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Interactive comment on "Bioavailable Soil and Rock Strontium Isotope Data from Israel" *by* Ian Moffat et al.

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Review of ESSD-2020-162

I thank the authors for submitting and sharing new data which contributes to the increasing world database of Sr isotope data for many applications.

The article overall is somewhat short but well written, and the data generation is well executed. However, in my opinion the discussion (and manuscript) could be strengthened in a number of ways: for example, by including the data in line 85 and 98, and/or by including the data from the literature in new combined maps and graphs.

Regarding the abstract: in the first line the surprising and rather concerning statement is made that bones and teeth are made of biogenic carbonate. Although animal and

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Discussion paper

human bone and teeth have some carbonate (for most around 4%) the majority of bone and teeth is made of bio-apatite which is a calcium phosphate mineral and Sr exchanges with Ca in either the phosphate or minor carbonate.

Regarding the sampling; it would help if the authors could clarify how soil and rock samples were taken at each site. Was it just a single soil and single rock sample at each site? Were replicate samples taken? If so, what was the variation at one soil/rock site? Was the soil sample a composite of a square meter or something else? This is important in relation to the spread of values observed in figure 4 to determine if the observed variation is very local or characteristic for a whole lithology. The choice of sampling sites is also not properly explained. Is this to fill in gaps from the literature or are the sites chosen for representative lithology or convenience? The maps would benefit from showing the locations of previous literature sampling points. What is also missing is a description of the mineralogy of at least the rock samples, and evidence that confirms that the collected rock samples match the expectation from the lithological map mentioned.

Regarding the results: when reporting scientific results, one should always consider the number of significant figures. In the text it is not clear what the quoted uncertainties entail, presumably single standard deviations of a single measurement (although figure 4 mentions 2sd) ? If so, proper reporting of the for example a value of 0.710199 $\pm$ 0.000034 should be as 0.71020 $\pm$ 0.00003. The reporting of extremely "precise" numbers for Sr isotopes in soil samples suggest very well constraint values in the field, but proper analyses of replicates mostly shows the real variation in the field to be in the 3rd decimal of Sr isotopes. This is extremely important in forensic applications as to over-estimate precision (and accuracy) might lead to wrongful conclusions.

Line 98: mentions that also elemental analysis was performed. Why has that data not been used in the discussion of the data? It might elucidate important processes like the mentioned influences of seaspray and dust? Same for data mentioned in line 85. Using this data like the pH would probably strengthen the discussion.

Line 110: It is custom to mention the value of SRM987 during the measurement period and explain if any normalization was applied?

Line 117: Figure 3 does not really show statistical “correlations” with lithology. The graph assumes a high familiarity of the reader with Sr isotope systematics, which is unfair on others, thus the text should explain why a trained isotope geochemist “sees” some confirmation of expectations related to lithology and/or geological age. Has whole rock/soil XRF analysis been performed on the samples? This would help to better define the lithology.

Line 129: significant figures?

Line 138: The text refers to “error”, but what error is meant here. As alluded to above there is a major difference between instrument or method error versus variation in the or a field. It would be very helpful to know what the variation was in either soil or rock at any of the sites. Previous work, using large amount of replicates within a lithology, (see Voerkelius et al) has shown that the variation of Sr isotope in a local lithology is much bigger than the analytical variation.

Line 140-148: Interesting mention of the variability of the dust input but how stable is the Sr isotope signal on an annual basis (food authentication of forensics) or on an archeological time scale? Would be interesting to get the authors opinion about that. In addition, it would be good to try to get a better hold on the reason behind the “offset”. The authors already mention seaspray and dust, but a third component could be irrigation, which in many parts of Israel is water from Yam Kinneret and piped around the country. Noting that water from Yam Kinneret has shown stable isotope fractionation of Sr isotopes (see literature DOI: 10.1016/j.gca.2017.07.026) so it could give an extra marker for irrigation water contribution. Noting that the authors bracketed their measurements on the Neptune with ample standards they might be able to recover 88Sr/86Sr data from the soil measurements. Worth a try!

Line 155-185; please round the Sr isotope figures to max 4 decimals as due the limited

sample numbers the present numbers are again over-representing the accuracy

Line 194-195: The conclusion statement that the dataset is “comprehensive” is debatable as only 40 sites were sampled (on average one sample per ∼550km2), and the sampling map clearly show large gaps. But it is a good start and complements other work. In addition, it would be good to investigate more what is the reason for the “offset”

Figure 1 and 2: What is the rationale behind the cut of levels for the colors? Other authors have used “packages” or deciles. Maybe it would be beneficial to add sampling points from the other discussed literature sources? Why is a satellite image used and not the geological/lithological map of Israel, as that would relate more to the choice of sites?

Figure 3: please add “n” numbers of samples in each lithology. Is it really 2 for granite? If so the box and whisker is very tentative, probably too tentative to present. A box and whisker plot gives information about quartiles and one could argue that that at least ∼7 observations would be a minimum to make any statements a such.

Figure 4: errors bars not visible. What 2sd values were use? Instrument sd’s? or method sd’s.

Table 2: best to report only significant figures.

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