Major change in Pb inputs to the eastern equatorial Pacific since the last deglaciation

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We report high precision triple spike (Galer, 1999) Pb isotope data covering the last 85 ka on deep-sea sediments from core ODP 849 located in the eastern equatorial Pacific (EEP) in order to investigate the existence of a climatic response of Pb isotopic compositions similar to that observed in the equatorial Atlantic (Abouchami and Zabel, 2001). The analyses were made on bulk sediment which are likely to reflect the isotopic composition of the detrital phase.

Pb isotopic compositions range from 18.59 to 19.09, 15.59 to 15.68, and 38.46 to 38.62 for the $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, and $^{208}Pb/^{204}Pb$ ratios, respectively. Important shifts in Pb isotope ratios are found at the transitions between isotopic stages (IS) 2 and 1 and between IS 5 and 4. The last deglaciation is characterized by the most unradiogenic values, with a decrease of Pb isotope ratios from the middle of IS 2 to 12 ka, followed by a huge increase during the Holocene, starting at ~10 ka. The core-top sample shows slightly less radiogenic values than the mid-Holocene ones. In Pb isotope space, the Holocene samples form a linear trend that is clearly distinct from that defined by the pre-Holocene samples. We interpret these lines as reflecting binary mixing between variable proportions of distinct Pb sources. The two lines converge to a common unradiogenic end-member which seems to reflect terrigenous inputs from the Andes, either by rivers or by winds. The pre-Holocene radiogenic end-member corresponds to Pacific deep-water as represented by Pb isotopic composition of Fe-Mn nodules from the Pacific (Abouchami and Galer, 1998). The Holocene line shows a progressive evolution of Pb isotopic composition from unradiogenic values at 12 ka to radiogenic values at the present day. The nature of the Holocene radiogenic end-member remains to be determined. The existence of two separate lines, one for the pre-Holocene and the other for the Holocene samples, as well as the temporal evolution of Pb isotopic composition after 12 ka show that a major change in Pb inputs to the EEP occurred, starting from the last deglaciation.

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Radiation damage in >4 Ga zircons from the Jack Hills, Western Australia

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The >4 Ga detrital zircons found in metasediments from Mt Narryer (Froude et al. 1984) and the Jack Hills (Compston and Pidgeon 1986) are the oldest surviving fragments of the Earth's crust and contain unique information on the early history of the Earth. However, an important question in the interpretation of isotopic and chemical measurements on the > 4 Ga zircons is what processes have affected the zircons since their primary crystallisation. One piece of evidence that might give some clues to the post crystallisation history of the >4 Ga zircons is the extent of their radiation damage. The ability to quantify the radiation damage in zircons by Raman spectroscopy and to correlate it with SHRIMP U-Pb measurements has been pioneered by Nasdala et al. (1988). Our purpose in this presentation is to describe the radiation damage determined by Raman for a set of >4 Ga detrital zircons from the Jack Hills and to consider the implications for the history of the zircons. Radiation damage measurements were made on the same analytical areas used to determine U-Pb ages and U-Th concentrations with the Curtin SHRIMP II. In comparison with the presently known radiation damage behaviour of zircons (e.g., Geisler et al. 2001) the >4 Ga zircons are far more crystalline than expected. This raises the question of whether the zircons have experienced episodic or continuous annealing during their history.

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