POSTER ABSTRACTS
CSPP/IMAPP USERS GROUP MEETING
EUMETSAT
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Bearson, Nick: *"CSPP-CLAVRx"*
(Authors: Andrew Heidinger, Denis Botambekov, Andi Walther, Nick Bearson)
Abstract: The Clouds from AVHRR Extended System (CLAVR-x) is a processing system developed at NOAA/NESDIS and UW/CIMSS for generating quantitative cloud products in real-time from AVHRR, MODIS, VIIRS, and other sensors. It is NOAA's operational cloud processing system for the AVHRR, and its cloud algorithms are scheduled to migrate to the operational processing system for NOAA JPSS. CLAVR-x was successfully packaged and released as part of the CSPP suite in May 2014, and has a 2015 update coming soon. We report on the status of CSPP-CLAVRx, its ease of use, and improvements users can expect in the new version.

Bobryshev, Oleksandr: *"Comparison of AMSU-A with radiosonde profiles"*
Abstract: Microwave instruments give us information to do temperature (AMSU-A) and humidity (AMSU-B, MHS) profile retrieval in all-sky conditions. During the last time there were works which test the AMSU-B performance. In this work the main focus is set on the AMSU-A instrument. The goal of the study is to check quality and mutual consistency of radiosonde data, radiative transfer models and AMSU-A data. The radiosonde data used are GRUAN (GCOS Reference Upper-Air Netowork), radiative transfer models – are ARTS (Atmospheric Radiative Transfer Simulator) and RTTOV (Radiative Transfer for TOVS). Special focus was taken on choosing optimal frequency grid for every channel of AMSU-A, without losing quality. The comparison is done in radiance space, using a radiative transfer model to simulate AMSU radiances from the radiosonde data.

Braun, Jessica: *"Aqua and Terra Direct Broadcast Processing at CIMSS/SSEC Using a New Merged Pass System"*
(Authors: Jessica Braun, Liam Gumley, Kathy Strabala, Bruce Flynn, Heath Skarlupka)
Abstract: The Direct Broadcast (DB) group at CIMSS/SSEC has been processing MODIS, AIRS, and AMSU data from Aqua and Terra direct broadcast data for over 10 years. A new merged ingest system has recently been implemented, which uses an overpass prediction method to merge collocated Level 0 PDS files ingested from multiple DB sites across the United States. The resulting PDS files have more extensive coverage and higher quality of data, as the majority of dropouts and bad packets are removed. The merged passes are processed into Level 1 and Level 2 products and distributed for use by many operational sites including the National Weather Service (NWS) and NOAA Coastwatch. The True Color Imagery we produce is often seen across social media outlets including Facebook, Twitter, and weather-related blogs.

Cintineo, Rebecca: *"IMAPP: Supporting the Aqua and Terra Operational Community"*
(Authors: Rebecca Cintineo, Kathleen Strabala, Liam Gumley, Allen Huang, James Davies, Eva Borbas, Elisabeth Weisz, and Bradley Pierce)
Abstract: The International MODIS/AIRS Processing Package (IMAPP) is freely available software that ground stations around the world receiving direct broadcast satellite data from the Terra and Aqua satellites can use to process the data from MODIS, AIRS, AMSU, and AMSR-E and create useful products for a variety of real-time applications. The IMAPP direct broadcast MODIS products serve a variety of users internationally, including the US National Weather Service (NWS) forecasters who are able to view the products in AWIPS to aid in their forecasting and decision-making. The software suite is extensive and several recent updates have been made, including the addition of Polar2grid software for re-projecting and creating GeoTIFFs of MODIS data and a web mapping service for displaying those GeoTIFFs in a Google Maps or Google Earth interface. The HYDRA2 Multispectral Data Analysis Toolkit can be used for visualizing and analyzing multispectral direct broadcast satellite data for research and training

applications. The Infusing Satellite Data into Environmental Applications - International (IDEA-I) software supports air quality forecasting by creating aerosol trajectory forecasts using the MODIS aerosol product and ozone trajectory forecasts using AIRS, CrIS, and IASI retrievals. The MODIS Level 2 processing package for processing Level 1 data to produce land, atmosphere, and polar products has been updated to include the latest official NASA Collection 6 science algorithms for the Cloud Mask (MOD35), Cloud Top Property (MOD06), Cloud Optical Depth (MOD06OD), Atmospheric Profiles (MOD07), and Aerosol Optical Depth (MOD04) algorithms in an easy to use package. Updates have also been made to both the IMAPP Virtual Appliance for AIRS and MODIS processing and the AIRS/AMSU/HSB processing package. The IMAPP suite of software continues to grow and improve through feedback from the user community and continued development of the science algorithms.

Cureton, Geoff: *"Level-2 Products in the CSPP-GEO Direct Broadcast Package"*
(Authors: Geoff Cureton, Scott Mindock, Graeme Martin, Liam Gumley)

Abstract: The Cooperative Institute for Meteorological Satellite Studies (CIMSS) has a long history of supporting the Direct Broadcast (DB) community for various sensors, recently with the International MODIS/AIRS Processing Package (IMAPP) for the NASA EOS polar orbiters Terra and Aqua, and the Community Satellite Processing Package (CSPP) for the NOAA polar orbiter Suomi-NPP. CSPP has been significant in encouraging the early usage of Suomi-NPP data by US and international weather agencies, and it is hoped that a new package, CSPP-GEO, will similarly encourage usage of DB data from GOES-R, Himawari, and other geostationary satellites. One of the capabilities of CSPP-GEO will be to generate Level-2 data products from Level-1 data, using operational algorithms present in the CIMSS geostationary processing framework, GEOCAT. GEOCAT is wrapped in a layer of scripting which serves to handle the various input preparation, ancillary data ingest and user interface handling tasks which lend themselves to a rapid-development scripting approach. In this work we describe the architecture of the CSPP-GEO Level-2 package, list the supported algorithms, and show examples of various Level-2 outputs generated using the package.

Cureton, Geoff: *"Near Real Time Level-2 Products Via Direct Broadcast Using the CSPP-International ATOVS Processing Package (CSPP-IAPP)"*
(Authors: Geoff Cureton, Liam Gumley)

Abstract: The International ATOVS Processing Package (IAPP), developed within the Cooperative Institute for Meteorological Satellite Studies (CIMSS), has for over a decade provided users with a means of processing High Resolution Infrared Radiation Sounder (HIRS), Advanced Microwave Sounding Unit-A (AMSU-A), and Microwave Humidity Sounder (MHS) data (in level-1d format) through to level-2 products (temperature and water vapor profiles etc...), in NetCDF format. Currently supported satellites are NOAA-18, NOAA-19, Metop-A and Metop-B. With integration into the Community Satellite Processing Package (CSPP) suite to create CSPP-IAPP, users now have access to a modern command-line interface, automated ancillary data ingest and transcoding, expanded logging and quicklook generation. CSPP-IAPP is directed at usage in the direct broadcast environment to generate near-real-time level-2 products.

Davies, James: *"Recent additions to the Community Satellite Processing Package (CSPP) from algorithm developers at NOAA"*
(Authors: James E. Davies, Aronne Merrelli, Kathy Strabala, Liam Gumley, Allen Huang, Christopher Grassotti, Xiwu Zhan, Christopher Barnet, Thomas King, John D. Stroup, Yury Kihai)

Abstract: The Community Satellite Processing Package (CSPP) supports the Direct Broadcast (DB) meteorological and environmental satellite community through the packaging and distribution of open source science software. We have recently added three NOAA-developed algorithms to our environmental data record (EDR) software suite, namely, Microwave Integrated Retrieval System (MIRS), NOAA Unique CrIS/ATMS Processing System (NUCAPS) and, most recently, Advanced Clear Sky Processor for Oceans (ACSPO). These packages are pre-compiled and statically linked; they are ready to run under most modern Linux distributions within minutes of download. Their command line interfaces are simple to use, either stand-alone or integrated into a near-real-time satellite data processing pipeline. This poster

describes system and data requirements for running these packages, how to obtain them, and outlines the major EDR product fields from each that can benefit the DB community.

Gerth, Jordan: *"Subtropical and Tropical Frontal Passages: A Hawaii Perspective"*
(Authors: Jordan Gerth and Eric Lau)

Abstract: Weather predictability in Hawaii and the surrounding tropical Pacific Ocean is uniquely challenging. Though the weather is generally pleasant, the lack of in-situ weather observations for monitoring the progress of fronts over the ocean makes for difficult wind, moisture, and occasionally temperature forecasts in Hawaii and surrounding areas. In addition, frontolysis can complicate timing and strength predictions as fronts makes southward progress. This, in turn, can decrease predictability for thunderstorms, heavy rainfall, surf regimes, and better air quality.

Along with developing a methodology for indicating a frontal passage based on station observations across the Hawaiian Islands, this presentation will investigate frontal passages over the Hawaiian Islands and provide insight about how new satellite imagery and products can characterize these events, using recent examples from the Suomi National Polar-orbiting Partnership (NPP) satellite. The objective is to better understand and forecast subtropical and tropical frontal passages in marine environments.

Lapeta, Bozena: *"Suomi NPP data recording and processing in Poland"*
(Authors: Bozena Lapeta, Danuta Serafin-Rek, and Piotr Struzik)

Abstract: Satellite Remote Sensing Department is responsible for operational receiving, processing and dissemination of meteorological satellite data for internal and external users at IMWM-NRI in Poland. The main purse of these activities is support to meteorological and hydrological forecasting as well as civil protection and warning systems. Data from geostationary (METEOSAT) and polar orbiting (NOAA, Metop, Terra and Aqua) are routinely used to meet the user's needs.

In 2012, the IMWM ground receiving station was extended with the facilities allowing for ground receiving of Suomi NPP satellite data. For data processing CSPP_SDR ver 2.0.1 package was implemented. In the paper the system for NPP data processing is described along with the derived satellite products applications. The main obstacles in the satellite data and products dissemination are also indicated.

Meyers, Patrick: *"Direct Broadcast Activities at CICS-MD"*
(Authors: Patrick Meyers, Huan Meng, Scott Rudlosky, Jun Dong, Ralph Ferraro)

Abstract: The Joint Polar Satellite System (JPSS) program has identified the critical role direct broadcast for mission success. Several ongoing activities at the Cooperative Institute for Climate and Satellites - Maryland (CICS-MD) aim to improve utilization of low earth orbit (LEO) satellite data. One of CICS-MD's successful direct broadcast applications is the snowfall rate (SFR) algorithm for passive microwave sounders (Kongoli et al. 2015). Weather offices greatly benefit from low-latency SFR data in areas with insufficient radar coverage. Additionally, blended hydrology products incorporate this newly available snowfall information in their analysis.

Future development of direct broadcast capabilities will occur through the CICS-MD Proving Ground and Training Center (PGTC) initiative. The PGTC is funded by JPSS and GOES-R programs and will provide a conduit for researchers at CICS-MD to interact directly with forecasters to optimize LEO data for use in the operational forecasting environment. Proposed projects include a regionalized OCONUS precipitation algorithm development for AMSR2, a blended SFR product over Alaska, and merged lightning/precipitation products. CICS-MD intends to further establish its relationship with the CSPP users community to better serve the forecasting community.

Mindock, Scott: *"CSPP SDR Past, and Present"*
(Authors: Scott Mindock, Ray Garcia, Graeme Martin)

Abstract: The CSPP SDR software package was one of the first offerings of the CSPP program. CSPP SDR software continues to be popular with our user base. The poster details the evolution of the package feature sets, that contribute to the packages continued popularity.

Skarlupka, Heath: *"Docker Containers for Deployment of AAPP and OPS-LRS Processing of NOAA and MetOp DB Data"*
(Authors: Heath Skarlupka, Nick Bearson, Liam Gumley)

Abstract: Docker Containers offer an open platform for developers and systems administrators to build and run complex applications. Reduced deployment complexity greatly reduces time spent building and debugging software packages and ensures uniformity between installation sites. We report on how we use Docker Containers to build and run the AAPP software package to process AVHRR, AMSU, HIRS, IASI, and MHS sensor data from the NOAA and MetOp satellite missions. We also present ideas on how Docker Containers can be used to process data from multiple sensors on a direct broadcast processing system.

Takeuchi, Wataru: *"Precise geometric correction of Advanced Himawari-8 Imager (AHI)"*
(Authors: Wataru Takeuchi, Kei Oyoshi and Shin Akatsuka)

Abstract: This paper presents an approach to check a geometric performance of Advanced Himawari- 8 imager (AHI) and demonstrate and evaluate a new approach to ensure more geometric ac- curately focusing on visible imagery in 500 meters. A series of processing is supplemented by ground control points of shore lines, land mark locations and digital elevation model. Firstly, a template matching technique is conducted to find a best matching point by simply moving the center of AHI sub-image over each point in a reference image of shore lines and calculating the sum of products between the coefficients and the corresponding neighbourhood pixels in the area spanned by the filter mask. Secondly, ortho-rectification processing is carried out to compensate for the geodetical distortions with respect to the acquisition condition including viewing geometry and so on. As a result, an average of root mean square sum of residual errors with system correction and that of precise geometric correction are shown. This is expected to show that our approach ensures a more precise geometric correction than that of system cor- rection and it results in the importance of a geodetic distortion compensation in high altitude area and off-nadir observation.

Zinke, Stephan: *"EARS-VIIRS DNB Service – Compression Techniques by using smaller bit-length floating point numbers in HDF5"*
(Authors: Stephan Zinke (EUMETSAT), Anders Soerensen (EUMETSAT))

Abstract: The EARS-VIIRS DNB service is currently in preparation at EUMETSAT. An initial analysis revealed that due to data size the data need to be compressed before it can be disseminated through EUMETSAT's dissemination service EUMETCast.

A tool was developed taking advantage of the HDF5 capabilities to define floating point numbers shorter than 32bit length and applying an N-Bit Filter, and using h5repack with additional compression options. The exponent size is determined automatically by examining the data fields, and the mantissa size can be set according to the particular needs in accuracy (precision).

The loss in accuracy (precision) is depending on the size of the significand (mantissa) used, e.g. 8 bit, and is directly related to this. It was found that the size of a DNB channel data file (SVDNB) can be reduced from around typically 10 MB to 3.5 MB on average, using an 8-bit-significand, introducing a maximum relative error of 2-9=0.001953125. This technique can be used for any HDF5 file using floating point numbers and integers.