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Thermospheric density and wind from GOCE thruster activation and accelerometer data

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In the framework of the ESA GOCE+ project, we are developing algorithms to retrieve thermospheric densities and crosswind speeds from GOCE observations. The resulting data on the thermosphere will complement and extend existing thermosphere datasets, such as those derived from CHAMP and GRACE data.

The data processing and the resulting data set are unique in several ways: GOCE uses an ion thruster to compensate for thermospheric drag, in order to maintain its orbit at a very low mean altitude of 270 km. This means that the most important acceleration data source for density retrieval is the thruster activation data. This information is combined with cross-track accelerometer measurements from GOCE's Electrostatic Gravity Gradiometer instrument to derive crosswind speeds. The nearly sun-synchronous dawn-dusk orientation of the orbit is also unique for high-resolution acceleration-derived thermosphere measurements.

This poster shows the current status of the work performed in the project and shows first results in terms of density and crosswind speeds.