# Particulate Organic Carbon Age Spectra: Evaluating Different Spectra from Different Basin Types

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We compare age spectra from a multi-year sampling effort on the Mississippi-Atchafalaya River System (MARS), in which several different discharge regimes were sampled, the Narayani River in Nepal, and the Colville River Delta, for application of ramped pyrolysis $^{14}C$ analysis to samples from different basin types. The emerging picture from the MARS is one of consistency, with some variability related to flood provenance and discharge. Large river systems such as the MARS are integrative of a range of different lithologies and carbon sources. In contrast, the Narayani River, where high incision rates erode old carbonaceous rocks more efficiently during high discharge events, shows more variability and wider overall age spectra. Limited sedimentary storage of watershed primary productivity in the Narayani River watershed results in substantially wider age spectra than from the MARS system. It is likely that the Narayani River is less consistent in time than the MARS as contributions of old carbonaceous material are likely driven by discharge regime. We add to this comparison density-separated fractions from POC samples of the Arctic Colville River to further test a recent conceptual model of basin-control on POC age structure (Blair and Aller, 2012).

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# The fate and behaviour of volatiles during subduction of oceanic crustal material towards the deep mantle

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Knowledge of the abundance and distribution of $H_2O$ in the Earth's deep interior (i.e. mantle and core) remains highly controversial.

The chief means of replenishment of the Earth's interior with volatiles over much of geological time is subduction (i.e. the transport of crustal material into the deep Earth by large-scale tectonic processes) but constraints are very poor as natural samples from the deep Earth's interior subduction zones are inaccessible. High pressure experimental investigations however can overcome that problem by simulating deep mantle conditions and processes.

The aim of this study is to experimentally determine the maximum storage cpacity, solubility and behaviour of $H_2O$ in hydrous and nominally anhydrous minerals (NAMs) during subduction of hydrated oceanic crustal material into the deep upper mantle. We apply a novel experimental approach, which will for the first time enable determination of maximum $H_2O$ contents of NAMs (and hydrous phases) in equilibrium with the full phase assemblage in subducted oceanic crust. This was not achieved in numerous previous studies which concentrated on simple, monomineralic systems.

Here, we present first results of experimentally determined melting and phase relations of an altered oceanic basalt composition GA1 [1] containing varying amounts of water (<1 wt%) at varying temperatures (sub-solidus to near solidus) and pressures (6-9 GPa; i.e. ~200 to ~300 km depth) using multi anvil apparatuses at University of Bayreuth, Germany.

Outcomes will allow constraints to be placed on the fluxes of $H_2O$ recycled into the mantle at subduction zones, a critical step in the Earth's overall volatile budget.

[1] Yaxley & Green (1994) *EPSL* **128**, 313-325.

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