IASI Level-2 Product Processing at EUMETSAT

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The IASI (Infrared Atmospheric Sounding Interferometer) Level 1C data are processed in near real time to Level 2 (geophysical products) in the EUMETSAT Polar System's Core ground segment and disseminated to the users via the EUMETCast system. The Level-2 processor ingests the IASI data along with information from the companion instruments AVHRR (Advanced Very High Resolution Radiometer), AMSU-A (Advanced Microwave Sounding Unit A), and MHS (Microwave Humidity Sounder). The processor functionality can be broadly broken down into three parts, the pre-processing, the cloud-detection, and the retrieval step. The level 2 processing starts with a pre-processing. The processing options are read from a user-configurable auxiliary data set. All necessary data are accepted from the input streams and are checked for availability, validated against thresholds, and co-located on IASI footprints by interpolation or nearest match-up. A radiance tuning is applied to the IASI spectra to account for biases between the natural and the modelled radiative transfer. A number of cloud detection tests are executed, based on IASI data alone, or using IASI in combination with AVHRR and/or ATOVS. The AVHRR scenes analysis is used to determine cloud amount, cloud height distribution, and the number of cloud formations within an IASI field of view. If clouds are detected, a CO2 slicing method, adapted for the use with interferometric data, is applied to determine cloud height and amount. The cloud phase is determined by applying thresholds on brightness-temperature differences in the infrared window. Flags are generated or updated to reflect the cloud situation and to modify the choice of the retrieval method accounting for the actual cloud condition. Different retrieval types are utilised, chosen according to data availability and cloud conditions. In the cloud-free case the parameters to be derived are temperature and water-vapour profiles, ozone amounts in deep layers, columnar amounts of carbon monoxide, methane, and nitrous oxide, surface temperature, and surface emissivity at different wavelengths. In cloudy situations, the number of retrieved parameters can change according to cloud amount and user choice. It is foreseen that parameters are derived above clouds only or in case of low cloud amounts, that a cloudy retrieval is performed. The retrieval techniques implemented are statistical retrievals based on EOF regression and artificial neural network methods for the first retrieval, and a variational Marquardt-Levenberg method employing a sub-set of IASI channels. It is possible that different choices can be made depending on the parameter to be

derived and on cloud condition. The processor is being optimised and validated with data from short-range NWP forecast and dedicated field campaigns.

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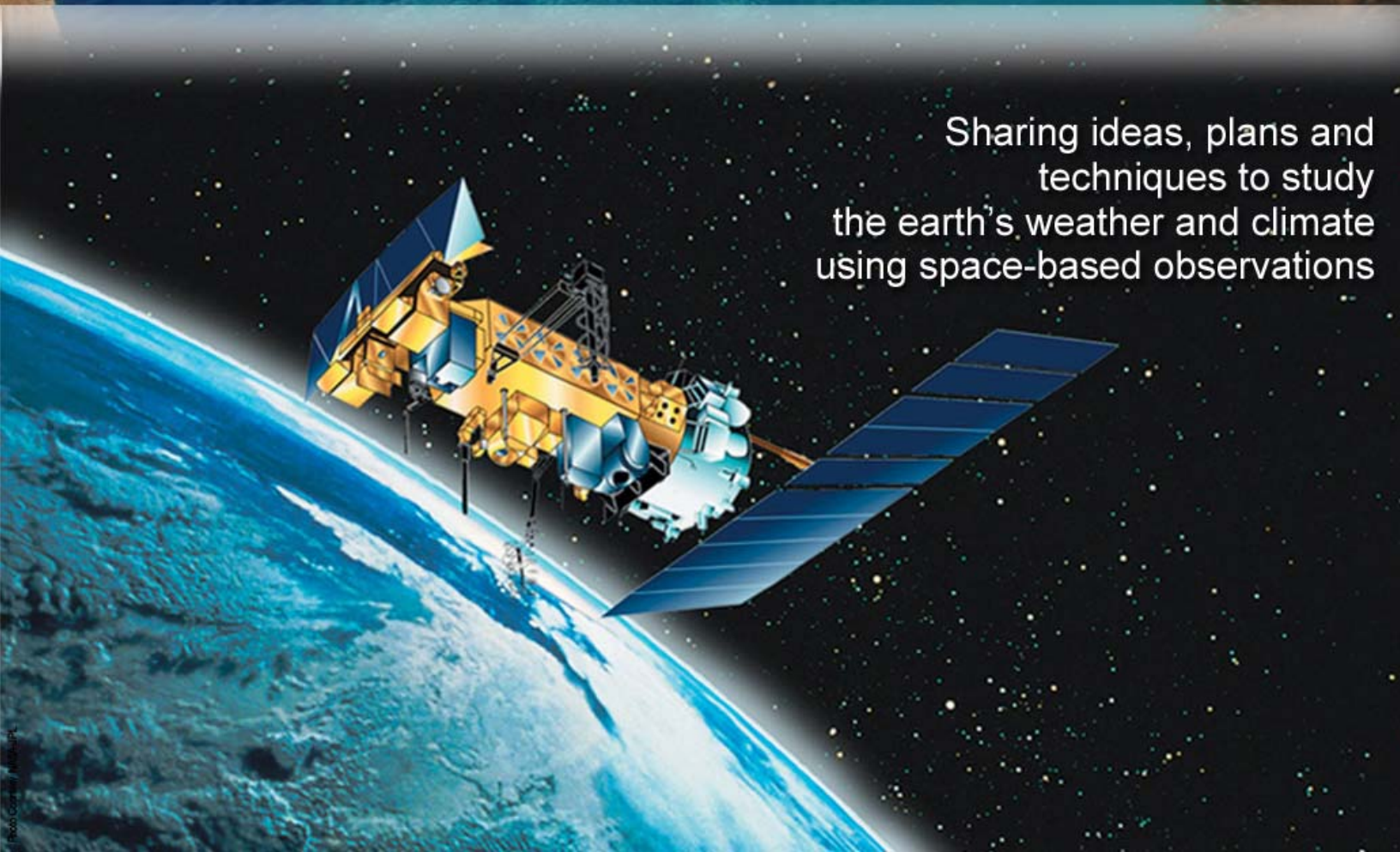

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