Geochronology Breakout Session, 15th January 2017   (11:45-12:45, room 240).

Leader: Mark Sier; Rapporteur: Helen Roberts

Discussion structured by site (and based on the availability of people within the room for discussion/report).

Key Q: what are our needs? Priorities? What's left to do?

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General considerations/recommendations for age-depth models:

We need more ages!

Due to the length and timescale of the records we are dealing with, we probably don't have to worry about the fact that we are combining ages that use different timescales (eg ^{14}C, ice core timescales etc).

It's worth thinking about whether we need a common approach to dealing with ages/dates and sources of dating accoss different sites for the HSPDP project.

We also need to think about what's a useful output for the model/what's most useful for others? Eg the age-depth models produce envelopes ('sausages') but how many different scenarios do we need to produce (eg for use in time-series)?

We do need full-age models to be run and used to try to counter the inherent problems of using techniques that produce distributions of ages, and to counter inversions etc.

Depth uncertainties can be an issue (eg uncertainties in magnetic reversal lock-in depths creates issues; also sampling resolution should be accounted for). Bayesian models can cope with input here, but we need to be aware of the need to think about these depth uncertainties and input them.

Advisable to use true measured distribution in age models (eg can be done for Ar-Ar and luminescence).

Data feeding directly into the age-depth models should be made available to the wider community so that age-depth models can be recalculated in future years if desired.

(Beyond HSPDP, make data available for each technique in accordance with the norms in that community.)

Q: can modelling approaches be used to help inform the age-depth model e.g. beyond event layers or Z' approach allowing for deposition rates, to give an indication of the link between particle-size data and accumulation? (-or one can do this iteratively if one has sufficient data).

Chew Bahir:

There are tephra everywhere Christine Lane has looked within Chew Bahir cores (unlikely to be visible by XRF data, but this will be looked at). To search for further tephra is a big job and there's no formal financial support or personnel to support this. Christine plans to search for some of the big known tephra (eg Kibbish @ ~100ka) now that we have an age-depth model for CB.

Magadi:

Awaiting U-series of cherts. Al Deino has a few samples in progress.

Mark Sier is looking for B/M boundary; also aiming to look at palaeointensity record (measurements complete; awaiting analysis).

W.Turkana:

Palaeomag. Complete and submitted.

Nothing from Ar-Ar here; possibly better prospects in outcrop sites? Al also comments that could consider looking at basalts (again) but doesn't anticipate it working well.

Beringo:

Ar-Ar complete. Palaeomag. measured.

Afar:

Palaeomag. measured, but P'mag age model could possibly be improved with a few more measurements. Lack of information regarding orientation of core material is an issue here. **Mark appeals for any ideas to help establish orientation here** (including perhaps photographs?)

Action point 1 – need to clarify whether the reflex device information is available to assist with magnetics orientation data. (Yes at Afar…).

Potential new sources of dating information:

Suggestion of glass for Ar-Ar, but unlikely to work well.

Action point 2 – Using heavy liquids, look for zircons in the Afar fine fractions for Ar-Ar.

Potential for luminescence dating using biogenic calcite (spanning entire Quaternary and probably beyond), but at early stages and hence ideally needs to be cross-checked against independent age

control if to be used at present. Material needs to be pure calcite (not aragonite), eg calcitic opercula, worm granules and slug plates tried so far.

Action point 3 – if there is calcitic material available from regions of cores or outcrops that are well dated, consider whether to undertake dating of biogenic calcite (technique being developed by G. Duller and H.M. Roberts at Aberystwyth, UK).

Recommendation to add tephra data from at least the larger eruptions into a common folder/database available to others within HSPDP (eg using OSF or using EarthChem/Navdat) – to maximise the chance of identifying/discovering another large common tephra like the Menegai Tuff (~36ka) to link sites.