Earth Surf. Dynam. Discuss.,
https://doi.org/10.5194/esurf-2019-54-AC3, 2019

Earth Surface Dynamics Discussions

Interactive comment on "Early–mid Miocene erosion rates measured in pre-Dead Sea rift Hazeva River using cosmogenic ^{21}Ne in fluvial chert pebbles" *by* Michal Ben-Israel et al.

Michal Ben-Israel et al.

michal.benisrael@mail.huji.ac.il

Received and published: 21 November 2019

We thank Dr. Tremblay for her time and for the constructive comments and her insightful review. We have incorporated many of the suggested changes and modified the manuscript to address the concerns raised. Of the major comments made, some have been addressed on our response to the first reviewer (Taylor Schildgen), and we include our responses to these concerns below.

The first major concern is regarding the calculation and interpretation of the reported erosion rates and more specifically, suggesting that the elevation used (∼1 km) is not representative and a catchment-integrated value should be used for calculations of

erosion rates. This is a very good point and incorporating this with the comment made by the first reviewer, we now consider a range of possible elevations between 500-1000 m and the ensuing production and erosion rates. We will alter the discussion, conclusions, and abstract accordingly in the revised manuscript.

The other major comment is regarding Ne diffusion from the Miocene samples during their burial in the Negev Desert over the past ∼18 Myr. An interesting point is made here both regarding the 'typical grain size' in the chert pebbles and the temperatures reached during their burial in the Negev Desert. While it is very true that air temperatures get very high in the Negev and the temperatures of exposed dark rock (such as cherts) can get up to 60-70°C and very possibly even higher. However, surface heating only effects the few top cm's and the Miocene samples presented in the manuscript were not collected from the surface. Miocene samples are buried continuously bellow tens of meters of sediment so they are not exposed to direct sunlight meaning temperatures are much cooler. In addition, these samples were collected either from an active quarry or from a shielded (and well-shaded) outcrop. We, therefore, have no reason to suspect that any significant diffusion occurred*. We will do our best to explain this point clearly in the revised manuscript.

As for the question raised regarding the chert mineral size diameter, we do not know with certainty whether or by how much the kinetic parameters of chert differ from that the ones measured for quartz. We agree that this point and the possible implications should be further discussed and we intend to do that in the revised manuscript.

Finally, there are several minor comments, edits, and questions. We will address each one in the revised manuscript.

———————————- *Just to show a cool example of surface weathering of chert, I include a photo of a different kind of chert (Upper Cretaceous) that was eroded and deposited in a fluvial terrace sometimes during the Pleistocene (most likely). This chert has been exposed to direct sunlight at the surface and has undergone severe

weathering (see darker fragment in the center of Fig. 1). This chert has nothing to do with the samples presented in the submitted manuscript (!) - it's just a nice example of surface weathering of chert. For comparison, we also attach a photo of Miocene pebbles from Arad Quarry. Notice its pristine condition, this pebble did not experience direct exposure to radiation at the surface (Fig. 2).

Interactive comment on Earth Surf. Dynam. Discuss., https://doi.org/10.5194/esurf-2019-54, 2019.

Fig. 1. Exposed chert from fluvial terrace

Fig. 2. Buried Miocene chert from Arad Quarry