

Remote Sensing Techniques (INSAR) used to Quantify the Long-Term Impact of Coal Mining on Surface Movement

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All underground mining excavations lead to a certain impact to the surface and to the surface infrastructure, in particular when a total extraction method without backfill is being applied. In this paper the impact of the longwall method of deep coal seams in Belgium is studied. In the past, the extractive industry focused on the short-term impact. However, the concepts of sustainable mining require the study of the long-term impact of mining on its surroundings. Such studies are facilitated a lot by the availability of data by remote sensing techniques (INSAR), whereby data is available for large areas above and around old mining excavations. These data have the additional advantage that they are recorded on a regular and frequent basis, and that they are characterized by a dense network of reflectors.

The studies so far clearly showed that after the closure of the coal mines, there is initial a period of further residual subsidence, followed by an uplift of the surface. Although that the residual subsidence and uplift are approximately an order of magnitude smaller than the short-term subsidence, both long-term movements cannot be neglected. The subsidence and uplift are based on two different mechanisms. While the subsidence is mainly a mechanical stress-deformation process linked to the caving and including time-dependent aspects, the uplift is the result of the flooding of the deep underground. Hence, the shape of the surface subsidence is different from the shape of the uplift.

Biography:

André Vervoort obtained in 1987 his Ph.D. degree in Mining Engineering in Belgium, studying the roof behavior in coal longwalls. From 1988 till 1992 he worked in South Africa for COMRO (Chamber of Mines of South Africa - Research Organization) in the coal mining division, mainly studying strata control in room and pillar panels and pillar extraction panels. Since 1992 he is a professor at KU Leuven, Belgium, lecturing courses on rock mechanics, mining and geostatistics. He has a special interest in all aspects of sustainable mining, including the long-term impact.