciente y caracterización geoquímica de los sedimentos de la laguna de Alvarado, Veracruz (suroeste del golfo de México). *Ciencias Mar.*, **40**, 291–303.

Sabatier, P., Dezileau, L., Blanchemanche, P., Siani, G., Condomines, M., Bentaleb, I. and Piquès, G. (2010) Holocene variations of radiocarbon reservoir ages in a mediterranean lagoonal system.
1765   *Radiocarbon*, **52**, 91–102.

Sabatier, P., Poulenard, J., Fanget, B., Reyss, J.-L., Develle, A.-L., Wilhelm, B., Ployon, E., Pignol, C., Naffrechoux, E., Dorioz, J.-M., Montuelle, B. and Arnaud, F. (2014) Long-term relationships among pesticide applications, mobility, and soil erosion in a vineyard watershed. *Proc. Natl. Acad. Sci.*, **111**, 15647–15652.

1770   Sabatier, P., Dezileau, L., Condomines, M., Briqueu, L., Colin, C., Bouchette, F., Le Duff, M. and Blanchemanche, P. (2008) Reconstruction of paleostorm events in a coastal lagoon (Hérault, South of France). *Mar. Geol.*, **251**, 224–232.

Sanada, Y., **Matsunaga, T.**, **Yanase, N.**, **Nagao, S.**, **Amano, H.**, **Takada, H.** and **Tkachenko, Y.** (2002) Accumulation and potential dissolution of Chernobyl-derived radionuclides in river bottom sediment. *Appl. Radiat. Isot.*, **56**, 751–760.

Sanchez-Cabeza, J.A., **Masqué, P.**, **Ani-Ragolta, I.**, **Merino, J.**, **Frignani, M.**, **Alvisi, F.**, **Palanques, A.** and **Puig, P.** (1999) Sediment accumulation rates in the southern Barcelona continental margin (NW Mediterranean Sea) derived from 210Pb and 137Cs chronology. *Prog. Oceanogr.*, **44**, 313–332.

Sanders, C.J., **Santos, I.R.**, **Patchineelam, S.R.**, **Schaefer, C.** and **Silva-Filho, E. V.** (2010) Recent 137Cs deposition in sediments of Admiralty Bay, Antarctica. *J. Environ. Radioact.*, **101**, 421–424.

Sanders, C.J., **Santos, I.R.**, **Silva-Filho, E. V.** and **Patchineelam, S.R.** (2006) Mercury flux to estuarine sediments, derived from Pb-210 and Cs-137 geochronologies (Guaratuba Bay, Brazil). *Mar. Pollut. Bull.*, **52**, 1085–1089.

Sanders, G., **Jones, K.C.**, **Hamilton-Taylor, J.** and **Dorr, H.** (1995) PCB and PAH fluxes to a dated UK peat core. *Environ. Pollut.*, **89**, 17–25.

Santschi, P.H., **Allison, M.A.**, **Asbill, S.**, **Perlet, A.B.**, **Cappellino, S.**, **Dobbs, C.** and **McShea, L.** (1999) Sediment Transport and Hg Recovery in Lavaca Bay, as Evaluated from Radionuclide and Hg Distributions. *Environ. Sci. Technol.*, **33**, 378–391.

Santschi, P.H., **Yeager, K.M.**, **Schwehr, K.A.** and **Schindler, K.J.** (2017) Estimates of recovery of the Penobscot River and estuarine system from mercury contamination in the 1960's. *Sci. Total Environ.*, **596–597**, 351–359.

Santschi, P.H., **Guo, L.**, **Asbill, S.**, **Allison, M.**, **Britt Kepple, A.** and **Wen, L.-S.** (2001) Accumulation rates and sources of sediments and organic carbon on the Palos Verdes shelf based on radioisotopic tracers (137Cs, 239,240Pu, 210Pb, 234Th, 238U and 14C). *Mar. Chem.*, **73**, 125–152.

Sarı, E., **Çağatay, M.N.**, **Acar, D.**, **Belivermiş, M.**, **Kılıç, Ö.**, **Arslan, T.N.**, **Tutay, A.**, **Kurt, M.A.** and **Sezer, N.** (2018) Geochronology and sources of heavy metal pollution in sediments of Istanbul Strait (Bosporus) outlet area, SW Black Sea, Turkey. *Chemosphere*, **205**, 387–395.

Sayer, C., **Roberts, N.**, **Sadler, J.**, **David, C.** and **Wade, P.M.** (1999) Biodiversity changes in a shallow lake ecosystem: A multi-proxy palaeolimnological analysis. *J. Biogeogr.*, **26**, 97–114.

Sayles, F.L., **Livingston, H.D.** and **Panteleyev, G.P.** (1997) The history and source of particulate 137Cs and 239,240Pu deposition in sediments of the Ob River Delta, Siberia. In: *Science of the Total Environment*, 202, 25–41.

Schell, W.R., **Tobin, M.J.**, **Novak, M.J.V.**, **Wieder, R.K.** and **Mitchell, P.I.** (1997) Deposition history of trace metals and fallout radionuclides in wetland ecosystems using 210Pb chronology. *Water. Air. Soil Pollut.*, **100**, 233–239.

Schertz, M., **Michel, H.**, **Barci-Funel, G.** and **Barci, V.** (2006) Transuranic and fission product contamination in lake sediments from an alpine wetland, Boréon (France). In: *Journal of Environmental Radioactivity*, 85, 380–388.

Schindler, M. and **Kamber, B.S.** (2013) High-resolution lake sediment reconstruction of industrial impact in a world-class mining and smelting center, Sudbury, Ontario, Canada. *Appl. Geochemistry*, **37**, 102–116.

Schmengler, A.C. and **Vlek, P.L.G.** (2015) Assessment of accumulation rates in small reservoirs by core analysis, 137Cs measurements and bathymetric mapping in Burkina Faso. *Earth Surf. Process. Landforms*, **40**, 1951–1963.

1815   Schneider, L., Maher, W., Potts, J., Batley, G., Taylor, A., Krikowa, F., Chariton, A., Zawadzki, A., Heijnis, H. and Gruber, B. (2015) History of metal contamination in Lake Illawarra, NSW, Australia. *Chemosphere*, **119**, 377–386.

Schneider, L., Maher, W., Potts, J., Gruber, B., Batley, G., Taylor, A., Chariton, A., Krikowa, F., Zawadzki, A. and Heijnis, H. (2014) Recent history of sediment metal contamination in Lake Macquarie, Australia, and an assessment of ash handling procedure effectiveness in mitigating metal contamination 1820   from coal-fired power stations. *Sci. Total Environ.*, **490**, 659–670.

Schuh, C.E., Jamieson, H.E., Palmer, M.J. and Martin, A.J. (2018) Solid-phase speciation and post-depositional mobility of arsenic in lake sediments impacted by ore roasting at legacy gold mines in the Yellowknife area, Northwest Territories, Canada. *Appl. Geochemistry*, **91**, 208–220.

Schwab, M.J., Werner, P., Dulski, P., McGee, E., Nowaczyk, N.R., Bertrand, S. and Leroy, S.A.G. (2009) 1825   Palaeolimnology of Lake Sapanca and identification of historic earthquake signals, Northern Anatolian Fault Zone (Turkey). *Quat. Sci. Rev.*, **28**, 991–1005.

Sedláček, J., Bábek, O. and Kielar, O. (2016) Sediment accumulation rates and high-resolution stratigraphy of recent fluvial suspension deposits in various fluvial settings, Morava River catchment area, Czech Republic. *Geomorphology*, **254**, 73–87.

1830   Seppä, H. (1997) The long-term development of urban vegetation in Helsinki, Finland: A pollen diagram from Töölönlahti. *Veg. Hist. Archaeobot.*, **6**, 91–103.

Sert, I., Ozel, F.E., Yaprak, G. and Eftelioglu, M. (2016) Determination of the latest sediment accumulation rates and pattern by performing 210Pb models and 137Cs technique in the Lake Bafa, Mugla, Turkey. *J. Radioanal. Nucl. Chem.*, **307**, 313–323.

1835   Sharma, P., Gardner, L.R., Moore, W.S. and Bollinger, M.S. (1987) Sedimentation and bioturbation in a salt marsh as revealed by 210Pb, 137Cs, and 7Be studies. *Limnol. Oceanogr.*, **32**, 313–326.

Shen, B., Wu, J. and Jin, M. (2018) Sedimentary polycyclic aromatic hydrocarbons record recent anthropogenic activities near high-elevation Lake Sayram, northwest China. *Limnologica*, **71**, 62–67.

Singhal, R.K., Basu, H., Venkatesh, M., Chavan, T., Reddy, A.V.R., Wagh, D.N. and Pimple, M. V. (2012) 1840   Determination of chronological heavy metal deposition and pollution intensity in the bottom sediments of Mumbai Harbour Bay, India using 137Cs as tracer. *J. Radioanal. Nucl. Chem.*, **292**, 863–869.

Sirocko, F., Dietrich, S., Veres, D., Grootes, P.M., Schaber-Mohr, K., Seelos, K., Nadeau, M.J., Kromer, B., Rothacker, L., Röhner, M., Krbetschek, M., Appleby, P., Hambach, U., Rolf, C., Sudo, M. and Grim, S. (2013) Multi-proxy dating of Holocene maar lakes and Pleistocene dry maar sediments in the 1845   Eifel, Germany. *Quat. Sci. Rev.*, **62**, 56–76.

Small, I.F., Rowan, J.S. and Duck, R.W. (2003) Long-term sediment yield in Crombie Reservoir catchment, Angus; and its regional significance within the Midland Valley of Scotland. *Hydrol. Sci. J.*, **48**, 619–635.

Smith, J.N., Ellis, K.M., Naes, K., Dahle, S. and Matishov, D. (1995) Sedimentation and mixing rates of radionuclides in Barents Sea sediments off Novaya Zemlya. *Deep. Res. Part II*, **42**, 1471–1493.

1850   Smith, J.N., Lee, K., Gobeil, C. and Macdonald, R.W. (2009) Natural rates of sediment containment of PAH, PCB and metal inventories in Sydney Harbour, Nova Scotia. *Sci. Total Environ.*, **407**, 4858–4869.

Snyder, N.P., Wright, S.A., Alpers, C.N., Flint, L.E., Holmes, C.W. and Rubin, D.M. (2006) Reconstructing depositional processes and history from reservoir stratigraphy: Englebright Lake, Yuba River, northern California. *J. Geophys. Res.*, **111**, F04003.

1855 **Sobocinski, R.W.** (1990) Sediment transport in a small stream based on 137 Cs inventories of the bedload fraction. *Water Resour. Res.*, **26**, 1177–1187.

Somayajulu, B.L.K., **Bhushan, R.**, **Sarkar, A.**, **Burr, G.S.** and **Jull, A.J.T.** (1999) Sediment deposition rates on the continental margins of the eastern Arabian Sea using 210Pb, 137Cs and 14C. In: *Science of the Total Environment*, 237–238, 429–439.

1860 **Sonke, J.E.**, **Burnett, W.C.**, **Hoogewerff, J.A.**, **Van Der Laan, S.R.**, **Vangronsveld, J.** and **Corbett, D.R.** (2003) Reconstructing 20th century lead pollution and sediment focusing in a peat land pool (Kempen, Belgium), via 210Pb dating. *J. Paleolimnol.*, **29**, 95–107.

Soster, F.M., **Matisoff, G.**, **Whiting, P.J.**, **Fornes, W.**, **Ketterer, M.** and **Szechenyi, S.** (2007) Floodplain sedimentation rates in an alpine watershed determined by radionuclide techniques. *Earth Surf. Process.* 1865 *Landforms*, **32**, 2038–2051.

Standring, W.J.F., **Brown, J.E.**, **Dowdall, M.**, **Korobova, E.M.**, **Linnik, V.G.** and **Volosov, A.G.** (2009) Vertical distribution of anthropogenic radionuclides in cores from contaminated floodplains of the Yenisey River. *J. Environ. Radioact.*, **100**, 1109–1120.

Steinberg, C.E.W. and **Högel, H.** (1990) Forms of metals in a sediment core of a severely acidified northern 1870 Black Forest lake. *Chemosphere*, **21**, 201–213.

Stephenson, M., **Klaverkamp, J.**, **Motycka, M.**, **Baron, C.** and **Schwartz, W.** (1996) Coring artifacts and contaminant inventories in lake sediment. J Paleolimnol. doi: 10.1007/BF00176992

Stern, G.A., **Braekevelt, E.**, **Helm, P.A.**, **Bidleman, T.F.**, **Outridge, P.M.**, **Lockhart, W.L.**, **McNeeley, R.**, **Rosenberg, B.**, **Ikonomou, M.G.**, **Hamilton, P.**, **Tomy, G.T.** and **Wilkinson, P.** (2005) Modern and 1875 historical fluxes of halogenated organic contaminants to a lake in the Canadian arctic, as determined from annually laminated sediment cores. *Sci. Total Environ.*, **342**, 223–243.

Stihler, S.D., **Stone, D.B.** and **Beget, J.E.** (1992) "Varve'' counting vs. tephrochronology and 137 Cs and 210 Pb dating: a comparative test at Skilak Lake, Alaska.'' *Geology*, **20**, 1019–1022.

Stiller, M., **Yanaki, N.E.** and **Kronfeld, J.** (1985) Comparative isotope study of two short sediment cores from 1880 the dead sea. *Chem. Geol.*, **58**, 107–119.

Strand, P., **Brown, J.E.**, **Drozhko, E.**, **Mokrov, Y.**, **Salbu, B.**, **Oughton, D.**, **Christensen, G.C.** and **Amundsen, I.** (1999) Biogeochemical behaviour of 137Cs and 90Sr in the artificial reservoirs of Mayak PA, Russia. *Sci. Total Environ.*, **241**, 107–116.

Su, M.C., **Christensen, E.R.**, **Karls, J.F.**, **Kosuru, S.** and **Imamoglu, I.** (2000) Apportionment of polycyclic 1885 aromatic hydrocarbon sources in lower Fox River, USA, sediments by a chemical mass balance model. *Environ. Toxicol. Chem.*, **19**, 1481–1490.

Su, M.-C., **Christensen, E.R.** and **Karls, J.F.** (1998) Determination of PAH sources in dated sediments from Green Bay, Wisconsin, by a chemical mass balance model. *Environ. Pollut.*, **99**, 411–419.

Sugai, S.F. (1990) Transport and sediment accumulation of210Pb and137Cs in two Southeast Alaskan fjords. 1890 *Estuaries*, **13**, 380–392.

Sun, L., **Zang, S.Y.** and **Sun, H.J.** (2014) Sources and history of PAHs in lake sediments from oil-producing and industrial areas, northeast China. *Int. J. Environ. Sci. Technol.*, **11**, 2051–2060.

Sun, L. and **Zang, S.** (2012) History of fuel consumption inferred from polycyclic aromatic hydrocarbons in sediments from the South Lianhuan Lake, Northeast China. Bull. Environ. Contam. Toxicol. 88:1027– 1895 1032.

Sun, L., **Zang, S.** and **Xiao, H.** (2011) Historical record and source apportionment of polycyclic aromatic hydrocarbons in the Lianhuan Lake sediments. *Ecotoxicology*, **20**, 951–958.

Sun, P., **Xie, B.**, **Song, Y.**, **Yang, H.** and **Wang, Y.** (2017) Historical Trends of Polycyclic Aromatic Hydrocarbons in the Reservoir Sediment of the Dianchi Watershed, Southwest China. *Bull. Environ. Contam. Toxicol.*, **99**, 117–124.

Sun, Q., **Liu, D.**, **Liu, T.**, **Di, B.** and **Wu, F.** (2012) Temporal and spatial distribution of trace metals in sediments from the northern Yellow Sea coast, China: Implications for regional anthropogenic processes. *Environ. Earth Sci.*, **66**, 697–705.

Sun, W., **Shen, J.**, **Zhang, E.**, **Hasebe, N.**, **Kashiwaya, K.**, **Chen, R.** and **Itono, T.** (2016) Stable nitrogen isotope record of lacustrine sediments in Lake Onuma (Northern Japan) indicates regional hydrological variability during the past four centuries. *Quat. Int.*, **397**, 307–316.

Suplińska, M.M. (2002) Vertical distribution of 137Cs, 210Pb, 226Ra and 239,240Pu in bottom sediments from the Southern Baltic Sea in the years 1998-2000. In: *Nukleonika*,

Swales, A., **Denys, P.**, **Pickett, V.I.** and **Lovelock, C.E.** (2016) Evaluating deep subsidence in a rapidly-accreting mangrove forest using GPS monitoring of surface-elevation benchmarks and sedimentary records. *Mar. Geol.*, **380**, 205–218.

Swales, A., **Williamson, R.B.**, **Van Dam, L.F.**, **Stroud, M.J.** and **McGlone, M.S.** (2002) Reconstruction of urban stormwater contamination of an estuary using catchment history and sediment profile dating. *Estuaries*, **25**, 43–56.

Swan, D.S., **Baxter, M.S.**, **McKinley, I.G.** and **Jack, W.** (1982) Radiocaesium and 210Pb in Clyde sea loch sediments. *Estuar. Coast. Shelf Sci.*, **15**, 515–536.

Swindles, G.T., **Galloway, J.M.**, **Macumber, A.L.**, **Croudace, I.W.**, **Emery, A.R.**, **Woulds, C.**, **Bateman, M.D.**, **Parry, L.**, **Jones, J.M.**, **Selby, K.**, **Rushby, G.T.**, **Baird, A.J.**, **Woodroffe, S.A.** and **Barlow, N.L.M.** (2018) Sedimentary records of coastal storm surges: Evidence of the 1953 North Sea event. *Mar. Geol.*, **403**, 262–270.

Szarlowicz, K. and **Kubica, B.** (2014) 137Cs and 210Pb radionuclides in open and closed water ecosystems. *J. Radioanal. Nucl. Chem.*, **299**, 1321–1328.

Tamburrino, S., **Passaro, S.**, **Barsanti, M.**, **Schirone, A.**, **Delbono, I.**, **Conte, F.**, **Delfanti, R.**, **Bonsignore, M.**, **Del Core, M.**, **Gherardi, S.** and **Sprovieri, M.** (2019) Pathways of inorganic and organic contaminants from land to deep sea: The case study of the Gulf of Cagliari (W Tyrrhenian Sea). *Sci. Total Environ.*, **647**, 334–341.

Tamtam, F., **Le Bot, B.**, **Dinh, T.**, **Mompelat, S.**, **Eurin, J.**, **Chevreuil, M.**, **Bonté, P.**, **Mouchel, J.M.** and **Ayrault, S.** (2011) A 50-year record of quinolone and sulphonamide antimicrobial agents in Seine River sediments. *J. Soils Sediments*, **11**, 852–859.

Taricco, C., **Alessio, S.**, **Rubinetti, S.**, **Vivaldo, G.** and **Mancuso, S.** (2016) A foraminiferal δ18O record covering the last 2,200 years. Sci Data. doi: 10.1038/sdata.2016.42

Teasdale, P.A., **Collins, P.E.F.**, **Firth, C.R.** and **Cundy, A.B.** (2011) Recent estuarine sedimentation rates from shallow inter-tidal environments in western Scotland: Implications for future sea-level trends and coastal wetland development. *Quat. Sci. Rev.*, **30**, 109–129.

Tessler, M.G., **Figueira, R.C.L.**, **Mahiques, M.M.**, **Fukumoto, M.M.** and **Ciapina, E.M.P.** (2004) Sedimentation rates and contamination levels by heavy metals at the shallow sedimentary columns from Santos estuary and bay, SP, Brazil.

Thevenon, F., Alencastro, L.F. de, **Loizeau, J.-L.**, Adatte, T., **Grandjean, D.**, **Wildi, W.** and **Poté, J.** (2013) A high-resolution historical sediment record of nutrients, trace elements and organochlorines (DDT and PCB) deposition in a drinking water reservoir (Lake Brêt, Switzerland) points at local and regional pollutant sources. *Chemosphere*, **90**, 2444–2452.

Thiebault, T., **Chassiot, L.**, **Fougère, L.**, **Destandau, E.**, **Simonneau, A.**, **Van Beek, P.**, **Souhaut, M.** and **Chapron, E.** (2017) Record of pharmaceutical products in river sediments: A powerful tool to assess the environmental impact of urban management? *Anthropocene*, **18**, 47–56.

Thomas, M., **Petit, D.** and **Lamberts, L.** (1984) Pond sediments as historical record of heavy metals fallout. *Water. Air. Soil Pollut.*, **23**, 51–59.

Tolkkinen, M., **Marttila, H.**, **Saukkoriipi, J.**, **Martinmäki, K.**, **Tammela, S.**, **Tertsunen, J.**, **Heikkinen, K.**, **Tuohino, J.**, **Ihme, R.** and **Klöve, B.** (2014) PH-levels in intensively drained and peatland-dominated river basin: Paleolimnological approach to detect impacts of past land use. *Ecol. Eng.*, **64**, 367–376.

Tomy, G.T., **Stern, G.A.**, **Lockhart, W.L.** and **Muir, D.C.G.** (1999) Occurrence of C10-C13 polychlorinated n-alkanes in Canadian midlatitude and Arctic lake sediments. *Environ. Sci. Technol.*, **33**, 2858–2863.

Trabelsi, Y., **Gharbi, F.**, **El Ghali, A.**, **Oueslati, M.**, **Samaali, M.**, **Abdelli, W.**, **Baccouche, S.**, **Tekaya, M. Ben**, **Benmansour, M.**, **Mabit, L.**, **M'Barek, N. Ben**, **Reguigui, N.** and **Abril, J.M.** (2012) Recent sedimentation rates in Garaet El Ichkeul Lake, NW Tunisia, as affected by the construction of dams and a regulatory sluice. *J. Soils Sediments*, **12**, 784–796.

Trefry, J.H., **Trocine, R.P.**, **Cooper, L.W.** and **Dunton, K.H.** (2014) Trace metals and organic carbon in sediments of the northeastern Chukchi Sea. *Deep. Res. Part II Top. Stud. Oceanogr.*, **102**, 18–31.

Tsabaris, C., **Patiris, D.L.**, **Fillis-Tsirakis, E.**, **Kapsimalis, V.**, **Pilakouta, M.**, **Pappa, F.K.** and **Vlastou, R.** (2015) Vertical distribution of 137Cs activity concentration in marine sediments at Amvrakikos Gulf, western of Greece. *J. Environ. Radioact.*, **144**, 1–8.

Tsuji, H., **Tanaka, A.**, **Komatsu, K.**, **Kohzu, A.**, **Matsuzaki, S. ichiro S.** and **Hayashi, S.** (2019) Vertical/spatial movement and accumulation of 137 Cs in a shallow lake in the initial phase after the Fukushima Daiichi nuclear power plant accident. *Appl. Radiat. Isot.*, **147**, 59–69.

Tylmann, W., **Enters, D.**, **Kinder, M.**, **Moska, P.**, **Ohlendorf, C.**, **Poreba, G.** and **Zolitschka, B.** (2013) Multiple dating of varved sediments from Lake Łazduny, northern Poland: Toward an improved chronology for the last 150 years. *Quat. Geochronol.*, **15**, 98–107.

Ueda, S., **Ohtsuka, Y.** and **Kondo, K.** (2004) Inventories of 239+240Pu, 137Cs, and excess 210Pb in sediment cores from brackish Lake Obuchi, Rokkasho Village, Japan. *J. Radioanal. Nucl. Chem.*, **261**, 277–282.

Ueda, S., **Ohtsuka, Y.**, **Kondo, K.** and **Inaba, J.** (2005) Sedimentation rate in brackish Lake Obuchi, Rokkasho Village, Japan, bordered by nuclear fuel cycle facilities. *J. Radioanal. Nucl. Chem.*, **264**, 343–349.

Ugur, A., **Miquel, J.C.**, **Fowler, S.W.** and **Appleby, P.** (2003) Radiometric dating of sediment cores from a hydrothermal vent zone off Milos Island in the Aegean Sea. *Sci. Total Environ.*, **307**, 203–214.

Ünlü, S. and **Alpar, B.** (2018) Ecological Risk Assessment of HCH and DDT Residues in a Sediment Core from the Küçükçekmece Lagoon, Turkey. *Bull. Environ. Contam. Toxicol.*, **101**, 358–364.

Usenko, S., **Landers, D.H.**, **Appleby, P.G.** and **Simonich, S.L.** (2007) Current and Historical Deposition of PBDEs, Pesticides, PCBs, and PAHs to Rocky Mountain National Park. *Environ. Sci. Technol.* **41**, 7235–7241.

Van Geen, A. and **Luoma, S.N.** (1999) The impact of human activities on sediments of San Francisco Bay, California: An overview. *Mar. Chem.*, **64**, 1–6.

1980   **Van Metre, P.C.**, **Callender, E.** and **Fuller, C.C.** (1997) Historical trends in organochlorine compounds in river basins identified using sediment cores from reservoirs. *Environ. Sci. Technol.*, **31**, 2339–2344.

Van Metre, P.C., **Wilson, J.T.**, **Callender, E.** and **Fuller, C.C.** (1998) Similar rates of decrease of persistent, hydrophobic and particle- reactive contaminants in riverine systems. *Environ. Sci. Technol.*, **32**, 3312–3317.

1985   **Vance, D.J.**, **Culver, S.J.**, **Corbett, D.R.** and **Buzas, M.A.** (2006) Foraminifera in the Albemarle Estuarine system, North Carolina: Distribution and recent environmental change. *J. Foraminifer. Res.*, **36**, 15–33.

Vane, C.H., **Kim, A.W.**, **McGowan, S.**, **Leng, M.J.**, **Heaton, T.H.E.**, **Kendrick, C.P.**, **Coombs, P.**, **Yang, H.** and **Swann, G.E.A.** (2010) Sedimentary records of sewage pollution using faecal markers in contrasting peri-urban shallow lakes. *Sci. Total Environ.*, **409**, 345–356.

1990   **Vanier, C.**, **Sylvestre, M.** and **Planas, D.** (1996) Persistence and fate of PCBs in sediments of the Saint Lawrence River. *Sci. Total Environ.*, **192**, 229–244.

Varley, A., **Tyler, A.**, **Bondar, Y.**, **Hosseini, A.**, **Zabrotski, V.** and **Dowdall, M.** (2018) Reconstructing the deposition environment and long-term fate of Chernobyl 137Cs at the floodplain scale through mobile gamma spectrometry. *Environ. Pollut.*, **240**, 191–199.

1995   **Viel, M.**, **Barbanti, A.**, **Langone, L.**, **Buffoni, G.**, **Paltrinieri, D.** and **Rosso, G.** (1991) Nutrient profiles in the pore water of a deltaic lagoon: Methodological considerations and evaluation of benthic fluxes. *Estuar. Coast. Shelf Sci.*, **33**, 361–382.

Viguri, J.R., **Irabien, M.J.**, **Yusta, I.**, **Soto, J.**, **Gómez, J.**, **Rodriguez, P.**, **Martinez-Madrid, M.**, **Irabien, J.A.** and **Coz, A.** (2007) Physico-chemical and toxicological characterization of the historic estuarine sediments: A multidisciplinary approach. *Environ. Int.*, **33**, 436–444.

2000   **Villa-Alfageme, M.**, **Chamizo, E.**, **Santos-Arévalo, F.J.**, **López-Gutierrez, J.M.**, **Gómez-Martínez, I.** and **Hurtado-Bermúdez, S.** (2018) Natural and artificial radionuclides in a marine core. First results of 236U in North Atlantic Ocean sediments. *J. Environ. Radioact.*, **186**, 152–160.

Virkanen, J. (1998) Effect of urbanization on metal deposition in the Bay of Toolonlahti, Southern Finland. *Mar. Pollut. Bull.*, **36**, 729–738.

2005   **Von Gunten, H.R.**, **Sturm, M.** and **Moser, R.N.** (1997) 200-year record of metals in lake sediments and natural background concentrations. *Environ. Sci. Technol.*, **31**, 2193–2197.

Vrel, A., **Boust, D.**, **Lesueur, P.**, **Deloffre, J.**, **Dubrulle-Brunaud, C.**, **Solier, L.**, **Rozet, M.**, **Thouroude, C.**, **Cossonnet, C.** and **Thomas, S.** (2013) Dating of sediment record at two contrasting sites of the Seine River using radioactivity data and hydrological time series. *J. Environ. Radioact.*, **126**, 20–31.

2010   **Zhang, H.**, **Shan, B.**, **Ao, L.**, **Tang, W.** and **Wen, S.** (2014) Past atmospheric trace metal deposition in a remote lake (Lake Ngoring) at the headwater areas of Yellow River, Tibetan Plateau. *Environ. Earth Sci.*, **72**, 399–406.

Vuorinen, A., **Alhonen, P.** and **Suksi, J.** (1986) Palaeolimnological and limnogeochemical features in the sedimentary record of the polluted Lake Lippajärvi in Southern Finland. *Environ. Pollution. Ser. A, Ecol. Biol.*, **41**, 323–362.

2015   **Wahlen, M.** and **Thompson, R.C.** (1980) Pollution records from sediments of three lakes in New York State. *Geochim. Cosmochim. Acta*, **44**, 333–339.

Walling, D.E. and **He, Q.** (1997) Use of fallout 137Cs in investigations of overbank sediment deposition on river floodplains. *Catena*, **29**, 263–282.

2020

Walling, D.E., **Owens, P.N.** and **Leeks, G.J.L.** (1997) The characteristics of overbank deposits associated with a major flood event in the catchment of the River Ouse, Yorkshire, UK. *Catena*, **31**, 53–75.

Wan Mahmood, Z.U.Y. and **Yii, M.W.** (2013) Sedimentation rate in the Sungai Linggi estuary using excess 210Pb and 137Cs. *J. Radioanal. Nucl. Chem.*, **298**, 1727–1732.

Wang, L., **Hu, S.**, **Ma, M.**, **Wang, X.**, **Wang, Q.**, **Zhang, Z.** and **Shen, J.** (2018) Responses of magnetic properties to heavy metal pollution recorded by lacustrine sediments from the Lugu Lake, Southwest China. *Environ. Sci. Pollut. Res.*, **25**, 26527–26538.

Wang, Q., **Song, J.**, **Li, X.**, **Yuan, H.**, **Li, N.** and **Cao, L.** (2016) Environmental evolution records reflected by radionuclides in the sediment of coastal wetlands: A case study in the Yellow River Estuary wetland. *J. Environ. Radioact.*, **162–163**, 87–96.

Wang, X., **Yang, H.**, **Gu, Z.**, **Zhang, M.** and **Yang, B.** (2018) A century of change in sediment accumulation and trophic status in Lake Fuxian, a deep plateau lake of Southwestern China. *J. Soils Sediments*, **18**, 1133–1146.

Ward, R.D., **Teasdale, P.A.**, **Burnside, N.G.**, **Joyce, C.B.** and **Sepp, K.** (2014) Recent rates of sedimentation on irregularly flooded Boreal Baltic coastal wetlands: Responses to recent changes in sea level. *Geomorphology*, **217**, 61–72.

Weis, P., **Barrett, K.R.**, **Proctor, T.** and **Bopp, R.F.** (2005) Studies of a contaminated brackish marsh in the Hackensack Meadowlands of northeastern New Jersey: An assessment of natural recovery. *Mar. Pollut. Bull.*, **50**, 1405–1415.

Wenning, R.J., **Bonnevie, N.L.** and **Huntley, S.L.** (1994) Accumulation of metals, polychlorinated biphenyls, and polycyclic aromatic hydrocarbons in sediments from the lower Passaic River, New Jersey. *Arch. Environ. Contam. Toxicol.*, **27**, 64–81.

Werritty, A., **Paine, J.L.**, **Macdonald, N.**, **Rowan, J.S.** and **McEwen, L.J.** (2006) Use of multi-proxy flood records to improve estimates of flood risk: Lower River Tay, Scotland. *Catena*, **66**, 107–119.

Wheatcroft, R.A. and **Sommerfield, C.K.** (2005) River sediment flux and shelf sediment accumulation rates on the Pacific Northwest margin. *Cont. Shelf Res.*, **25**, 311–332.

Wihlborg, P. and **Danielsson, Å.** (2006) Half a century of mercury contamination in lake Vänern (Sweden). *Water. Air. Soil Pollut.*, **170**, 285–300.

Whitmore, T.J., **Brenner, M.** and **Schelske, C.L.** (1996) Highly variable sediment distribution in shallow, wind-stressed lakes: A case for sediment-mapping surveys in paleolimnological studies. *J. Paleolimnol.*, **15**, 207–221.

Wilhelm, B., **Arnaud, F.**, **Enters, D.**, **Allignol, F.**, **Legaz, A.**, **Magand, O.**, **Revillon, S.**, **Giguet-Covex, C.** and **Malet, E.** (2012) Does global warming favour the occurrence of extreme floods in European Alps? First evidences from a NW Alps proglacial lake sediment record. *Clim. Change*, **113**, 563–581.

Williams, H.F.L. (1995) Foraminiferal record of recent environmental change: Mad Island Lake, Texas. *J. Foraminifer. Res.*, **25**, 167–179.

Winter, L.T., **Foster, I.D.L.**, **Charlesworth, S.M.** and **Lees, J.A.** (2001) Floodplain lakes as sinks for sediment-associated contaminants - A new source of proxy hydrological data? In: *Science of the Total Environment*, 266, 187–194.

Wolter, J., **Lantuit, H.**, **Herzschuh, U.**, **Stettner, S.** and **Fritz, M.** (2017) Tundra vegetation stability versus lake-basin variability on the Yukon coastal plain (NW Canada) during the past three centuries. *Holocene*, **27**, 1846–1858.

Woszczyk, M., **Poręba, G.** and **Malinowski, Ł.** (2017) 210Pb, 137Cs and 7Be in the sediments of coastal lakes on the polish coast: Implications for sedimentary processes. *J. Environ. Radioact.*, **169**–**170**, 174–185.

Wren, D.G., **Davidson, G.R.**, **Walker, W.G.** and **Galicki, S.J.** (2008) The evolution of an oxbow lake in the Mississippi alluvial floodplain. *J. Soil Water Conserv.*, **63**, 129–135.

Wright, A.J., **Edwards, R.J.**, **van de Plassche, O.**, **Blaauw, M.**, **Parnell, A.C.**, **van der Borg, K.**, **de Jong, A.F.M.**, **Roe, H.M.**, **Selby, K.** and **Black, S.** (2017) Reconstructing the accumulation history of a saltmarsh sediment core: Which age-depth model is best? *Quat. Geochronol.*, **39**, 35–67.

Wu, F., **Zheng, J.**, **Liao, H.** and **Yamada, M.** (2010) Vertical distributions of plutonium and 137Cs in lacustrine sediments in northwestern china: Quantifying sediment accumulation rates and source identifications. *Environ. Sci. Technol.*, **44**, 2911–2917.

Wu, X., **Bi, N.**, **Kanai, Y.**, **Saito, Y.**, **Zhang, Y.**, **Yang, Z.**, **Fan, D.** and **Wang, H.** (2015) Sedimentary records off the modern Huanghe (Yellow River) delta and their response to deltaic river channel shifts over the last 200 years. *J. Asian Earth Sci.*, **108**, 68–80.

Wunderlin, T., **Corella, J.P.**, **Junier, T.**, **Bueche, M.**, **Loizeau, J.L.**, **Girardclos, S.** and **Junier, P.** (2014) Endospore-forming bacteria as new proxies to assess impact of eutrophication in Lake Geneva (Switzerland-France). *Aquat. Sci.*, **76**, 103–116.

Wurzbacher, C., **Fuchs, A.**, **Attermeyer, K.**, **Frindte, K.**, **Grossart, H.-P.**, **Hupfer, M.**, **Casper, P.** and **Monaghan, M.T.** (2017) Shifts among Eukaryota, Bacteria, and Archaea define the vertical organization of a lake sediment. *Microbiome*, **5**, 41.

Xia, X., **Wu, Q.**, **Zhu, B.**, **Zhao, P.**, **Zhang, S.** and **Yang, L.** (2015) Analyzing the contribution of climate change to long-term variations in sediment nitrogen sources for reservoirs/lakes. *Sci. Total Environ.*, **523**, 64–73.

Xue, B., **Yao, S.** and **Xia, W.** (2007) Environmental changes in Lake Taihu during the past century as recorded in sediment cores. *Hydrobiologia*, **581**, 117–123.

Yan, B., **Abrajano, T.A.**, **Bopp, R.F.**, **Chaky, D.A.**, **Benedict, L.A.** and **Chillrud, S.N.** (2005) Molecular tracers of saturated and polycyclic aromatic hydrocarbon inputs into Central Park Lake, New York City. *Environ. Sci. Technol.*, **39**, 7012–7019.

Yan, D., **Wünnemann, B.**, **Zhang, Y.**, **Long, H.**, **Stauch, G.**, **Sun, Q.** and **Cao, G.** (2018) Response of lake-catchment processes to Holocene climate variability: Evidences from the NE Tibetan Plateau. *Quat. Sci. Rev.*, **201**, 261–279.

Yang, H. and **Turner, S.** (2013) Radiometric dating for recent lake sediments on the Tibetan Plateau. *Hydrobiologia*, **713**, 73–86.

Yang, H., **Nozaki, Y.**, **Sakai, H.**, **Nagaya, Y.** and **Nakamura, K.** (1986) Natural and man-made radionuclide distributions in Northwest Pacific deep-sea sediments: (rates of sedimentation, bioturbation and 226Ra migration). *Geochem. J.*, **20**, 29–40.

Yang, L., **Li, X.**, **Crusius, J.**, **Jans, U.**, **Melcer, M.E.** and **Zhang, P.** (2007) Persistent Chlordane Concentrations in Long Island Sound Sediment: Implications from Chlordane, 210 Pb, and 137 Cs Profiles. *Environ. Sci. Technol.*, **41**, 7723–7729.

Yang, R., **Zhou, R.**, **Xie, T.** and **Jing, C.** (2018) Historical record of anthropogenic polycyclic aromatic hydrocarbons in a lake sediment from the southern Tibetan Plateau. *Environ. Geochem. Health*, **40**, 1899–1906.

Yao, S.C., **Li, S.J.** and **Zhang, H.C.** (2008) 210Pb and 137Cs dating of sediments from Zigetang Lake, Tibetan Plateau. *J. Radioanal. Nucl. Chem.*, **278**, 55–58.

Yao, S., **Xue, B.** and **Kong, D.** (2010) Chronology and nutrients change in recent sediment of Taihu Lake, lower Changjiang River Basin, East China. *Chinese Geogr. Sci.*, **20**, 202–208.

Yeager, K.M., **Schwehr, K.A.**, **Schindler, K.J.** and **Santschi, P.H.** (2018) Sediment accumulation and mixing in the Penobscot River and estuary, Maine. *Sci. Total Environ.*, **635**, 228–239.

Yeloff, D.E., **Labadz, J.C.**, **Hunt, C.O.**, **Higgitt, D.L.** and **Foster, I.D.L.** (2005) Blanket peat erosion and sediment yield in an upland reservoir catchment in the southern Pennines, UK. *Earth Surf. Process. Landforms*, **30**, 717–733.

Young, M., **Murray, J.W.** and **Croudace, I.W.** (1995) Radionuclide dates and foraminiferal accumulation rates: examples from submarine canyons. *Mar. Micropaleontol.*, **26**, 57–63.

Yuan, G.L., **Liu, C.**, **Chen, L.** and **Yang, Z.** (2011) Inputting history of heavy metals into the inland lake recorded in sediment profiles: Poyang Lake in China. *J. Hazard. Mater.*, **185**, 336–345.

Zaborska, A. (2017) Sources of 137Cs to an Arctic fjord (Hornsund, Svalbard). *J. Environ. Radioact.*, **180**, 19–26.

Zamana, L. V., **Ptitsyn, A.B.**, **Chu, G.**, **Reshetova, S.A.**, **Dar'in, A. V.** and **Kalugin, I.A.** (2011) Estimation of modern sedimentation rate in Zun-Torei Lake (East Trans-Baikal Region) by 137Cs. *Dokl. Earth Sci.*, **437**, 335–339.

Zan, F., **Huo, S.**, **Xi, B.**, **Zhang, J.**, **Liao, H.**, **Wang, Y.** and **Yeager, K.M.** (2012) A 60-year sedimentary record of natural and anthropogenic impacts on Lake Chenghai, China. *J. Environ. Sci.*, **24**, 602–609.

ZENG, H.A. and **WU, J.L.** (2009) Sedimentary Records of Heavy Metal Pollution in Fuxian Lake, Yunnan Province, China: Intensity, History, and Sources. *Pedosphere*, **19**, 562–569.

Zhang, X., **Christensen, E.R.** and **Yan, L.Y.** (1993) Fluxes of Polycyclic Aromatic Hydrocarbons to Green Bay and Lake Michigan Sediments. *J. Great Lakes Res.*, **19**, 429–444.

Zhang, Y., **Huo, S.**, **Zan, F.**, **Xi, B.**, **Zhang, J.** and **Wu, F.** (2015) Historical records of multiple heavy metals from dated sediment cores in Lake Chenghai, China. *Environ. Earth Sci.*, **74**, 3897–3906.

Zhang, Y., **Gao, X.**, **Zhong, Z.**, **Chen, J.** and **Peng, B.** (2009) Sediment accumulation of Dianchi Lake determined by 137Cs dating. *J. Geogr. Sci.*, **19**, 225–238.

Zhang, Y., **Liao, J.**, **Long, Y.**, **An, J.**, **Xu, S.** and **Wang, X.** (2018) Dating reservoir deposits to reconstruct sediment yields from a small limestone catchment in the Yimeng Mountain region, China. *Catena*, **166**, 1–9.

Zhou, P., **Li, D.**, **Li, H.**, **Fang, H.**, **Huang, C.**, **Zhang, Y.**, **Zhang, H.**, **Zhao, L.**, **Zhou, J.**, **Wang, H.** and **Yang, J.** (2015) Distribution of radionuclides in a marine sediment core off the waterspout of the nuclear power plants in Daya Bay, northeastern South China Sea. *J. Environ. Radioact.*, **145**, 102–112.

Zhu, L.P., **Zhang, P.Z.**, **Xia, W.L.**, **Li, B.Y.** and **Chen, L.** (2003) 1400-Year cold/warm fluctuations reflected by environmental magnetism of a lake sediment core from the Chen Co, southern Tibet, China. *J. Paleolimnol.*, **29**, 391–401.

Zhuang, Q., **Li, G.**, **Wang, F.**, **Tian, L.**, **Jiang, X.**, **Zhang, K.**, **Liu, G.**, **Pan, S.** and **Liu, Z.** (2019) 137Cs and 239+240Pu in the Bohai Sea of China: Comparison in distribution and source identification between the inner bay and the tidal flat. *Mar. Pollut. Bull.*, **138**, 604–617.

Zong, Y., **Shennan, I.**, **Combellick, R.A.**, **Hamilton, S.L.** and **Rutherford, M.M.** (2003) Microfossil evidence for land movements associated with the AD 1964 Alaska earthquake. *Holocene*, **13**, 7–20.

Zourarah, B., **Maanan, M.**, **Carruesco, C.**, **Aajjane, A.**, **Mehdi, K.** and **Conceição Freitas, M.** (2007) Fifty-year sedimentary record of heavy metal pollution in the lagoon of Oualidia (Moroccan Atlantic coast). *Estuar. Coast. Shelf Sci.*, **72**, 359–369.

Zourarah, B., **Maanan, M.**, **Robin, M.** and **Carruesco, C.** (2009) Sedimentary records of anthropogenic contribution to heavy metal content in Oum Er Bia estuary (Morocco). *Environ. Chem. Lett.*, **7**, 67–78.

Zuo, Z., **Eisma, D.** and **Berger, G.W.** (1989) Recent sediment deposition rates in the oyster ground, North Sea. *Netherlands J. Sea Res.*, **23**, 263–269.

Zuo, Z., **Eisma, D.** and **Berger, G.W.** (1991) Determination of sediment accumulation and mixing rates in the Gulf of Lions, Mediterranean Sea. *Gauthier-Villars*, 253–262 pp.

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