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Mineralogical, geochemical and hydrogeochemical assessment of the Sao Domingos decommissioned mining and metallurgical site, South Portugal.

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The decommissioned Sao Domingos mine is located in the Iberian Pyrite belt, South Portuguese Zona of the Iberian Massif. Its geographical location is very close to the Spanish-Portuguese border in the Bajo Alentejo region of Portugal. The mineralization exploited corresponds to massive pyrite with contents in copper, and was exploited during the 20th Century both by an open pit and by a underground mine reaching 420 m. depth. Besides the mine, an important metallurgical center, for the calcination of pyrite from this and other mines of the area, was active also in the area.
Mining of pyrite has a major environmental concern: the formation of the so called “Acid Mine Drainaje” (AMD), consequence of the hydrolysis of pyrite and eventually other sulfides, producing the release of complex acid sulphates and metallic ions to surficial and ground waters, and acidifying the local soils. This process is conspicuous in the Sao Domingos mine area, affecting at least an area of some 50 km2.
In this communication we present the data obtained in an environmental survey performed in this area, including the characterization of the mineralogy, geochemistry of soils and sediments, efflorescences and waters.
Mineralogy is dominated by the destruction of the original sulphides paragenesis, with formation of a variety of Fe oxides; also, the formation of AMD produces mineralogical changes in the clay mineralogy of the hosting shales.
The geochemistry of soils and sediments shows a very strong pollution, particularly involving the presence of extremely high concentrations of Cu, Zn and Pb.
Efflorescences showed a composition based on Mg salts, with high concentrations in As, Pb, Zn and Ni, higher downstream the mine area.
The composition and physico-chemical parameters of the local waters appears as the most important concern, with acid reactivity, very high salts contents, and also very high metallic loads, persisting even at 5 km downstream from the mine area.
A LIFE-funded project is carrying out some reclamation measured to minimize the impact of the AMD formation.