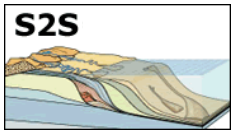
Interpreting the biogeochemical signals of environmental change on the Waipaoa margin, NZ



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The Waipaoa Sedimentary System on the North Island of New Zealand provides a superb natural laboratory in which to investigate how the signals of terrestrial environmental perturbations are transmitted from upland sedimentary sources to offshore stratigraphic archives. The recent recovery of giant piston cores from the Waip aoa margin has provided us the opportunity to investigate the biogeochemical signatures of such perturbations in late Pleistocene through Holocene sediments from sites on the inner and outer shelf. Interpretations of carbon and nitrogen isotopic ratios (13C/12C, 14C/12C, 15N/14N) in bulk sediments, clay-sized isolates, wood, and charcoal are informed by ongoing work on rocks, soils, river suspensions, and surficial sediments in the modern sedimentary system, and are complimented by measurements of particle size, mineralogy, and specific surface area.

- Isotopic shifts in the offshore record appear to be primarily driven by changes in the proportions of various terrestrial organic matter fractions discharged by the Waipaoa River, including plant debris, soil, and rock carbon (kerogen).
- Both organic and inorganic proxies in the cores record dramatic shifts in the watershed after the Taupo volcanic eruption approximately 1718 yrs. BP. Ongoing work is aimed at untangling the relative impacts of deforestation, stream capture, rates of shallow landsliding, and rates of gully incision on the biogeochemical record.

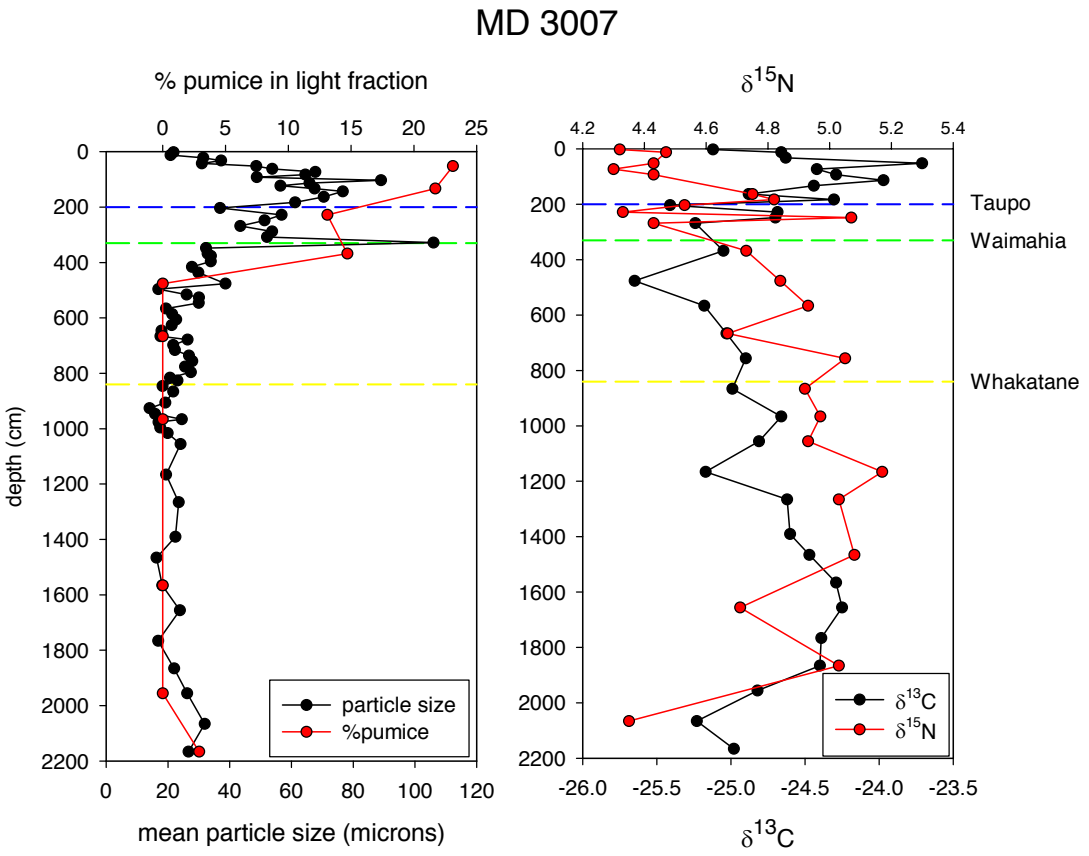

Figure: Profiles of mean particle size, percent pumice in the low density fraction, and the C and N stable isotopic composition of bulk sediments in a piston core recovered from about 60 m water depth on the Waipaoa continental shelf. Horizontal lines depict the positions of tephra layers identified by Gerber et al. (in press). Both the inorganic and organic parameters reflect dramatic changes in watershed processes over time, particularly from about the time of the Taupo eruption to the present.

Leithold, E.L., Blair, N.E., Childress, L.B., Brulet, B., and Thompson, C.E., 2008, Signals of landscape destabilization on continental margins—comparisons of organic geochemical records from the Eel and Waipaoa shelves: AGU-ASLO Ocean Sciences Meeting, Orlando FL, March 2-7, 2008