New Investigations on the Geology and Mineralogy of the S'aliderru Bentonite Deposit (Sardinia, Italy)

Sebastiano Coticelli[1], Piergiulio Cappelletti[1], Concetta Rispoli[1], Giuseppina Balassone[1], Fabio Granitzio[2], Nicola Mondillo[1]
1. Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse, Università degli Studi di Napoli Federico II, Napoli, Italy, 2. Clariant Prodotti (Italia) Spa, Milano, Italy

Bentonites are a group of rocks formed essentially by smectites, mainly belonging to the montmorillonite-beidellite series. Bentonites derive from the alteration of volcanic and/or sedimentary rocks, with a prevalent siliceous-vitreous component, by aqueous fluids that operate at temperatures between 90° and 120°C. During the alteration, chemical elements are remobilized and the composition and structure of the minerals are modified. The resulting mineral assemblage depends on the nature of the protolith and the composition of the altering fluids (Cuadros et. al., 1999). Bentonites have a wide range of properties (CEC, thixotropy, swelling, viscosity, water absorption) that make them very important industrial minerals, which are periodically tested also by the EU for possible inclusion in the list of critical raw materials. The aim of the present study is to investigate the genesis of the S'Aliderru deposit, located in north-western Sardinia (Italy), which represents one of the largest bentonite deposits of the Mediterranean area. The bentonite formed at the expense of arc-related Cenozoic tuff and ignimbrite products. From fieldwork, distinct bentonite horizons were identified, belonging to multiple pyroclastic flows that were progressively emplaced in a pull-apart basin hosted in the Mesozoic carbonate basement. The occurrence of travertine bodies and conglomerate and sand lenses hosted in the pyroclastic sequence suggests that the deposition and alteration took place in a marine-transitional environment. Mineralogical and petrographic analyses on several samples collected in the S'Aliderru deposit allowed the classification of the bentonites into four classes and discrimination of the featuring minerals of the other lithologies. Petrographic analyses confirmed that the alteration of the volcanic glass into clay minerals occurred in a marine environment, but the presence of barite as well as other phases suggests that low-temperature hydrothermal fluids also contributed to determining several peculiar features of this deposit.