One year water chemistry monitoring of the flooding of the Meirama open pit (NW Spain)

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In December, 2007, after 30 years of operations, the mine of Meirama finished the extraction of brown lignite. Starting in April 2008, the flooding of the open pit has started and this is leading to the formation of a large mining lake ($\tilde{2}$ km2 surface and up to 180 m depth) in which surface (river and rain water) and ground waters are involved. Since the beginning of the flooding, lake waters are weekly sampled and analyzed for temperature, pH, redox, EC, TDS, TSS, DO,DIC, DOC, turbidity, alkalinity/acidity as well as nearly 40 inorganic chemical components. Stable water isotopes (deuterium and oxygen) are also being recorded. In order to better understand the dynamic chemical evolution of lake waters, the chemical characteristics of rain water as well as a series of lake tributaries and ground waters are also being measured. Since the beginning of the flooding process, the chemical quality of lake water has experienced an interesting evolution that obeys to a variety of circumstances. The silicic geologic substratum of the catchment determines that both ground and surface waters have a rather low alkalinity. Moreover, the presence of disseminated sulfides (mainly pyrite) within the schistous materials of the mine slopes and internal rock dumps provokes a significant acidic load. From April to October 2008, the lake waters had only the contribution of rain and ground waters. Since the beginning of October, a significant volume of surface waters has been derived to the mine hole. Taking pH as indicator, the first water body had a rather acidic pH ($\tilde{3}$) which was progressively amended with the addition of a certain amount of lime to reach an upper value of $\tilde{8}$ by late August. The diminution in the addition of lime up to its elimination, in December, has conducted to the progressive acidification of the lake. At present, an instrumented floating deck is being deployed in the lake. This device will serve as a base point where it is planned to locate a series of instrumentation (complete weather monitoring station, multiparametric probe, sediment trap line) that will complement with depth profiles the surficial sampling performed so far.