



A new method of combined techniques for characterization and monitoring of seawater interface in an alluvial aquifer

Albert Folch (1,2), Laura del Val (1,2), Linda Luquot (6,2), Laura Martínez (6,2), Fabian Bellmunt (3), Hugo Le Lay (4), Valentí Rodellas (7), Núria Ferrer (1,2), Sheila Fernández (6,1,2), Juanjo Ledo (3), Philippe Pezard (5), Olivier Bour (4), Pilar Queralt (3), Alex Marcuello (3), Jordi García-Orellana (7), Maarten Saaltink (1,2), Enric Vázquez-Suñé (6,2), Jesús Carrera (6,2)

(1) Department of Civil and Environmental Engineering, Universitat Politècnica de Catalunya (UPC), Jordi Girona 1-3, 08034 Barcelona, Spain, (2) Associated Unit: Hydrogeology Group (UPC-CSIC), (3) Institut de Recerca Geomodels, Universitat de Barcelona, Spain, (4) Geosciences Rennes, University Rennes, Rennes, France, (5) Laboratoire Géosciences Montpellier, UMR 5243, place Eugène Batallon, 34095 Montpellier, France, (6) Institute of Environmental Assessment and Water Research (IDAEA), CSIC, c/ Jordi Girona 18, 08034 Barcelona, Spain, (7) Departament of Physics and Institut de Ciència i Tecnologia Ambiental, Universitat Autònoma de Barcelona, Bellaterra, Spain

Understand the dynamics of the fresh-salt water interface in aquifers is a key issue to comprehend mixing process and to quantify the discharge of nutrients in to coastal areas. In order to go beyond the current knowledge in this issue an experimental site has been set up at the alluvial aquifer Riera Argentona (Barcelona – Spain). The site comprises 16 shallow piezometers installed between 30 and 90 m from the seashore, with depths ranging between 15 and 25 meters. The seawater interface is being monitored using several techniques, the combination of which will help us to understand the spatial and temporal behaviour of the mixing zone and the geochemical processes occurring there. Specially the deepest piezometers are equipped with electrodes in order to perform cross-hole electrical resistivity tomography (CHERT). In addition, all piezometers are also equipped with Fiber Optic cable to perform distributed temperature measurements. Two single steel armoured fibre optic cable lines of around 600m length were installed in all boreholes. The objective is to use the cable both as passive and active temperature sensor. The first is being done for the continuous monitoring of temperature whereas; the second provides a higher temperature resolution used to monitor field experiments.

Periodic CHERT measurements are carried out between the piezometer equipped with electrodes, resulting in parallel and perpendicular vertical cross sections of the site resistivity. The position of the fresh-salt water interface can be identified due to the resistivity contrast between the saline and fresh water. Preliminary results of periodic distributed temperature measurements will be also be used to monitor the position of the mixing zone thanks to the contrast and seasonal temperature changes. Periodic down-hole EC profiles will be used to validate the method.

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