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Isotope  
signatures

## and hydrochemistry as tools in assessing groundwater occurrence and dynamics in a coastal arid aquifer (Article) (Open Access)

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### Abstract

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Groundwater from the La Paz arid coastal aquifer in Baja California, Mexico, is essentially the only source of drinking water for the local population and tourists, as well as irrigation water for agricultural needs. The intensive exploitation of the aquifer and water cycling has resulted in groundwater abatement (up to 10 m) and high salinity (up to ~5800 mg l<sup>-1</sup>). A study using hydrochemistry, isotopic (deuterium, oxygen-18 and carbon-14) and gaseous tracers (chlorofluorocarbons CFC-11, CFC-12, CFC-113), as well as multivariate statistics, was developed to elucidate groundwater composition, flow and occurrence. Groundwater is of meteoric origin, and a large proportion is subject to evaporation. The primary natural recharge is generated in the El Novillo and Las Cruces ranges, and groundwater subsequently flows in a SE–NW direction toward the coast. The initial water type is the result of discordant dissolution of silicate minerals and ion exchange on soils. In the lower plain portion, the aquifer system is recharged from irrigation return flow and seawater intrusion, which significantly affects groundwater chemistry. Nitrate and chloride concentrations indicate that groundwater is highly affected by an overuse of fertilizers in agricultural activities, but there is little effect from urban activities. Seawater intrusion has progressed rapidly during the past decade, and the impact currently extends 13 km inland. Radiocarbon residence time calculations suggest that groundwater is modern, with the exception of Chametla and El Centerario sites in the central and western lowlands with ages of up to ~5000 years. These waters indicate an additional recharge source for the upconing of fossil groundwater or regional flow. © 2016, The Author(s).

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### SciVal Topic Prominence

Topic: [groundwater](#) | [noble gas](#) | [groundwater residence](#)

Prominence percentile: 89.912

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### Reaxys Database Information

[View Compounds](#)

## Author keywords

Arid regions Coastal aquifers Contamination Hydrogeochemistry Isotope hydrology

## Indexed keywords

### Engineering controlled terms:

Agriculture Aquifers Arid regions Carbon Contamination Groundwater  
Groundwater geochemistry Groundwater pollution Groundwater resources  
Hydrochemistry Hydrogeology Ion exchange Irrigation Isotopes  
Mercury (metal) Multivariant analysis Potable water Salt water intrusion Seawater  
Silicate minerals Silicates Water

### Engineering uncontrolled terms

Agricultural activities Chloride concentrations Coastal aquifers  
Groundwater composition Hydro geochemistries Intensive exploitations  
Irrigation return flows Multivariate statistics

### Engineering main heading:

Recharging (underground waters)

### GEOBASE Subject Index:

aquifer pollution arid region coastal aquifer concentration (composition)  
drinking water exploitation hydrogeochemistry hydrology ion exchange  
isotopic composition multivariate analysis recharge residence time  
saline intrusion salinity silicate mineral tracer

### Regional Index:

Baja California Sur La Paz [Baja California Sur] Las Cruces Mexico [North America]  
New Mexico United States

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