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**Migration of strontium
in clayey and calcareous sandy soil:
Precipitation and ion exchange**

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An equilibrium model for describing strontium transport through a clayey and calcareous sandy soil is presented. The speciation model includes calco-carbonic equilibria, water dissociation, Ca/Sr ion exchange, and precipitation/dissolution of strontianite and calcite. This speciation mechanism is included in a flow model taking into account dispersion and advection. The transport model is validated by column experiments performed with sand from Gûe, France. The model allows the prediction of strontium transport in a wide concentration range. Strontium retardation is mainly governed by strontianite precipitation and Ca/Sr exchange. The ability of the driving water to dissolve the precipitated strontianite can be responsible for an overconcentrated strontium peak, and determines its retardation.