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Interpretation by numerical modeling of data monitored at a cover for a nuclear waste repository

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Two pilot covers have been set up at the Spanish facility for disposal of low and intermediate-level radioactive waste located at El Cabril (southern Spain). Their objective is to test the effectiveness in reducing or preventing surface erosion and runoff, infiltration and biointrusion. They consist of multilayer systems that profit from capillary barrier concepts. A complete monitoring system involving more than 200 sensors has been installed. At the same time, a complete meteorological station records meteorological data. This information is used to define initial and boundary conditions of a numerical model and also to test its validity. Here we discuss results of a preliminary 1D non isothermal multiphase flow model with an atmospheric boundary (whose fluxes depend on meteorological data) at the top. Furthermore a sink-source term has been developed to simulate the effect of lateral flow caused by the steep slope (40%) of the cover. Joint analysis of numerical simulation results together with field data allows us to study the behaviour of the liquid, gas and energy fluxes in a layered slope and to study the effects of different hydraulic properties, capillary pressures and degrees of saturation of the materials on the magnitude and direction of these flows.