**Recalculation of earlier published 36Cl ages**

Original geochemical data were provided by F. Philips or obtained from publications and their supplementary files (Jackson et al., 1997, 1999, 2011). The samples were processed using whole rock analyses—a common, but not ubiquitous approach until the 2000s. One goal was to reduce the data with updated spiking and process blank subtraction (provided by S. Marerro) in order to propagate uncertainty in a uniform manner. Another goal was to recalculate the published 36Cl ages with the latest production rate parameters for 36Cl and a scaling method, the ’LSD time-dependent scaling' (Lifton et al., 2014), which was used for the 10Be chronology in this study. The re-calcuations were conducted with the online 36Cl Exposure Age Calculator version 2.0, on December 18 and 19, 2018 (Marrero, 2016). The difference between the revised 36Cl/ClT concentrations and the published ones is small (mostly less than 2%). In some instances data were not available. We used the published or otherwise provided cosmic radiation shielding factors (average 0.99). We used the published or otherwise provided elemental abundances. In instances where the values of all oxides did not total 100%, the difference in the age was negligible. For Cr and Li concentrations which were not measured, we assumed zero ppm. In instances where analytical water weight percent or bulk CO2 weight percent were not provided, we assumed weight percents of 0.02 and zero respectively. These minor changes will have small but not insignificant impacts on the final age. For over half the samples the number of atoms of 36Cl in the process blank was not available. However, we used an estimate of 200,000 atoms provided in several of the datasets, which resulted in an average decrease of the measured concentration by only 1.2%. If all errors added in one direction, the result would likely cause a deviation in final age of less than 7%, which is less than the total combined internal and external error. We provided the exposure ages for erosion rates of zero, and 2 mm/kyr (Table 1), to compare with the new 10Be dataset. However, we did not adjust for snow cover. While estimates of snow cover effects were provided for many of the samples, there has been a significant revision in the way to realize the thermal neutron moderation and cosmic radiation shielding by snow. For instance, the new calculations are very sensitive to duration, thickness, and density of snow or ice cover, and to geometrical considerations. Adjustments for snow cover can make an age older or younger. We have decided not to incorporate snow cover effects into the revision. Error in the effect of snow cover will contribute an uncertainty as high as 10% if all controlling factors added together (and snow thicknesses less than 1 m). Therefore, the total internal and external uncertainty in the revised ages will be greater than indicated for the recalculated ages, and may approach 11 to 15% on most samples. The AMS standards were not reported for these data but all AMS measurements were completed at PRIME Lab, Purdue University.

References not cited in the main text:

Lifton, N., Sato, T., Dunai, T.J., 2014. Scaling in situ cosmogenic nuclide production rates using analytical approximations to atmospheric cosmic-ray fluxes. Earth and Planetary Science Letters 386, 149-160.

Marrero, S.M., Phillips, F.M., Borchers, B., Lifton, N., Aumer, R., Balco, G., 2016. Cosmogenic nuclide systematics and the CRONUScalc program. Quaternary Geochronology 31, 160-187.