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Latitudinal variation of Cloud Top Height throughout the seasons as seen from SEVIRI, AIRS and ATSR-2

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The main objective of the presented study is to monitor temporal changes in the large scale distribution of Cloud Top Height/Pressure (CTH/CTP). as they are operationally generated by the EUMETSAT's Satellite Application Facility on Climate Monitoring (CM-SAF).
CTH/CTP of CM-SAF is considered together with two datasets based on ATSR-2 (the Along Track Scanning Radiometer 2 aboard ERS-2) as well as a combination of AIRS/AMSU-A (Atmospheric Infrared Sounder/ Advanced Microwave Sounding Unit) measurements.
CM-SAF uses space-based observations from geostationary Meteosat Second Generation (MSG) satellites and polar orbiting NOAA and MetOp satellites to provide satellite-derived geophysical parameter data sets suitable for climate monitoring. CM-SAF's product suite includes cloud parameters, radiation fluxes, surface albedo, and atmospheric water vapour, temperature and humidity profiles on a regional and partially on a global scale.
ATSR-2's cloud and aerosol products were produced within the project Global Retrieval of ATSR Cloud Parameters and Evaluation (GRAPE) employing an optimal estimation method for the retrieval.
AIRS is installed together with AMSU-A on the Aqua mission, the cloud products as well as greenhouse gases and dust maps are produced at the Jet Propulsion Laboratory, California Institute of Technology. For the cloud retrieval the cloud-clearing approach is applied.
The monthly mean products from a period between August 2006 and October 2010 from the three different instrument systems were analysed and compared.
There are large differences in the derivation of the three data sets concerning the instrumentation and retrieval methods, not to forget that two of the instrument systems fly onboard of polar orbiting satellites while the other one is kept in a geostationary orbit.
Nevertheless large scale distributions of the respective cloud top heights are quite comparable. As an example, the travelling of the ITCZ as depicted by the three different datasets is illustrated.
For depicting interannual variations of cloud top height products, four months of daily mean fields are chosen, to represent the four seasons.
Additionally the operational daily mean product is compared to the instantaneous CTH data in order to detect changes in variability on a larger spatial scale.
For that purpose all the daily mean and instantaneous data are averaged over the individual months (January, April, July and October) and longitude, i.e. latitude dependent distributions of CTH data are considered and compared to the instantaneous data.