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Detailed Mineralogical Study of the Bentonitic Basin of Northwestern Sardinia (Italy): the S'Aliderru and Sa Pigada Bianca Deposits

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In recent years, bentonite has been gaining increasing importance from an industrial viewpoint due to its many properties that make it a valuable product, especially in the oil and steel industries. The objective of this study is the detailed mineralogical investigation of mineralized samples from the S'Aliderru and Sa Pigada Bianca deposits, the two most important deposits in the bentonite basin of northwestern Sardinia (Italy). The samples collected represent the different varieties found at the two sites and differ in color and the nature of parent rock. The study was based on XRPD analysis of the samples, which were subjected to various processes (AD, EG, DMSO, heating) to identify the occurring mineralogical phases to understand the geological processes that led to the formation of the deposits and possible genetic differences at the basin scale. The analyses showed a very complex mineralogical assemblage. In detail, the S'Aliderru bentonites are composed mainly of Ca-Montmorillonite, with the accessory presence of kaolinite, chlorite, muscovite, and biotite. The Sa Pigada Bianca samples are composed of Ca-Montmorillonite, Muscovite, Biotite, Kaolinite, and Zeolite. In the case of S'Aliderru, the new mineralogical information, combined with information from previous studies, indicates that the volcanic material that gave rise to the mineralization was probably deposited in a marine-transitional environment and was then affected by at least one hydrothermal stage. About Sa Pigada bianca, from the mineralogical assemblage and the limited extent of mineralization, a continental-type genesis can be inferred, driven by the faults affecting the area, with fluid evolution over time resulting in the present mineralogy. In the near future, it is planned to conduct analyses of other deposits in the area to formulate a genetic model at the basin.