Monitoring techniques for analysing subsidence: a basis for implementing an Early Warning System

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Abstract The L’Estació neighbourhood located in Sallent (a town near Barcelona, Spain) is affected by large ground subsidence phenomena that extend within the former exploitation limits of an old underground potash mine. In the 1990s, several damages were reported in different buildings. Since then, different monitoring techniques have been implemented. This paper compares and analyses these techniques that identify, measure and monitor subsidence phenomena. On the one hand, high precision topographic surveys are used to investigate the subsidence phenomena extent on the terrain and its effects on buildings. On the other hand, in situ extensometers, inclinometers and piezometers are used to investigate the underground conditions and infer the mechanisms that control the subsidence motion in detail. The parameters obtained from the land surface deformation (measured with the automatic total station) and the underground deformation measurements (extensometers network) have been integrated into a real-time monitoring system as a basis for an early warning system developed by the IGC. The use of these techniques, as well as threshold values to activate civil protection alarm and communication procedures, are done on the basis of the experience obtained during the investigation of the phenomena.

Key words mining subsidence; emergency plan; monitoring network; Catalonian potash basin