Using the full IASI spectrum for the physical retrieval of Temperature, Water Vapour, Ozone and minor and trace gases: CO, CO_2, CH_4, N_2O, SO_2, HNO_3 and NH_3

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ABSTRACT

IASI (Infrared Atmospheric Sounder Interferometer) is flying on the European MetOp series of weather satellites. Besides acquiring temperature and humidity data, IASI also observes the infrared emission of the main minor and trace atmospheric components with high precision. The retrieval of these gases would be highly beneficial to the efforts of scientists monitoring Earth's climate. IASI retrieval capability and algorithms have been mostly driven by Numerical Weather Prediction centers, whose limited resources for data transmission and computing is hampering the full exploitation of IASI information content. The quest for real or nearly real time processing has also affected the precision of the estimation of minor and trace gases, which are normally retrieved on a very coarse grid, e.g., 0.5°×0.5°. The paper presents for the first time the retrieval of the complete suite of IASI target parameters by exploiting all 8461 IASI channels along with the full non-diagonal observational covariance matrix. The analysis will be exemplified for sea surface and the target parameters will include sea surface temperature, temperature profile, water vapour profile, ozone profile, total column amount of CO, CO_2, CH_4, N_2O SO_2, HNO_3 AND NH_3. Concerning CO_2, CH_4 and N_2O, it will be shown that minor and trace gases can be obtained for each single IASI IFOV (Instantaneous Field of View) with a precision better than 1-2%, which opens the possibility to analyze, e.g., the formation of regional patterns of greenhouse gases. To assess the quality of the retrieval, a case study has been set up which considers one year of IASI observations over the Hawaii, Manua Loa validation station.

EXTRACTION OF 3D WIND PROFILES FROM IASI LEVEL2 PRODUCTS.

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Proposed topic: Atmospheric sounding products
Preference of presentation: oral

ABSTRACT

Atmospheric Motion Vectors (AMVs) derived from satellite imagery constitute a significant part of the observation data assimilated in Numerical Weather Prediction (NWP) models because they are the only upper wind observations with good global coverage for the tropic, mid-latitudes and polar regions. AMVs are routinely extracted from the Meteosat geostationary satellites at EUMETSAT as well as from the EUMETSAT low orbit Polar System satellite Metop AVHRR instrument.
The AMVs commonly extracted from imagers provide information of cloud motions at a single level in the troposphere, and do not allow to getting the whole wind profiles. Such wind profiles may theoretically be estimated from temperature and humidity profiles retrieved from hyperspectral sounding, for which the height information is already available together with the retrievals. Time sequences of retrieved water vapour fields become in this approach the "imagery" for tracking winds and the corresponding AMV heights can be directly inferred from the profile heights information.
Studies involving novel methods to extract AMVs from humidity fields have been realised by EUMETSAT in the past. Results of these studies illustrated the potential benefits of using optical flow methods on smooth water vapour fields, but they also pointed important limitations of these methods. The 2D framework of the tested methods did not allow to manage correctly the frequent multilayer situations for example, or to consider properly the convection in cloudy areas. Such limitations may be potentially reduced by considering the 3D optical flow algorithm (Heas and Mémin, 2008) recently developed at INRIA/IRISA, which is fed with several horizontal layers of atmospheric fields to extract dense wind fields for all the considered layers.
This last algorithm has been adapted to ingest IASI level 2 temperature and humidity fields, and to extract dense wind fields from a pair of IASI data taken consecutively by Metop A and Metop B satellite over high latitudes areas. This paper will present the method and the preliminary results of this new development, highlighting the feasibility of wind profile extraction from IASI level 2 data, and discussing the short-term perspective of this project at EUMETSAT.

$PWLR^3$ - exploiting horizontal correlation in PieceWise Linear Regression.

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ABSTRACT

PWLR is a fast, accurate and precise, all sky retrieval of temperature, water vapour, ozone, and surface pressure, which was developed for version 6 of EUMETSAT's operational IASI L2 processor, using IASI as well as co-located AMSU and MHS radiances as inputs. The retrieval is based on linear regression, but in order to capture non-linear relationships between the inputs and the outputs better, the input space is divided into several classes. For each of these classes a separate set of linear regression coefficients is computed from the corresponding subset of the training set, such that overall a piecewise linear function from the input space into the output space is obtained. The training set consists of millions of real measurements paired with co-located ECMWF analysis profiles and the retrieval also computes estimates of the absolute retrieval error for each field of view, which are used as quality indicators.

We present $PWLR^3$, which is an evolution of the PWLR scheme. $PWLR^3$ preserves the single field of view retrievals, but exploits horizontal correlation by using measurements from all four fields of view within each EFOV jointly. A number of further enhancements have also been made:

- Finer classification based on k-means clustering.
- Use of regression forest to decrease random noise.
- Surface emissivity added to the retrieved parameters.

We demonstrate that PieceWise Linear Regression trained with large sets of reference data matched with real measurements is a very competitive retrieval technique. Reference data without systematic errors are needed, but as long as the training set is big enough, the technique is insensitive to random errors in the reference data.

Since the $PWLR^3$ retrieval is not based on fitting the measured radiances, an a posteriori analysis of the radiance fit is a valuable tool. The radiance fit, especially in the water vapour channels, is better with the $PWLR^3$ retrieved profiles than with the ECMWF analysis profiles.

An extension of EARS-IASI to disseminate $PWLR^3$ products is under preparation at EUMETSAT. The high speed and full coverage, allowed by the joint use of infrared and microwave, is ideal for nowcasting and regional applications. Furthermore, the high vertical information on water vapour is is useful, for example, for tracking of moisture features.

The NOAA Hyper Spectral Infrared and Microwave Retrieval System: algorithm description and applications.

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ABSTRACT

The NOAA hyper spectral IR and MW retrieval system was developed to produce cloud-cleared radiances and atmospheric temperature, water vapor and trace gas profiles from hyper spectral infrared sounders such as CrIS, IASI and AIRS, in conjunction with microwave sounders, such as ATMS, AMSU and MHS. These retrieval products are accessible in near real time (about 1 hour delay) through the NOAA Comprehensive Large Array-data Stewardship System. Since February 2015, the NOAA Unique CrIS/ATMS Processing System (NUCAPS) retrievals have been also available to the science community with unprecedented low latency (less than 0.5 hours) through Direct Broadcast. The implementation of the IASI system in Direct broadcast is also scheduled for mid 2016.

Our current research aims towards the development of a robust retrieval algorithm suitable for both near real time regional forecast applications and long term climate analysis. This talk is organized into two main foci. We first present an overview on the status of the retrieval system, with a highlight on the latest enhancements to the algorithm. Secondly, we discuss some of the lessons learned during recent intensive field campaigns and international projects targeted at validating our products and engaging new user applications.

Measuring air pollution from thermal infrared satellite observations: when, where and how?

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ABSTRACT

Air quality has become a major concern in many megacities and highly populated areas. In those regions, there is a need to properly quantify the emissions of pollutants and to understand their transport pathways and their reactivity in the atmosphere. In recent years, there has been important progress in the monitoring of air quality from satellites. Among the instruments currently in orbit, those operating in the thermal infrared have usually their maximum sensitivity in the mid-troposphere and were thought to be inadequate for probing the near-surface atmospheric composition. This has, however, been challenged recently with IASI measurements of surface air pollution in specific geophysical conditions, characterized in particular by large temperature differences between the ground and the air above it.

This work will review the principal results obtained with IASI on the sounding of the near-surface atmospheric composition, especially above pollution hotspots. The presentation will then address the following questions: where and when is IASI sensitive to the near-surface atmosphere? How large and how variable is the sensitivity to near-surface pollutants? Which are the parameters that drive this variability? Answers to these questions will be given for sulfur dioxide (SO_2) and carbon monoxide (CO) on the basis of theoretical sensitivity studies (radiative transfer simulations and retrieval diagnostics) and real test cases. Based on the results, the capability of IASI to monitor air quality will be revisited.

New insights into the hydrological cycle from IASI δD distributions across the globe

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Because they have different vapour pressures, the different isotopologues of water ($H_2{}^{16}O$ and HDO) preferentially evaporate or condense during phase changes, leading to a fractionation of their ratio (δD). Numerous key processes of the hydrological cycle - such as convection, re-evaporation of hydrometeors, evapotranspiration, mixing - mark distinctly the isotopic ratio of the air masses. Observations of δD constitute therefore a useful constraint on the moistening/drying processes. IASI provide observations of δD in the free troposphere, after inversion of the measured radiances, at an unprecedented resolution.

In this presentation, we illustrate the IASI capabilities to retrieve δD in the troposphere and show first distributions across the globe. The interest of these distributions is presented by analyzing the information contained in δD. For example, we show that the height of convection gives the water vapour a particular isotopic fingerprint which is of great interest to evaluate the representation of tropospheric mixing in climate models. We also present long term (6 years) time-series in the Northern Atlantic. The seasonal and inter-annual variations are interpreted with backward trajectory analyses and we show that the Saharan dynamic strongly influence the isotopic composition above the Atlantic Ocean through the formation of the Saharan Heat Low.

Convective Available Potential Energy (CAPE) derived from Hyperspectral Infrared Satellite Sounders

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ABSTRACT

In this study, a10-year radiosonde climatology of Convective Available Convective Energy (CAPE) was used to assess satellite-derived CAPE from the EUMETSAT IASI, the NASA Atmospheric Infrared Sounder (AIRS) and from ERA-Interim reanalysis. High vertical resolution Vaisala RS92 radiosondes from the Atmospheric Radiation Measurement (ARM) SGP site were used for reference. CAPE was computed using a python implementation of the SHARP software used at the U.S. Storm Prediction Center. CAPE errors were evaluated for spatial, temporal, vertical resolution and measurement error in the vertical profile profiles. It was found that numerical estimates of CAPE are sensitive to the vertical smoothing of the temperature and moisture profile. A vertical smoothing of 1-2 km leads to a reduction in the 50th percentile of CAPE by 10-20 percent. In addition, error in the surface parcel dew point estimate is found to degrade the accuracy of CAPE. For CAPE values greater than 50 J/kg, both AIRS v6 and ERA-Interim surface dewpoint temperatures are dry by 2 degrees compared to the surface radiosonde observations. This error increases to more than 5 degrees Celsius for CAPE exceeding 2500 J/kg. In order to investigate the potential of satellite observations at both 10:30 am and 1:30 pm local time, METOP IASI v6 data is included in the comparison with AIRS and ERA-Interim. The characterization of IASI surface parcels will help to give insight into error of convective indices and the time tendency of these quantities. The goal of this work is the near real-time use of satellite data to provide additional warning lead-time for severe weather events involving rapid convection.

4ARTIC :
4A Radiative Transfer Inversion Code

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ABSTRACT

4ARTIC (4A Radiative Transfer – Inversion Code) is a tool developed at CNES for retrieving gaseous profiles from atmospheric spectra and estimating the performance of an inversion. This tool has been designed for the Microcarb mission and then has been extended to the thermal infrared domain to analyze the IASI-NG performances. For several months, an operational version of 4ARTIC with a Graphical User Interface is developed by Thales Services, under the direction of CNES.

The inversion performed by 4ARTIC is based on the optimal estimation method and coupled with the very accurate radiative transfer model 4A (French code, developed jointly by the LMD, the company NOVELTIS and CNES, dedicated to the thermal infrared spectral range and recently extended to the short-wave infrared domain).

After a description of the method used by 4ARTIC to estimate geophysical parameters (gas profiles, temperature profiles, surface parameters) from atmospheric spectra with high spectral resolution, the main features of the software will be presented. An outlook on the use of 4ARTIC for assessing the performances of the IASI-NG system at level 2 will be given.

A flexible and robust IASI-NH_3 retrieval algorithm

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ABSTRACT

In recent years, infrared sounders on board satellites have demonstrated their capabilities to detect and measure atmospheric ammonia (NH_3). The retrieval of NH_3 total columns from satellite-based measurements remains, however, challenging due to the large variability both in terms of NH_3 columns and measurements sensitivity. We present here a new flexible and robust NH_3 retrieval algorithm from the measurements of IASI. The method is an extension of the method presented recently in Van Damme et al. (2014), based on the calculation of a spectral index (HRI) from the level1C radiances. The difference lies in the conversion of the HRI to a NH_3 column. Indeed, instead of using two-dimensional look-up tables (LUT), the conversion of the HRI relies now on a neural network (NN), offering therefore a lot more flexibility since a neural network can easily cope with hundreds of input parameters. We describe the major improvements of the NN-based method over the other retrieval methods developed so-far. We next derive the first global distributions and compare the impact of different averaging procedures on these distributions. We assess the impact of the use of variable NH_3 vertical distribution on the retrieved total column (this is a unique feature of the new retrieval method) on a global scale. We will show with different example applications and comparison with models how the NN-based HRI method will provide a further step in a better assessment of the NH_3 atmospheric budget, its spatial distributions and long-term trends.

Greenhouse gases information content analysis from high spectral measurements in the thermal infrared (IASI like) in the presence of ice cloud

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ABSTRACT

The survey at global scale of greenhouse gases is of particular interest for monitoring their evolution in the context of global warming. Beside their strong contribution to weather forecast improvement through data assimilation, thermal infrared sounders onboard polar-orbiting platforms (such as IASI) are now playing a key role in monitoring atmospheric composition changes. However, it is notoriously known that clear sky observations are only a small part of the entire set of measurements. The aerosol and/or cloud scattering contamination is therefore a major source of error for greenhouse gases retrievals.

The present study aims in quantifying the effect of the presence of an ice cloud layer on the H_2O, CO_2 and CH_4 column information content and errors budget. Based on a previous study by Herbin et al. (2013), we will show how the gaseous column information is affected by the presence of an ice cloud layer as a function of its opacity and the a-priori knowledge of its optical properties. The synthetic measurements will be simulated by a line-by-line model developed at the Laboratoire d'Optique Atmospherique (ARAHMIS), and the multiple scattering by the open source radiative transfer code VLIDORT (Spurr et al., 2008). The ice cloud microphysics will be simulated by the ensemble model developed by Baran and Labonnote (2007).

Accounting for IASI Inter-Channel Correlated Observation Errors in the GSI

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ABSTRACT

IASI Observations are operationally assimilated at NCEP and are a vital part of the data assimilation system. The Gridpoint Statistical Interpolation (GSI) uses prescribed observation errors for IASI instruments and assumes that the observation errors of different channels are uncorrelated. This presentation uses the Desroziers diagnostic to estimate the observation errors and their inter-channel correlations for IASI radiances used in the GSI assimilation system. The new error covariances are then used in a subsequent analysis scheme, and the diagnostic recomputed, until convergence. This presentation details the estimation of the correlated IASI error covariance matrix as well as the results of using this matrix in the GSI.

Sensitivity study of the capacity of a three-band multispectral approach UV+VIS+TIR to observe lowermost tropospheric ozone using IASI and GOME2 spaceborne measurements

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Tropospheric ozone is currently one of the air pollutants posing greatest threats to human health (e.g. Gryparis et al., 2004; Ito et al., 2005) and ecosystems (e.g. Fuhrer and Achermann, 1994; USEPA, 1996; EEA, 2013). Exposure to ground-level ozone may irritate the respiratory system, aggravate asthma and other lung diseases and even lead to premature mortality. Monitoring tropospheric ozone at regional and global scales is a crucial societal issue, which only spaceborne remote sensing is capable to fulfil.

At the LISA laboratory, a first method has shown the capacity to observe lower tropospheric ozone down to 3 km of altitude using IASI (Infrared Atmospheric Sounding Interferometer) spaceborne spectra in the thermal infrared (Eremenko et al., 2008, Dufour et al., 2012). Then, a new multispectral approach has been developed for observing lowermost tropospheric ozone by combining the information provided by atmospheric radiances in TIR observed by IASI and earth reflectances in the ultraviolet (UV) measured by GOME-2 (Global Ozone Monitoring Experiment-2), allowing the fist observation of ozone down to 2 km of altitude (Cuesta et al., 2013). Studies from Chance et al., (1997) and Sellitto et al., (2012) have suggested the possibility to enhance sensitivity to ozone closer to the surface by including the information provided by the Chappuis band in the visible (VIS) spectrum. However, ozone shows a weak signature in the Chappuis band, which is also affected by other atmospheric or surface variables like water vapour, surface albedo and aerosols.

The present work is the evaluation of the contribution of visible measurements for observing lowermost tropospheric ozone, and the combination with UV and TIR spectra for developing the first multispectral synergism of three spectral bands UV+VIS+TIR. This method is implemented with simulated observations in order to evaluate the improvements in terms of expected sensitivity and accuracy, compared to existing methods. In order to exploit the ozone information from the Chappuis band, the retrieval approach uses spectral micro-windows selected by maximising the ozone information content, thus minimising the spurious effects of uncertain variables (water vapour, NO2, etc). Simulations of multispectral retrievals consider realistic atmospheric scenes of an ozone outbreak provided by the MOCAGE chemistry-transport model, instrumental characteristics (noise, calibration) and uncertainties in the observed scene (e.g. surface properties, aerosols). The performance of the multispectral approaches using three (UV + VIS + TIR) and two bands (UV + VIS and TIR + VIS) is also compared with single band approaches.

IASI, CrIS, IASI-NG and MTG IRS PC compression - how to handle multiple detectors with different characteristics.

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ABSTRACT

The four IASI detectors have different noise, different strength of the ghost effect, etc., which is clearly observed statistically. We use the technique of canonical angles to determine and retain only directions which are similar in the signal spaces of all detectors. In this way, part of the instrument artefacts can be removed without relying on any forward model. The technique is demonstrated with IASI (Metop-A and B together) and CrIS, and we suggest to use it operationally for the future instruments IASI-NG and MTG IRS, which both have more detectors then the current instruments.

Furthermore, we estimate the number of PC scores needed in each of the four IASI-NG bands. The higher spectral resolution and sampling of IASI-NG results in an increased information content and therefore a need for more PC scores than with IASI. We show how many more and make the case that the PC training set should include all available spectra.

Middle-Upper Tropospheric Methane and Nitrous Oxide Retrievals from Metop/IASI within the project MUSICA

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The large potential of the space-based instruments for observing global methane (CH_4) and nitrous oxide (N_2O) distributions has extensively been reported in the literature. Among the current space-based remote sensing instruments, IASI (Infrared Atmospheric Sounding Interferometer) has special relevance, since it successfully combines the needed requirements for atmospheric trace gases retrievals (very good signal to noise ratio and a high spectral resolution), and a long-term data availability (between 2007-2022 on-board the EUMETSAT/Metop meteorological satellites). Based on the IASI sensor, the European Research Council MUSICA project (MUlti-platform remote Sensing of Isotopologues for investigating the Cycle of Atmospheric water) provides a comprehensive space-based database, including tropospheric water vapour isotopologues observations as well as middle-upper tropospheric CH_4 and N_2O retrievals as side products.

This work presents the MUSICA/IASI CH_4 and N_2O products as well as their validation by using the HIAPER Polo-to-Pole Observations (HIPPO) campaign. Here, we focus on the mission HIPPO-1 and HIPPO-5, covering from 67ºS to 80ºN and the winter and summer seasons. Particular attention will be pay on the analysis of the geographical uniformity of the MUSICA/IASI CH_4 and N_2O retrievals. Moreover, we will explore how the co-retrieved N_2O estimates could successfully be used for reducing common errors in the CH_4 retrievals.

Preference of presentation: Poster.

Single Field of View IASI/AMSU Retrieval Under All Sky Condition

An ultra fast Physical retrieval algorithm has been developed to carry out combined Infrared/Microwave (IR/MW) retrieval for collocated IASI/AMSU measurements. The retrieval algorithm uses Principal Component Based Radiative Transfer Model (PCRTM) for the IR forward simulation and Community Radiative Transfer Model (CRTM) for the MW part. PCRTM has been developed to effectively perform cloud radiative transfer calculations using pre-computed cloud transmittance and reflectance, enabling the retrieval algorithm to obtain cloud properties along with atmospheric variables and surface properties simultaneously from single field of view (FOV) measuremtns. While fully utilizing IR instrument's higher spatial and vertical resolution, the combined IASI/AMSU retrieval takes advantage of the MW instrument's ability to penetrate cloud so that accurate information for under the cloud atmosphere profiles and surface parameters can be retrieved from top-of-atmosphere (TOA) radiation measurement with high yield rate.

What is the error?

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ABSTRACT

Retrievals are estimates of the true state at different points in time and space. The error of each retrieval can not be known without additional knowledge of the true state, but an estimate of the error covariance matrix is sometimes desired and can be provided for any retrieval system. It is composed by the smoothing error covariance and the retrieval noise. Strictly speaking, only the retrieval noise is random, but at larger scales we can consider the smoothing error random as well. To estimate the retrieval noise all we need to do is to transform the instrument noise into state space with the help of the so called gain matrix, which is the derivative of the retrieval with respect to the measurement - something which can be computed for any retrieval function implemented on a computer. To estimate the smoothing error covariance we need to compute the averaging kernel by multiplying the gain matrix with the Jacobian evaluated at the retrieved state. In the optimal estimation setting, the combined retrieval error covariance can also be computed as a direct combination of the a-priori error covariance and the observation error covariance transformed into state space. For this reason it might falsely be believed that an error covariance estimate can only be produced for optimal estimation retrievals. To illustrate the opposite we present some averaging kernels and error covariance estimates for EUMETSATs PieceWise Linear Regression retrievals. Finally we study the case where optimal estimation is performed, using a regression retrieval, based on the same measurement, as a-priori. In this case the measurement error and the a-priori error can not be expected to be independent and the usual formula for the retrieval error covariance matrix does not hold. Instead we look at the averaging kernel, from which the error covariance matrix can be computed. Recall that the optimal estimation retrieval can be written as $x = (I-A)x_a + Ax_{true}$ plus a contribution due to instrument noise. When we substitute x_a with the similar expression for the regression retrieval we get $x = (I-A)((I-A_R)x_{aR} + A_R x_{true}) + Ax_{true} = (I-A)(I-A_R)x_{aR} + ((I-A)A_R + A)x_{true}$, where A_R is the averaging kernel of the regression, and see that the overall averaging kernel can be written as $(I-A)A_R + A$, which is close to A when A_R is close to A.

Satellite-derived 3D winds from hyperspectral sounders: Derivation and impact in global models

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ABSTRACT

The global measurement of 3D winds is recognized as an important dataset to improve medium- to long-range weather forecasts. At this time, vertical wind profiles through the troposphere are primarily from rawinsondes and aircraft ascents/descents, and are mostly confined to land areas. Wind information over mid- and low-latitude oceanic regions is limited to Atmospheric Motion Vectors (AMVs) from cloud and water vapor feature tracking using imagers on geostationary satellites. A similar technique is used with imagery from polar orbiting satellites over high-latitude regions. However, these geostationary and polar satellite-derived AMVs provide only single-level wind information at a particular geographic location.

To attain a 3D distribution of wind information, an AMV product is being developed based on tracking water vapor features retrieved from hyperspectral sounders. The retrievals produce spatial maps of humidity on pressure surfaces in clear sky and above clouds. The initial AMV product, available in near real-time, is based on retrievals from the Aqua Atmospheric Infrared Sounder (AIRS) and is being evaluated by several Numerical Weather Prediction (NWP) centers. Moreover, a two-month case of AMVs derived from IASI retrievals is currently being generated and analyzed.

The status of the project will be reported, along with a discussion on: (a) The 3D wind derivation technique as applied to AIRS and IASI; (b) assimilation statistics from the Gridpoint Statistical Interpolation (GSI) system; (c) and, the forecast impact in the Global Forecast System (GFS).

Real-Time Access to Advanced Sounder Data over North America from the NOAA Direct Broadcast Network

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ABSTRACT

In order to enable the timely use of advanced sounder data in numerical weather prediction applications, and to provide a backup in the event of unanticipated satellite coverage gaps, NOAA has funded the installation of several ground stations across North America and the Pacific Ocean to receive advanced infrared and microwave sounder data from polar orbiting meteorological satellites including Suomi NPP, Metop-A, Metop-B, Aqua, NOAA-18, and NOAA-19. These ground stations, operating at both X-band and L-band frequencies, enable advanced sounder data to be received on the ground directly from the spacecraft in real time. Stations in the network include Honolulu Hawaii, Monterey California, Madison Wisconsin, Miami Florida, and Mayaguez Puerto Rico. An additonal station will be installed in Guam by the end of 2016.

Sounder data collected by the stations includes CrIS and ATMS from Suomi NPP; IASI, AMSU, MHS, and HIRS from Metop-A/B; AIRS and AMSU from Aqua; and AMSU, MHS, and HIRS from NOAA-18/19. The sensor data are transmitted to a central processing facility at the Space Science and Engineering Center, University of Wisconsin-Madison, where they are processed from Level 0 to Level 1B radiance products, converted to WMO standard BUFR format, and transmitted to NOAA NCEP for NWP assimilation. In addition, under the umbrella of an agreement recently established with EUMETSAT, the data will be included as part of the EUMETSAT Advanced Retransmission Service (EARS) network.

Sounder data are also processed on-site at each station for local consumption by weather forecasters and other decision makers. Atmospheric temperature, moisture, cloud, and trace gas products are provided from the combination of CrIS and ATMS, and IASI and AMSU via the dual regression hyperspectral infrared retrieval algorithm developed by W. Smith et al. at SSEC and the NUCAPS infrared/microwave physical retrieval algorithm developed by C. Barnet et. al at NOAA.

This poster will describe the data acquisition and processing frameworks created to enable the network to deliver advanced sounder data to NOAA NCEP and EUMETSAT EARS with an average latency of less than 15 minutes, as measured from the start of a satellite overpass. It will also describe the range of software and products created locally at each station, and show examples of the local applications of the products.