

Review ESSD-2019-224, global water withdrawal

Authors address an interesting global water issue with a potentially useful data product but the products themselves and the presentation in the manuscript fail - by a very long way - to meet ESSD standards.

The Figshare link allows users easy access but the presented data remain almost useless. THE FILES CONTAIN NO METADATA!! A user finds no column headings, no introductory lines (rows) of explanation or attribution, nothing to help the user know what he or she looks at. More information comes from the filename (e.g. Data\_W\_Sources) than from the files themselves. Most folders include only maps, not referenced or sorted except by date. Data availability section in the manuscript (lines 221 to 235) provides only minimal guidance. A large set of guidelines and taxonomies exist for surface water hydrology - the authors have neither used nor referenced any of that. Authors should look at almost any other ESSD product to find very good examples of how to present and record metadata. Not acceptable in present form.

Entire text very weak, disorganized, confusing. This review highlights dozens of issues below. Basically, authors show some skill in mapping and interpolation, but have not shown understanding or skill with data or description to help users. Does not meet standards expected for a top data journal.

Line 29 - "United Nations World Water Development Report 2018": after authors have cited this report once (line 24) they should use a standard acronym. The report itself suggests a proper citation, which these authors should use.

Line 33 - "regularity of water space distribution" - What does this mean? Regularity in time or space? Regularity in classification? This entire introductory paragraph basically repeats the same issues two or three times. Whatever motivation might exist remains hidden by or obscured by random language.

Line 35 - "withdrawal intensity is the main forms of water consumption" - Singular / plural confusion, happens frequently throughout the manuscript, often confuses the reader about what authors intend.

Lines 35 to 48: this entire paragraph reminds user that authors have produced a geographic data product, not a hydrologic data product. But, from the title, authors implied a hydrological product? Authors should make clear their intent, their tools and their skills. This is a GIS / mapping exercise, not an effort to produce a valid global hydrologic data product.

Line 54 - "errors in the statistics and collection of the original water withdrawal data": most users will know that accurate data on water supply or use remains highly restricted and highly distorted by most countries. Here the hydrology / geography confusion arises clearly: what use does a higher spatial resolution product have if the underlying data remain almost completely unreliable. These authors with their spatial

GIS skills never address the fundamental issue of the quality or availability of the basic hydrological data?

Line 56 - “With the reference of the official data available, the accuracy of the data set is sufficient to meet the current research”: yes, the authors can assemble and provide nice maps but the fundamental data remain almost useless.

Line 58 - “products that can reflect the spatial and temporal changes of water withdrawal in the world”: No, strongly disagree. New maps from bad data, not an overall improvement.

Line 60 - “improvement of the accuracy of the original data”: improvement of spatial resolution does not equal improvement of accuracy.

Line 62, Table 1: The FAO data products are notoriously unreliable. Likewise for other UN sources. Chinese sources seem perhaps interesting and useful but authors provide no publications, validations, or reliability analyses?

Lines 64 to 205, Methods: This is basically a GIS, data-filling, data interpolation exercise, to fill in missing national reports and then to fill in spatial gaps. The authors, who may have skill in using these products and tools, give no indication that they understand, much less question, the underlying data. I repeat: better maps of unreliable data do not result in better data.

Lines 175 to 182: Here the authors provide a weak description of GlobeLand30, the Chinese remote sensing product (based on USGS Landsat). No details, no references, no uncertainties, nothing accessible or open access that can convince other users of the quality of this product.

Line 182 - “water is only used on artificial surface and cultivated land”: Reader / user never learns what the authors mean by the term ‘artificial surface’ (reservoir?, impervious urban pavements?, compacted drought-impacted land with high run-off?) but the assumption stated in this phrase is almost certainly false. The authors demonstrate no understanding whatsoever of surface hydrology!

Line 206 and following - Technical validation: Validation consists of comparing their interpolated products to two countries, India and China, for which they have data of higher spatial resolution. But from exactly the same FAO/UN national report source data! How does that represent independent data? Many other data products, including those derived from satellites (e.g LandSat or others), exist, for which these authors could at least construct some intercomparison maps. Not one quantitative assessment (run-off, storage, retention, etc.) in useful hydrological terms anywhere in the entire manuscript. Validation, uncertainty, reliability completely absent.

Line 216 - “dataset derived from the existing water withdrawal data is accurate”  
Authors may believe this, but due to complete ignorance of surface hydrology, reader /

user can only accept that maps might prove faithful to national reports but that underlying data has neither validity nor accuracy. Authors can neither make nor verify any statement about accuracy. Large community of hydrologists sharing data through ESSD will not find this product in any way useful.

Line 237 - “fill the blanks of complete water withdrawal sequence data, enhance the accuracy and spatial variability of water withdrawal data, and can reflect the space-apace changes of water withdrawal.” Complete = no. Accuracy = no. Spatial variability = a product only of their interpolation tools, never verified. Space-apace = ????

Line 270 and following: 13 references, 4 of which represent unreviewed UN or private technical reports. If well and carefully done, a product like this could have reference to dozens of primary and validation sources and to literally hundreds of hydrological and social applications. The authors seem aware of none of that, not even the vast remote sensing or interpolation literature.