



## **Geochronological constraints of the salar Grande halite body, Atacama Desert, I Region Chile. An approach from surface and subsurface data.**

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Salar Grande (SG) is a very particular salt pan located in northern Chile, at the Atacama desert. Whereas the most of the Chilean salars are located in the high mountains of the Andes (Andean salars), SG is placed to the west, in the Coastal Cordillera south of Iquique ( $20^{\circ}48'-21^{\circ}14'S$  and  $69^{\circ}54'-70^{\circ}02'W$ ). Covering a 45 km long, 4-5 km wide area with ca. 162 m deep, SG body is formed of almost pure halite with some sulfate bearing strata remnants at its margins. The upper 55 m of the salar are made of banded halite (between 55 and 35 m deep), massive halite (between 35 and 0.5 m deep) and 30-50 cm of efflorescent halite at its surface. Moreover it is a fossil salar, i.e. currently there is no salt deposition and thus, the salar's top is an erosion surface. Another outstanding characteristic is that the salt body is deformed by faults, and because of its fossil state, geomorphologic features like fault traces and associated escarpments can be seen at the surface of the salt body. Additionally due to the absence of radiometric data, previous studies established a Late Miocene-Pliocene depositional age of the SG on the base of its stratigraphical relations.

The halite body locally contains interbedded volcanic ash layers, which are deformed by the activity of NNW-SSE, E-W and NW-SE trending faults. Particularly this deformation results in volcanic ash beds outcropping at the surface. In this work, we obtained four  $^{40}\text{Ar}/^{39}\text{Ar}$  biotite ages of samples from abandoned mine quarries; one directly from the salar surface and another from an exploration drilling core. The maximum age of the salar is not well constrained because it was not found suitable material for dating in the lower portion of the salt body. Nevertheless, the gravels below the salt body have an age of ca. 21.5 Ma. On the other hand, an age of  $5.7 \pm 0.5$  Ma obtained within the salt body could be reworked or in situ volcanic ash, for this reason is considered a maximum age. Moreover the youngest ages of the marginal alluvial fans that were probably coeval with the halite body are ca. 0.3 Ma. All these data suggest that this unit is as old as Early Miocene and as young as Middle Pleistocene. Considering the ages obtained into the salt body, and that the younger halite body age is 1.23 Ma; it is concluded that the SG halite body age ranges from, at least 5.70 to 1.23 Ma. Our results show that the depositional age of the SG has a broader age range than the proposed in previous works.

This work is part of the National Mapping Program of the Chilean Geological and Mining Survey.