STAR/JPSS workshop on Artificial Intelligence (AI) and Machine Learning (ML) for Calibration, Validation and Algorithm Innovation

Date and Time: September 15, 2025, 10:00 AM to 4:00 PM EDT
Venue: NCWCP College Park, MD. Conference Rooms A,B&C (across from the Auditorium)
Participation: In-person and virtual attendance available

You are cordially invited to attend the STAR/JPSS Workshop on ***Calibration, Validation and Algorithm Innovation with Artificial Intelligence and Machine Learning***, co-hosted by STAR, JPSS and NOAA Center for AI (NCAI). This workshop is a part of annual NOAA AI Workshop Series (https://www.noaa.gov/ai/events), dedicated to advancing the use of AI/ML in satellite-based Earth observations -particularly in the area of sensor calibration/ validation (cal/val) and environmental data product development. The event aims to bring together experts, researchers, and practitioners to foster collaboration around applied AI/ML research, with a focus on transitioning innovative solutions into operational applications supporting NOAA's mission -especially in Numerical Weather Prediction and Environmental Monitoring.

Workshop Overview:

- Morning Session:
  Focuses on applications of AI/ML for satellite sensor calibration and validation, with emphasis on improving data quality, and efficiency for numerical weather forecasting and environmental prediction models.

- Afternoon Session:
  Highlights selected environmental data record (EDR) products developed using AI/ML techniques applied to satellite observations.

Workshop Objectives:

- Accelerate, optimize and enhance post-launch satellite calibration and validation (cal/val) by leveraging state-of-the-art AI/ML approaches, enabling more timely and accurate observations crucial for advanced weather forecasting and environmental monitoring
- Identify and outline specific AI/ML applications that can be incorporated into STAR's routine/operational cal/val processes.
- Advance and Improve the accuracy and efficiency of satellite sensor cal/val by integrating AI/ML with diverse data sources, including:
    - Numerical Weather Prediction models
    - Inter-satellite and inter-sensor calibration
    - Data fusion techniques

    - Radiative transfer models
    - In situ and other observational datasets
- Foster collaboration and knowledge exchange by providing the platform for sharing the latest progress, addressing current technical challenges, and charting the future directions for AI/ML in satellite calibration and validation.
- Promote Research-to-Operations (R2O) readiness by proposing AI/ML models suitable for operational use and outlining standard procedures for robust model development, training, validation and implementation in environmental data systems/ products.

We look forward to your participation in this important discussion on integrating AI/ML into satellite observation systems to optimize and enhance NOAA's environmental monitoring and prediction capabilities with improved environmental intelligence.

Morning Session (10:00 AM - 12:30 PM EDT):

1. Welcome & Opening Remarks

- Introduction by NOAA/NESDIS/STAR team (Ingrid Guch).
    - Overview of workshop objectives, agenda, and logistics
- Opening Remarks:
    - Invited Leadership
        - Victor Grycenkov (LEO NOAA Deputy Director)
    - NCAI (Rob Redmon)
    - STAR leadership (Kristen Tronvig/Paul Digiacomo)
        - Workshop Highlights

2. Advancing satellite sensor calibration/validation with AI/ML for numerical weather prediction and nowcasting (20 mins talk+4 mins discussion) Session Chair: Lihang Zhou

1. Advancing operational microwave sounder calibration/validation and data quality assurance with AI/ML, weather model data, and CRTM (Changyong Cao)

2. AI-Enabled calibration, validation, and data exploitation of emerging microwave sounders: a NOAA perspective (Flavio Iturbide-Sanchez)

3. Accelerating the direct radiance assimilation of OMPS for NWP using AI/ML (Banghua Yan)

4. Exploring the use of AI/ML to accelerate the use of commercial radio occultation data for NWP (William Miller)

5. AI-RTM Inference Algorithm with Jacobian Computation under Clear-Sky Conditions (Xingming Liang)

Morning session wrap up

3. Lunch Break Coffee/Poster Break (12:30 PM - 1:30 PM)

Afternoon Session (1:30 PM - 4:00 PM EDT):

4. AI/ML uses cases for Environmental Data Record products (Chair:Changyong Cao)

1. Trustworthy ML CRTM Emulators with Physics Guardrails for Cal/Val and DA (Benjamin Johnson)
2. Prithvi: Advancing Earth Science with AI Foundation Models (Manil Maskey, Manager, Office of Data Science and Informatics, Science and Technology Office, Marshall Space Flight Center, NASA) 30 mins talk, 10 mins discussion
3. Next Generation Fire System (Michael Pavolonis)
4. Tropical Cyclone Formation Probability (Christopher Slocum)
5. Enhance HRRR model heavy precipitation using satellite observation and machine learning (Huan Meng)

5. Closing Remarks & Next Steps

- Interactive Q&A to identify key takeaways
- Vision for continued engagement and collaboration
- Opportunities for future working groups and research initiatives
- Workshop report