

Estany Redó: A case study on sediment formation and particle dynamics in a Pyrenean mountain lake

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Natural climate and environmental variations are nowadays often masked by the influence of anthropogenic factors, making it difficult to obtain precise information on how ecosystems can or will respond to climate change. Remote mountain lakes with small catchment areas are influenced by direct atmospheric deposition and internal particle production. Despite the remoteness of such lakes, the influence of anthropogenic factors can regularly be detected there because of long distance atmospheric transport, although this influence is generally less than in lowland lakes. Particles settling during the ice break-up on Estany Redó, a deep (73 m) Pyrenean lake, indicate aeolian input into the lake. They show high Ca and S concentrations (measured by SEM-EDS), indicating a gypsum-bearing dust source outside the catchment area. Nonetheless, high-elevation areas are very sensitive to climatic and environmental change and react more distinctly to these changes than lower-lying areas. Remote mountain lakes are therefore thought to be excellent sensors of environmental change. However, climatic or environmental signals are affected by many sedimentation processes on their way from the atmosphere and/or the catchment area through the water-column into the sediment. Here we present sequencing sediment trap data measured at high temporal resolution (days to weeks) from 14 April 2000 to

25 October 2001 (536 days) in Estany Redó. The study was conducted within the framework of the EU-project EMERGE (European Mountain lake Ecosystems: Regionalisation, diaGnostic & socio-economic Evaluation). Our results show highly variable, seasonal particle dynamics during the study period. Sediment fluxes varied from almost zero to more than 600 mg/m²d. Large differences in the sediment flux are also apparent from 2000 to 2001: in 2001 the sediment accumulation was 2-4 times lower than 2000. C/N values in the bulk trap material from April to May changed significantly from 2000 (6-14) to 2001 (>28), indicating much higher rates both of soil erosion and of the transport of the remains of higher plants into the lake. The sediment trap data show that the highest particle fluxes occur during very small time spans within the year, i.e., during autumn turnover and after spring ice break-up. Additionally, because only small amounts of planktonic biomass were found in the traps, the data suggest that the productivity peaks of planktonic biomass in spring (Felip et al., 1999) have a very low preservation potential.

FELIP, M., BARTHUMEUS, F., HALAC, S. & CATALAN J. (1999) Microbial plankton assemblages, composition and biomass, during two ice-free periods in a deep high mountain lake (Estany Redó, Pyrenees). *Journal of Limnology*, 58, 193-202.