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Aerosol monitoring is of growing interest due to the impact of aerosol particle concentration on human health and the global climate. Air quality models as the EURopean Air pollution Dispersion model EURAD of the Rhenish Institute for Environmental Research (RIU) at the University of Cologne offer a continuous and operational monitoring and forecasting of the aerosol load in sufficient temporal and spatial resolution. But they fail in case of episodic emissions which are not covered by the underlying emission data bases used to describe aerosol sources.

Satellite-based measurements available from ENVISAT offer global measurements over land and ocean as provided by the ESA GSE PROMOTE using the SYNAER method. Model and observational information can be coupled by means of data assimilation. ENVISAT-SYNAER measurements are able to distinguish between different aerosol components as sulphate/nitrate, soot, water insoluble erosion-based or industrial particles, sea salt and long-range transported mineral aerosols. Therefore, a component-wise assimilation approach is under development. During the assimilation procedure, the final analysis is highly dependent on the specification of the relative weights to each source of information through the error covariance matrices. The observation error covariance matrix is not perfectly known, so a large potential for improvements of the analyses is offered by methods allowing its tuning. The focus of the work is applying information theory for an analysis of the information content properties of the SYNAER method and its application for tuning of observation error variances in an assimilation algorithm for SYNAER data.