

## **Evidence of Na-metasomatism of phyllite rocks from the Verrucano of Monti Pisani (Tuscany, Italy)**

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We report here for the first time the occurrence of albitite rocks in the Middle Triassic “Verruca” Formation (Monti Pisani, Northern Apennine, northern Tuscany, Italy). The albitite is the result of a pervasive Na-metasomatism of phyllites (originally formed by potassic white mica + quartz + chlorite + hematite + albite). The albitisation process took place after the Miocene main phases of Apenninic deformation and was followed by the formation of a system of veins made of Fe-carbonate ± quartz. Hydrothermal alteration continued with the ingression, possibly favored by the increase of permeability due to albitization, of a slightly acidic, oxidizing, aqueous fluid that led to the kaolinization of the albitite and to the complete replacement of the Fe-carbonate of the veins by Fe-hydroxides. This stage was followed by a supergene alteration that led to the formation of a pervasive network of tiny veins of halloysite and colloform (P-Al-Si)-bearing Fe-hydroxides. Finally, the hydrothermally altered rock underwent a localized brittle fracturing without new minerals formed. The most important chemical changes occurred during the whole hydrothermal process were the inversion of the Na<sub>2</sub>O/K<sub>2</sub>O ratio of the whole rocks (from 0.07 in the pristine phyllite to up to 200 for the kaolinized albitite), the loss of Fe and Mg, and the enrichment of Sb. Light REE and HREE behaved conservatively, whereas MREE were partially lost. The occurrences of hydrothermal alteration are common in central-southern Tuscany, and generally related to the post-collisional extensional regime, lithospheric thinning, and emplacement of magmatic bodies in the crust. The Monti Pisani kaolinized albitite, although occurring far from potential magmatic sources, can be considered related to this post-collisional extensional tectonic setting, thus stretching out northward the occurrence of post-Miocene hydrothermal activity in Tuscany.