Developped a methodology for topography and paleo-climate correction.

Anderson (1940) thus inferred that the surface temperature rose from 0 to 11.5°C at 9.5 ka before falling to present day temperature of 9.5°C at about 1500 BC, and that the observed and unpertubed heat flow in the Balfour borehole are 34.7 and 50 mW/m2. Corrections brough to that boreholes are of ∼20mWm−2 according to Benfield (1939) or ∼15mWm−2 according to Anderson (1940).

Analysis of heat flow and heat production distribution:

* Basal component of heat flow due to conduction from Earth’s mantle is 35 mW/m2 in NE Scotland (Lee 1986)
* Granites have a negative gravity anomaly of about -5 mgals (Lee 1986) – 13 km depth indicated by models (Lee et al., 1987)
* Variable RHP in granites (= different compositions; Gould, 2001; Smith et al., 2002) – 5 µW/m3 in theCairngorm granite and 5.7µWm−3 in Ballater granite (Lee, 1986) reported as 7.3 and 6.8 by Lee et al.(1987) – based on sampled from geothermal BH penetrating only 300m in the granites. After topo correction, the surface heat flow is ∼70mWm−2 in the Ballater granite and about 72mWm−2 in the Cairngorm granite.

Corrections for paleoclimate proposed in this paper in valley floor locations may be conservative because they may underestimate the duration of extreme cold (i.e. Kukkonen et al., 1998) and the magnitude of the cooling effect around the LGM at times when region was unglaciated (assuming -20°C or overlain by ice that was well below the melting point. The average and coldest predicted temperature anomaly between last glacial period and present day (Kageyama et al., 2001) are in the order of -25°C or -32°C, assuming a temperature of 7°C in NE Scotland. 12000 year duration of ice cover may be overestimated for some part of Scotland (Clarck et al., 2012). In such case, magnitude of paleoclimate correction would be > 30 mWm-2.



