### 4.1.P17

# Downcore $^{40}$Ar/$^{39}$Ar provenance of Cenozoic eolian dust in the central North Pacific

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New data from drill and piston core samples in the central north Pacific have yielded fresh insight into the history of windblown dust. A detailed record of Cenozoic paleoclimate and atmospheric circulation can potentially be constructed using the eolian component dominating many Pacific pelagic clay cores. Recent investigations have demonstrated that such cores can be reliably dated using the isotopic composition of strontium in pre-cleaned fish teeth. This method provides stratigraphic age resolution down to the 0.5 m.y. level for core material between 38 and 16 million years old (1.0 m.y. age resolution over the 16-0 Ma interval). Nd-Sr-Pb isotopic tracers demonstrate that the extracted eolian dust component can be tied to provenance characteristics of distinct continental source areas. 40Ar/39Ar ages for the sub 5-micron dust fraction from several cores clearly show increasing dominance of Chinese loess in Pacific dust deposited north of the intertropical convergence zone (ITCZ) after c. 35 Ma. This Asian component, which is completely dominant by the late Pliocene, is characterized by an average Ar-Ar retention age of 220 Ma. A detailed 70 m.y. Ar-Ar record for the giant piston core LL44-GPC3 reveals a marked change at (or near) the 33.7 Ma Eocene-Oligocene boundary, which may reflect significant changes in global atmospheric circulation associated with the Eocene-Oligocene greenhouse-icehouse climatic transition.

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### 4.1.P18

# Marine limestone accumulation over the past 550 million years—control by seawater chemistry

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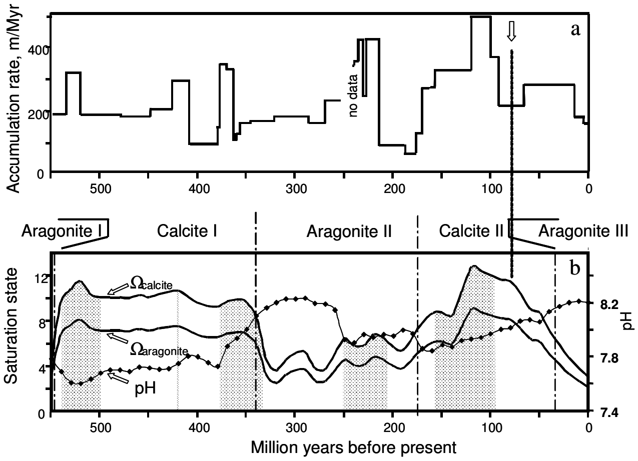
Using estimates of past seawater ionic composition [1] and atmospheric $CO_2$ levels [2], and assuming constant temperature of 15ºC, we calculated seawater saturation state ($\Omega$) with respect to $CaCO_3$ minerals (aragonite and calcite) for the past 550 million years. Comparison shows that measured rates of shallow marine limestone accumulation (Figure a) for the same period [3] covary with calculated saturation ratio (Figure b). Episodes of increased abundance of microbial and nonskeletal carbonates [4-6] (stippled in Figure b) correlate with elevated calculated saturation ratios.



These relationships imply a primary control by seawater chemistry on limestone formation, and therefore also on the biomineralization processes of many algae and invertebrates whose shells are common limestone components. Higher values of saturation state and limestone accumulation during times of 'calcite seas', and lower values during 'aragonite seas', suggest an integrated pattern of long term variation in marine $CaCO_3$ precipitation, and consequently in $CO_2$ sequestration, reflecting global geochemical cycles.

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