

Weathering over a large range of erosion solid products: Insights from Amazon river depth-samplings

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Continental erosion processes produce dissolved material plus sediments. The latter are heterogeneous in terms of mineralogy, grain size, chemical composition and weathering intensity. Within large rivers, these particles are vertically sorted during their transport to the oceans, following their physical properties and stream hydrodynamics.

In order to take in account this internal variability, we sampled the Amazon along depth profiles, and carried out granulometric and chemical analysis of suspended sediments as well as bedload.

The vertical profiles of suspended sediments concentration increase exponentially downward, and can be explained by a simple sedimentary transport model, based on an equilibrium between sedimentation velocity and bedload turbulent diffusivity. This model allows depth-integrated estimates of Amazon suspended matter fluxes (total and elemental) to the oceans.

Major elements composition, along with microscopic and mineralogic analysis, shows a rather strong evolution from clay-dominated sediments near the surface towards quartz and other silicon-rich minerals downward.

The weathering indexes of Na, K and Ca (as defined by Gaillardet *et al* (1999)) in the sediments of the Solimoes river, show respectively a three-fold, two-fold and two-fold increase from the bottom to the surface. In Madeira surface sediments, the apparent depletion in soluble elements is amplified by a factor of two by the granulometric sorting with respect to the integrated weathering index.

The results obtained on the Amazon system are compared with those from the Ganga-Brahmaputra system (Galy *et al*, submitted) and are interpreted in terms of weathering/erosion intensities, bedrock lithology and rivers hydrodynamics.

References

Gaillardet J., Dupré B., and Allègre C.J. (1999) Geochemistry of large rivers suspended sediments : silicate weathering or recycling tracers? *Geochim. Cosmochim. Acta* **63**(23/24), 4037-4051

Root zone of sheeted dike complex in Oman ophiolite-petrological model

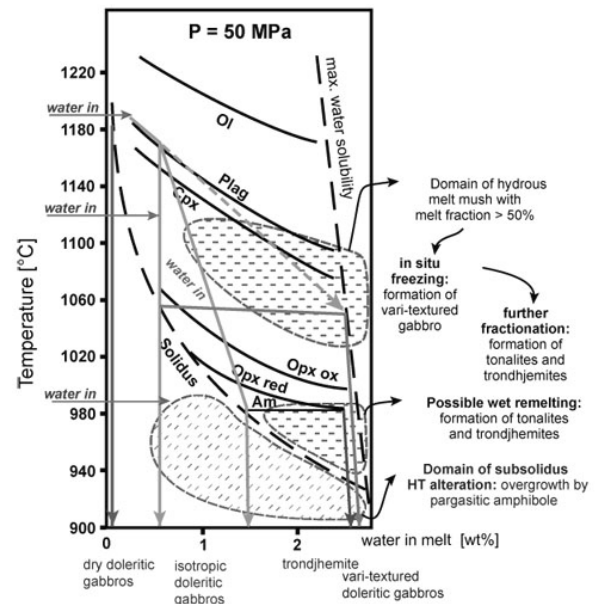
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Recently, IODP (Integrated Ocean Drilling Program) has penetrated in the eastern Pacific Ocean (Hole 1256D) the root zone of the sheeted dike complex (RZSDC). In Oman ophiolites, it is a well exposed horizon ~100m thick between the main gabbro unit and above, the crustal lid (sheeted dikes and lavas). To compare with the IODP hole, a new petro-structural study was conducted in Oman. We explain this complex zone by interference between the magmatic system of the melt lens present in fast spreading ridges, and a hydrothermal system operating at very high temperatures penetrating down to the roof of this lens where it induces successive stages of hydrous anatexis. This results in a crude stratigraphy throughout the RZSDC with doleritic isotropic gabbros evolving upwards in vari-textured, pegmatitic gabbros and trondjemite intrusions. New melt intrusions from the melt lens proceed through basaltic 'protodikes' which are, in the RZSDC, a relay to the overlying sheeted dikes. Injected in gabbros still at solidus temperature, protodikes develop against these gabbros a typical microgranular margin. The following phase diagram constructed for pressure 50MPa, issued from Feig *et al.*, 2006 allows to follow the sequence of formation of the successive magmatic facies described in the RZSDC.



References

Feig, S., Koepke, J., Snow, J., 2006. *Contrib. Mineral. Petrol.* **152**, 611-638