2026 CSPP Users' Group Meeting
EUMETSAT, 19-22 May 2026

Oral Presentations

1.01: **Coyne, Nicholas**: "EUMETSAT Regional Services Overview", *Authors*: N. Coyne, Sreerekha Thonipparambil, G. Potiriadis, A. Jeanjean (EUMETSAT).
Abstract: This is our current EARS service. We are getting ready for EPS-SG regional services. We have EPS-Strena on the horizon. We will cover these topics most likely in different sections of one presentation. This would be tailored to be as relevant as possible to the CSPP group. We are expecting a separate paper on the ESP-SG local processing package. This will be part of another registration.

1.02: **Atkinson, Nigel:** "NWP SAF Support for local Processing of Metop-SG A1"

1.03: **Aguilar-Sierra, Alejandro**: "CSPP GEO and LEO at the National Laboratory for Earth Observation (LANOT)", *Authors*: Aguilar Sierra, Alejandro; Jimenez Escudero, Victor (UNAM, Mexico).
Abstract: The operation of LANOT has crucial importance for risk prevention in our country. Data and images, that are received and processed in our laboratory, are essential inputs for issuing hurricane alerts, severe storms, wildfires, and volcanic ash emissions, among other phenomena. For instance, we were able to prepare an opportune report about the Otis Hurricane. In this work we present and updated review about our system to process images and data using CSPP GEO and LEO, in combination with other open source programs, as well as algorithms developed in-house. We also develop technological innovation in efficient usage of computing power and data storing management, saving time and reducing costs.

1.04: **Taiki, Nasu**: "Direct Readout Activity of LEO Satellites and an Overview of the Future Satellite System Himawari-10", *Author*: Taiki Nasu (Japan Meteorological Agency/Meteorological Satellite Center).
Abstract: The Meteorological Satellite Center (MSC) of the Japan Meteorological Agency (JMA) is responsible for meteorological satellite observations, data processing, and product derivation and distribution. Its main tasks include the derivation and distribution of Level-1 and Level-2 products from Himawari-8 and -9, as well as the reception and processing of direct broadcast data from LEO satellites.

For LEO satellites, direct broadcast data from Metop-B/C, NOAA-20/21, and Suomi-NPP are received at Kiyose, Tokyo, where the MSC is located. The data are processed using AAPP and CSPP SDR, and the resulting products are provided to internal users at JMA, such as those involved in numerical weather prediction and sea ice monitoring, as well as to external organizations, including DBNet and the University of Wisconsin.

JMA is also proceeding with preparations for the future satellite, Himawari-10, targeting the initiation of operation for JFY 2030. In line with this, the MSC has initiated and accelerated the development of various satellite products in preparation for its operational phase. Himawari-10 is a geostationary meteorological satellite equipped with an 18-band imager (GHMI) and a hyperspectral infrared sounder (GHMS) and is expected to help improve the accuracy of typhoon and heavy rain forecasts.

This presentation reports on the current activities of the Meteorological Satellite Center related to direct readout activity and provides an overview of Himawari-10.

1.05: **Liu, Yanan**: "An Integrated Direct Broadcast Satellite Data Platform for Real-Time Management, Visualization, and Applications of CSPP-Derived Products", *Authors*: Yan-An LIU (East China Normal University) Hung-Lung Huang(University of Wisconsin-Madison).
Abstract: Direct Broadcast (DB) satellite systems provide near-real-time access to observations from international polar-orbiting satellites, enabling rapid generation of weather and environmental products for both scientific research and operational applications. With the growing volume of multi-sensor observations processed through the Community Satellite Processing Package (CSPP) developed and distributed by the Space Science and Engineering Center (SSEC), efficient management, visualization, and rapid access to satellite-based products have become increasingly important.

In this presentation, we present an integrated satellite data management and visualization platform designed to support real-time processing and application of CSPP-derived products. The system automatically ingests observations received by a DB ground station located at ECNU campus and processes them through the CSPP pipeline to produce Sensor Data Records (SDR) and Environmental Data Records (EDR) from instruments such as Visible Infrared Imaging Radiometer Suite (VIIRS) , Cross-track Infrared Sounder (CrIS), and Advanced Technology Microwave Sounder (ATMS). A unified data management framework is developed to organize these products and provide efficient data indexing, storage, and rapid access for downstream applications.

The platform provides a web-based interface that enables users to visualize horizontal spatial distributions of satellite products, examine vertical atmospheric profiles, analyze temporal evolution, and retrieve pixel-level high-spatial resolution values at user-specified locations. These capabilities improve the accessibility and usability of satellite observations for both scientific analysis and operational regional decision-making.

To further support low-latency applications, we also investigate AI/ML–based surrogate retrieval approaches to accelerate the time-consuming traditional physical retrieval algorithms, such as those implemented in the NOAA Unique Combined Atmospheric Processing System (NUCAPS). The proposed platform provides an efficient framework for real-time satellite data services and demonstrates the potential for integrating advanced retrieval techniques into direct broadcast processing systems.

1.06: **Jeanjean, Antoine**: "Technical approach for EUMETSAT Regional Services: EARS (Metop, JPSS, FY-3), Metop-SG, AWS, Sterna", *Author*: Antoine Jeanjean and Georgios Potiriadis (EUM).
Abstract: Presentation that will details the overview of the EARS system in EUMETSAT (METOP, NOAA, FY3 services).

1.07: **Górecki, Tobiasz**: "Real-Time Satellite Data Processing at IMGW-PIB in Poland Using CSPP", *Author*: Tobiasz Górecki (IMGW-PIB, Poland).
Abstract: The Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB) is the primary agency responsible for meteorological and hydrological services in Poland. Real-time satellite data is widely used in its operational activities. To support these functions, IMGW-PIB uses the Community Satellite Processing Package (CSPP) within a direct broadcast satellite data reception system, enabling processing of data from polar-orbiting satellites such as NOAA-20, NOAA-21, Suomi-NPP, Metop-B, and Metop-C.

In my talk, I will describe the dataflow and processing setup at the IMGW-PIB station to demonstrate how satellite data is handled in real-time, with a particular focus on CSPP. I will cover a few key components of CSPP: HEAP and MIRS, which calculate vertical temperature profiles and atmospheric gas concentrations using hyperspectral and microwave data; VIIRS Active Fire, used for wildfire detection; ATMS microwave channels, which provide information, among others, on hydrometeors; and ACSPO, which monitors sea surface temperatures. Finally, I will outline our plans to incorporate additional CSPP modules to further enhance the utilization of satellite data in meteorological forecasting and water risk management.

1.08: **Ryyppö, Timo**: "FMI Arctic Space Centre: Current and future satellite missions and CSPP based services", *Author*: Timo Ryyppö (Finnish Meteorological Institute).
Abstract: Finnish Meteorological Institute's Arctic Space Centre (FMI-ARC) host a satellite ground station in Sodankylä, Finland providing real-time services for both public and private users. This presentation introduces the satellite ground station and its infrastructure, and services and data FMI-ARC is providing that are based on different CSPP software. A roadmap and plans for new services and data products will be also discussed.

Currently FMI-ARC operates four satellite antennas of which two are 3,7 meter and two 7,3 meter in diameter. The antennas work as a pair to provide both redundancy and capacity. All the optical satellites can be tracked with any antenna and data routed to any output using intermediate frequency matrices. This concept of operations (CONOPS) enables to bypass defective components and still maintain the high availability. The site location is 67 latitudes making it favourable for polar orbiting satellites. The location of site has drawn interested of satellite operators and currently FMI-ARC is hosting two external antennas besides their own antennas.

Since early 21st century FMI-ARC has used software developed by CIMSS/SSEC. At first International MODIS and AIRS Processing Package (IMAPP) and since the launch of Suomi NPP in 2011 the Community Satellite Processing Package (CSPP). Nowadays most of the optical data products and services rely on CSPP based software. CSPP software is in general easy to use and user friendly making the start of usage fast without requiring heavy software skills. CSPP is used at FMI-ARC to create Active Fire products for both domestic and European wide services and maps to identify burned areas. The forest fire service requires usage of several CSPP software like SDR, Active Fire and ATMOS. Finnish and Swedish icebreakers operating in Baltic Sea are also provided CSPP produced data and ice charts besides Synthetic Aperture Radar (SAR) data that is not usually available during the local day time.

Future plans of FMI-ARC are to introduce more CSPP software to production, leading to wider variety of services. Flood mapping is traditionally made from planes in Finland. Satellite imagery has been difficult to get into use, mainly due to high price of SAR images. CSPP flood mapping could be a potential cost-effective solution to find the flooded areas and after that focus on with more accurate instruments, like SAR. The most interesting future development path is possible OMPS Level 2 support in CSPP. Currently only Level 1 SDRs are supported, and further processing needs to be done with legacy software like International Planetary Observation Processing Package (IPOPP) that is not anymore supported. OMPS Level 2 products are vital for FMI that is maintaining a service called SAMPO (Satellite Measurements from Polar Orbit) that is also providing atmospheric composition data for civil aviation as an operational service.

1.09: **Canestri, Alessio**: "EPS Sterna and the Arctic Weather Satellite (AWS)

1.10: **Jeanjean, Antoine**: “Status and Evolution of the EARS SEWA project”, *Author*: Antoine Jeanjean (EUM).
Abstract: Presentation that will details the overview of the EARS system in EUMETSAT (METOP, NOAA, FY3 services).

1.11: **Abani, Ali Ahmed**: “RARS Africa STATIONS Network”, *Author:* Ali Ahmed Abani (IT and RARS Telecommunications Expert, African Center of Meteorology).
Abstract: The African Center of Meteorological Applications for Development ACMAD, has installed from 2017-2020 four RARS stations in Africa (Gabon, Kenya, south Africa and Niger) under the SAWIDRA project. That has improved the coverage over the African continent of the Reception of Low Orbit satellite data with improved Numerical weather prediction and DRR services. The Satellite for Early Warning in Africa -SEWA project, is planning the upgrade of this network. This presentation will elaborate on key achievements from SAWIDRA to SAWA as well as challenges and future opportunities of the RARS Africa Network.

1.12: **Oware, Allan**: “RARS-Africa: Building operational EO data pipelines using CSPP and Apache Airflow”, *Authors*: Allan Oware, John Aseyo, Eugene Kayijamahe.
Abstract: In 2020, through the EU funded Satellite and Weather Information for Disaster Resilience in Africa (SAWIDRA) program, a network of four Regional Advanced Retransmission Service (RARS) receiving stations was established to access and acquire real-time data from polar orbiting meteorological satellites. The goal of RARS-Africa is to provide data products from polar satellites operated by EUMETSAT, the US National Oceanic and Atmospheric Administration (NOAA), and the China Meteorological Administration (CMA), supporting the needs of operational regional and global numerical weather prediction centers. This year, through the Strengthening Early Warning in Africa (SEWA) program implemented by EUMETSAT, the four ground stations located in Gabon, Kenya, Niger and South Africa, will be upgraded with advanced capabilities to improve data acquisition, processing, redistribution and next-generation mission capabilities. This presentation will examine the role of CSPP and Apache Airflow in the operationalization of RARS-Africa data services, highlighting the benefits of improving continental-level capacity to create user-driven products vital for weather forecasting, early warning and disaster risk reduction. Also discussed will be the exploitation of RARS products for local applications such as vegetation monitoring; wildfire monitoring; marine and coastal ecosystem monitoring; air quality and pollution monitoring; flood detection; and monitoring severe weather events.

1.13: **Mbule, Themba**: “SEWA Activities at SANSA”.

2.01: **Gumley, Liam**: “CSPP LEO: Current Status and Future Evolution”, *Authors*: Liam Gumley, Kathy Strabala, Geoff Cureton, Matthew Odle, Thomas Rink, Jessica Braun, Graeme Martin, Allen Huang.
Abstract: This briefing will present an overview of the CSPP LEO software suite and highlight current capabilities and features for supported sensors and products.

2.02: **Martin, Graeme**: “CSPP Geo: What's New and What's Coming”

2.03: **Strabala, Kathleen**: “Empowering Users to Create High-Quality Satellite Imagery with Polar2Grid and Geo2Grid”, *Authors*: Kathleen Strabala and Davide Hoese (University of Wisconsin-Madison, Space Science and Engineering Center (SSEC), Cooperative Institute for Meteorological Satellite Studies (CIMSS)).

2.04: **Kalluri, Satya**: "Evolution of NOAA Low Earth Orbiting Satellites Architecture and Plans for Direct Broadcast Capabilities", *Authors*: Satya Kalluri, Ken Yienger (Office of LEO NASA GSFC).

Abstract: Low Earth Orbit (LEO) observations are fundamental to global Numerical Weather Prediction (NWP), with the Joint Polar Satellite System (JPSS) serving as a critical pillar for monitoring extreme weather events such as wildfires, hurricanes, and floods. With three satellites in operations, and two more under development the JPSS constellation is expected to provide backbone observations that support both short- and long-term weather forecast models well into the next decade. Direct Broadcast (DB) services that enable real time downlink of science data is a critical feature of all JPSS missions and enables low latency exploitation of critical observations for weather forecasting and disaster monitoring. To ensure data continuity into the 2030s, NOAA is transitioning from the current JPSS architecture — supported by Suomi-NPP, NOAA-20, NOAA-21 and later JPSS-3 and JPSS-4—toward the future Near Earth Orbit Network (NEON) mission architecture.

The future NEON architecture is envisioned to be in a disaggregated architecture which replaces a single, large, multi-mission satellite (a "monolithic" satellite) with a distributed network of smaller, more specialized satellites carrying next generation sensors. For its first mission, NOAA expects to launch the QuickSounder mission in 2026 which carries the Advanced Technology Microwave Sounder in the 1730 LTAN to demonstrate commercial ground services including science data reception and delivery to evaluate end to end data latency. Future NEON satellites are expected to have Optical Inter-satellite Link (OISL), a high-speed communication link that uses laser beams to communicate and transport data using space mesh networks, enabling high-speed data relay for low latency downlink of mission data. OISL along with traditional radio frequency DB capabilities such as in X-band would increase reliable and robust low latency mission data access in the next generation. Under formulation to prototype these capabilities is the Stratus mission concept where a prototype low-light-capable weather imager will use both the new OISL and traditional RF direct broadcast capabilities to provide low latency data to our field terminal users.

This presentation will highlight current JPSS mission status and describe future LEO NEON formulation plans and activities through 2040.

2.05: **Zhou, Lihang**: "NOAA LEO Products: Updates for CSPP Users", *Author*: Lihang Zhou (NOAA/NESDIS/LEO).

Abstract: The Low Earth Orbit (LEO) missions are essential for global environmental monitoring, providing critical observations for weather forecasting and environmental management. The LEO Joint Polar Satellite System (JPSS), via the Community Satellite Processing Package (CSPP)-LEO, delivers critical low-latency data, empowering a wide range of user applications with near-real-time access to high-quality environmental observations. This rapid data availability is particularly beneficial for time-sensitive applications, such as weather forecasting, disaster response, and emergency management, where timely information is crucial for making informed decisions. JPSS's direct broadcast capabilities and low-latency data significantly enhance operational planning, risk mitigation, and resource management across various sectors, demonstrating the value of timely Earth observation data in addressing dynamic environmental challenges.

This presentation will provide an update of the latest status and plans for the LEO products algorithm upgrades, especially for JPSS-4 and JPSS-3; as well as partnership missions such as JAXA's Advanced Microwave Scanning Radiometer 3 AMSR3) aboard the GOSAT-GW and EUMETSAT Metop-SG. The latest LEO products development, including the adoptions of emerging AI/ML techniques for enhancements and improvements of the weather and environmental forecasting and monitoring applications will be highlighted. In addition, plans

for future LEO missions and products, including the JPSS and Near Earth Observation Network (NEON) series, and their relevant to the CSPP and direct broadcast user community will also be presented.

2.06: **Braun, Jessica**: “GWSAS and the use of CSPP Geo in supporting operations at NWS”, *Authors*: Jess Braun, Douglas Schumacher, Denny Hackel, Graeme Martin, Tommy Jasmin, Ray Garcia (SSEC).
Abstract: The oral presentation would discuss the GWSAS project, the role it plays across NWS, and how CSPP Geo software is used.

2.07: **Goldberg, Mitch**: “Real-Time MLP Neural Network Atmospheric Retrievals via Direct Broadcast: CSPP-Compatible Packages for ATMS-Only and Combined CrIS/ATMS/VIIRS”, *Authors*: M. Goldberg (CCNY), D. Li (CCNY), S. Mejia (CCNY), A. Dixon (CCNY), L. Zhou(NESDIS), S. Kalluri(NESDIS).
Abstract: We present two Direct Broadcast (DB) software packages for delivering real-time atmospheric profile retrievals to the DB user community, both built around multi-layer perceptron (MLP) neural networks trained against ERA5 reanalysis collocated in space and time to each satellite granule from the global data for 2018 and 2019. The first is a standalone ATMS retrieval package, applicable to SNPP, NOAA-20, and NOAA-21. The second is a combined CrIS/ATMS/VIIRS retrieval package, applicable to NOAA-20 and NOAA-21; it cannot be applied to SNPP because the midwave IR channels are not available on that platform. Both packages deliver the same core retrieval suite: temperature profiles from the surface to 1 hPa, water vapor profiles from the surface to 100 hPa, skin temperature, total precipitable water, cloud liquid water, and total column rain water — products of direct relevance to nowcasting, severe weather monitoring, and local environmental applications served by the DB community. Design principles are extensible to MetOp MWS and STERNA as those data streams become available via DB.

We assess retrieval performance across the full continuum of cloud conditions encountered in DB data streams, from clear sky (cloud fraction < 0.1) to complete overcast (cloud fraction = 1.0) The algorithm has been tested using global historical data, as well as real-time DB data acquired by our DB antenna at CCNY and from DB antenna via from our colleagues at University of Alaska, Fairbanks.

2.08: **Butler, Michael**: “NOAA Algorithm Scientific Software Integration and System Transition Team (ASSISTT) Collaboration with CSPP Geo and Leo on L2 Product Software”, *Authors*: Michael Butler 1,2 (presenting), Priyanka Roy 1,2, Walter W. Wolf 2, and Melissa Zweng 2 (1. GAMA-1 Technologies, Greenbelt, MD 20770, USA; 2. NOAA/NESDIS/OCS, Silver Spring, MD , USA).
Abstract: The Algorithm Scientific Software Integration and System Transition Team (ASSISTT) at NOAA/NESDIS/OCS leverages its effective model for transitioning algorithms from research to operations in support of doing the same for CSPP. This collaboration with CSPP provides the project with algorithms that are either identical or closely comparable with those currently running in NESDIS operations.

ASSISTT handles much of the routine transition to operations work at OCS, and once the Cloud Containerized Algorithm Package (CCAP) becomes operational they are shared with CSPP . The most recent deliveries to CSPP Geo (including the patch to enable GOES-19 processing) and LEO has been a mix of science algorithms (SAs) that utilized the Algorithm Services Framework (ASF v2.0) and standalone packages. However for future releases we will be moving toward delivering all of them as standalone enterprise packages. For CSPP Geo and some of

CSPP LEO, this would mean transitioning more toward the CSPP LEO delivery method where each of the algorithm packages are run separately and so are delivered separately.
We will discuss how the standalone CCAPs are containerized and run, how their production rules are defined, and main differences from the previous deliveries, including several new algorithms we are preparing for transition to operations. We will also present the latest implementation schedule for the CSPP products in NCCF and when they will be ready to be shared with CSPP.

2.09: **Desamsetti, Srinivas**: "DBNet Data Usage at NCMRWF: Status and Plans", *Authors*: Srinivas Desamsetti1, Indira Rani S1, John P George1, ,V.S. Prasad1, N. Srinivasa Rao2, E. Pattabhi Rama Rao2, N. Aparna3, and Shankar Nath4 (1. National Centre for Medium Range Weather Forecasting (NCMRWF), Ministry of Earth Sciences, Noida, Uttar Pradesh).
Abstract: NCMRWF receives DBNet (Direct Broadcast Network) data from Low Earth orbit satellites primarily via the Global Telecommunication System (GTS), EUMETSAT's ATOVS Retransmission Service (EARS), and the Regional ATOVS Re-transmission Service (RARS). To enhance data acquisition capabilities and timeliness, NCMRWF initiated the reception of DBNet data from two Indian stations, the Indian National Centre for Ocean Information Services (INCOIS),which supports ocean applications, and the National Remote Sensing Centre (NRSC), focusing on remote sensing applications.

NCMRWF uses the community software packages like CSPP, AAPP, etc for processing the level-0 DBNet data from the Indian stations. In the initial phase, NCMRWF transmitted DBNet BUFR data from Indian stations to the international community through the GTS. Currently, the data are processed at the reception station at INCOIS, and the BUFR files are disseminated through the GTS via the India Meteorological Department (IMD).

NCMRWF plans to establish two new DBNet reception stations under the "Mission Mausam" (Mission Atmosphere) project launched by the Indian Ministry of Earth Sciences. . The proposed DBNet stations will be strategically located at NCMRWF, Noida (North India), and Chennai (South India), significantly expanding the scope of meteorological and oceanographic satellite sensor data acquisition across the country covering the north Indian ocean. The newly acquired datasets will be disseminated globally in BUFR format through the next-generation WMO Information System (WIS 2.0).These initiatives mark a significant step forward in NCMRWF's mission to enhance real-time satellite data reception, processing, and sharing, thereby contributing to the global efforts in weather prediction and climate monitoring.
Keywords: DBNet data, processing, dissemination, WIS2.0

2.10: **Stafford, Robert**: "NTIA Efforts to Protect Meteorological Satellite Signals - Past, Present and Future", *Authors*: Dr. Robert Stafford (NTIA/ITS), Skyler Fennel (NTIA/ITS).
Abstract: As cellular spectrum use increases, satellite services face greater danger of radio interference from relatively high-power signals in adjacent bands as well as in-band spectrum sharing systems. This talk discusses three efforts to help mitigate these issues. The first, RFIMS, represents a past effort to determine interference from cochannel cellular handsets and take steps to mitigate the problem. A discussion of testing to determine interference susceptibility in GOES-DCS receivers represents present work. Soon cellular base stations in low earth orbits are expected to create unique interference conditions, and future work concerns efforts being made to understand these DTC and DTD environments.

2.11: **Hutchings, Toby**: "Future Plans for NOAA NESDIS Direct Readout".

2.12: **Rattenborg, Mikael**: "Status of the WMO-coordinated Direct Broadcast Network for Real-Time Acquisition, Processing and Fast Delivery of Satellite Direct Readout Data", *Authors*: Mikael Rattenborg (WMO), Zoya Andreeva (WMO), Liam Gumley (CIMSS, Chair, DBNet Coordination Group).

Abstract: The Direct Broadcast Network (DBNet) is a highly successful collaborative undertaking of the World Meteorological Organization and its Members. The DBNet system provides fast acquisition, processing and delivery of satellite products from direct readout data, primarily for Numerical Weather Prediction (NWP) applications with stringent timeliness requirements. Since about 20 years, sounding data from the ATOVS suite of instruments has been acquired by receiving stations around the globe, which has improved the availability and impact of satellite sounding data on short-term regional and global NWP.

DBNet has been extended to support the acquisition of advanced satellite sounder data from instruments such as IASI on METOP, CrIS and ATMS on Suomi-NPP and NOAA-20/21, MWHS and MWTS on FY-3. Key challenges for the coming years include the support for JPSS-2, Metop-SG and FY-3. To assist DBNet operators in this process, more flexible processing architectures are being considered, enabling local, centralized as well as cloud processing. A key priority for DBNet is the migration to data access via the WMO Information System 2.0, which will allow greater flexibility and enable the dissemination of full spectral-resolution data.

The presentation will provide an overview of the DBNet concept and its current status, with a particular focus on the role of CSPP processing. It will highlight how DBNet enables local applications of direct readout data through CSPP and will present illustrative examples demonstrating these capabilities.

2.13: **Rashkovetsky, Dmitry**: "A Low-Latency, Direct Broadcast-Enabled Multi-Sensor Framework For Global Wildfire Intelligence", *Authors*: Dmitry Rashkovetsky (OroraTech GmbH), Florian Fichtner (OroraTech GmbH), Christian Krullikowski (OroraTech GmbH).

Abstract: As wildfires increase in frequency, intensity, and geographic extent, effective operational management requires timely and well georeferenced notifications with enough context to assist responders with decision making. Reliable decision support depends on minimizing data acquisition latency, rapidly processing telemetry, and harmonizing multiple satellite sources. This work presents the Wildfire Solution, an operational intelligence framework designed to address these challenges through Direct Broadcast processing, the integration of a proprietary thermal-infrared constellation, and low-latency data synthesis. The system operates on a hybrid infrastructure designed for rapid ingestion and heavy computational processing. This architecture supports the continuous assimilation of data from an extensive network of Low Earth Orbit and Geostationary satellites. A core focus of this framework is the localized processing of VIIRS and FY-3E data via Direct Broadcast, maximizing global coverage while minimizing reliance on centralized, delayed data distribution nodes. Uniquely, the system augments these public feeds with proprietary data from the OroraTech Constellation, the newly operational OTC-P1 mission. These proprietary assets are specifically designed to close the critical afternoon coverage gap, occurring approximately between 16:30 and 18:00 local time, a period that typically correlates with peak fire intensity but remains largely unobserved by traditional polar-orbiting systems. Additionally, ongoing development of the data pipeline and algorithm for detecting active fires in directly broadcasted FY-3F will be presented. Furthermore, the presentation will cover the current development of the data pipeline and algorithm designed for active fire detection using directly broadcasted FY-3F data. Beyond active monitoring, this near real-time data flow powers advanced downstream modeling. The low and ultra-low latency provided by directly broadcasted and proprietary constellation feeds enables on-demand Fire Spread Simulations to initialize directly from the freshest possible satellite-derived perimeters. These simulations ingest real-time meteorological data to predict fire front evolution over 24-hour windows. Furthermore, the framework integrates an automated Burnt Area mapping processor that utilizes Sentinel-2 and

Landsat-8/9 imagery to generate high-resolution burn scar outlines within hours of a satellite overpass. By combining a diverse multi-sensor portfolio with a latency-optimized, direct broadcast-driven architecture, this work demonstrates how next-generation wildfire solutions can accelerate the delivery of actionable intelligence. The resulting framework delivers a comprehensive, real-time view of global fire activity, proving that minimized latency and robust DB processing are critical for supporting disaster response and risk management at regional to global scales.

2.14: **Wright, Richard**: "Easing the Transition from IPOPP: An Automation Wrapper for CSPP and IMAPP", *Authors*: Richard Wright & Chris Wright (Dartcom Systems Ltd.).
Abstract: Despite being officially archived nearly three years ago, IPOPP is still in widespread use. Its recommended replacements, CSPP and IMAPP, are very capable. However, they do not currently provide the automation, archiving, easy configuration and dashboard to which IPOPP users have been accustomed. The daunting task of finding or developing a solution to add this missing functionality has become a barrier to switching for many.

Faced with this problem, Dartcom has developed AutoPOP (Automatic Polar Orbiter Processor). This is a flexible wrapper for CSPP and IMAPP comprising shell scripts which automatically ingest granules output by RT-STPS, archive them, then run the appropriate processing chain. This includes level 1 and 2 algorithms and GeoTIFF outputs via Polar2Grid. Configuration files allow adjustment of global settings such as archive size and GeoTIFF projection, enabling and configuration of the required CSPP and IMAPP modules, and selection of GeoTIFF outputs.

Modules are run in parallel wherever possible, taking into account dependencies on other modules. Processing of each satellite pass occurs independently, allowing further parallelism. To assist with monitoring and diagnostics, a browser-based Node-RED dashboard shows the archive contents, with status icons and logs available for each processing module. AutoPOP also downloads ancillaries and manages the ancillary cache automatically, and offers the ability to manually reprocess archived passes if errors occur or retrospective configuration changes are needed.

This presentation introduces AutoPOP and demonstrates how it can ease the transition from IPOPP, providing a standardised automatic processing workflow for all CSPP and IMAPP users.

3.01: **Delamere, Jennifer**: "Leveraging Direct-Broadcast to Power a LEO Satellite Collective in Alaska", *Authors*: Jennifer Delamere, Jay Cable, Carl Dierking, Owen Larson, Abigail Haas, Christina Buffington, Abigail Haas, Quinn McHenry, Grace Veenstra (Geographic Information Network of Alaska, University of Alaska Fairbanks); Lihang Zhou (NESDIS Office of Low-Earth Orbit).
Abstract: Across Alaska's vast landscape, Low-Earth Orbit (LEO) weather satellite products aren't just a resource—they are a weather lifeline. A specialized system of regional antennas, coupled with computer servers and data distribution platforms, is the primary mechanism through which Alaskans receive satellite data products from NOAA's Joint Polar Satellite System (JPSS) and international partner missions. Colloquially referred to as Alaska Direct-Broadcast (DB), this regional system is more than just a data pipeline from the final frontier to the last frontier. Powered by the Community Satellite Processing Package (CSPP) and hosted at the Geographic Information Network of Alaska (GINA), DB in Alaska is a collaborative ecosystem where the expert community of forecasters and hazard managers can directly shape the satellite products they rely on to help protect life and property, and where the public can find the images they need to assess their spot on the map in the context of the unfolding weather systems that define life in the North.

This presentation will highlight how Alaska DB supports federal agencies, state agencies, and the Alaskan public through the examination of recent weather and wildfire events. By leveraging frequent engagement and shared expertise, we will present examples of how Alaskan stakeholders have identified data challenges and driven localized solutions. We will also discuss how this community's collective voice is shaping the path to Alaska's future, ensuring that the next generation of LEO satellites and products remains responsive to the frontline needs of the North.

3.02: **Li, Sanmei**: "Development of the Global GEO-LEO 3-D Flood Mapping System", *Authors*: Sanmei Li* 1, Marilyn Yuen Murphy2, Satya Kalluri3, Lihang Zhou3, Dan Lindsey4, Mitchell D. Goldberg5, Donglian Sun6 (1. Global Science & Technology Incorporation, MD, USA 2. National Environmental Satellite, Data, and Information Service, NOAA, College Park).

Abstract: Optical satellite imagery has been widely applied in detecting spatial flood extent. In 2022, NOAA (National Oceanic and Atmospheric Administration) declared operational flood products from JPSS (Joint Polar Satellite System)/VIIRS (Visible Infrared Imaging Radiometer Suite) imagery. These products, including a VIIRS near real-time granule flood product, a VIIRS daily composited flood product and a VIIRS 5-day composited flood product, provide flood extent at 375-m spatial resolution covering major global land from 80°S to 80°N. Later in 2024, another operational flood product from GOES-R/ABI (including GOES-16, 17, 18 and 19) was declared to provide near real-time flood extent with the maximal clear-sky coverage during daytime at 1-km spatial resolution in Mainland of America Continent from 50.5°S to 50.5°N. A blended VIIRS/ABI flood product, fusing the VIIRS 375-m flood extent and 1-km ABI flood extent together and thus inheriting the advantages of both VIIRS and ABI flood products, becomes operationally available in 2025 with the same spatial coverage as ABI flood products. All these products, available on the website: https://www.ssec.wisc.edu/flood-map-demo/flood-products/ and https://noaa-jpss.s3.amazonaws.com/index.html#JPSS_Blended_Products/, play significant roles in global/regional near real-time flood mapping with reliable quality and good time manners for the user community.

However, one issue with these flood products is that they only provide horizontal flood extent at coarse-to-moderate spatial resolution from 1km to 375m. Flood operations require more detailed inundation information for flood investigation and disaster mitigation. With the development of a downscaling model, the VIIRS 375-m floodwater fraction products have been applied to produce VIIRS 3-D flood products including a VIIRS 30-m floodwater depth product and a 375-m floodwater surface level product along with the Copernicus Digital Surface Model (CDSM), tree cover and watershed data. Different to the original VIIRS 375-m flood products, which only provide 2-D spatial distribution of flood extent at 375-m spatial resolution, the 3-D flood products not only provide flood extent at 30-m resolution but also show the vertical distribution of floodwater. Recently, new research has also proved of a high feasibility to derive 3-D flood products from the ABI 1-km flood product with similar quality to the VIIRS 3-D flood products. Validation on these downscaled 30-m floodwater depth products using a large amount of high-resolution satellite images from Landsat-8&9/OLI and Sentinel-2 indicates an average accuracy above 85%, which meets the requirements on flood investigation for flood operations.

The reliable flood detection and downscaling algorithms show a strong flexibility to be adjusted to other optical satellite imagery similar with VIIRS and ABI imagery. Successful experiments include flood detection with Himawari-8&9/AHI imagery and Sentinel-3/SLSTR imagery based on similar algorithms. NOAA has been hosting a Himawari-8&9/AHI 1-km flood product since 2020 and a Sentinel-3A/SLSTR 500-m flood product since 2022 through SSEC/CIMSS and these products are also available in SSEC's Real Earth.

With these capabilities, it is highly possible to construct a global GEO-LEO 3-D flood mapping system which can be used to produce multiple-scale flood products horizontally and vertically. With global LEO flood products from JPSS/VIIRS and Sentinel-3/SLSTR as the base products, GEO flood products from GOES-R/ABI, Himawari-8&9/AHI, MTG/FCI and other similar GEO satellite imagery can be used to fill the gaps of clouds and cloud shadows in the global LEO flood products. The blended results can provide global flood extent at 375-m spatial resolution for near real-time large-scale flood monitoring. The LEO and GEO flood products can be further downscaled to derive 30-m floodwater depth products, respectively, and then combined to get a blended GEO-LEO 30-m floodwater depth products with the maximal clear-sky coverage for near real-time small-scale flood monitoring. Additionally, NOAA flood team is also conducting research and development on global SAR flood products from Sentine-1 and Radarsat. These products can be merged with either the 375-m blended GEO-LEO flood product or the 30-m GEO-LEO floodwater depth product for flood mapping under cloud/cloud shadows. Such 3-D GEO-LEO flood mapping system, providing flood products with daily global coverage and capturing the maximal clear-sky coverage during daytime, assures powerful capabilities for global flood mapping in near real time to benefit the user community.

3.03: **Schumacher, Douglas**: “LEO Products for NWS Pacific and Alaska Regions”.

3.04: **Flynn, Bruce**: “Ultra-low Latency Fires”, *Author*: Bruce Flynn (SSEC).
Abstract: I will present on our Ultra-low Latency Fires (ULL) system that delivers Aqua, SNPP, NOAA 20, and NOAA21 fire location data to NASA Fire Information for Resource Management System (FIRMS) within 60 seconds.

3.05: **Pfantz, Levi**: “A Practical Introduction to LightningCast”, *Author*: Levi Pfantz (SSEC).
Abstract: LightningCast is a cutting-edge scientific tool and AI nowcast model for lightning prediction and one of the more recent packages to be part of the Community Satellite Processing Package for Geostationary Data (CSPP-Geo). LightningCast predicts the next-hour likelihood of a GLM observation of lightning using publicly accessible GOES ABI or Himawari AHI data. This talk will showcase the utility of the package, with practical usage examples for LightningCast's major features and equip the attender to quickly start generating images and scientific data for the benefit of their research or organization.

3.06: **Uttmark, Gwyn**: “Courier: Event-Driven Orchestration for Near Real-Time Data Processing”, *Authors*: Gwyn Uttmark, Evan Rose, Jeremy Solbrig, Jim Fluke, John M. Haynes, Yoo-Jeong Noh, Steven D. Miller (Cooperative Institute for Research in the Atmosphere, Colorado State University).
Abstract: Operational satellite processing depends as much on software as on science. Files must be detected as they land on disk, grouped into observation sets, and dispatched to process the moment a set is complete. The gap between data arrival and scientific processing is where many groups get stuck, especially when ingesting from several instruments at once, each with its own cadence, naming scheme, and rules for what constitutes a complete scene. In practice, many installations are a menagerie of shell scripts and cron jobs that nobody wants to disturb, let alone port to a new machine or cluster.

Courier is a plugin-based orchestration framework that feeds downstream processors such as the Geolocated Information Processing System (GeoIPS). In this system, three kinds of plugins talk to one another through a message broker: monitors watch for new files and emit events, builders consume those events and assemble complete observation jobs under YAML-configured idempotent rules, and dispatchers run jobs. Because the stages communicate only by event and are appropriately idempotent, they can be scaled and distributed independently. Courier enforces a Python protocol for inter-plugin communication, so a filesystem watcher can be replaced with a RabbitMQ consumer, or a subprocess dispatcher with a SLURM dispatcher, without changes elsewhere in the pipeline. Local bash and SLURM dispatchers are in use today and a GeoIPS dispatcher is in development for GeoIPS 2.0.

The broker layer uses Kombu, which gives users AMQP, Redis, MongoDB, SQS, Zookeeper, and an in-memory backends to choose from. The in-memory option is enough for a single machine with low throughput (e.g. a field campaign or a researcher running a single receiver). For when operational centers need to distribute jobs to achieve desired throughput and redundancy, AMQP or Redis deployments can scale deployments to clustered computing. Every plugin exports Prometheus metrics and a health endpoint by default with built-in machinery, and structured logs carry correlation IDs that follows files and associated metadata from arrival through final product for provenance traceability. In addition, Loki and Grafana hooks are available for sites that want centralized monitoring. We ship YAML configurations for common geostationary instruments (such as ABI on GOES-16/18/19, AHI on Himawari-9, AMI on GK-2A, and SEVIRI on Meteosat) to help with job grouping and metadata extraction.
Courier is in beta at CIRA, where it supports OVERCAST, a project generating near real-time global 3D cloud fields. It is being developed alongside the new Level 0 capabilities in GeoIPS as well as a custom built HRIT receiver for near real time testing of an open-source path from raw RF capture to science-ready product.

3.07: **Hindenes, Tom**: “MEOS™ Polar with integrated CSPP SDR and other processing packages”, *Author*: Tom Hindenes (Kongsberg).
Abstract: KONGSBERG's MEOS™ Polar Ground Station is a complete turnkey system for acquisition, processing, and distribution of Meteorological data from Direct Broadcast EOS satellites. In addition to antenna control and data reception, it integrates several third-party processing packages in a single system.

3.08: **Cureton, Geoff**: “OMPS Level 2 Ozone and Sulfur Dioxide Products in CSPP LEO”, *Authors*: Geoff Cureton (CIMSS/SSEC); David Hoese (CIMSS/CSPP).
Abstract: This presentation will give updates on the CSPP SNPP/NOAA-20/NOAA-21 VIIRS I-Band Flood Detection Package, and the CSPP VIIRS/ABI Blended Flood Mapping Package. Both packages are based on the NOAA Blended VIIRS/ABI Flood Mapping Product.

3.09: **Dove-Robinson, Harry**: “Community GOES-R Image Processing with heregoes”, *Authors*: Harry Dove-Robinson (Weatherstar Technologies).
Abstract: heregoes is an open source Python library for GOES-R imagery. Originally developed for the real-time stream of Here GOES Radiotelescope, a community GRB receive station in upstate New York, heregoes has seen production use at UW-Madison SSEC and beyond. With support for both L1b and L2 operational netCDF products, heregoes can be used in concert with other real-time applications like CSPP Geo GRB and AIT. We consider heregoes for low-latency product development, analysis, and visualization, demonstrating software features matured out of our ground station testbed. Capabilities discussed will include SUVI RGB, ABI geolocation correction, orthorectification, and spatial resampling of ABI and ancillary datasets.
https://github.com/heregoesradio/heregoes
https://heregoesradio.com/images.html

3.10: **Diop, Bouya**: "Characterization of Natural Regions in Guinea Using ATOVS Data", *Authors*: Thierno Hamidou Barry1, younouss Biaye2,Abdoulaye Bouya DIOP2, Bara Ndiaye2 ,Abdou Karim Farota2,3, Bouya Diop1,2.

Abstract: The regions of Guinea remain among the most sensitive to climate fluctuations due to their strong dependence on seasonal rainfall and the fragility of their ecosystems. With the anthropogenic activities of recent decades, Guinea is experiencing a rainfall deficit and degradation of vegetation cover, jeopardizing food security, water availability, and the livelihoods of the population. This study examines Guinean climate evolution over the period 1992–2025 using satellite microwave observations, which constitute the only data source capable of providing continuous, homogeneous series, independent of cloud cover and sensitive to both surface properties and atmospheric processes. Two complementary classes of instruments are used. Microwave imagers (SSM/I, SSMIS), integrated into homogenized climate records, utilize the 19–37 GHz frequencies, whose polarization differential (ΔTB = TBV – TBH) provides a robust indicator of soil moisture, roughness, and plant biomass. In parallel, ATOVS atmospheric sounders (AMSU-B and MHS), using the 85–89 GHz and 183±7 GHz channels, allow for the characterization of deep tropospheric water vapor, convective intensity, and conditions favorable to rainfall or drought events. The combined analysis of these different sensors reveals particularly marked east-west and north-south spatial gradients, as well as a clear interregional heterogeneity between the natural regions of Guinea (Lower Guinea, Middle Guinea, Upper Guinea, and Forest Guinea).

Keywords: Atmospheric sounders, ATOVS, Guinean natural regions, Humidity, Vegetation

Poster Presentations

P.1: **Flynn, Bruce**: "Antenna Control System: A New Antenna Controller for Direct Broadcast Satellite Data Reception", *Authors*: Bruce Flynn, Liam Gumley (SSEC).

Abstract: I will be introducing Antenna Control System (ACS), a new system for orchestrating receiving station antenna hardware and software for the reliable reception, decoding, and delivery of satellite data.

P.2: **Gumley, Liam**: "CSPP LEO: Overview and Capabilities", *Authors*: Liam Gumley, Kathy Strabala, Geoff Cureton, Matthew Odle, Thomas Rink, Jessica Braun, Graeme Martin, Allen Huang (SSEC).

Abstract: This briefing will present an overview of the CSPP LEO software suite and highlight current capabilities and features for supported sensors and products.

P.3: **Odle, Matthew**: "Digital Archaeology & Automated Architecture: Modernizing Legacy Satellite Pipelines with AI Chatbots", *Author*: Matthew Odle (SSEC).

Abstract: AI-assisted development can be a powerful force multiplier in managing complex, legacy, and data-intensive codebases. By leveraging chatbots as digital archaeologists and automated architects, teams can modernize systems while ensuring they remain human-readable and maintainable.

P.4: **Piyush, Durgesh Nandan**: "Validation of IASI Level 2 Temperature and Humidity Profiles Using Radiosonde Observations over India", *Authors*: Durgesh Nandan Piyush, S Indira Rani, John P George, and V S Prasad (National Centre for Medium Range Weather Forecasting, Ministry of Earth Science, Noida, India, 201309).

Abstract: India operates approximately 50 radiosonde stations, routinely launching observations at 00 and 12 UTC, providing high-quality vertical profiles of atmospheric temperature, relative humidity, and wind at multiple pressure levels. In this study, these radiosonde observations are used as a reference to evaluate the performance of temperature and humidity profiles retrieved from the Infrared Atmospheric Sounding Interferometer (IASI) Level 2 products. IASI is a high-spectral-resolution sounder onboard the MetOp series of polar-orbiting satellites (MetOp-B and MetOp-C), operated by EUMETSAT. It measures Earth-emitted thermal infrared radiances across a broad spectral range (645-2760 cm^{-1}) with a spectral resolution of 0.5 cm^{-1}. The Level 2 retrievals are generated using optimal estimation techniques, combining observed radiances with prior atmospheric information to derive vertical profiles of temperature and humidity at predefined pressure levels under clear-sky conditions. The vertical resolution of the retrieved profiles is typically ~1-2 km in the troposphere, with reported accuracies of about 1 K for temperature and ~10% for relative humidity per 1 km layer under clear-sky conditions. The retrieval quality is influenced by cloud contamination, surface emissivity, and atmospheric variability, particularly in the lower troposphere. To enhance temporal coverage, additional radiosonde observations at 06 and 18 UTC are incorporated from the CAIPEX experiment at Solapur and the Atmospheric Research Testbed (ART) facility of the Indian Institute of Tropical Meteorology (IITM) at Bhopal. These high-resolution observations provide an independent and reliable benchmark for assessing satellite retrieval performance.

The analysis focuses on two months of 2025, August and December, representing contrasting atmospheric conditions over the Indian region. August is characterized by strong moisture gradients and deep convection associated with the southwest monsoon, while December features relatively dry, stable conditions. Collocated IASI and radiosonde profiles are used for systematic validation, quantifying biases, root-mean-square errors, and vertical structure differences in temperature and relative humidity. The results provide insights into the reliability of IASI retrievals under varying atmospheric conditions and their suitability for applications in numerical weather prediction and data assimilation.

P.5: **Uttmark, Gwyn**: “GeoIPS: Extending an Open-Source Geolocated Data Framework into Level 0 Processing”, *Authors*: Gwyn Uttmark, Jeremy Solbrig, Evan Rose, Kumar Gampa, Jairo Moreno, Coleman McClelland (CIRA/CSU); Christopher Selman (NRL Marine Meteorology); Melinda Surratt, Christopher P. Camacho, Andrew Thorpe, Lance Wilson, Lauren Porter (NRL Remote Sensing).

Abstract: The Geolocated Information Processing System (GeoIPS) is an open-source Python framework for scientific research and analysis of geolocated data, developed cooperatively by CIRA at Colorado State University and the U.S. Naval Research Laboratory. Originally built to support operational requirements for the U.S. Navy, GeoIPS provides a modular, plugin-based architecture that integrates multiple data sources, algorithms, and output formats. It natively supports a wide range of satellite sensors (including instruments aboard JPSS, EOS, EPS, GOES, MTG, Himawari, and GEO-KOMPSAT platforms), model outputs, and observational datasets used in atmospheric, oceanic, and terrestrial research. Its plugin design lets researchers extend functionality with new readers, algorithms, and writers, while its emphasis on reproducible workflows ensures processing chains are easily documented, shared, and replicated. GeoIPS is in operations at NRL Monterey and at CIRA. At CIRA it is orchestrated using LazyLemon to support OVERCAST, a project generating near real-time global 3D cloud fields.

To date, GeoIPS has operated primarily on Level 1 and Level 2 (SDR/EDR) data, requiring users to acquire pre-processed inputs. We present ongoing work extending GeoIPS upstream into Level 0 processing, enabling ingestion of raw bitstream data from satellite direct broadcast

downlinks. This targets the growing community of users receiving over-the-air transmissions who seek an open-source option from antenna to finished product. The pipeline performs frame synchronization and CCSDS packet extraction to produce Level 0 data, then applies geolocation and radiometric calibration to yield Level 1 products ready for GeoIPS's full processing chain. Our development has focused on legacy standards including GVAR, HRIT, and AHRPT, but we anticipate supporting modern formats such as GRB and future missions including GeoXO, NEON, and EPS-Sterna.

To support development and testing, CIRA is building a local HRIT receiver that will serve as both an end-to-end validation platform for the Level 0 pipeline and a reference deployment for users assembling their own direct readout systems. We are interested in the possibility wrapping other software that natively handles Level 0 data in our efforts to provide an open-source path from raw downlink to ready products.

P.6: **Yoerger, Geoff**: “A Novel Mechanism for Managed Egress and Privileged Access in Meteorological Data Distribution”, *Authors*: Geoff Yoerger, David Parker, Jerrold Robaidek (SSEC).
Abstract: While meteorological data distribution has evolved significantly over the past five decades, managing access to privileged resources remains a challenge. Specifically, rigorous access control and data accounting are essential for monitoring egress among authorized users. This poster presents a novel data distribution architecture that couples a high-performance proxy with an internal API service to strictly enforce access control and fully account for all data requests. To provide full functionality, the system utilizes a public API component—accessible via an interactive web interface—that handles user registration, administration, and dynamic features while sharing state with the high-throughput internal API. Secured by OAuth 2.0-compliant authentication, the mechanism generates authorization tokens that allow for both seamless browser-based access and robust integration with API and CLI tools. Furthermore, this architecture extends beyond standard file distribution to support dynamic HTTP services, such as tile services for web map consumers. We demonstrate the efficacy of this approach using the University of Wisconsin-Madison Space Science and Engineering Center (UW SSEC) Satellite Data Services (SDS) Data Exchange as a primary operational use case.

P.7: **Jacobsohn, Jeremy**: “Ancillary Data Services for IPOPP and Simulcast”, *Authors*: Jeremy Jacobsohn and Starry Manoharan (NASA, USA).