Geophysical Research Abstracts
Vol. 20, EGU2018-11983-2, 2018
EGU General Assembly 2018

Hydrodynamics and hydrogeochemical changes in the mixing zone of a coastal aquifer during a heavy rain event

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Coastal aquifers are characterised by being the confluence of fresh water and sea water. The density dependent flows maintain the two masses in equilibrium, with a transition zone between both called mixing zone. It's in this zone which the water composition is modified by a set of biogeochemical reactions.
This equilibrium can be cancelled when the recharge increase due to an important rainfall event. For example, in the Mediterranean area the aquifer recharge is largely directed by heavy rainfall events concentrated during autumn and spring. We tried to understand the spatial and temporal behaviour of the mixing zone and the geochemical processes occurring after an important inflow of fresh water.
The experimental site of the alluvial aquifer in the ephemeral stream of Argentona (Barcelona – Spain) with its 16 shallow piezometers next to the seashore permit to monitor the seawater interface movement. An event occurred in October 2017 was followed there with permanent measurement of water level, salinity and temperature in boreholes. Also regular groundwater sampling during five days after the event. Furthermore, geophysical methods were applied with cross-hole electrical resistivity tomography (CHERT), spectral gamma-ray and conductivity induction.
Preliminary results of this campaign show that different behaviours in water table response are observed between wells related with the geology. The changes in salinity suggest that dilution processes occurred with the inflow of fresh water, followed by a recovery of higher salinity than the initial values. This results have been validated by the samples analysis, which show more elements about dissolutions and cation exchanges processes.

Acknowledgements
This work was funded by the projects CGL2013-48869-C2-1 y CGL2013-48869-C2-2-R of the Spanish Government. We would like to thank SIMMAR (Serveis Integrals de Manteniment del Maresme) and the Consell Comarcal del Maresme in the construction of the research site.