Geophysical Research Abstracts,
Vol. 11, EGU2009-8387, 2009
EGU General Assembly 2009

Vertical ground movements for Prague and Ostrava-Karviná areas determined by PSInSAR

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Permanent Scatterers Interferometry SAR (PSInSAR) allows precise measurements of ground movements to be detected. This remote sensing technique assesses displacements along the satellite line of sight and detects vertical movements of targets on the Earth surface (called permanent scatterers). They are representing particularly by man-made objects (e.g. individual buildings) and by rock outcrops in a landscape. For area of Prague were processed 78 ERS1/2 SAR scenes for period from 1992 to 2005. Subsidence and uplift rates in the Prague area reach millimetres to centimetres per year. The PSInSAR analysis identifies primarily vertical movements of local significance, mostly subsiding of buildings and/or object complexes in the urban area. The second investigated Ostrava-Karviná area is heavily affected by long-term undermining activities. The PSInSAR data for this area relate to the 1995–2000 period (acquired by processing ERS1/2 48 SAR scenes). Displacements for the urban area of Ostrava town display subsiding effects, because of coal-mining decrease, while in the Karviná coal mining area they are still in a progress. Some areas located in the undermined region move down up to several decimetres per year. Detectable rate of vertical movement obtained by the PSInSAR application reaches at most 1.5 centimetres per year. Since in a few locations rates of movements are rather high, three scenes from 2007 by differential interferometry SAR were processed using the ALOS PALSAR approach to determine these intensive movements. The work was supported by the Targeted Research Programme of the Academy of Sciences of the Czech Republic (1QS300460551) and by Ministry of Education, Youth and Sport of the Czech Republic (LC506).