UAV-based mapping of radioactive contamination of uranium mining legacies in Central Asia

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In the Central Asian countries of Kyrgyzstan, Tajikistan, Uzbekistan and Kazakhstan, uranium production activities during the Soviet era have led to a large number of mining legacies. The mining residues can show significant levels of radioactive contamination. Due to the mountainous landscape and the geotechnical conditions at these sites, there is a risk of uncontrolled release of radioactive contaminants into the environment and into cross-border rivers in the region. The situation is exacerbated further by the fact that the countries are prone to natural hazards such as earthquakes, floods, mudflows and landslides. There is an urgent need to map locations, extent and inventory of the contaminated areas in order to be able to support remediation measures and monitor the long-term stability of the remediated legacies.

The research project DUB-GEM funded by the German Federal Ministry of Education and Research (grant no. 01LZ106A-C) deals with the development of a UAV-based gamma spectrometry for the exploration and monitoring of uranium mining legacies. The aim of the three-year project is to develop and apply a method that allows regulatory authorities and operators to map contaminated sites rapidly and economically using gamma spectrometers mounted on a UAV (unmanned aerial vehicle). The main tasks of the project are to select and configure suitable detectors, to develop flight, measurement, and data processing strategies and to design an airframe that is ideally suited to carry out the surveys. In this contribution we present the current status of the project, including the design of the UAV prototype, results of the first test and calibration measurements with the selected gamma spectrometers and an outlook on upcoming project activities.