NPOESS Preparatory Project Validation Program for the Ozone Mapping and Profiler Suite

Lawrence Flynn[1], with M. Caponi[2] , I. Petropavlovskikh[3], D. Rault[4], C. Long[5], E, Beach[6], D. Swales[6], J. Niu[6], W. Yu[7]

[1]NOAA STAR, Camp Springs, MD, [2]The Aerospace Corporation, El Segundo, CA, [3]NOAA Boulder, CO, [4]NASA LaRC, [5]NOAA NWS, [6]IMSG, [7]Dell Services Federal Government

Overview

The Joint Polar Satellite System (JPSS) Program, in partnership with the National Aeronautics and Space Administration (NASA), will launch the NPOESS Preparatory Project (NPP), a risk reduction and data continuity mission, prior to the first operational JPSS launch. The NOAA/NESDIS Center for Satellite Applications and Research (STAR) will execute the NPP Validation program in collaboration with subject matter experts from the user communities to ensure the data products comply with the requirements of the sponsoring agencies.

The Ozone Mapping and Profiler Suite (OMPS) consists of two telescopes feeding three detectors measuring solar radiance scattered by the Earth's atmosphere and solar irradiance by using diffusers. The measurements are used to generate estimates of total column ozone and vertical ozone profiles. The validation efforts will make use of external resources in the form of ground-based and satellite measurements for comparisons, and internal consistency methods developed for backscattered ultraviolet measurements over the last thirty years.

This presentation provides an overview of the comparative data, analysis techniques, and collaborative teamwork for the validation of the NPP ozone environmental data products.

Ozone Validation Team

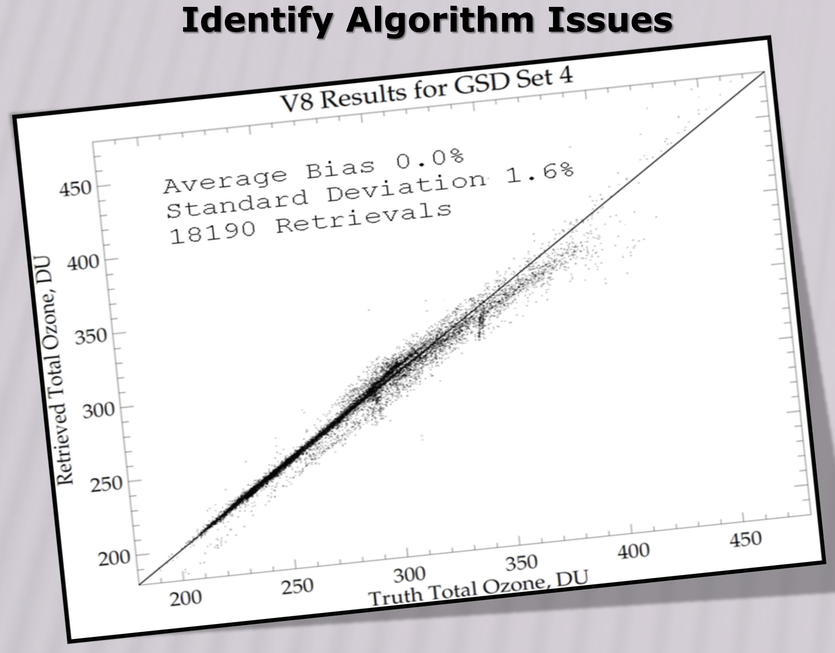
Name	Organization
L. Flynn	NOAA/NESDIS
I. Petropavlovskikh	NOAA/ESRL
C. Long	NOAA/NCEP
D. Rault	NASA LaRC
R. McPeters	NASA GSFC
S. Janz	NASA GSFC
J. Hornstein	NRL

Validation Approach

The ozone validation team will utilize expertise from a variety of organizations. The principal activities will be performed by researchers at the National Oceanic and Atmospheric Administration's (NOAA) National Environmental Satellite, Data, and Information Service (NESDIS), NOAA's National Weather Service (NWS) and the National Centers for Environmental Prediction (NCEP), NOAA's Office of Oceanic and Atmospheric Research (OAR) and Earth Systems Research Laboratory (ESRL), the National Aeronautics and Space Administration's (NASA) Goddard Space Flight Center (GSFC), members of the Northrop Grumman Aerospace Systems (NGAS) calibration/validation team—especially those working on the OMPS Sensor Data Records (SDRs)—and the NPP on-orbit verification team.

These participants will use computing resources at their respective home institutions and the NPOESS Government Resource for Algorithm Verification, Independent Testing, and Evaluation (GRAVITE), the Algorithm Development Area (ADA), the NOAA Science Investigator-led Processing System (NSIPS), and the NASA Science Data Segment (SDS) [via the OMPS Product and Evaluation and Test Element (PEATE)]. The participants will make comparisons to their own data sets as well as others from the World Ozone and Ultraviolet Radiation Data Centre (WOUDC), the Aura Validation Data Center (AVDC), and the Network for the Detection of Atmospheric Composition Change (NDACC).

Heritage Algorithms Used to Identify Algorithm Issues



Total Ozone Datasets provided by researchers at George Mason University under contract to NGAS were used in our alternative/heritage algorithm (V8). The results helped to identify the programmatic source of the Snow/Ice errors in the EDR algorithm. They also allowed recognition of some of the limitations of the "Truth" ozone data used as an input. NGAS is responding to correct these deficiencies, now reports improved performance.

This figure shows comparisons of V8 Retrieval values and "Truth" values for Global Synthetic Dataset (GSD) #4. The "Truth" data have been adjusted for unrealistic Layer 0 ozone amounts and terrain pressure difference between the generating and retrieving algorithms.

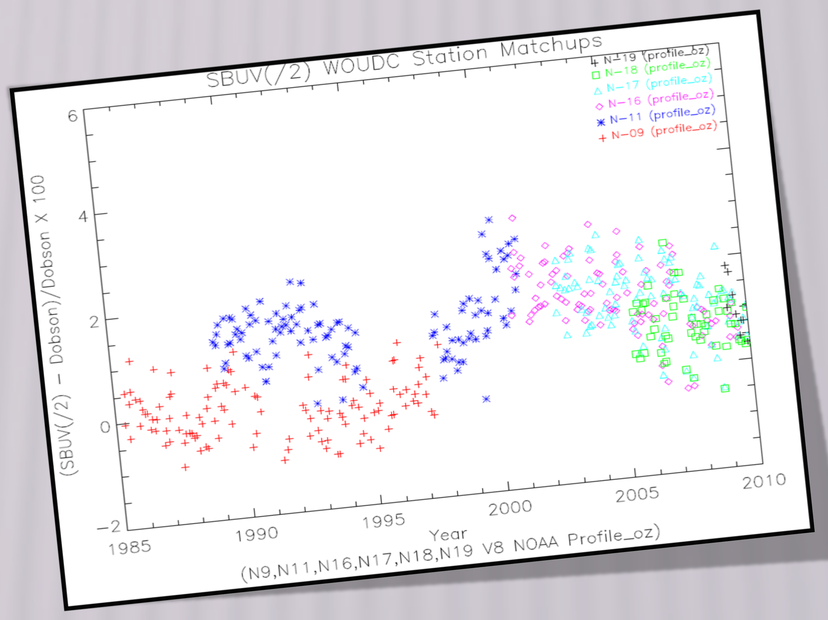
Correlative Data

GOME-2, SBUV/2, Odin-OSIRIS, OMI, SCIAMACHY, SOLSTICE, TOMS, Dobson and Brewer Ground Stations

Ground-based Matchup Database Updated

SBUV/2
http://www.ozonelayer.noaa.gov/action/sbuv2.htm

Dobson Spectrophotometer
http://ozone.gi.alaska.edu/dobson.htm



Summary plot of matchup overpass SBUV/2 ozone profile total ozone estimates with a collection of ground-based Dobson stations total column ozone estimates.

Each symbol represents the average percent difference for a month's collection of comparisons for the designated satellite instrument; N-# is shorthand for the NOAA-# POES satellite carrying each SBUV/2.

PRE-LAUNCH

- Demonstrate assimilation and assessment capability using GOME-2, SBUV/2, and MLS ozone products
- Implement Dobson automation, perform instrument calibration and maintenance
- Calibrate, maintain, and upgrade NeuBrewer instruments and data processing and display system
- Obtain and navigate instrument characterization and calibration measurements
- Increase ground-based matchup data base, test Overpass creation with SBUV/2 and GOME-2
- Adapt alternative heritage ozone algorithms (V8Pro and V8TOZ) for use with OMPS
- Create and use proxy and synthetic solar and Earth view SDR measurements
- Obtain and manipulate sample EDR, SDR, DIP, and GEO data sets
- Evaluate Global Synthetic Data (see Figure above)

EARLY ORBIT CHECK-OUT (EOC)

- Initialize the Algorithm, and establish the regular operational functioning to produce SDRs and EDRs
- Compare orbital sensor characteristics to the laboratory measured characteristics
- Establish the orbital calibrations of the sensor, place them into the SDR Algorithm, and measure the combined performance of sensor and SDR and EDR Algorithms

INTENSIVE CAL/VAL (ICV)

- Conduct and report on comparisons of OMPS products with Dobson, Brewer, and other ground-based measurements
- Conduct and report on comparisons of OMPS products with other satellite products
- Conduct and report on comparisons of standard OMPS products with those from heritage algorithms
- Report on assimilation and other applications of OMPS products

LONG-TERM MONITORING (LTM)

- Track long-term differences between OMPS and other measurements
- Provide Matchup overpass data set files.

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