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Natural underground caves such as karsts are quite common in the region “Centre”, France. These subsurface perturbations can be found underneath the protection dykes around “the Loire” River and the damage caused can create routes for floods. Geophysical methods such as Multi-channel Analysis of Surface Waves (MASW) can be used for locating voids or karsts systems, but its efficiency on surface with strong topography such as dykes is not certain. Three dimensional Rayleigh wave modelling was used to understand the role of topography in the propagation of surface waves and with the aim of determining the best way for MASW investigations of surfaces with strong topography such as river dykes. Numerical modelling shows that surface waves propagation is not strongly affected by topography for an array parallel to the dyke. For homogeneous models with topography, a diminution of surface waves amplitude is observed while higher propagation modes are amplified in the dispersion curves in the case of heterogeneous models with topography. For an array perpendicular to the dyke, numerical modeling shows that Rayleigh waves’ velocity is lower. MASW investigations can then be applied if lateral variations of the topography are not too strong along the seismic line. Diffraction hyperbolas created by a full of water cavity were identified in numerical modelling with topography. According to these elements, a MASW survey has been performed on the dykes of “the Loire” river close to a collapsed cavity and potential karstic systems were discovered.