Geophysical Research Abstracts, Vol. 8, 09106, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09106

Lithologic composition of continents and applications for regional seas catchments using a new global database targeting riverine material transfer

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Surface lithology of the continents is needed by various scientific communities, working on chemical weathering, land erosion, carbon cycling, sediment formation, riverine fluxes, aquifer typology or coastal erosion. Estimating global direct inputs of groundwater to the coastal zone needs knowledge of lithology (e.g. karst regions on the coasts, coastal alluvial aquifers). Lithology of the continental surfaces has been established using a new digital map in vector mode (n $\approx$ 8 300 polygons, reaggregated at 0,5˚ x 0,5˚ resolution) for 15 rock types (plus water and ice) targeted to surficial Earth System Analysis (Dürr et al. 2005). These types include acid (0,98 % at global scale) and basic (5,75 %) volcanics, acid (7,23 %) and basic (0,20 %) plutonics, Precambrian basement (11,52 %) and metamorphic rocks (4,07 %), consolidated siliciclastic rocks (16,28 %), mixed sedimentary (7,75 %), carbonates (10,40 %), semi- to unconsolidated sedimentary rocks (10,05 %), alluvial deposits (15,48 %), loess (2,62 %), dunes (1,54 %) and evaporites (0,12 %). Where sediments, volcanics and metamorphosed rocks are too intimately mixed, a complex lithology (5,45 %) class is added. Average composition is then tabulated for continents, relief types (n = 7), ocean drainage basins, and exorheic vs. endorheic domain. It is also re-aggregated for 140 mega coastal segments and major regional seas catchments (Meybeck et al. 2006 in press, Meybeck et al. 2006 in preparation) and to their related runoff (Fekete et al. 2002). Surficial lithology is highly heterogeneous and major differences are noted in any of these ensembles. Expected findings include the importance of alluvium and unconsolidated deposits in plains and lowlands, of Precambrian and metamorphic rocks in mid-mountain areas, the occurrence of loess, dunes and evaporites in dry regions, and

of carbonates in Europe. Less expected are the large occurrences of volcanics (74 % of their outcrops) in highly dissected relief and the importance of loess in South America. Asia and the Atlantic Ocean drainage basin, without Mediterranean and Black Sea, are the most representative ensembles. In cratons the influence of ancient geological periods is often masked by young sediments while active orogens have a specific composition. Lithology of regional seas catchments often reveals marked differences compared to catchments directly connected to open ocean explaining differences in natural material fluxes.

References

Dürr H.H., Meybeck M., Dürr S. (2005). Lithologic composition of the Earth's continental surfaces derived from a new digital map emphasizing riverine material transfer. Global Biogeochemical Cycles, vol. 19, GB4S10, doi:10.1029/2005GB002515.

Meybeck M., Dürr H.H., Vörösmarty C.J. (2006). Global coastal segmentation and its river catchment contributors : a new look at land-ocean linkage. Global Biogeochemical Cycles, in press.

Meybeck M., Dürr H.H., Roussennac S. (in preparation). Regional seas as mega-filters of the land to oceans riverine inputs.