

The LA-ICP-MS U-Th-Pb Network: Improving data standards in laser ablation geochronology

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The inter-laboratory comparison (ILC) of laser ablation (LA-)ICP-MS U-Th-Pb data is currently compromised by the use of multiple and disparate 1) mass spectrometer and laser ablation platforms, 2) data processing packages and independent spreadsheets, and 3) geological factors, which in combination, result in differing results for the same materials and potentially misleading and inaccurate interpretations. Since 2006, an international network of LA-ICP-MS U-Th-Pb specialists has been addressing these issues, and measures and documentation are now in place to inform new and existing practitioners of better practice in acquiring, handling, reducing and interpreting LA-ICP-MS U-Th-Pb data. These measures include: completion and documentation of a detrital zircon-focussed ILC, a defined uncertainty propagation protocol, defined tables for publishing data and acquisition information, peer-reviewed publications [1], provision of reference material sets for long-term validation of lab performance, the running of workshops and shortcourses, recommendations with respect to the interpretation of detrital zircon data and a maintained website with resources and information (www.plasmage.org). These measures will: a) improve the standard and accuracy of published LA-ICP-MS U-Th-Pb data, b) allow better comparability of published data, c) ensure appropriate age uncertainty quantification and, ultimately, d) improve the rigour of geological interpretation. New insights into achievable ILC performance and future Network activities will be highlighted.

[1] Kosler *et al* (in review)

A global molecular ecological survey of subseafloor microbial communities

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Recent advances of the culture-independent molecular ecological survey such as deep sequencing enable us to provide precise and detailed views of naturally occurring microbial communities [1]. For the deep subseafloor microbial communities, an improved hot-alkaline DNA extraction method have significantly improved the cell-lysis efficiency, providing less-biased DNA pools for the subsequent molecular ecological analyses [2]. Regarding the molecular quantification, the conventional used real-time PCR assay is highly sensitive to the PCR inhibitors such as humic acids and polysaccharides in organic-rich ocean margin sediments. However, a new technique using digital PCR and microfluidic devices is free of such an inhibitory effect, providing absolute quantification of the target genes [3]. Using these newly standardized molecular ecological techniques, a new global-scale molecular survey of subseafloor microbial communities has been planned.

In this project, we have currently extracted DNA from over 200 deep-frozen samples from 15 drilling sites using a new hot-alkaline method: e.g., off Peru and eastern equatorial Pacific (ODP Leg 201), Juan de Fuca ridge flank (IODP Exp. 301), South Pacific Gyre (IODP Exp. 329), Nankai Trough (IODP Exp. 315 and 316), off Shimokita of Japan (CK0606, IODP Exp. 337), Gulf of Mexico (IODP 308), Porcupine carbonate mound (IODP Exp. 307). These environmental DNA pools provide an unprecedented opportunity to study biogeographical distribution and diversity of bacterial and archaeal 16S rRNA and some other ecologically significant functional genes with a systematic analytical scheme.

[1] Hoshino, *et al*, *Front. Microbio.*, 2, no. 231 (2011). [2] Morono, *et al*, submitted. [3] Hoshino & Inagaki, *Syst. Appl. Microbiol.*, 35, 390-395 (2012).