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The El Cabril cover: design, monitoring system and modelling

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A cover has been planned for the final confinement of low and intermediate level radioactive waste. Its objective is to avoid any root or animal entry, and to minimize water infiltration, in liquid or vapor phase, to guarantee the isolation of nuclear waste. The spanish facility for disposal of this waste is located at El Cabril (Córdoba, Southern Spain). We have designed and set up two pilot covers at the facility, but without waste underneath. They consist of multilayer covers based on capillary barrier concepts. They need to guarantee isolation of the waste until radiation will have decayed to admissible levels (300 years). Their objective is to test surface erosion and runoff, infiltration and biointrusion.

This work consists of two parts: field experiment and modelling of the pilot covers. The former focuses on the analysis and interpretation of the data recorded by a comprehensive monitoring system made up of more than 200 sensors (temperature, water content, suction, surface runoff and infiltration). These collected data are compared to predictions obtained from a 2D non-isothermal multiphase flow model. The thus calibrated model allows us to study the behavior of the liquid, vapor and heat fluxes in the system. In this way we can verify the covers effectiveness and establish the definitive design for the confinement of the radioactive waste.