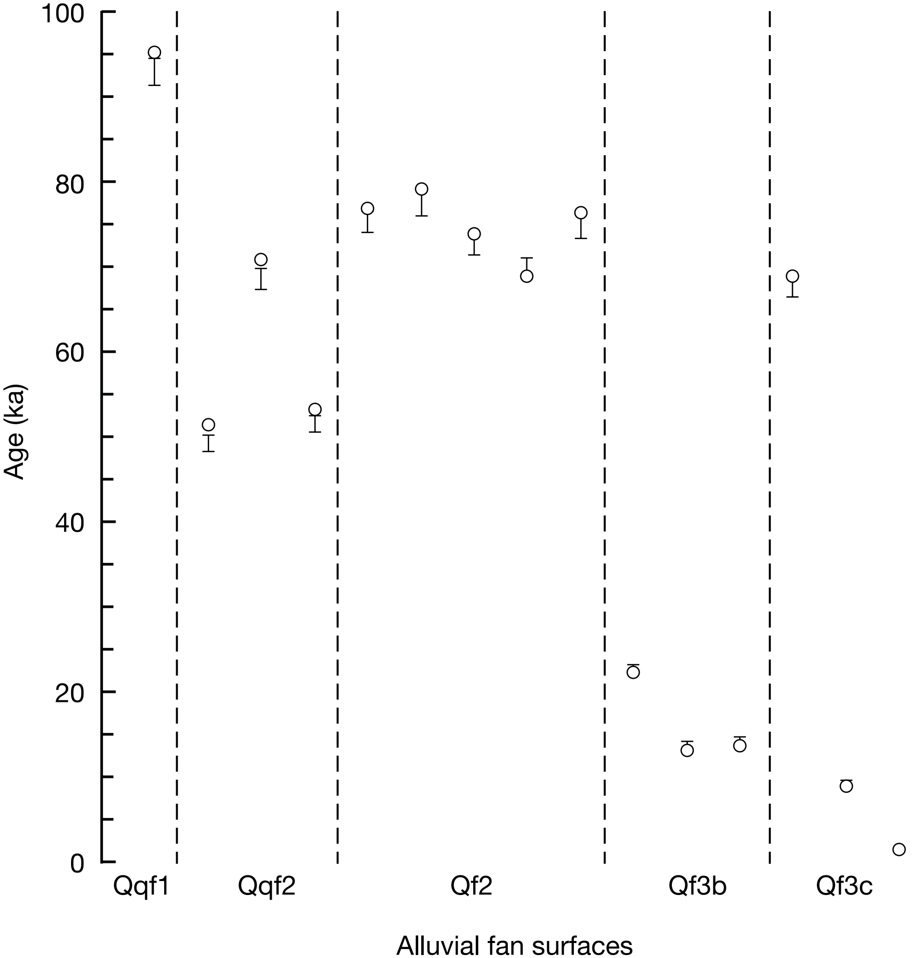
DR2008169


100
80
60
40
20
0
Age (ka)
Qqf1
Qqf2
Qf2
Qf3b
Qf3c
Alluvial fan surfaces

Data Repository Item 1. Terrestrial Cosmogenic Nuclide (TCN) Surface Exposure Ages
All samples for TCN surface exposure dating were prepared in the geochronology laboratories at the University of Kansas except for sample QV07 which was prepared at Dalhousie University. First, the samples were crushed and sieved. Quartz was then separated using the methods of Kohl and Nishiizumi (1992). Approximately 50 g of quartz (concentrated using ultrasonic HF differential leaching and air abrasion until Al <100 ppm and 35% of quartz had been removed) was spiked with 1015±15 μg/mL Be carrier prepared from a shielded Homestake Gold Mine beryl crystal by J. Klein (typical carrier $^{10}Be/^{9}Be = 4 \times 10^{-15}$) and dissolved in perchloric acid following the procedures of Kohl and Nishiizumi (1992) and Baker (2005, Appendix 3). AMS on the BeO-niobium targets was performed at CAMS, Lawrence Livermore National Laboratory and exposure duration was calculated according to Lal (1991) and Stone (2000) using a high latitude sea level production rate of 5.1 atom $g^{-1}a^{-1}$, and compared to other methods of calculating ages (Balco et al., 2008) which adjust production rates for temporal and spatial variations in geomagnetic paleointensity for the high latitude sea level reference and at each sample site (Fig. A1). This comparison of exposure ages indicates that error from paleointensity variations and non-dipole field effects will not be significant (<10% on the mean age of each fan surface). This error should be considered when comparing exposure ages on fans with significantly different ages (>10^5 a) or when comparing to ages from other chronometers.

References Cited

Baker, S., 2005, Quaternary history of incision of the Rio Diamante, Mendoza, Argentina: M.Sc. thesis, Dalhousie University, Halifax, Nova Scotia, 152 p.

Balco, G., Stone, J.O., Lifton, N.A., Dunai, T.J., 2008, A complete and easily accessible means of calculating surface ages or erosion rates from ^{10}Be and ^{26}Al measurements: Quaternary Geochronology, in press.

Kohl, C.P., and Nishiizumi, K., 1992, Chemical isolation of quartz for measurement of in-situ-produced cosmogenic nuclides: Geochimica et Cosmochimica Acta, v. 56, p. 3583–3587, doi: 10.1016/0016-7037(92)90401-4.

Lal, D., 1991, Cosmic-ray labeling of erosion surfaces: in situ nuclide production rates and erosion models: Earth and Planetary Science Letters, v. 104, p. 424-439.

Stone, J.O., 2000, Air pressure and cosmogenic isotope production: Journal of Geophysical Research, v. 105, p. 23,753-23,759.

Figure Caption

Figure A1. Plot of boulder exposure ages vs. alluvial fan stratigraphy. Open circles are ages calculated according to text and Table 1. Error bars indicate the range of ages (without uncertainty) calculated using the procedures used by Balco et al. (in press) to consider the possible influence of spatial and temporal geomagnetic field variations on cosmogenic nuclide production.

Normal Fault Profiles

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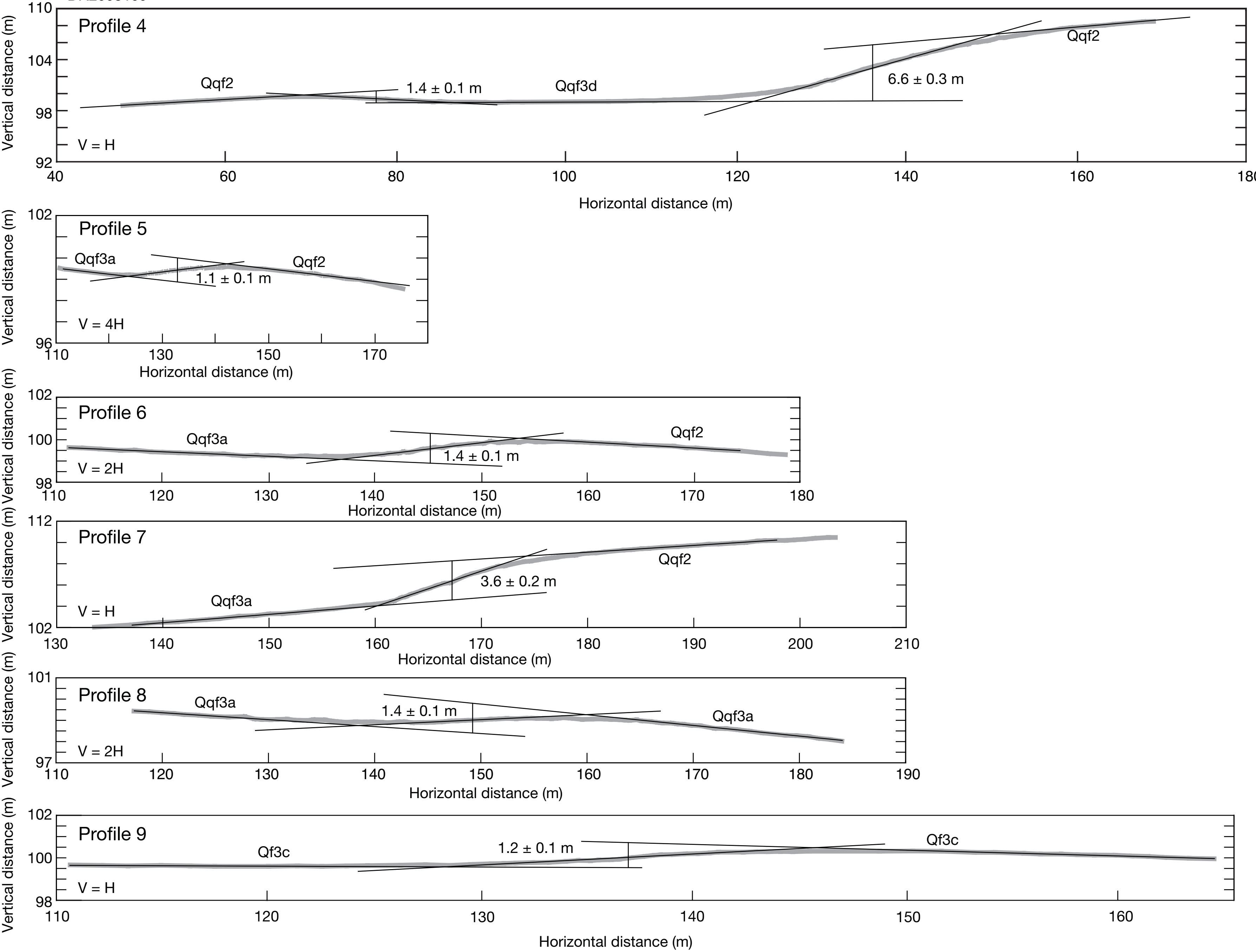

Fig. A2, Lee et al.

Data Repository Item 2. Magnitude of Offset Across Fault Scarps

We used total station, tape measure, and GPS surveying to document the magnitude of offset across fault scarps. Maximum vertical offsets of alluvial surfaces were calculated geometrically using the middle of the fault scarp (after Hanks et al., 1984). Errors associated with the vertical offset measurements include surface roughness (~20 cm) and total station survey points (<5 cm). The larger of the two errors is <5% of the measured vertical offset, therefore we report a conservative error of 5%. A tape measure and compass were used to measure the vertical offset of alluvial fan surfaces across a few of the normal fault scarps. Errors associated with these vertical offset measurements include far field slope and scarp angle measurements (typically 1-3°) and fault scarp down-dip length measurement (0.2-0.3 m); these errors are incorporated into the calculation of the vertical offset. Errors associated with lateral offset measurements include GPS survey points (≤10 cm) and visually defining the location of the geomorphic feature in the field (0.5-1.0 m); we report the latter error because it is the larger of the two.

References Cited

Hanks, T.C., Bucknam, R.C., Lajoie, K.R., and Wallace, R.E., 1984, Modification of wave-cut and fault controlled landforms: Journal of Geophysical Research, v. 89, p. 5771-5790.

Figure Caption

Figure A2. Topographic profiles across normal fault scarps not shown in Figure 9. Calculated surface offset or scarp offset shown. See Figure9b for location of profiles and Table 2 for a list of measured offsets.