ATMOSPHERE (IMAGERY, CLOUDS, AND AEROSOLS) WRAP-UP

Don Hillger for Satya Kalluri
NESDIS/StAR Atmos Lead
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VIIRS EDR IMAGERY WRAP-UP

Don Hillger, PhD
Don.Hillger@noaa.gov
VIIRS EDR Imagery Team

Imagery Main Topics

- VIIRS imagery is **generally very high quality with many operational users**:
  - NRL, NIC, NCEI, JTWC, NWS (including NHC and Alaska Region), US State Department/foreign governments (incomplete list; only includes what was mentioned during the session)
- Image **artifacts inherited from SDRs are rare**, but do happen
  - Attitude error documented in SDR and EDR imagery
- **Uses of VIIRS imagery** include:
  - Boat detections
  - Nightfire product
  - City Lights mapping/power outage detection
  - Hazard detection (floods, fires, dust storms, smog, landslides, explosions/disasters)
  - Snow and ice detection/monitoring
  - Tropical cyclone analysis and forecasting
  - Airglow waves (mesospheric gravity wave detection)
- Value of **Day/Night Band for a wide variety of applications** – mentioned by every speaker
- Near Constant Contrast **(NCC) EDR now in AWIPS**
  - Lack of terrain correction in Imagery EDRs negatively impacts NCC imagery

Imagery Issues/Future Work

- **Terrain-corrected geoloc**ation is needed for all Imagery EDRs
  - Lack of terrain correction impacts any land surface application of VIIRS Imagery
- Only 6 of 16 M-bands are **Imagery EDRs**
  - Desire to have all VIIRS SDRs produced as EDRs
- Work with Land Team (Ivan Csiszar) to better quantify **Day/Night Band for fire detection**
  - Is DNB more sensitive to small/cool fires than M-13, I-4?
  - What are its limitations?
- What happens when **JPSS-1 launches**?
  - How will stray light impact Day/Night Band imagery from JPSS-1?
  - Is L+90 enough time to reach Provisional maturity for NCC?
  - Will AWIPS handle both S-NPP and JPSS-1 at the same time?
  - How will the addition of JPSS-1 imagery impact other operational users?

CLOUD WRAP-UP

Andy Heidinger, PhD
andrew.heidinger@noaa.gov
VIIRS Cloud Team

Enterprise VIIRS Cloud Algorithms

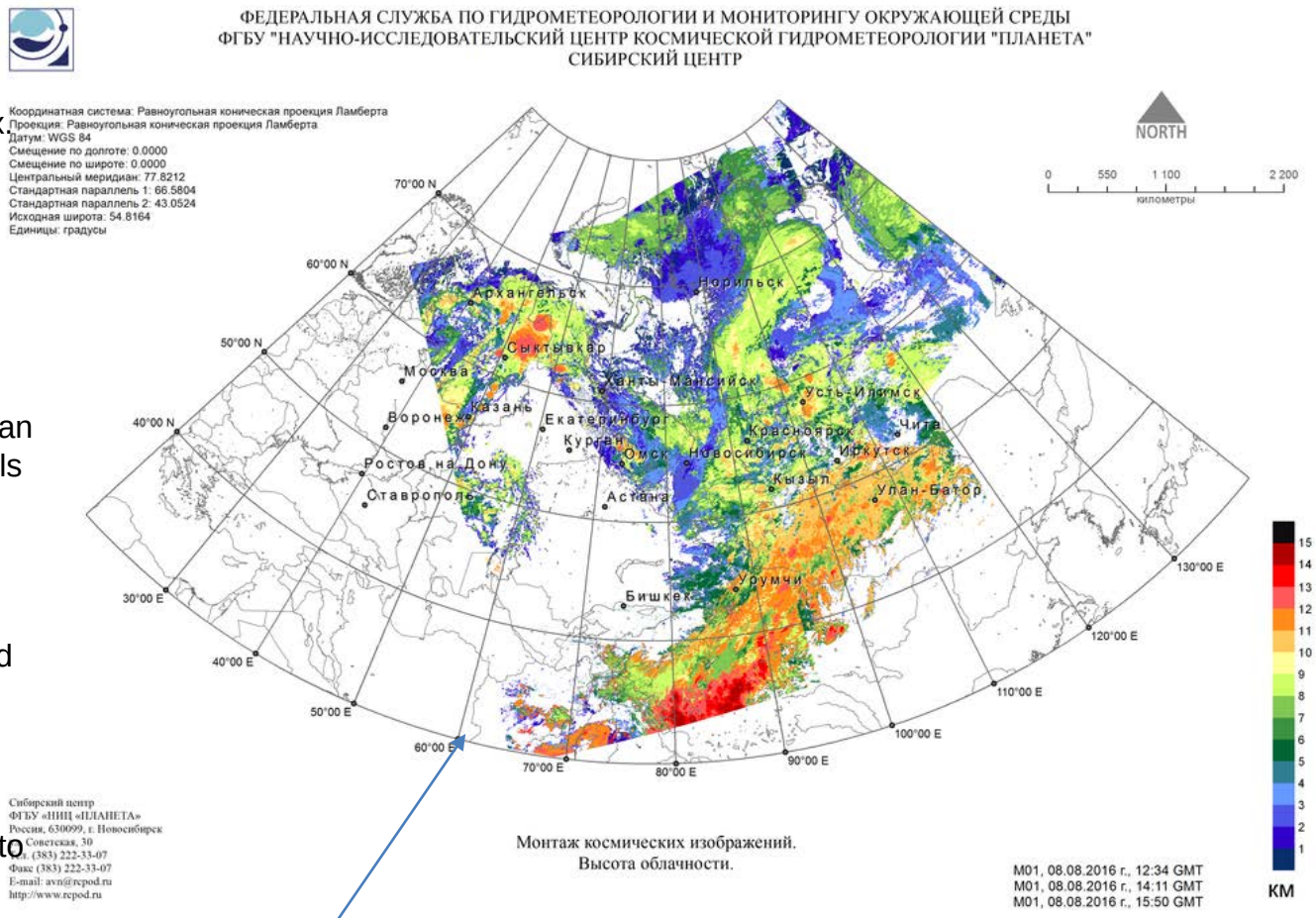
- **Operational Status**:
  - Code Delivered to ASSISTT in April and will go operational in NDE in Nov 2016
  - Next update is August 2016 for a January 2017 operational update.
  - Enterprise now includes Cloud Base and (baseline) Cloud Cover Layers.

- **Cloud team short term user-focused priorities**
  - ECM in SAPF improvement and modification based on team feedback.
  - Working with NCEP on the use of VIIRS cloud products for use in CrIS cloud characterization.
  - Optimizing cloud heights for the Polar Winds Application.

- **Cloud Team longer term user-focused activities**.
  - Active in inserting VIIRS cloud / precip. information in JPSS Hydro Initiative
  - Working with Tony Wimmers (CIMSS) to get ”morphed” cloud product data from all polar orbiters into Alaska NWS Region with GINA.
  - Working with NCEP to get VIIRS clouds in Real-Time Mesoscale Analysis (RTMA)
  - Demonstrating use of I-bands for cloud products – a unique capability from VIIRS.

CSPP LEO / CLAVR-x Providing NOAA Enterprise Clouds to DB Now

- The NOAA Enterprise Cloud Algorithms are distributed through UW/SSEC CSPP LEO.
- CSPP LEO runs NESDIS CLAVR-x.
- Provided good feedback for VIIRS Enterprise cloud products before operational in NDE this fall.
- Roughly 50 downloads
- Active communication with a Russian Remote Sensing Company that sells services to the Russian Weather Agency.
- Goal is to release updates in step with our deliveries to SAPF. (ahead of operations but in-sync with ASSIST)
- CSPP LEO supports VIIRS DNB usage. We hope to transition this to SAPF.



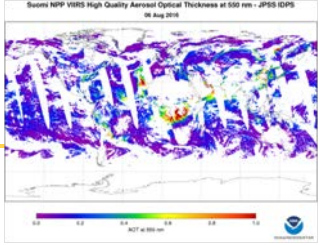
Example CSPP LEO CLAVR-x image provided by Russian CSPP customer

AEROSOL WRAP-UP

Istvan Laszlo
istvan.laszlo@noaa.gov
and
Shoba Kondragunta
shobha.kondragunta@noaa.gov

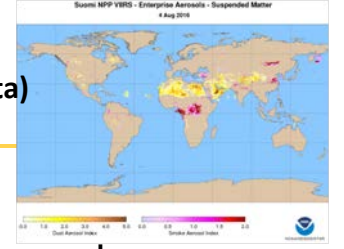
VIIRS Aerosol Team

Aerosol – Summary (Laszlo & Kondragunta)



- **Products**: Aerosol Detection (AD) and Aerosol Optical Thickness (AOT)
- No work on S-NPP IDPS AD and now only (reactive) maintenance of AOT algorithms.
- IDPS AD/AOT product remains at beta/validated maturity level. No degradation in AOT product quality as indicated by Long Term Monitoring (LTM) at fixed sites and comparison to AERONET ground measurements.
- **Developed and delivered EPS AD and AOD algorithms**
  - Both algorithms represent significant improvements compared to IDPS:
    - better accuracy; extended AOD measurement range; AOD retrieval over bright snow-free surface;
  - **Both products meet L1RDS requirements**.
- Tools for LTM have been developed and deployed.
- **Completed reprocessing of aerosol products with EPS algorithms for 2015** and provided them to users. Reprocessing of other years is ongoing.
- **Overall feedback from users on product quality is positive.**
- **Planned Algorithm improvements:** update AD thresholds to minimize false AD; develop technique to estimate surface concentration; update AOT algorithm to decrease seasonal/regional and spectral biases.
- **From S-NPP to JPSS-1:** No major algorithm changes are expected. No major risks or issues at this time, assuming S-NPP VIIRS instrument performance is maintained, and J1 VIIRS instrument performance is better or comparable to that of S-NPP VIIRS.

Aerosol - User Feedback and Team Interaction (Laszlo & Kondragunta)



- VIIRS AOT, and dust and smoke masks are evaluated for assimilation in aerosol forecast models, for monitoring model forecasts (NCEP, ESRL, NRL), and for improving air-quality forecast (PSU). VIIRS AOT is investigated in field experiment (UMBC).
- **Findings**:
  - IDPS aerosol product has deficiencies for DA (missed smoke plums, no retrieval over bright surface, max AOT reported is “only” 2; positive over-land bias).
  - EPS AOT product has smaller bias than IDPS AOT.
  - EPS, by extending the reporting range, allows greater number of dust-related values into NAAPS data assimilation (DA);
  - Using VIIRS+MODIS is better than using MODIS alone.
  - Combining EPS AOT with EPS dust and smoke masks has better potential for assimilation to improve dust and smoke forecast.
  - VIIRS RGB and AOT essential for identifying smoke plume transport upwind; 48 hour aerosol trajectories are critical tool for forecast.
  - VIIRS IDPS AOT retrievals at 6 km matched AERONET well over the southeast U.S. during August/September 2013, but are less capable over the urban surface in greater Houston.
  - The VIIRS AOT algorithm is showing some skill at deriving size parameter over land, and seems to be able to choose the correct aerosol model.
- **Side meeting with Cloud Team:** discussed ECM vs VCM differences and their impact on AOT, and correct interpretation of flags and masks (glint, cloud shadow, snow, land-sea) for aerosol retrieval.