

**Improved groundwater management from in-situ geophysical monitoring of the
Chatelaillon coastal aquifer
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Chatelaillon is a touristic seaside resort in western France where the water supply is provided by a coastal limestone aquifer exploited from two wells. Every summer, due to high touristic demand, groundwater extraction is strongly increased, leading to a progressive aquifer salinization and constraining the city to buy water from inland. In order to document the saltwater intrusion dynamics into the Chatelaillon coastal aquifer, and better constrain groundwater extraction, a downhole (in-situ) monitoring network was installed in January 2015. Based on 3 downhole geophysical observatories installed in 30m deep piezometers, daily to hourly EC profiles with 70cm electrode spacing are recorded in an automatic and remote controlled mode. The three observatories are installed respectively at 50m, 1000m and 2000m from extraction wells. Automatic electrical conductivity measurements of the extracted water are also recorded. Over the past year, this subsurface monitoring network has provided daily to hourly saltwater intrusion geophysical pictures of conductivity versus depth and time. The saltwater intrusion location, shape and ionic content is detailed on an hourly basis, then confronted to boundary conditions such as rainfall and groundwater extraction. A saltwater intrusion maximum is recorded from mid-June to the beginning of August with the piezometer located close to the shore, with a decrease as soon as the recharge occurs. Regarding the two other observatories, rainfall events and groundwater extractions both lead water conductivity changes. For the observatory located within the pumping zone, the pore water conductivity steadily increases (from 800 to 1100microS cm) at bottom of the hole from July to the beginning of September. During this period, when the water level stays bellow 0,20mNGF (the productive upper part of the aquifer is then dewatered), the pumped water comes from the salinized bottom, leading to water contamination. In summary, automatic and high frequency EC profiles recorded at Chatelaillon with autonomous and automatic downhole geophysical observatories lead to a better understanding of aquifer contamination process by saltwater and provide data for a more precise water management.

