

Interactive comment on “The first luminescence dating of Tibetan glacier basal sediment” by Zhu Zhang et al.

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This is an interesting paper that should eventually be published.

However, the authors could give more thought to the calculation of dose rate and the meaning of the optical age for basal sediment.

The OSL age is the equivalent dose divided by the dose rate. In calculating the OSL age, the authors calculated a lower limit age for dehydrated sediment, containing air in the pore space, and an upper limit age, for hydrated sediment containing water in the pore space. The dose rate is lower for hydrated sediment because water attenuates radiation transfer from grain to grain. The actual sample came from sediment embedded within ice. The authors should calculate a dose rate for the real situation of sediment in ice.

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There are potentially two additional sources of radiation that are not included in the dose rate calculation.

(1) Radiation from the bedrock or subglacial sediment.

(2) Radiation from dust layers in the core.

The authors should add these sources of radiation to the dose rate, or show that they are insignificant. If these other sources are included, the higher radiation dose rate would lower the calculated age.

Finally, I am not sure that the OSL age of the basal sediment directly relates to the age of the ice cap. The authors suggest that the sand-sized quartz grains are sourced from subglacial erosion. If true, it seems likely that some of the silt-sized quartz is also derived from subglacial erosion. Thus, it is conceivable that the dated aliquots are a mixture of eolian quartz and subglacially derived quartz.

If the ice flow at the core site is dominated by downward vertical motion, then the OSL age of the eolian component of the dated aliquots would represent the time for the ice to move from the surface to the bed, not the age of the ice cap itself.

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