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Coupling between hydrology in unsaturated porous media and geochemical models

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Along the beach we can observe tidal variations who lead to a runoff of seawater into sand beach, this infiltration infer some geochemical reactions that we want to quantify. We have developed a 2D numerical model that couples the non-linear Richards'equation for describe runoff into beach permeable sediment with transport-diffusion equations submitted to tides influence. The flow into the sediment is described by the Richards' equation which generalizes the Darcy's law for variably-saturated porous media. The velocity field and the watertable location, deduced from the numerical resolution of the Richards' equation, are introduced into the transport diffusion-equation. Tidal oscillations are modeled as a sinusoidal pressure boundary condition along the beach slope. Both flow characteristics and concentration are solved by finite element method. Numerical results have been compared with concentration measured in the Truc Vert beach located along the Atlantic coast.