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The fate of the fossil organic carbon released from marls weathering: application to the experimental watersheds of Draix.

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The study of the greenhouse gases behaviour, as CO2, requires estimations of carbon fluxes between soils, biosphere, hydrosphere and atmosphere. Such estimates generally do not take into account Fossil Organic Carbon (FOC) fluxes, originating from rock weathering and erosion of ancient and recent sediments. However, at a global scale, the lonely chemical weathering of shales and carbonates, annually releases 0.04 Gt organic carbon /year (Copard and al 2007). Although FOC is generally considered as degradable and as a carbon source for the atmosphere (Berner, 1989), its occurence was highlighted in different compartments, such as rivers (Kao et al, 1996), soils (Lichtfouse and al, 1997 ; Di Giovanni and al, 1998) and marine sediments (Dickens and al, 2004), revealing a strong resistance to the weathering.

This present work consists to clarify the role of FOC in the carbon cycle in terms of delivery (chemical weathering and mechanical erosions) and fate (resistance to weathering or mineralization). It focuses on two experimental watersheds (Le Laval and Le Brusquet, 1km^2 in area) located near Digne (Alpes-de-Haute-Provence, France) that overlaid by Callovo-Oxfordian marls, and is divided as follow.
1 – FOC characterization in non weathered rocks and its tracking in different com-

partments (weathering profiles, soils and riverine particles), using complementary investigations: optical (quantitative palynofacies method), geochemical (Rock-Eval 6 pyrolysis), molecular (gas chromatography / mass spectrometry) and isotopic ones (Delta13C).
2 - Estimation of annual FOC' fluxes at the watershed scale, discriminating chemical and mechanical inputs.
3 - Representativity test at extension to the Rhône and the Durance watershed scale.

Preliminary results, (notably obtained by the quantitative palynofacies method) allow us: - (1) to confirm and to quantify the contribution of FOC, both in studied soils and riverine particles,- (2) to propose some estimates of FOC fluxes released by chemical weathering and mechanical erosion at the watershed scale, (3) to display and categorize the factors controlling these fluxes (vegetation cover rates, precipitations and slopes), (4) to emphasize the importance of Jurassic badlands that, despite their low area as compared as the Rhone watershed (0.2%), can release by erosion between 8 to 16% of the Rhône's Particulate Organic Carbon (POC).

Y.Copard and al (2007), Storage and release of fossil organic carbon related to weathering of sedimentary rocks. Earth and Planetary Science Letters. 258, 345-357.

R.A. Berner (1989), Biogeochemical cycles of carbon and sulphur and their effect on atmospheric oxygen over Phanerozoic time. Paleogeogr. Paleoclimatol. Paleoecol. 75; 97-122.

S.J. Kao and al (1996), Particulate organic carbon export from a subtropical mountainous river (Lanyang His), in Taiwan. Limnol. Oceanogr. 41, 1749-1757.

E. Lichtfouse and al (1997), Molecular ^{13}C and ^{14}C evidence for the allochtonous and ancient origin of $C_{16}-C_{18}$ n-halkanes in modern soils. Geochimica et Cosmochimica Acta. 61, 1891-1898.

E. Lichtfouse and al (1997), Ancient polycyclic aromatic hydrocarbons in modern soils: $^{13}C,^{14}C$ and biomarkers evidence. Org. Geochem. 26, 353-359.

C.Di-Giovanni and al (1999), Variability of the ancient organic supply in modern humus. Analusys. 27,5, 398-402.

A.F. Dickens and al (2004), Reburial of fossil organic carbon in marine sediments. Nature. 427, 336-339.