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Hydrochemistry Studies of Saltwater Intrusion in Drought Scenarios in Canelones, Uruguay´S Aquifers

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Extended Abstract

Water scarcity in quality and quantity is an urgent concern around the world. In recent years, the groundwater sources in Uruguay have been compromised to meet the high demands of the productive and industrial sectors due to climate change factors that have had a serious impact during 2023, such as periods of prolonged drought. Coastal sedimentary and fractured aquifers like those present in the Canelones district should be monitored frequently and this should be driven by water resources managers. A hydrochemistry and geology analysis focused on the medical geology approach was performed in this work, from 3 wells across a study area of 16 km^2 in Costa Azul, two wells 15 km to the east in Cuchilla Alta and one well 12 km far from the coast to the north in Soca.

Physico-chemical selected parameters (electrical conductivity (EC), temperature, dissolved oxygen, potential redox and pH) were analysed with a Hanna® multiparameter probe existing in the Hydrogeology chair *of the Science Faculty, UDELAR*. The collected samples were conditioned in 500 mL PET or similar and were stored at 4°C to be transported to the Laboratory for subsequent analysis in the *Water and Soil Laboratory*, from *Water Department*, *CENUR LN*, *UDELAR*. Samples were filtered (Whatman®, Uniflo Nylon, 25 mm, 0.45 µm) and Li^+, NH_4^+, Na^+, K^+, Mg^{+2}, Ca^{+2}, F^-, Br^-, Cl^-, PO_4^{-3}, SO_4^{-2} and NO_3^- were analysed by ion chromatography according to APHA_4110-B in the Thermo Dionex AquoION®, alkalinity and bicarbonate (HCO_3^-) by APHA_2320-B hardness by APHA_2340-C respectively [1].

The processing of results was carried out using EasyChem® hydrochemical modeling software and statistics such as InfoStat® and CoDaPack® for compositional statistics (Pamoukaghlián et al unpublished results).

To understand the threat to human health posed by the high accumulation of sodium in groundwater used for consumption and domestic activities, the methodology proposed by Amu et al. [2] was applied. Na^+ levels detected (58.0-385.0 mg/L), Cl^- (44,0-381,0 mg/L) and EC (571-2460 µs/cm). Promising results shed light on the saline intrusion and possible contamination to preserve human health and promote good practices of groundwater management.

References

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