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An environmental tracers approach to characterize groundwater recharge within a carbonate coastal aquifer (Corse-du-Sud, France)

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Bonifacio is a coastal city, highly touristic, located in the southest part of Corsica Island. One million people visit the city in July and August, whereas 3000 inhabitants live throughout the year. Bonifacio lies on a small limestone plateau with a potential aquifer poorly understood. Actually there is a strong need to characterize the hydrogeological behavior for the reason that the economic development of the region is highly dependent of the groundwater supply potential. The Miocene sedimentary basin of Bonifacio has an area of 25 km^2 with a depth up to 250 m in the center. It is based and surrounded by a Hercynian granitic substratum. The basin is open to the Mediterranean Sea on its south and east sides. The formation is calcareous-sandstone and is divided in 3 sedimentary units. The upper unit is highly calcareous and sandstone with a pseudo-karstic morphology, the intermediary unit is more silty-sandstone than the last but less than the unit from below. To establish a conceptual model of the groundwater flows of the Bonifacio aquifer, a hydrochemical (major ions, $\delta^{18}O$, $\delta^{2}H$, ^{3}H) and hydrodynamic investigation was carried out on 12 wells, 1 spring and 1 river since May 2011. Vertical recharge is dominant in the centre of the aquifer where unsaturated zone is thicker, while on the aquifer boundaries with the granitic area, lateral flow was significant. Environmental tracers approach had clearly showed the important role of the boundaries conditions for the groundwater flow behavior of the aquifer of Bonifacio and the necessity of an investigation larger than the aquifer itself due to its limited spatial extension.