



U. S. Atmosphere Observing System (AOS) Status

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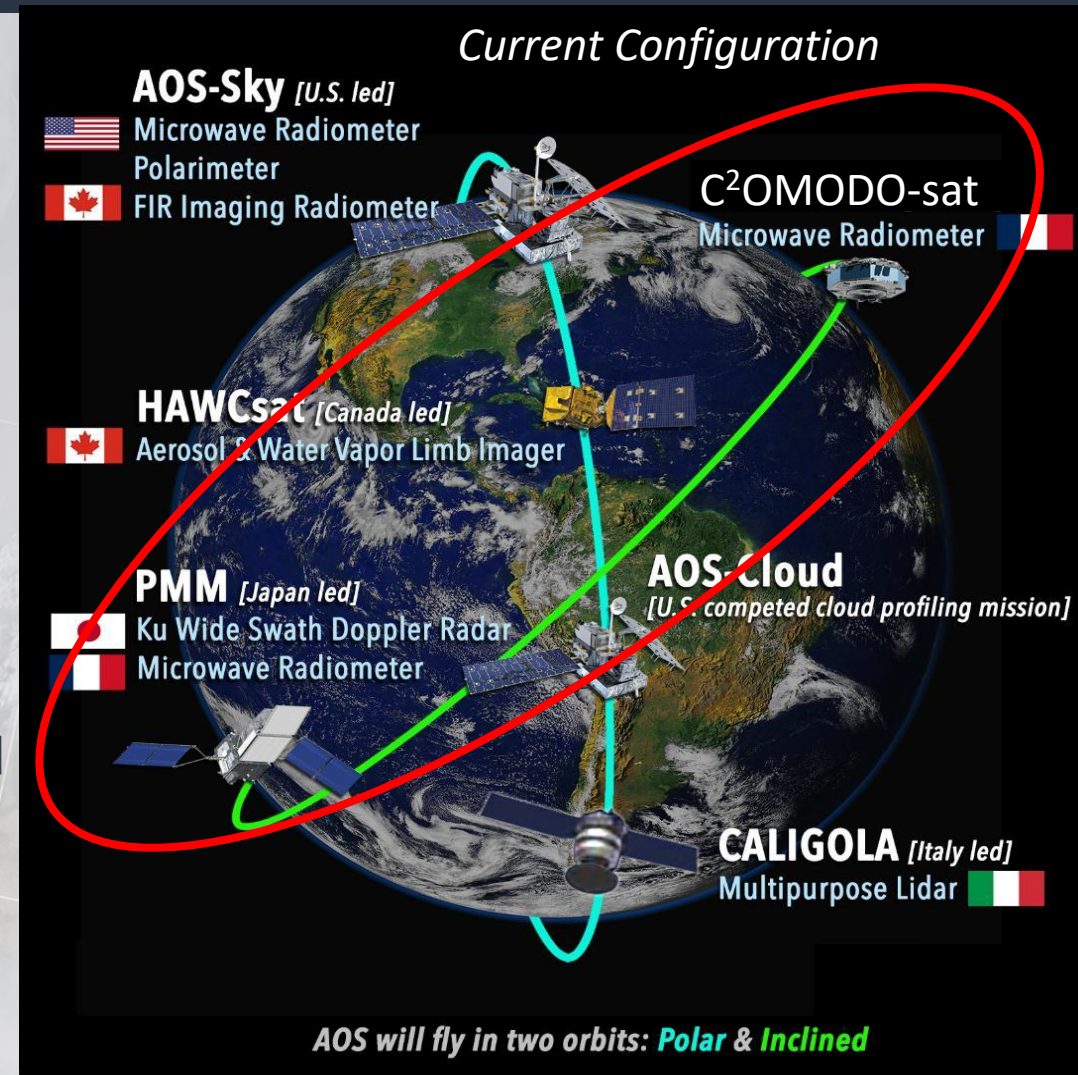
Joint PI Meeting of JAXA Earth
Observations Missions—GPM/AOS
Meeting
November 19, 2024



Current AOS and Partner Architectures

AOS Storm

- Two satellites in 55° inclined orbit
- JAXA provided Precipitation Measurement Mission satellite with Ku-band Doppler Radar
- CNES provided tandem radiometers (C²OMODOR) as C²OMODO* mission
- NASA providing spacecraft for CNES and launch
- Moving toward Mission Concept Review February 12 and KDP-A Review in early April (to be confirmed)



Graphic reflects current architecture concept

*Convective Core Observations through MicrOwave Derivatives in the trOpics

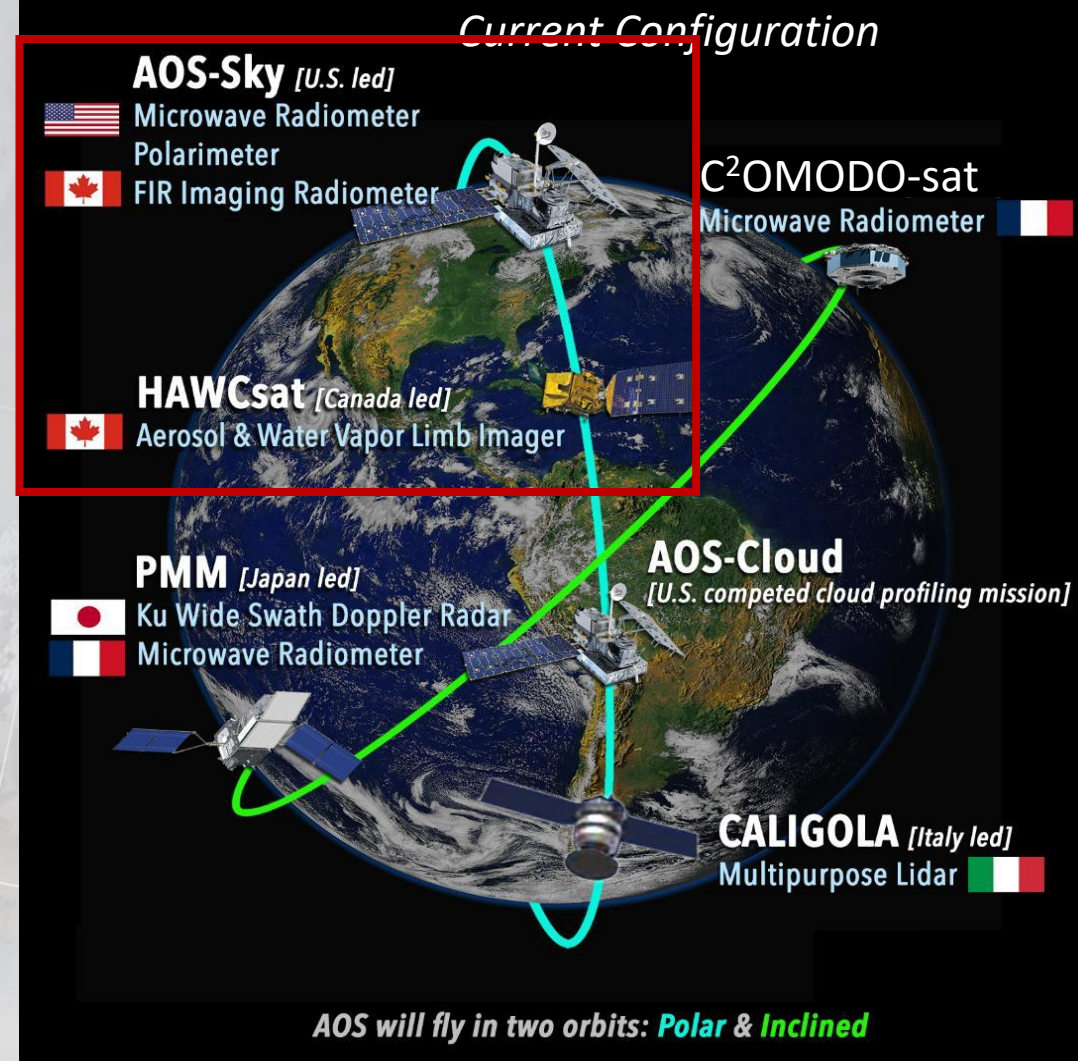
Current AOS and Partner Architectures

AOS Sky

- Polar, sun-synch. orbit, 01:30 Equatorial crossing time
- Multi-wavelength (UV, VIS, SWIR), multi-angle polarimeter
- High-frequency passive microwave radiometer (89-700 GHz)
- Canadian Space Agency Thin Ice Cloud in Far InfraRed Emissions (TICFIRE) instrument
- Baseline is NASA's intent but final decisions are pending FY25 appropriations and the FY26 Budget Request

HAWCsat

- Aerosol Limb Imager (ALI)
- Spatial Heterodyne Observations of Water (SHOW) moisture limb imager



Graphic reflects current architecture concept

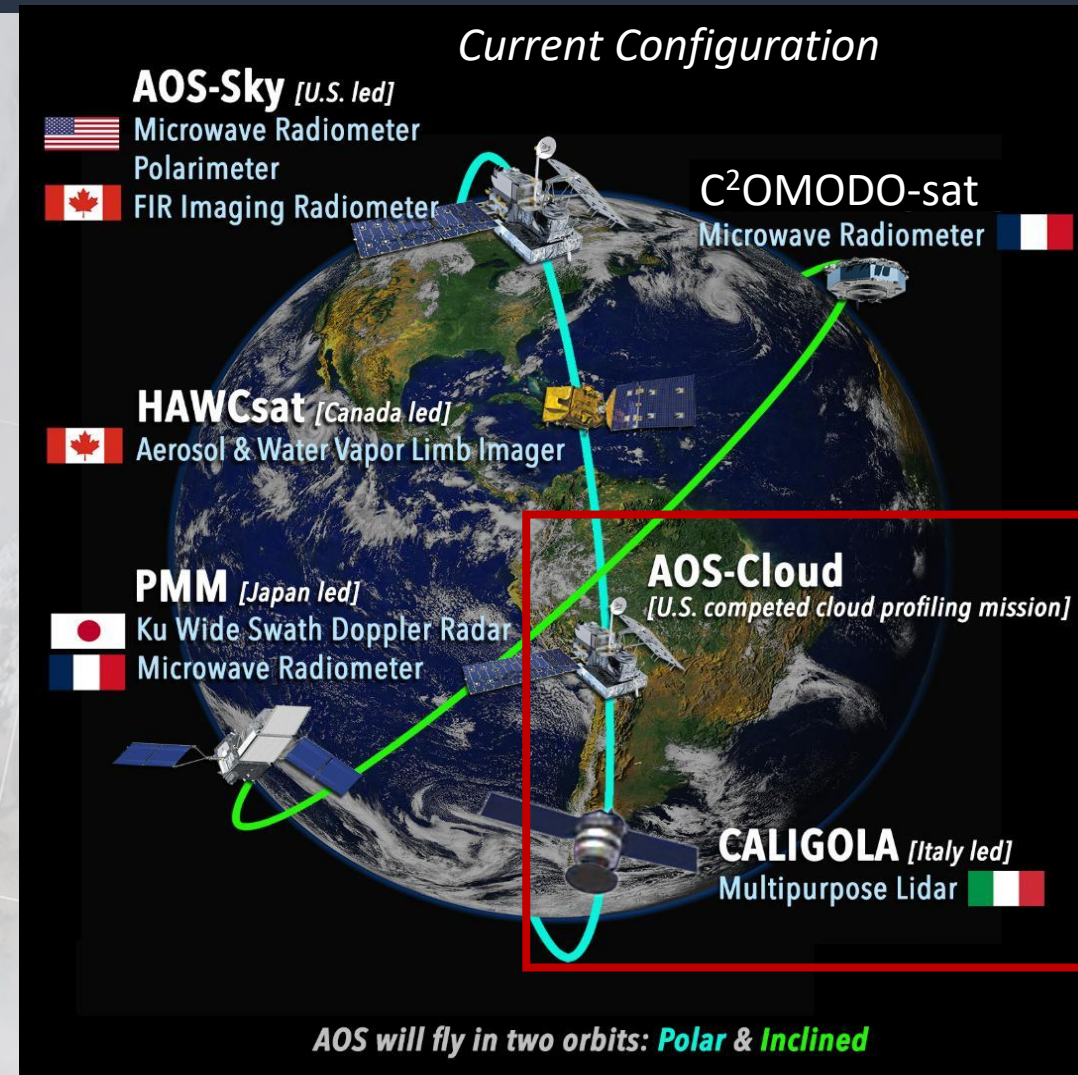
Current AOS and Partner Architectures

CALIGOLA

- CALIGOLA: Italian Space Agency (ASI) lidar in partnership with NASA
 - ASI instrument and spacecraft
 - NASA provided detectors and downlink capabilities
- 8-channel, 3-wavelength (355, 532, 1064 nm) lidar for aerosol, cloud and ocean measurements
- Recently completed equivalent of MCR, planning KDP-A as early as November

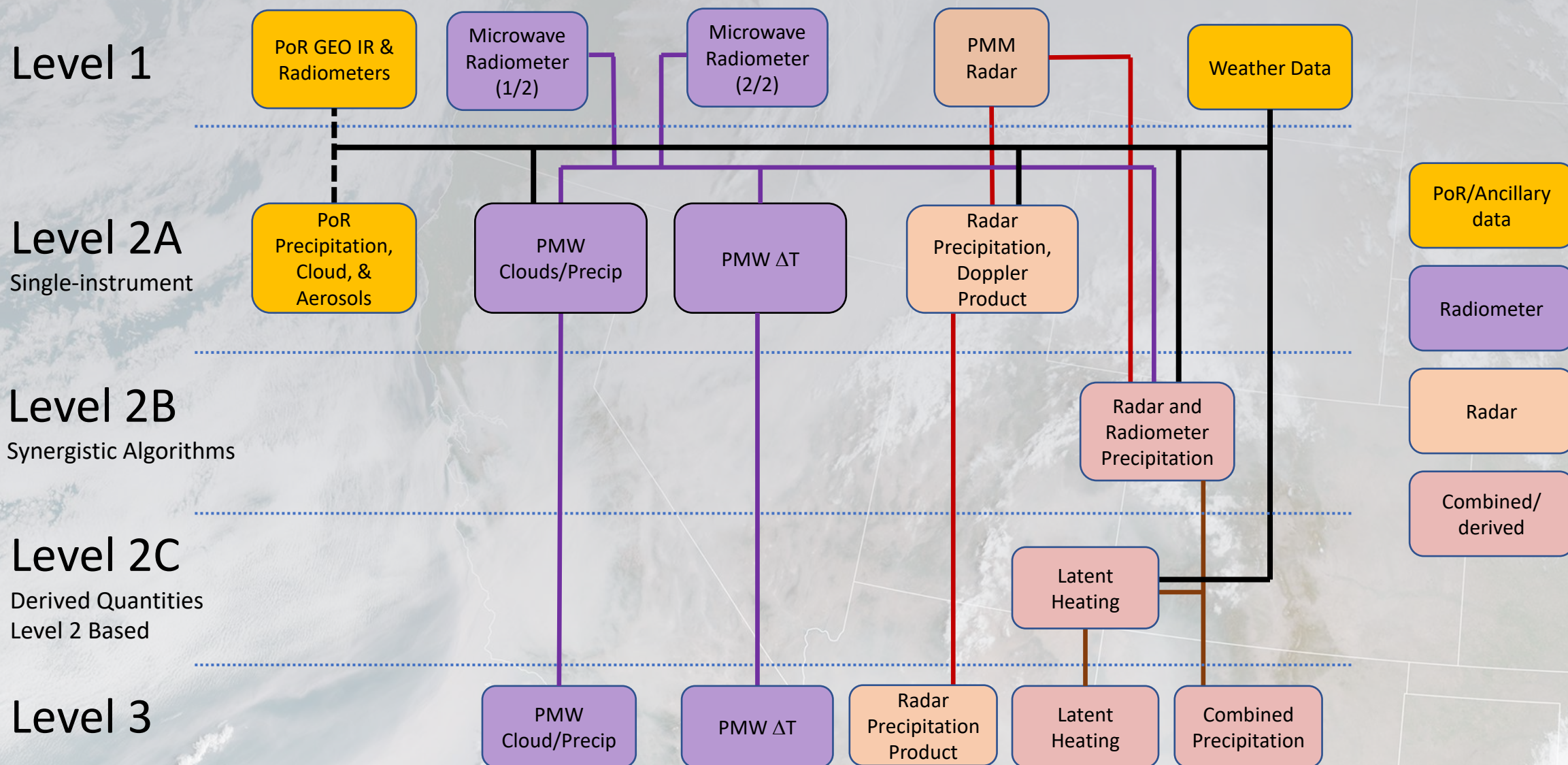
AOS Cloud

- Announcement of Opportunity (AO) for PI-led cloud profiling mission
- AO release anticipated in FY25

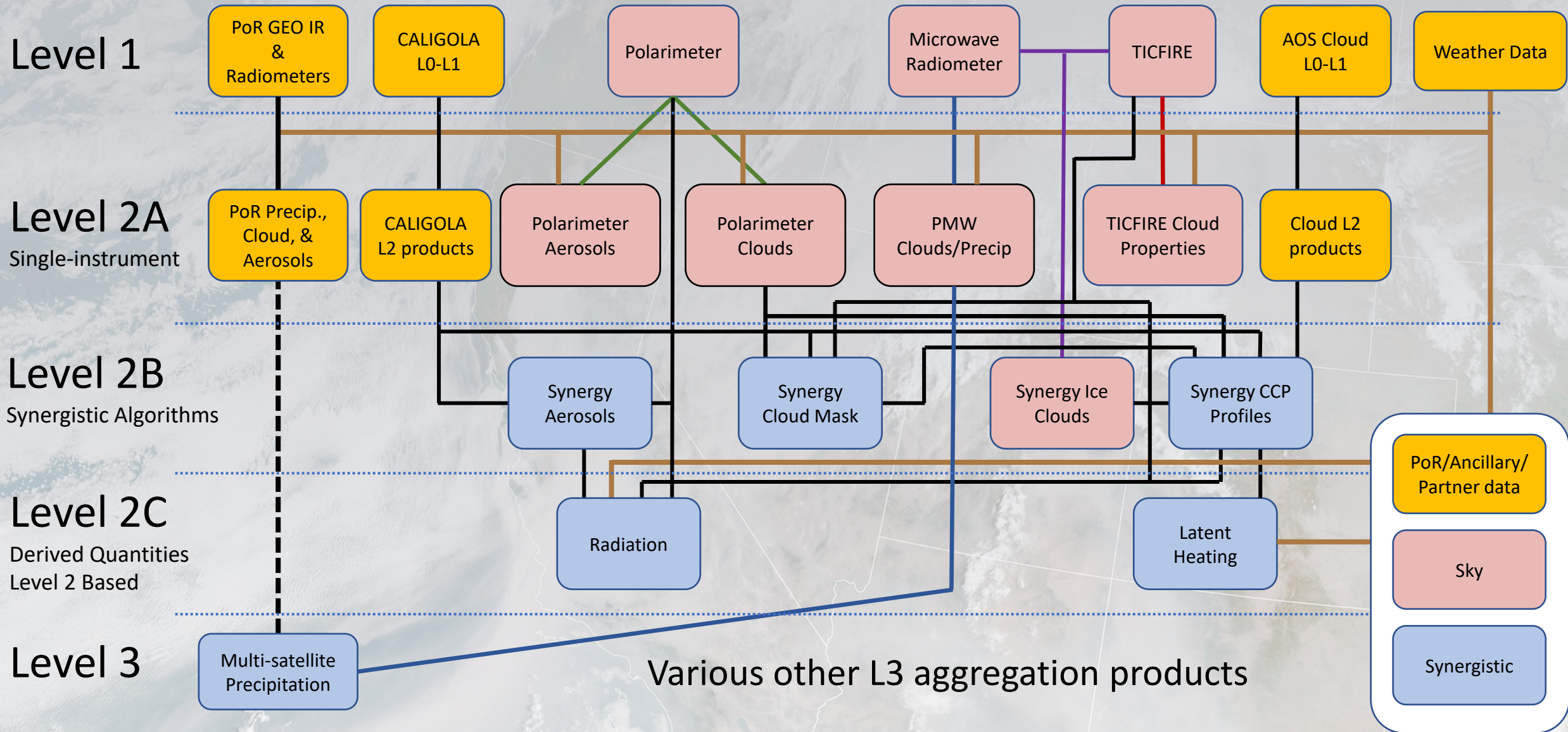


Graphic reflects current architecture concept

Anticipated AOS Storm Products



Anticipated Sky & Synergistic Products



Airborne Campaign Concepts

Low Clouds: *Microphysics, precipitation initiation*

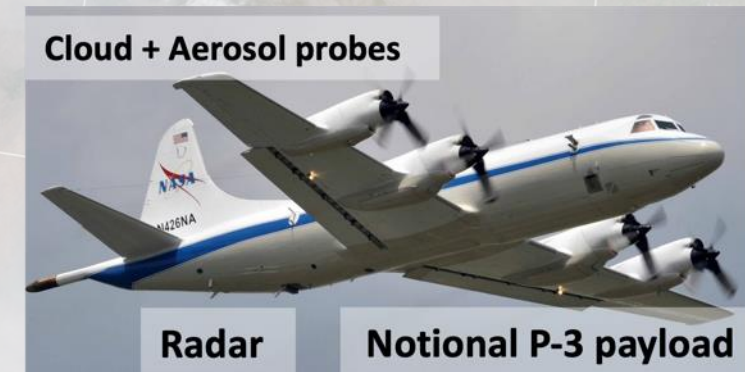
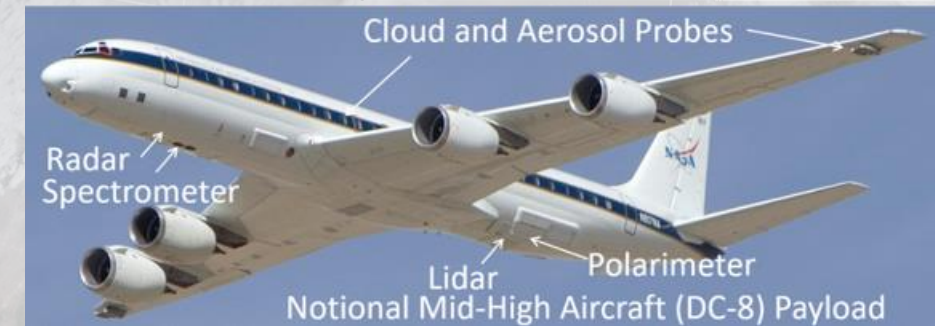
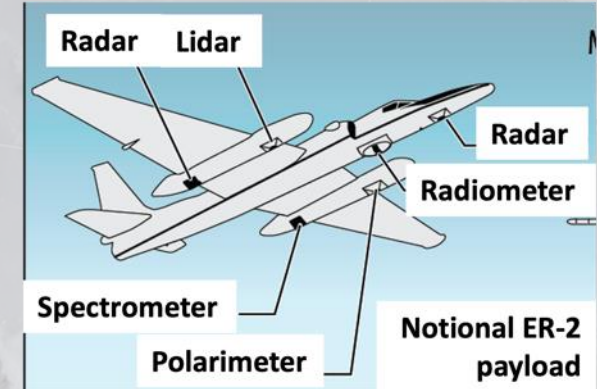
Convection/High Clouds: *Microphysics and dynamics, anvil cirrus lifecycle.*

Aerosol-Cloud-Radiation Interactions:
Vertically resolved aerosol-cloud-radiation interaction processes and lifecycle.

May include large post-launch campaigns and smaller pre-launch campaigns

**EARTH
SYSTEM
OBSERVATORY**

Payloads depicted are notional... instruments to be prioritized / deconflicted for each campaign



AOS Storm L1 Program Level Requirements

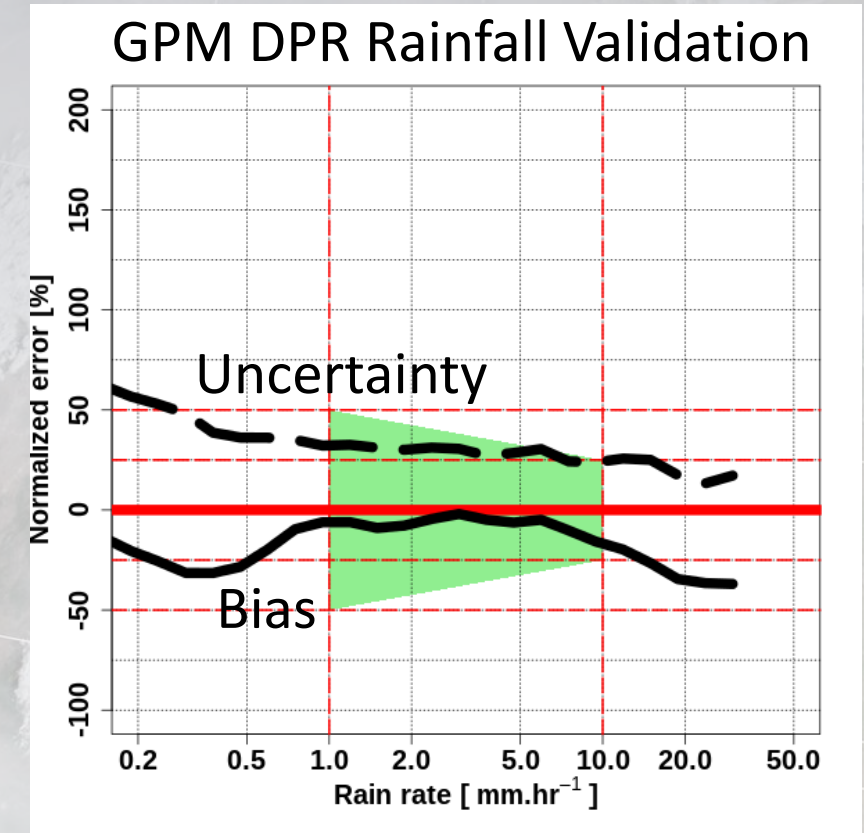
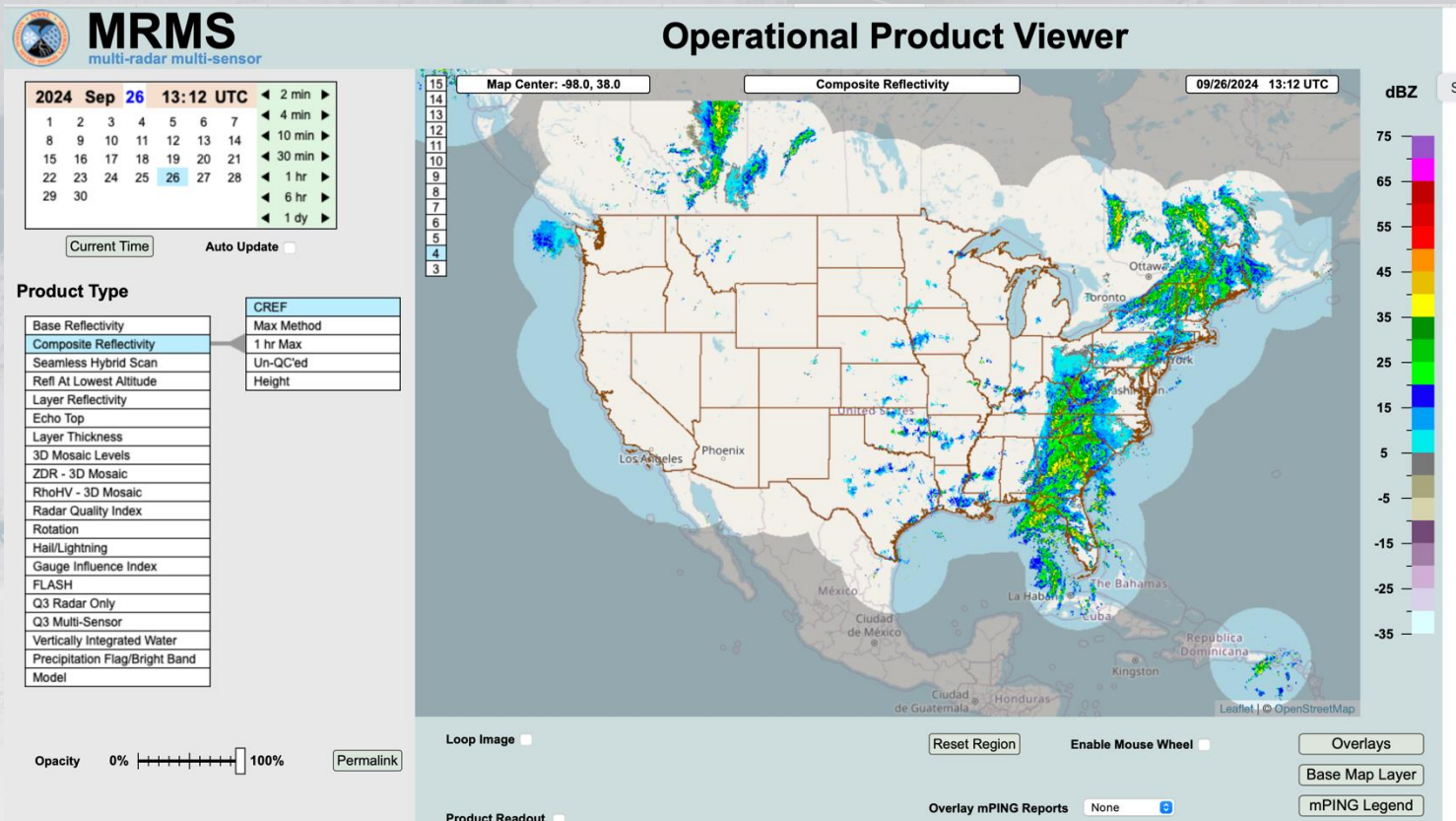


Geophysical Variables	Baseline Capability Range and Uncertainty	Averaging spatial Scale for Uncertainty	Notional NASA Validation Approach
Precipitation rate profile	0.5 to 100 mm h ⁻¹ with a 2- σ random error and bias of 50%/25% at 1/10 mm h ⁻¹ measured at the surface	50 km	Comparison of KuDPR rain rates to ground radar network data (MRMS)
Precipitation particle vertical velocity profile	Range ± 2 -30 m s ⁻¹ with a 1- σ random error of the larger of 2 m s ⁻¹ or 30%	Footprint	Comparisons to airborne Ku-band Doppler radar
Ice water path (IWP) and time rate of change	0.2 < IWP < 40 [TBC] kg m ⁻² within a 1- σ random error of 100% over swath	Footprint	Comparisons to airborne Ku, Ka, W band radar, passive microwave, and lidar

AOS Storm CAL/VAL



- Precipitation validation following GPM using MRMS radar data
 - MRMS=Multi-Radar, Multi-Sensor



AOS Storm CAL/VAL

- Doppler motion, IWP validation using airborne data
 - Ku-Ka, W band Doppler radars (HIWRAP, CRS, APR-3)
 - Lidar (CPL)
 - Microwave radiometer (COSMIR, COSSIR, AMPR)
 - Short flights under AOS Storm overpasses

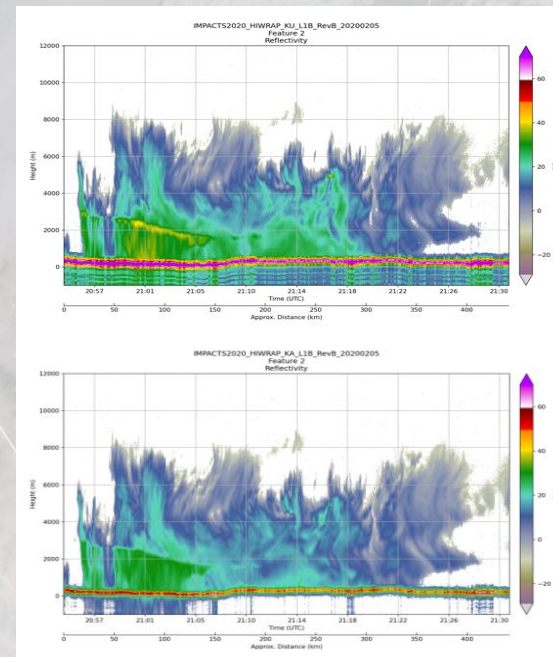
ER-2



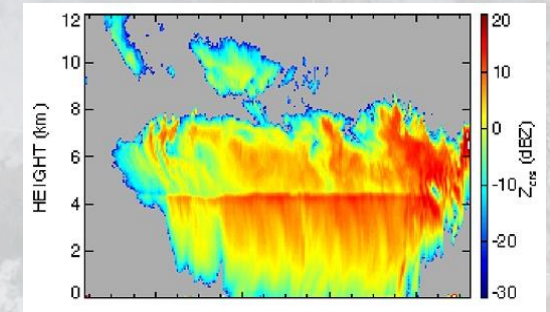
WB-57



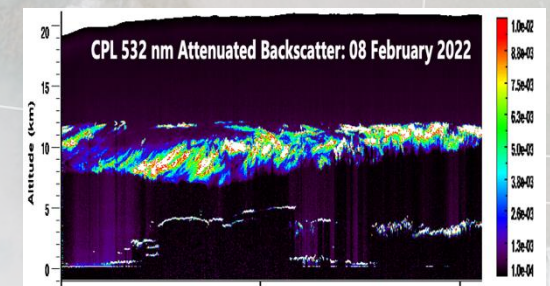
HIWRAP Ku, Ka band



CRS W band

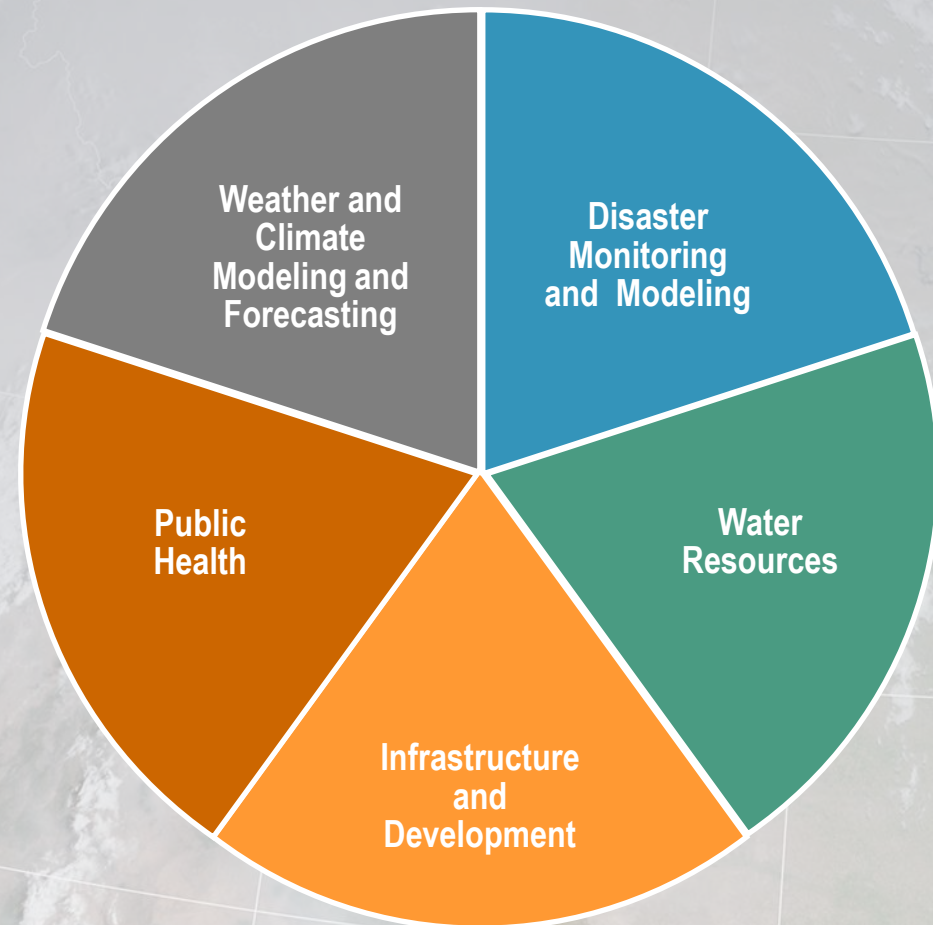


CPL Lidar



AOS Applications

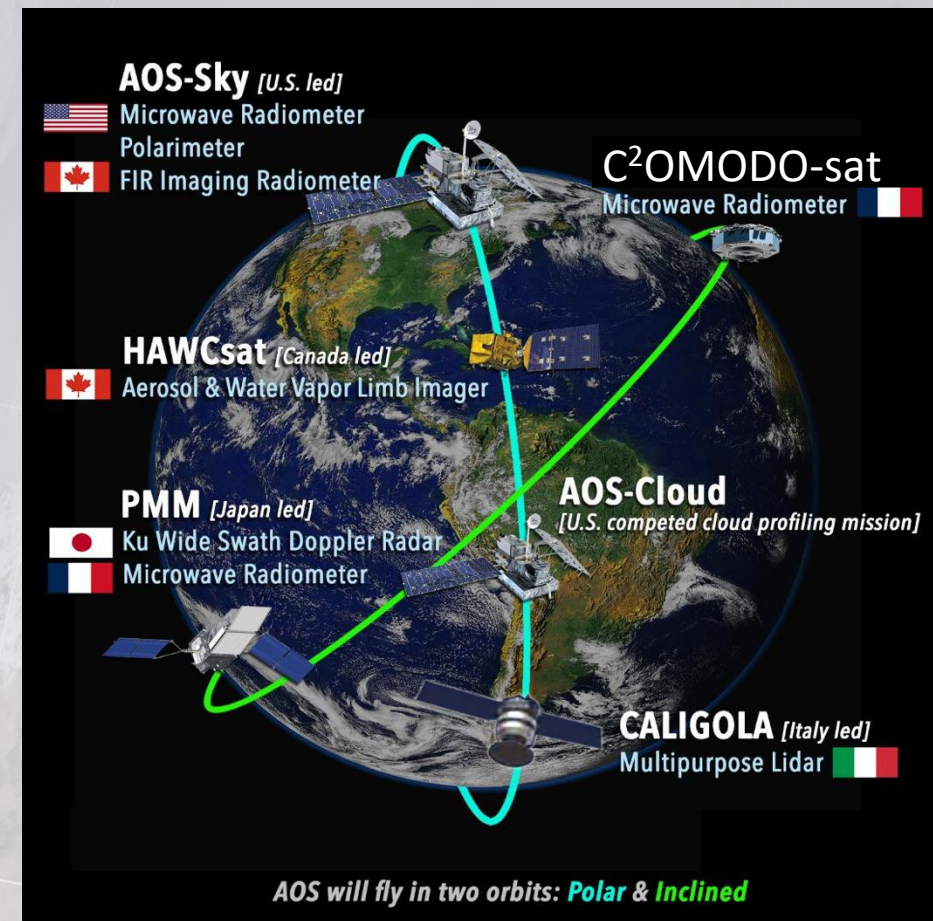
- The overarching goal of the AOS Applications Impact Team
 - Identify future AOS applications and stakeholders
 - Develop Novel-AOS products that will support applications
 - Help improve the capacity for transitioning science to applications to make it possible to more quickly and effectively use NASA data to directly benefit society
- The AIT will foster interaction between users, the science team, and data systems to accelerate the uptake of AOS observations for Earth Action
- AIT is evaluating potential applications opportunities with the current architecture
- Stay tuned for future opportunities to join an AOS Early Adopter program



Applications Themes under consideration
AOS will provide key information to support decision making at timescales from hours to decades enabling

Summary

- AOS was two projects (AOS-Sky, AOS-Storm), now four:
 - AOS-Storm
 - AOS-Sky (passives)
 - AOS-Cloud
 - CALIGOLA
- Working toward procurement for spacecraft for second CNES radiometer
- Working trades for AOS-Sky polarimeter & radiometer capabilities
- AOS-Cloud capabilities will not be known until final selection
- Continuing to define products, characterize data flow, and advance algorithms for AOS products



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