EARTHTIME Spike Now Available

Interlaboratory bias is a major source of uncertainty in U-Pb geochronology. Our new spike will eliminate most of the bias and be a major step forward in producing an accurate and precise history of Earth.

The EARTHTIME spike is now available due to the efforts of Dan Condon, Blair Schoene, Jim Crowley, Randy Parrish and Sam Bowring and the facilities of both MIT and the NERC Isotope Geoscience Science Labs in the UK. We prepared mixed ^{205}Pb-^{235}U-^{233}U and ^{202}Pb-^{205}Pb-^{235}U-^{233}U tracers and a mixed CRM112a (natural U metal) - CRM981 Pb (NBS981 Pb metal) reference solution using high purity isotopic materials. The solutions were made with great care and preliminarily verified to have the desired composition and homogeneity. We are now ready to make the ^{205}Pb-^{235}U-^{233}U tracer available to the EARTHTIME community (the ^{202}Pb-^{205}Pb-^{235}U-^{233}U will be available shortly). The ET project will make aliquots of the spike and reference solution available, in limited quantity (but on a renewable basis when nearing exhaustion) to laboratories that use high precision U-Pb geochronology to further the goals of EARTHTIME and that can demonstrate an ability to use the spikes effectively. The spike will be shipped in clean dropper bottles along with our working calibration.

The spikes are intended for 'high-precision' geochronology, but reasonable requests for the spikes will be considered. Labs are strongly encouraged to calibrate their existing tracer solutions (gravimetric solutions are available) and continue to utilize these tracers for more 'routine' applications. The criteria for effective use of the ET spikes should include evidence that a lab is committed to high precision U-Pb dating, that they have adopted or are working towards method improvements, and that they are able to measure small amounts of radiogenic Pb (<150 picograms) with very low blank levels. We also request that all labs that are provided with aliquots of this spike comply with the following:

(1) Regularly analyze one or more of the zircon standards (Temora, R33, 91500, others) and report these data to an EARTHTIME database as well as include data in all publications, for example in supplementary data tables.

(2) Demonstrate laboratory Pb blank levels by reporting zircon measurements with less than 2 picograms of total common Pb. Labs with total Pbc >2pg are encouraged to also apply for the tracer if they are committed to lowering their lab blank; there is much collective expertise within the EARTHTIME community that could be called upon for advice and help. We have prepared some information about the relationship between blank levels and precision of U-Pb dates that are available separately for information to the community.

(3) Those who wish to do their own calibration should report to EARTHTIME their spike calibration measurements with a description of their procedure. Details of the spike mixing and calibration will be discussed amongst the community and published once the calibration has been finalized. It is expected that all labs will use the same calibration values. Continued refinement of the calibration may result in updated values akin to the measurement of isotopic composition of NBS reference materials.

Laboratories are invited to submit a brief one or two page summary describing the blank levels, providing a table of data with recent measurements on zircon standards, and a general outline of their need for having a spike that will allow them to determine ages to very high precision. An indication of anticipated usage per year would also be desirable. The intention is to provide limited quantities (2 + years) and to replenish this with new aliquots ('refills') in a timely fashion**.** The spikes can either be sent from the EARTHTIME home at MIT or they may be picked up in person, please note your preference.

Later in 2006, the EARTHTIME project also plans to make one or more synthetic solution(s) comprising pure radiogenic Pb (i.e. SRM983 metal supplemented for some solutions by enriched ^{207}Pb) and natural uranium whose composition will plot on concordia. This solution(s) will be advantageous over natural zircon standards in that quantity would not be limited and the solution would be homogeneous - this would serve as an adjunct to measurement of natural zircon standards. Further detailed interlaboratory measurements on the solutions will be made in 2006 to fully characterize them by both TIMS and MC-ICP-MS methods of analysis by at least two different laboratories and final values will be provided at a later date.