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Establishing the geometry and nature of sediments trapped in either natural or artificial dam lakes in contrasted drainage basins from Western Europe (French Massif Central and Pyrenees)

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Lacustrine sedimentary archives from artificial dam lakes are poorly documented both in terms of basin fill geometries and dominating sedimentary processes. In order to better understand their sensitivities to regional environmental changes, we performed a similar multidisciplinary study of French natural and artificial dam lakes in contrasted drainage basins from the volcanic Massif Central (lakes Aydat and Crégut) and two granitic sectors of the northern Pyrenees (lakes Fourcat and Orédon). Our approach combined high-resolution sub bottom profiling (14 kHz and 4 kHz chirp) and a detailed study of sediment cores based on qualitative and quantitative analysis (radiographies, sediment physical and chemical properties) together with radionuclide and radiocarbon dates. In all cases either changes in land uses within the drainage basin or the flooding of natural lakes by dams and the production of hydroelectricity induced changes in sedimentation rates and modes. Human activities affecting either the catchment or the lake itself favored enhanced clastic sediment supply in the lake basins and/or higher and fluctuating lake levels. Subaquatic slopes failures are also identified in Lake Aydat formed by a lava flow 8.5 kYrs ago and in glacial lakes Crégut (Massif Central) and Orédon (Pyrenees) now used to produce hydroelectricity and suggest that lake level changes and ground accelerations during earthquakes can remobilize distinct sectors of the basin fills and not only deltaic environments.