22nd International TOVS Study Conference

Saint-Sauveur, Québec, Canada

31 October – 6 November 2019

Abstracts

Session 1: Direct readout (oral presentations)

1.01 20 years of the NWP SAF

Presenter: Nigel Atkinson, Met Office

Authors: Nigel Atkinson, Sam Pullen, James Hocking, Roger Saunders, John Eyre, Pascal Brunel, Pascale Roquet

At the end of 2018, the NWP SAF celebrated an important milestone – 20 years since the agreement was signed for the creation of the Satellite Application Facility on Numerical Weather Prediction. Coordinated and funded by EUMETSAT, the NWP SAF was led by the UK Met Office with ECMWF, Météo France and KNMI as partners. Following a period of development, the NWP SAF became operational in 2004, and has been providing satellite data processing software and monitoring services to users ever since. In the latest phase DWD joined the SAF, replacing KNMI which consolidated its NWP activities in the OSI SAF.

The software packages AAPP and RTTOV have been NWP SAF software deliverables for the whole of that time, and evolved through many different versions to support new satellites and instruments. We have also seen the development of direct broadcast retransmission services based on AAPP, pioneered by EUMETSAT in their EARS services, and supported by NWP SAF monitoring facilities.

The talk will present some highlights of the last two decades, and will also look forward to upcoming NWPSAF developments, such as support for instruments on EPS Second Generation and Meteosat Third Generation.

1.02 Status of the Direct Broadcast Network for globally coordinated real-time acquisition, processing and fast delivery of satellite direct readout data, an initiative of the World Meteorological Organisation

Presenter: Pascal Brunel, Meteo France (for Mikael Rattenborg)

Authors: Mikael Rattenborg (WMO), Pascal Brunel (Meteo France) and Werner Balogh (WMO)

The Direct Broadcast Network (DBNet) is a highly successful collaborative undertaking of the World Meteorological Organization and its Members. The DBNet system provides fast acquisition, processing and delivery of satellite products from direct readout data, primarily for Numerical Weather Prediction (NWP) applications with stringent timeliness requirements. Since about 10 years, sounding data from the ATOVS suite of instruments has been acquired by receiving stations around the globe, which has improved the availability and impact of satellite sounding data on short-term regional and global NWP. DBNet is now being extended to cover the acquisition of advanced satellite sounder data from instruments such as METOP/IASI and SNPP/CrIS.

The paper will present the DBNet status and implementation plans, with particular emphasis on the numerous areas where feedback is required from the ITSC community to guide its further development.

1.03 The DBNet Cloud Service for providing low-latency sounder data to NWP centers

Presenter: Liam Gumley, Space Science and Engineering Center, University of Wisconsin-Madison

Authors: Liam Gumley, Bruce Flynn

The WMO Direct Broadcast Network (DBNet) is a worldwide group of DB antenna operators who acquire and process infrared and microwave sounder data from operational meteorological satellites in low earth orbit. The calibrated and geolocated Level 1B data are converted to BUFR format and then disseminated with low latency to NWP centers for assimilation in regional and global models.

6p.10 The increase in the impact of the observations in a 40 multi-year Reanalysis on the tropical region with 41 emphasis on the Amazon basin

Presenter: Dirceu Herdies, CPTEC/INPE
Authors: Fabio L. R. Diniz, Dirceu L. Herdies and Ricardo Todling

Conventional and non-conventional atmospheric observations are of fundamental importance to allow reliable weather forecasts and allow researchers to improve the modeling of the atmosphere to create plausible scenarios for climate studies. However, conventional observations make up a very small number of observations available for use in weather forecasts and climate studies. Satellites, the non-conventional observations, observe the Earth System almost continuously in time and generate massive amounts of data that by far dominate the observation blend. Unlike conventional observing networks, satellites observe the Earth indirectly by measuring either emitted or absorbed radiation by the Earth and the instruments they carry, this makes their use somewhat harder than using conventional observations. Assessing how these various observing systems contribute to improving weather forecasts has become an essential tool to help scientists understand how to build future and better observing systems. The present study provides a comprehensive assessment of nearly 40 years of observations used in the Reanalysis procedure, which essentially provides a mixture of model predictions and observations. This particular work examines the regional impact of observations on the Amazon basin during the period 1980 to 2017. On this relatively dense and difficult-to-access tropical forest region, certain observation systems have a particularly greater impact than they normally have when observed on a global scale, such as AMVs. The impact of the observations on short-range reanalysis forecasts has increased slightly over the course of the reanalysis. This increase is largely associated with an increase in available observations on this region.

6p.11 Satellite-Derived Upper Tropospheric Humidity Datasets and Comparison with Total Column Water Vapor

Presenter: Lei Shi, National Centers for Environmental Information (NCEI), NOAA
Authors: Lei Shi, Carl J. Schreck III, Marc Schröder

As part of the activities for the Global Energy and Water Exchanges (GEWEX) water vapor assessment (G-VAP, http://gewex-vap.org), the upper tropospheric humidity (UTH) datasets are inter-compared. With the recent availability of new versions and extended time series of datasets, the analyses are updated. The UTH datasets include both infrared and microwave satellite sounder measurements. The HIRS UTH dataset has also been compared to the total column water vapor (TCWV) time series focusing on their respective patterns during major El Niño events. The examination shows that the difference in UTH and TCWV patterns results in an opposite phase in the time series during a major El Niño event when a tropical average is taken. Though both UTH and TCWV are closely correlated with major climate indices, they have significantly different lag correlations with the Niño 3.4 index in both the sign (positive or negative) and lag time over tropical oceans.

6p.12 EUMETSAT's Contribution of Fundamental Climate Data Records to Copernicus Climate Change Service

Presenter: Viju John, EUMETSAT
Authors: Viju O. John, T. Hanschmann, J. Onderwaater, F. Ruethrich, R. Roebeling, M. Grant, and J. Schulz

The detection of climate change and analysis of climate variability at inter-annual and decadal scales require well-calibrated measurements that can be used to create long-term, homogeneous time series of climate data records. These data records can be utilised in direct analysis of the climate system but also within Numerical Weather Prediction (NWP) models to create a physically consistent reanalysis such as the ERA-5 generated by the C3S. EUMETSAT has been generating a wide variety of level 1 satellite climate data records, also known as fundamental climate data records (FCDR) and they include data from the following instruments: microwave humidity sounders SSM/T-2, AMSU-B, MHS, MWHS, MWHS-2, and ATMS, infrared sounders IASI and HIRS, infrared imagers MVIRI (also the visible band) and SEVIRI, radio occultation instruments GRAS, COSMIC, and CHAMP, scatterometer ASCAT, and the optical spectrometer GOME-2. All these FCDRs, except of the GOME-2 will be assimilated in the next generation ERA reanalysis.

The presentation will focus on the generation of microwave and infrared FCDRs. The microwave humidity sounding FCDRs were generated using a common algorithm for all the sensors, which is based on principles, developed in the EU Horizon-2020 FIDelity and Uncertainty in Climate data records from Earth Observations (FIDUCEO) project. A thorough analysis of the physical effects in the measurement equation, which could introduce uncertainties to the measurements, is performed, and thus we are providing not only the radiances