

REMOTE SENSING FOR EVALUATING HAZARDS CAUSED BY UNDERGROUND MINING

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Multisensor satellite and airborne remote sensing has been used to assess subsidence at the Earth's surface caused by underground mining and to test and improve remote sensing methodology for hazard detection. The study area is near Magdeburg, about 100 km west of Berlin, Germany, and is characterized by abandoned lignite and potash mines. The fact that the abandoned mines were only partly stabilized is the reason for the development of subsidences and collapse sinkholes, which are still forming today. Satellite data (Landsat TM, IRS-1C, Spot) were used to add to the basic structural data on the 1:100,000 and 1:50,000 master maps and to detect moisture anomalies related to unstable ground. Several airborne remote sensing systems have been used for special investigations at scales of 1:10,000 to 1:2000 (e.g., aerial photography, thermal scanning, laser scanning, airborne SAR). Remote sensing methods have been significantly improved by integration of laser scanning into the sensing system. Laser scanning revealed gentle depressions in the study area which - associated with features suggesting fracturing - indicated the early stages of subsidence. The efficiency of the applied methods was confirmed when a huge collapse sinkhole formed at these locations at the beginning of April 1998.