Evolution of the surface displacement field associated with the operational Mine De Potasse d'Alsace (MDPA) over the 1990's from InSAR-ERS observations

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Résumé

The Mine De Potasse d'Alsace (MDPA), located in the south of the Rhine graben near Mulhouse (France), was operational between 1904 and 2002. Two distinct layers were exploited at e depth of 635m and 655m and a thickness of 1-2m and 2-5.5m.

We used ERS SAR data acquired along two ascending and two descending tracks, to estimate the surface deformation during the exploitation phase. Because of the low interferometric coherence due to fields and forests, we used the Stanford Method for Persistent Scatterers (StaMPS) (Hooper & al, 2012) to track the displacements at permanent scatterers and follow the surface evolution using the time series analyses. Doing, we are able to cover around one third of the total surface above the full gallery network.

The resulting surface LOS displacement fields are consistent with localised and fast vertical displacement. The maximum mean velocity is 36.5 mm/year but the velocity reached about 85 mm/year. The exponential behavior of the subsidence, observed through time series, explain the differences. At a specific place, an unexplained uplift is detected. We then compared our results to leveling data, provided by the MDPA. The displacement curves are nearly the same for both data set, except at some locations where the subsidence rate is above 100 mm/year.
After these first encouraging results, our future work will consist in the treatment of ENVISAT and Sentinel data to follow the displacement field during the post-exploitation phase. By adding to our InSAR data some in-situ measurements of the convergence speed, we aim to build a geomechanical model.

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