

Way to reduce the uncertainties on ecological consequences assessment of technological disasters using satellite observations

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Abstract

The study presented is dedicated to assessment of the consequences of technological disasters using varied approaches to data analysis. The basic idea is to involve satellite observations data in context of integrated modeling of ecosystems for reducing of decision support immanent uncertainties in field of disaster mitigation measures.

Area studied is the northern part of eastern macro-slope of Carpathian Mountains. This region characterizing by good ecological conditions, is the source of few transboundary rivers, well-known recreation area, important agricultural and industrial territory. The regional data available from existing authorized agencies is analyzed from viewpoint of applicability to forecasting of long-term ecological impact of disasters. The existing data and methods uncertainty as well as the methodological gaps have been defined. As it was shown the additional data is required for more adequate analysis.

Using Earth observation data as the information with higher spatial integration the alternative pollution scenarios have been calculated taking into account the observed ecosystems response and expectable evolution. Key observation data derived from satellites is different vegetation and water indexes. Its superposition analysis allows to identify biophysical disturbs and driving forces of ecosystems changes caused by external impact investigated.

Basic analytical approach is the modeling of ecosystems and analysis of its response to climate changes predicted. On this base the possible pollution scenarios were calculated and interpreted. On the base of scenarios obtained the socio-ecological threats and deferred risks of technological disasters of different types have been identified with local natural and anthropogenic features.

Thus the role of Earth observation in the analysis of technological accidents was determined as well as the ways of optimal satellite observations utilization. Calculated set of disaster scenarios allows to elaborate recommendations to fulfill the methodological gaps in existing national emergency response services to reduce the uncertainties.