JPSS-CPO TIM on Atmospheric Composition

November 18, 2:00-4:00 PM

Meeting Notes

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(With inputs from Brad Pierce, Chris Barnet, Lihang Zhou, Jin Huang, and Nazmi Chowdhury)

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1. Background

One of the objectives of the JPSS Program is to reach out to user agencies, both to bolster the operational utility of high quality JPSS products and to foster possible collaboration for joint proposal calls. NOAA/OAR/CPO has a mission to advance scientific understanding, monitoring and prediction of climate and its impacts to enable effective decisions, which includes utilizing satellite data. JPSS and CPO held a first kick-off meeting on September 12, 2016 to discuss future partnerships and possible collaborations towards using JPSS products for climate applications. The JPSS Program Scientist and JSTAR Program Manager provided an overview of the JPSS products, NJO connection and PGRR initiatives. The CPO ESSM Division Chief gave a general introduction to CPO, and the CPO Program representatives introduced the following on-going CPO Programs: (1) Arctic (presentation by: Jeremy Mathis); (2) OOM Division (presentation by: David Legler); (3) MAPP program (presentation by Dan Barrie); and (4) AC4 program (presentation by: Monika Kopacz). Three common areas of interest, (1) Arctic, (2) Atmospheric Composition, and (3) Reanalysis, Modeling, Drought and Hydrology were identified in the kick-off meeting for collaboration between the JPSS and the Climate Program Office (CPO). Technical Interchange Meetings (TIMs) were suggested for in-depth discussions on potential collaborations. This document is the first TIM following the kick-off meeting, conducted by the JSTAR team and CPO AC4 program on the JPSS Atmospheric Composition (JAC) products.

2. JPSS Atmospheric Composition (JAC) Products TIM – Nov. 18, 2016.

The first JAC product meeting was held on November 18, 2016 and was well attended by the JSTAR atmospheric science teams, representatives from ESSM Division, and users from NOAA OAR Laboratories (ESRL/GFDL). The main objectives of the TIM are to: (1) Bring together AC4/OAR needs for the JAC products and areas of interest by other CPO programs and laboratories as part of their support to the earth system modeling, (2) Determine user needs requirements for satellite products (in particular JAC products) and realize those recommended requirements through the development of schedules and priorities tailoring the products, (3) Start coordinating collaborative activities between JAC product teams, CPO, and user agencies, and (4) Develop necessary user justifications for the JPSS Program approvals and get recommended products into operations in line with planned field campaigns

2.1 JAC Products

The JSTAR teams discussed details of JAC products from the CrIS/ATMS, OMPS, and VIIRS suite of instruments. JAC products fell primarily into two categories: (1) products operationally available on a routine basis (global/regional, daily/weekly and other spatial/temporal composites), and (2) research and experimental products currently under consideration and exploration.

2.1.1 The CrIS/ATMS NUCAPS Products

The NUCAPS team provided a summary of the NUCAPS operational products and the status of trace gas product retrievals and validation. In addition to temperature, water vapor and ozone products, the NUCAPS system operationally produces and distributes six trace gas products (CO, CH_4, CO_2, Volcanic SO_2, HNO_3 and N_2O) through CLASS. Temperature, water vapor, and ozone retrievals have been validated over the years starting with AIRS, IASI and CrIS/ATMS, and the team is currently approaching the validated maturity of the products using the CrIS Full Spectral (FS) resolution data sets. Other trace gas products are being validated and the scientific utility of these products is being demonstrated through JPSS funded initiatives.

Based on the lessons learned about the product utility by user groups through earlier campaigns of opportunity, the team identified many user needs in preparation for future field campaigns. These include providing (a) spatial vertical error covariance and distributing averaging kernels and apriori information as an integral part of the operational products, (b) sophisticated QC flags specifically tailored for trace gas applications, and (c) user friendly and preferred formats (e.g. netcdf). The team also identified the need for mission life reprocessing, re-gridding capability, and the implementation of CrIS FS SDR and associated EDRs through NOAA CSPP/Direct Broadcast (DB) facilities for near real time high resolution operational products in support of future real time applications such as the NOAA FIREX (http://esrl.noaa.gov/csd/projects/firex/).

The team also summarized the operational products as well as potential new science products derivable from the current hyper-spectral sounding instruments (AIRS, IASI, and CrIS). One of the highlighted new products is Ammonia (NH_3), an experimental AIRS product that has demonstrated user applications related to agriculture, fire emissions and air quality, Earth System modeling (nitrogen cycling), aerosol formation and understanding fire effects on atmospheric composition. The algorithm to retrieve Ammonia (NH_3) is readily available and compatible with the NUCAPS system. Implementation of the NH_3 algorithm into NUCAPS and transition to operations require user requests/requirements from NWS, ARL and other user agencies (ESRL, EPA, NFS, USDA) for justification and approval of the CCR process by the JPSS program office. The NUCAPS team looks forward to active collaboration in support of any of the AC4 program/projects and in engaging new potential users (EPA, NFS, and USDA) to justify both maintaining the current NUCAPS products and developing new trace gas products in support of upcoming field campaigns.

2.1.2 OMPS Products

The JSTAR OMPS team provided an overview of the OMPS operational ozone products for daily monitoring of three dimensional distribution of ozone and other atmospheric constituents. The Nadir Mapper (NM) instrument provides Total Column Ozone (TC), UV Absorbing Aerosol Index (UVAI), and Total Column SO_2 at 50 x 50 km^2 horizontal resolution at nadir from S-NPP with 2% accuracy. Starting with JPSS-1, these products will be produced at 17 x 17 km^2

resolution at nadir. The Nadir Profiler (NP) produces ozone profile in the orbital track at 250 x 250 km^2 (50 x 250 km^2 from JPSS-1) resolution with 5% accuracy and 5 to 10 km vertical resolution in the middle and upper stratosphere. The Limb profiler (LP) currently on S-NPP (and in future on JPSS-2) provides the ozone limb product at 5% accuracy and 3 km vertical resolution in the stratosphere. The team produces daily, global and regional scale products of TC, UVAI and SO_2 supporting UV index forecasts and hazard warning systems in place of OMI (SO_2). Some of the research products include total column and tropospheric NO_2 (from NM), the Mg II index product that is of interest to solar activity (from NP), and stratospheric aerosol profiles derived from the LP which help to map out stratospheric aerosol loading due to natural eruptions. The presentation also included samples plots followed by a discussion on the utility of these products.

In addition to the OMPS products, the team discussed total column Formaldehyde (HCHO) and tropospheric NO_2 products from the MetOp-AB GOME-2 instrument that has better spectral resolution and wavelength coverage (https://atmos.eoc.dlr.de/gome/product.html). NOAA has cooperative agreements to get these products in real time from EUMETSAT and requires some protocols to be satisfied to receive these deliveries or generate the products at STAR with a better real time feed from EUMETSAT. The EUMETSAT team also has plans to combine the UV and VIS products to make new aerosol indices products and the team is currently looking in to making similar products. All of these products can be included in the JPSS satellite product resources to support future OAR programs/projects. The SO_2 product is still not in L1RDS and requires SPSRB user request/requirements to be part of the official JPSS product. The product will be made starting with J-01 as the SO_2 exclusion goes away and it is needed to make better total ozone products. The presentation also provided a list of expected products from the future NASA-TEMPO geostationary satellite (https://fpd.larc.nasa.gov/tempo.html) and the rapid-refresh possibility of the products over the CONUS. These products will be somewhat similar to the MetOp-AB/GOME and JPSS/OMPS products. Also included in the presentation was a description of the S5P TROPOMI Level-2 Products (http://www.tropomi.eu/science/level-2-products). Currently there is no real time tie-in for the TROPOMI products. However, many future products under consideration by the OMPS team can be obtained from TROPIMI Level-2 products.

2.1.3 VIIRS Products

The VIIRS Atmospheric composition product included Aerosol products. VIIRS Active Fire (AF) products, which can be used as input for characterizing atmospheric emissions, were also discussed. The team introduced two main operational aerosol products from S-NPP, (1) the Aerosol Optical Depth (or Aerosol Optical Thickness, AOD, AOT, quantitative measure of aerosol loading), and (2) the aerosol detection product (ADP, qualitative information on the type of aerosol). The team also presented validation charts of the AOD product with the AERONET (http://aeronet.gsfc.nasa.gov/index.html) sun-photometer measurements, and a comparison of the

current IDPS product implemented at S-NPP launch by Northrop Grumman, and the NDE enterprise algorithm product developed at STAR that works on both GOES-R and JPSS. Both of these algorithms meet the accuracy and precision requirements with the enterprise algorithm showing improved bias characteristics with respect to the AOT measurements. The enterprise algorithm (EPS) also has fixes that reduced some anomalies found with the IDPS algorithm over melting snow contamination. The major benefits from the EPS algorithm are the retrieval of the AOT product over an expanded measurement range (-0.05 to 5), over bright surfaces such as the desert and semi-arid dry regions, and over inland water bodies. The algorithm is ready for operational implementation in the NDE (planned for the year 2017). The team also presented comparisons of reprocessed EPS AOT product with the MODIS AOT product for the S-NPP mission long period to date. The team has provided the EPS AOT product to many user agencies including ESRL, JCSDA, NCEP-EMC, NRL, and the State University of New York, and the product is being tested in assimilation experiments.

The ADP algorithm currently identifies volcanic ash, dust, and smoke. The ash information comes from a separate algorithm and the ash product information is included in the output file as part of the ADP products. The presentation also included a qualitative comparison of the VIIRS dust and smoke product with the NASA-MISR instrument derived products. The current operational IDPS ADP does not meet the requirements. However, the enterprise ADP algorithms meet the requirements for smoke and dust detection. The team has produced S-NPP VIIRS 2013-2015 dust and smoke climatologies from the reprocessed data sets using the enterprise algorithm. The ADP enterprise algorithm is ready and is scheduled for implementation in the NDE environment in the spring of 2017. The team also discussed various flavors of the Aerosol products and trade-offs between data consistency and data latency applicable for different types of users and for different applications.

The VIIRS Active Fire (AF) product is an operational M-band product at 750m resolution and provides a variety of information at each pixel, identifying fire hot spots or cloudy conditions over either land or water. The AF product also provides for each fire pixel the fire radiative power (FRP), a proxy for the intensity of fire. The product has been validated by comparing against airborne radiometric measurements from the Forest Service, and by comparing against space-borne observations from other satellite instruments such as Landsat-class (30m), DLR-TET1 (185m) and the MODIS AF product. The NOAA JPSS team is also involved in evaluating an experimental/research AF product at I/M-band resolution and validation of the experimental product is planned using the planned campaigns of opportunities. Operational implementation plans are still evolving.

The aerosol products and the AF products are used routinely for estimating bio-mass burning emissions and operational air quality forecasting. These products are provided to many users (HRRR, NWS AWIFS, and GBBEPx) with imagery and integrated air quality analysis tools available through the eIDEA website (http://www.star.nesdis.noaa.gov/smcd/spb/aq/eidea/). As part of the JPSS Fire and Smoke initiative, the HRRR smoke model is ingesting fire hot spot and

FRP and smoke products information to forecast near-surface smoke and vertically integrated smoke concentration. The National Weather Service is evaluating the usefulness of ingesting VIIRS fire products into the model for smoke forecasts and the feedback especially from the Western Region has been very positive VIIRS AF products are used in the operational Hazard Mapping System (HMS) operated by the NOAA SAB. The system combines fire hot spots from multiple satellite platforms (both polar and geo-stationary) and provides the information in real time for various applications. The GBBEPx project that runs an emission algorithm utilizing a network of geostationary (GOES-E, GOES-W, MetoSAT-10) and polar orbiting satellite (Terra and Aqua MODIS) fire hot spots data is planning to add VIIRS AF data in the next year. The GBBEPx product in real time at hourly time steps is used by NWS/NCEP NGAC model.

2.2 Atmospheric Chemistry, Carbon Cycle and Climate (AC4) Program and FIREX

The AC4 program is a competitive research program which manages multi-year projects, including but not limited to nitrogen cycle, atmospheric compositions retrieved from space, Carbon Tracker (ESRL/GMD assimilation system), and other related topics. AC4 works closely with external community, GFDL, ESRL, and other laboratories to accomplish the goals of its projects. This presentation provided thoughts on potential collaborations for atmospheric concentrations of greenhouse gases and for aerosols in the context of the Earth System and climate. AC4 efforts, plans, and investments on the Emissions and Chemistry of Wildfires were highlighted, as well as upcoming field and laboratory data campaigns. Specifically referencing FIREX (2015-2019), the presentation provided details of the AC4 efforts/coordination studying western wildfires through instrument development, laboratory experiments, field deployment (P3, mobile labs, other aircrafts) and modeling (http://esrl.noaa.gov/csd/projects/firex). Details of FIREX science priorities and AC4 supported research projects with FIREX foci include (1) collecting, analyzing and/or modeling data from FIREX, (2) exploiting the use of multiple data sets (in-situ as well as space borne), (3) investigating the effects of biomass burning on nitrogen cycle, and (4) improving the prediction of smoke from wildfires, especially in NOAA's Air Quality Forecasting system. Atmospheric composition products derived from the JPSS and GOES-R platforms show a lot of promise for mutual collaborations in alleviating many science queries and in satisfying the data needs for the FIREX and future campaigns. In-situ airborne trace gas and aerosol measurements during FIREX and the proposed NASA FIRE-Chem field campaigns would provide data for validation of the JPSS and GOES-R products. Special data needs relevant to Atmospheric Chemistry research needs were discussed in length in anticipation of receiving JAC products from CrIS, OMPS, and VIIRS to meet the latency requirements during the planned field campaigns. Recommendations from the 2015 CrIS workshop were revisited to seek available/suggested solutions on data needs, special needs for atmospheric chemistry, validation, and future instrument development. These recommendations might be applicable across all of the JAC products derived from the other JPSS suite of instruments. In the past, the scientific communities have used TIR and UV products provided by NASA (e.g.

MOPITT, TES, AIRS, OMI) to explore the utility of satellite derived products. Lack of continuity or replacement makes JAC products more valuable for long term continuity and connectivity for coordinated science experiments.

3. Enterprise Algorithms and Reprocessing

The final presentation of the meeting provided an overview of the S-NPP SDR/EDR product maturity status of (a) the EDRs currently in NDE operations, (b) EDRs migrating to NDE from IDPS (or replacement enterprise algorithms going to NDE), and (c) the EDR algorithms expected to be in NDE operations by 2018. Most of the S-NPP SDR/EDR products reached validated maturity and the science teams anticipate shorter timelines in reaching JPSS-1 SDR/EDR provisional and validated maturity (http://www.star.nesdis.noaa.gov/jpss/Docs.php). Suomi-NPP SDR/EDR reprocessing plans to generate mission-long high quality science data products were discussed. Examples of reprocessed S-NPP SDR products and benefits in science quality achieved in SDR and EDR products were demonstrated. The presentation also highlighted the applications of Suomi-NPP reprocessed data sets in climate research.

4. Meeting Outcome, Actions

Both JSTAR and OAR representatives discussed in length the common areas of interests for collaborative proposals, data products, user needs on new data products derivable from the JPSS instruments suite, and field campaigns. The discussion emphasized what JPSS can provide for the AC4 needs, and what CPO/AC4 can do to complement with STAR efforts on future collaborations. A list of items, available solutions, and suggestions for future course of action is in the Appendix Table 1. Moving forward, the following key items are identified for STAR, JPSS, and CPO to continue to collaborate:

- Develop user requests/requirements to start-up the CCR process for the JPSS Program for NUCAPS Ammonia (NH3) product. Plan to implement Ammonia (NH_3) product in NUCAPS for real time support during upcoming field campaigns.
- Discuss the potential for a chemical reanalysis of the atmosphere. (JPSS STAR manager Lihang Zhou, to talk with ESSM Division Chief, Jin Huang, to discuss this possibility)
- Provide calibrated radiances for SDR data at CrIS full spectral resolution (and SDRs for other instruments), as well as JAC Products through DB/CSPP in support of real time applications like FIREX.
- Complement NOAA P-3 flights during FIREX with NASA DC-8 flights during the proposed FIRE-Chem field campaign to obtain profiles from tropopause to boundary layer.
- Consider NASA ER-2 JPSS/GOES-R EDR validation mission during the summer of 2018 to extend previous ER-2 JPSS and planned GOES-R validation SDR campaigns.
- Further coordination with OAR customers: CPO/AC4, ESRL/CSD, ESRL/GMD, GFDL, ARL on the JPSS AC product needs, such as data time frame, latency, special needs.

Appendix

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November 18, 2:00-4:00 PM

Agenda

(Presentations available on the Google Invite/Drive)

	Topic	Presenter(s)	Time (min)
	Meeting Agenda/Discussion Plan	Murty Divakarla	
1	Introduction	Lihang Zhou	10
2	**JPSS Products**		
	NUCAPS Trace Gas Products	Antonia Gambacorta, Chris Barnet, Nadia Smith, and Jonathan Smith	10
	OMPS Products	Larry Flynn	10
	VIIRS Aerosol and Fire Products	Shobha Kondragunta, Istvan Laszlo, and Ivan Csiszar	15
3	**AC4 Program and JPSS**	Monika Kopacz, Kenneth Mooney	20
4	JPSS Products - Reprocessing and Enterprise Algorithms Status	Lihang Zhou	5
5	**Group Discussion**		20
	• Common Areas of Collaboration JPSS Science Teams and CPO • User Needs Assessment and Coordination • Future Course of Actions		

Table 1: List of Action Items, Available/Suggested solutions

	Items and Actions
1	Implementation of Ammonia (NH_3) product in the NUCAPS for real time support during upcoming field campaigns. List user agencies, convene a meeting with the user agencies to foster user requests/requirements and possible CCR process for the JPSS Program for NUCAPS Ammonia (NH3) product.
	Discussion: **Shobha**: Mentioned that ARL has been requesting NH3 for a while. **Daniel**: from ARL mentioned that regarding NH3, the NWS only wants to endorse ARL when they see some operational capabilities. **Nazmi** informed the group that in response to ARL's request for Ammonia (NH3), Mitch Goldberg and the Program Science has asked for additional information from ARL (through email from Nazmi in August) that includes the justification behind why current JPSS products are not suitable, how ARL plans to use JPSS Product, what current JPSS product ARL is using and if they have any plan of using it and the timeline. **Chris:** mentioned that ARL and CPO should bring-in user request to the NOAA management- through Program Science Proving Ground Initiative/SPSRB user request. Mitch is aware of it. I will also push Mitch to consider the use of the ammonia product. **Monika:** Indicated that supporting the current use of ammonia at GFDL is a request that CPO and GFDL can immediately make. **Ken:** If there is a high priority product, we can potentially still address it from AC4. **Action(s):** (1) ARL and CPO needs to bring user request to the NOAA through Program Science Proving Ground Initiate/SPSRB user request. (2) Chris and Antonia need to provide a briefing on the software changes and other needs to address NH3 implementation) (3) This requires a follow-up meeting at an appropriate time after a consultation with the CPO, ARL, NUCAPS development team, and the JPSS program office representatives.
Action	**Murty Divakarla, Chris Barnet, Antonia Gambacorta, Monika Kopacz, Kenneth Mooney, and Nazmi Chowdhury**
2	Provide calibrated radiances SDR data at CrIS full spectral resolution (and SDRs for other instruments), as well as JPSS Atmospheric Composition Products through DB/CSP in support of real time applications like FIREX.
	Discussion: **Brad**: 1. The distinction between "research" and "real-time" doesn't apply for field campaigns. NESDIS/STAR should begin the process to request access to the NUCAPS and VIIRS Enterprise algorithms through OSPO during FIREX so that there is a way to get real-time data during FIREX in addition to CSPP to avoid

	risks. 2. For VIIRS, it's critical to get the Enterprise algorithms for AOD, Aerosol Detection, and Fire detection into CSPP so that low latency, real-time data will be available during FIREX. The same is true for NUCAPS and the Full Spectral Resolution CrIS and OMPS SDR data. We are working with Chris and Shobha to accomplish this under our JPSS Fire and Smoke activities and this should be OK, but JPSS management needs to be aware of this and support it. **Action(s):** 1. Brad will communicate with Liam Gumley about DB/CSPP access. 2. Shobha had a discussion with Mitch and Mitch suggested Shobha to setup a meeting with the CSPP team on including EPS algorithms into DB/CSPP.
Action	**Shobha Kondragunta (setup a meeting), Brad Pierce, Lihang Zhou**
3	**Special needs for atmospheric chemistry**
	A. Provide reduced file size (like TES "lite") with retrievals for individual trace gases and their observation operators at a reduced vertical resolution. B. Provide essential information: a priori, averaging kernels, estimated retrieval error. C. Allow rapid multi-file download from CLASS **Action(s):** 1. Chris and Antonia need to provide the current status of the NUCAPS output products in providing a priori, averaging kernels, estimated retrieval error, any required algorithm/software changes to address user needs/requirements and special data needs.
Action	**Chris Barnet, Antonia Gambacorta**
4	**Validation**
	A. Coordinate validation with upcoming field campaigns (e.g. FIREX)
	B. More frequent ESRL flights to validate trace gases
	C. Plan additional field campaigns with retrieval and user communities
	Discussion: **Shobha**: What can JPSS do for FIREX? Provide data, perform validation, and perform science applications? **Monika's answer**: NUCAPS can be brought in to compare with respect to CrIS-OMPS combined product (as part of Kevin Bowman and Brad Pierce's funded proposal). NOAA management must be made aware of the need of NUCAPS FSR by the time of the field campaign through Direct Broadcast. **Brad:** 3. One of the issues with the validation using the NOAA P3 is that the aircraft doesn't have the altitude range that is needed and it would be very beneficial to pair up with the proposed NASA FIRE-Chem campaign that will allow profiles up to the

	tropopause. The ESRL flights are valuable and are focusing on the boundary layer and we need to complement them with other field campaigns. 4. Need to broaden JPSS/CPO composition and aerosol collaboration to include chemical and aerosol reanalyses. This is the current state of the science. **Greg:** The NASA flights provide very good data for validation since they have the whole latitudinal coverage with critical profiles. **Action(s):** 1. Complementing ESRL flights with NASA field campaign flight plans to receive profiles from tropopause to boundary layer. 2. Brad will connect with Jim Crawford during the NASA FIRE-Chem mission which complements the NOAA FIREX campaign. 3. Request access to the data from NASA ATOM campaign
Action	**Brad Pierce, Monika Kopacz, and Kenneth Mooney**
5	**Discussion on OMPS/VIIRS products** **Brad:** 1. Are there plans for an absorbing aerosol optical depth retrieval in addition to aerosol index? Highly relevant for FIREX and opportunities for combining with VIIRS AOD. 2. Real-time GOME-2 HCHO and NO2 retrievals during FIREX would be valuable and provide the test case that Larry Flynn was looking for. 3. Jassim Al-Saadi (NASA/LaRC) is tied into TROPOMI validation activities which will likely be a part of the FIRE-Chem mission objectives. 4. GSICS now has a UV component (led by Larry Flynn). This might be a good way to tie NOAA into TROPOMI. 5. There is currently (as far as I'm aware) no airborne remote sensor that can be used to validate Fire Radiative Power (FRP). This is a significant gap since we use FRP to estimate fire emissions. This could potentially be filled within FIREX/FIRE-Chem if JPSS could contribute funding for flying such an instrument (assuming one exists). Otherwise, there should be a call for proposals to design such an instrument. 6. There's a need for airborne remote sensing during FIREX for VIIRS aerosol and fire validation, if JPSS could support land based ER2 EDR validation flights that would be very helpful for satellite validation. 7. It is likely that NASA will be flying the airborne High Spectral Resolution Lidar (HSRL), which could be used for aerosol (and cloud) validation activities. 8. **Lihang**: Discussed with Larry whether they are developing anything from TROPOMI and Larry responded saying that we could just receive TROPOMI data. **Action(s):** Larry and Shobha are preparing a white paper to participate in Sentinel 5P validation plan and as a part of that activity; NO_2 data could be tested and made available perhaps for the FIREX field campaign.
Action	**Larry Flynn and Shobha Kondragunta**

6	**Discussions/comments during the closing session** a) **Brad**: the call for FIREX is closed. But we are in the process of writing a satellite section of the FIREX white paper. This is where we can insert the discussion on the need for satellite data. Question: when is the next ER-2 validation campaign? b) **Chris's answer**: we should take an action item to push for priority to be given to a land validation campaign during Summer 2018. c) **Shobha**: do they need new instruments? d) **Brad**: the only gap I see is fire radiative power validation. NASA will put a LIDAR on aircrafts to provide in situ AOD measurements. e) **Chris**: About NUCAPS support for FIREX: we'll have the reprocessed data sets, the averaging kernels in netcdf4 format, we'll have NUCAPS in CLASS and CSPP. Reprocessing should include averaging kernels. We should have the final reprocessing to occur as close as possible to FIREX in order to have the most robust system in operations. f) **Monika:** We could be writing proposal call based on what is available during FIREX. g) Chris: we'll have IASI in CSPP too. We'll make sure that JPSS will fund us to support FIREX. The ammonia product from Karen Cady-Pereira will have to come from NASA. NUCAPS cannot ingest that product, but Juying Warner's ammonia product can be ingested because it supports the same framework of inputs (RTA, Cloud cleared radiances, sequential approach). But we need support to do it. For $50 to $100 K, Juying could make it playable in CSPP. Also need Larrabee to make CrIS Forward model. h) **Daniel**: Regarding NUCAPS products, I think a number of them are very useful to the NOAA national air quality forecasting operations. ARL develops computer models and data applications for NWS, and we develop satellite applications for three areas: emission, data assimilation, and model validation. Among NUCAPS products, NH3, HCHO, and CO bears great potential to be used to improve agricultural, biogenic and fire emissions. i) **Greg**: if you need a user requirement, we can provide one. j) **Daniel**: GFDL can also chime in. k) **Chris**: we'll have the algorithm ready but it will take ~3 years before it is in CLASS. l) **Brad**: can we put a research version into CSPP, prove that it is useful during the campaign and then make the request? m) **Chris**: it is not that simple, I have tried in the past with ammonia for example. You need to demonstrate a user application need. n) **Lihang**: let's take an action on following up with a request to develop an ammonia product. o) **Brad:** we need to move towards atmospheric chemical and aerosol reanalysis. We need something like MACC-2. p) **Ken:** we should tell the head of the NWP center that we are interested in a chemical re-analysis and the starting point should be MACC. q) **Larry:** let's have a test case to see GOME-2 products. We are getting level 1b but not level 2 products that we can look at. We should be able to get their level 2 near

	real time products that we are not generating. **r) Shobha:** Suggested restarting GOME-2 NO_2 processing and requested Lihang on funding this activity as a risk reduction for developing NO_2 capability for OMPS on J1. s) **Lihang:** These products are not currently part of the requirements. To fund the development/demonstration of the new products, Mitch wants a 'User Commitment Letter' signed off by the NOAA line offices. We need to formalize the letter and have it signed off by ESRL/GFDL/ARL Directors to ensure that once these products are developed and demonstrated, the users are committed to use these products in their operation. **Action(s):** 1. Land Validation Campaign – ER2 flights 2. Other action items were already covered.
Action	**Lihang Zhou, Shobha Kondragunta, Brad Pierce, and Larry Flynn**
4	Future Plans on Instruments/Products
	A. Explore the possibility of new species/products B. Close spectral gap C. Reduce noise and increase resolution for future instruments **Discussion:** J2 and Beyond Improvements workshop may have some answers to these queries. **Action(s):??**
Action	**??**
5	User Coordination: Coordination with OAR customers: CPO/AC4, ESRL/CSD, ESRL/GMD, GFDL, ARL on the JPSS AC product needs, such as, data time frame, latency, special needs. Follow-up on requests/requirements to the NOAA/JPSS management **Action(s):** 4. A follow-up meeting is necessary
Action	**Lihang Zhou, Murty Divakarla, Monika Kopacz, Antonia Gambacorta**
Action	**Science Teams, Lihang Zhou, Murty Divakarla, Nazmi Chowdhury, Monika Kopacz**

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List of Acronyms

AC4	Atmospheric Chemistry, Carbon Cycle, and Climate
ADP	Aerosol Detection Product
AERONET	AErosol RObotic NETwork
AF	Active Fire Product
AIRS	Atmospheric InfraRed Sounder
AOD/AOT	Aerosol Optical Depth/Aerosol Optical Thickness
ARL	Air Resources Laboratory
ATMS	Advanced Technology Microwave Sounder
AWIFS	Advanced Wide Field Sensor
CCR	Configuration Change Request
CLASS	Comprehensive Large Array-data Stewardship System
CPO	Climate Program Office
CPO	Climate Program Office
CrIS	Cross-track Infrared Sounder
CSD	ESRL Chemical Sciences Division
CSPP	Community Satellite Processing Package
DB	Direct Broadcast
EDR	Environmental Data Record
EMC	Environmental Modeling Center
EPA	Environmental Protection Agency
EPS	Enterprise Algorithm Processing System
ESRL	Earth System Research Laboratory
ESSM	Earth System Science and Modeling
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FIREX	Fire Influence on Regional and Global Environments Experiment
FRP	Fire Radiative Power Product
GBBEPx	The Blended Global Biomass Burning Emissions Product
GFDL	Geophysical Fluid Dynamics Laboratory
GMD	Global Monitoring Division
GOES	Geostationary Operational Environmental Satellite
GOME	Global Ozone Monitoring Experiment
HRRR	High Resolution Rapid Refresh
IASI	Infrared Atmospheric Sounding Interferometer
QC	Quality Check
IDPS	Interface Data Processing Segment
JAC	JPSS Atmospheric Composition
JCSDA	Joint Center for Satellite Data Assimilation
JPSS	Joint Polar Satellite System
JSTAR	JPSS STAR
LP	S-NPP Limb Profiler
MAPP	Modeling, Analysis, Predictions and Projections
Meteosat	Geostationary Meteorological Satellites operated by EUMETSAT
MetOp	Meteorological Operational satellite programme
MISR	Multi-angle Imaging SpectroRadiometer
MODIS	Moderate Resolution Imaging Spectrometer

MOPITT	Measurements of Pollution in the Troposphere
NASA	National Aeronautics and Space Administration
NCEP	National Center for Environmental Prediction
NDE	S-NPP Data Exploitation (NDE)
NEMS	NOAA Environmental Modeling System
NFS	National Forest Service
NGAC	NEMS GFS Aerosol Component
NJO	NOAA JPSS Office
NM	OMPS Nadir Mapper
NOAA	National Oceanic and Atmospheric Administration
NP	OMPS Nadir Profiler
NRL	Navy Research Laboratory
NUCAPS	NOAA Unique CrIS/ATMS Processing System
NWS	National Weather Service
NWS	National Weather Service
OAR	Oceanic & Atmospheric Research
OMI	Ozone Mapping Instrument
OMPS	Ozone Mapping and Profiler Suite
OOM	Ocean Observing and Monitoring
PGRR	Proving Ground & Risk Reduction
SAB	Satellite Analysis Branch
SDR	Sensor Data Record
S-NPP	Suomi-National Polar-orbiting Partnership (S-NPP)
S-NPP	Suomi-National Polar Orbiting Partnership
STAR	Center for Satellite Applications and Research
TC	Total Column Ozone
TEMPO	Tropospheric Emissions: Monitoring Pollution
TES	Tropospheric Emission Spectrometer
TIM	Technical Interchange Meetings
TROPOMI	TROPOspheric Monitoring Instrument
USDA	US Department of Agriculture
UVAI	UV Absorbing Aerosol Index
VIIRS	Visible Infrared Imaging Radiometer Suite