



# Leveraging Existing Satellite Precipitation Missions for AOS Applications Development

**Andrea Portier** (SSAI/ NASA Goddard Space Flight Center)  
Emily Berndt (NASA Marshall Space Flight Center [MSFC])  
Anita LeRoy (MSFC)

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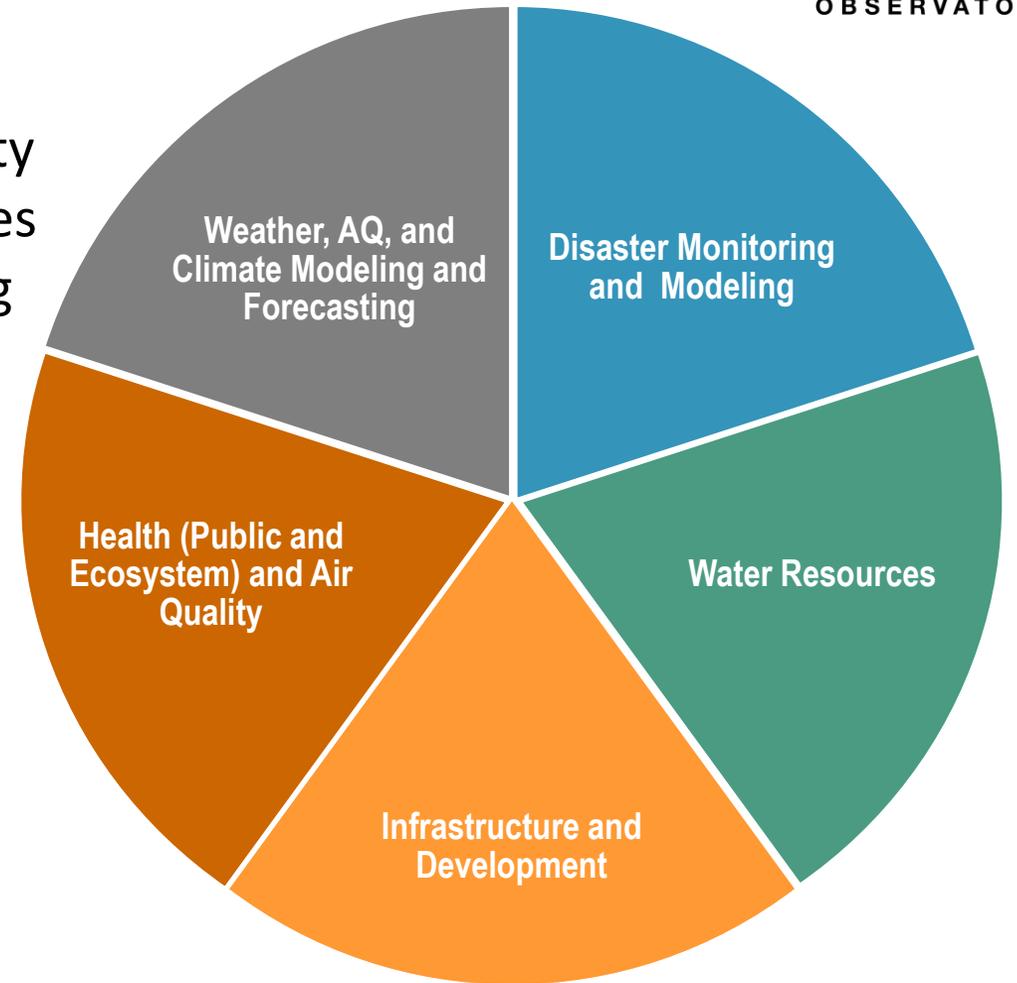


# AOS Applications

**AOS will provide key information to support decision making at timescales from hours to decades**, enabling improved weather and air quality forecasting today, seasonal to sub-seasonal changes in the near future, and societal challenges resulting from climate change in the decades to come.

The AOS Applications Team (AIT) is charged with **ensuring that applications are considered to the greatest extent possible** in mission design and implementation.

Phase-A activities focus on **updating the Applications Traceability Matrix, development of a Project Applications Plan and recruitment of the earliest Early Adopters**



# ACCP Study: Community & Stakeholder Feedback

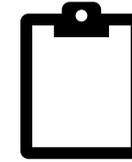


## ACCP Stakeholder Workshops

- Weather and Air Quality Modeling (7/2019)
- Transportation and Logistics (11/2020)
- Air Quality (3/2021)



## Interviews with Communities of Practice and Potential



## Surveys and Trainings

- Weather and AQ modeling community
- ARSET GPM training



## Science Conference Engagements

AGU, AMS, Community Forums, HAQAST Workshops, GPM Science Team, International Association of Wildland Fire, CALIPSO Science Team



## Community Assessment Report

Characterize 10 user communities that could benefit from AOS measurements

- Over 250 workshop attendees and surveys solicited
- Over 60 independent interviews
- Engagement with National/International agencies and the private sector



## Non-Traditional User Needs

Summary of new users and applications with a focus on private sector

# Program of Record: Applications

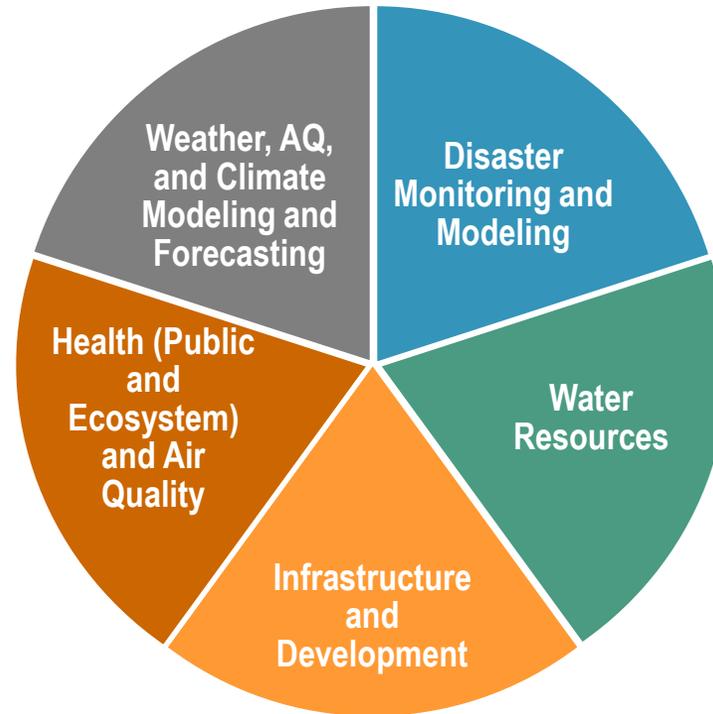
## GPM



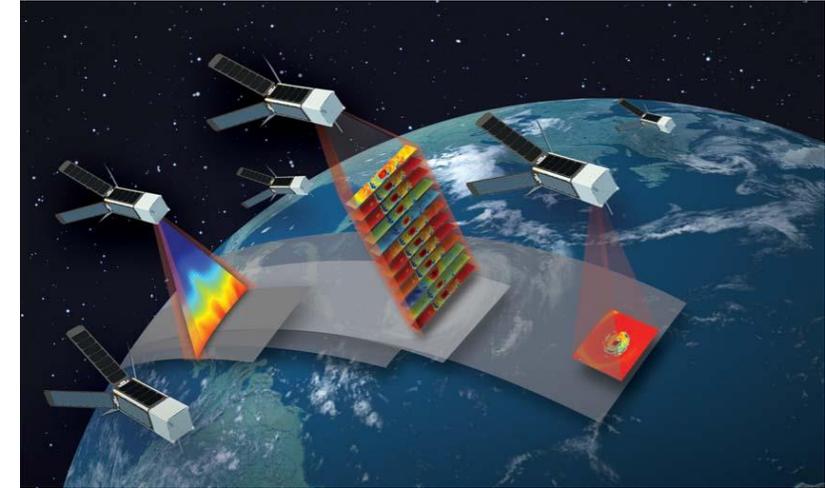
- Weather forecasting
- Climate modeling
- Water resources
- Agriculture
- Disasters
- Energy
- Public Health



## AOS



## TROPICS



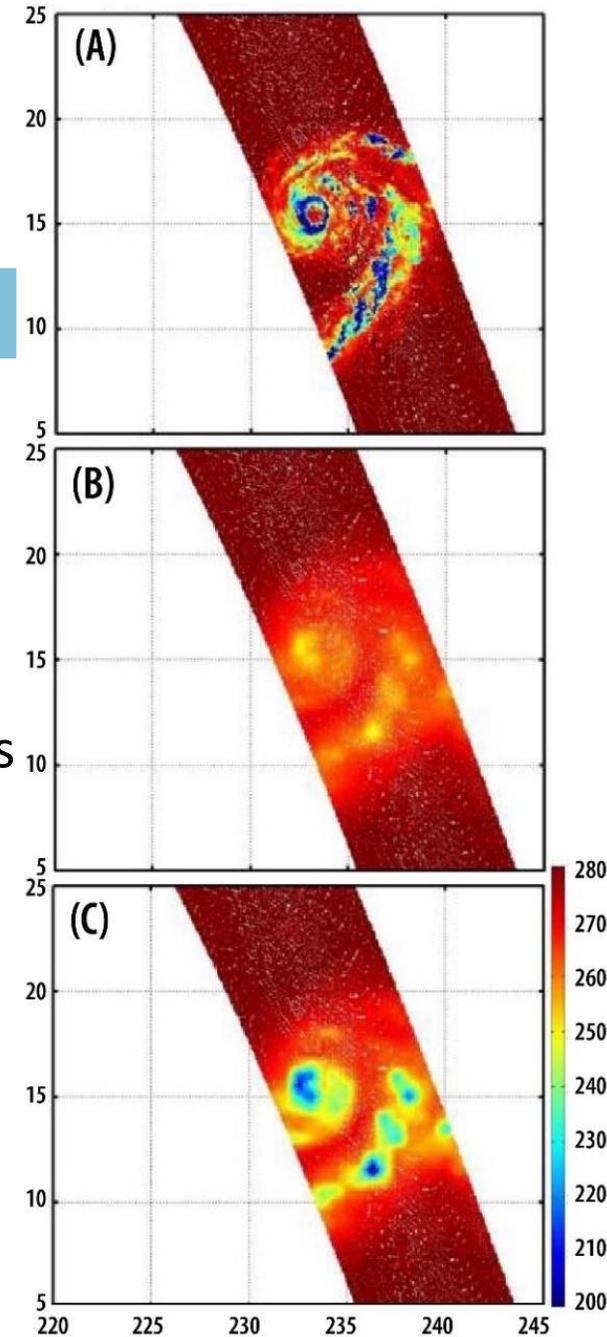
- TC analysis and nowcasting
- TC modeling and data assimilation
- TC and dynamics
- Terrestrial/ disasters



# Operational Data Assimilation and NWP

What can we learn about this community of users?

- 89 GHz and 183 GHz are important
  - Characterizes precipitation structure, precipitation retrievals over land, and high cloud properties, moisture profiles
  - Critical to improve models and issue forecasts
- Importance of latency:
  - “latency < 4h, all data can go into the DA” ECMWF
  - low latency radiometer data benefit several agencies
- Integration and testing new data takes time:
  - 7 months to 2 years

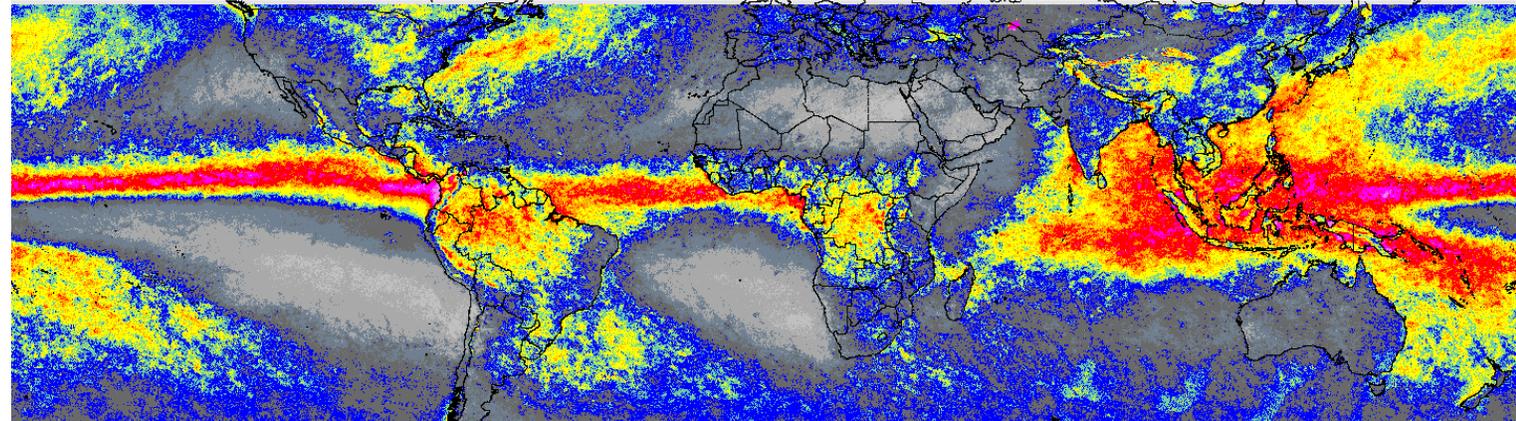


Observed and simulated GPM GMI Tb using different scattering assumptions; an example of data assimilation in NASA GEOS model, which benefits from improved microphysical retrievals to constrain initial conditions in the presence of clouds and precipitation.

# Aviation

What can we learn about this community of users?

TROPICS  
precipitation  
retrieval

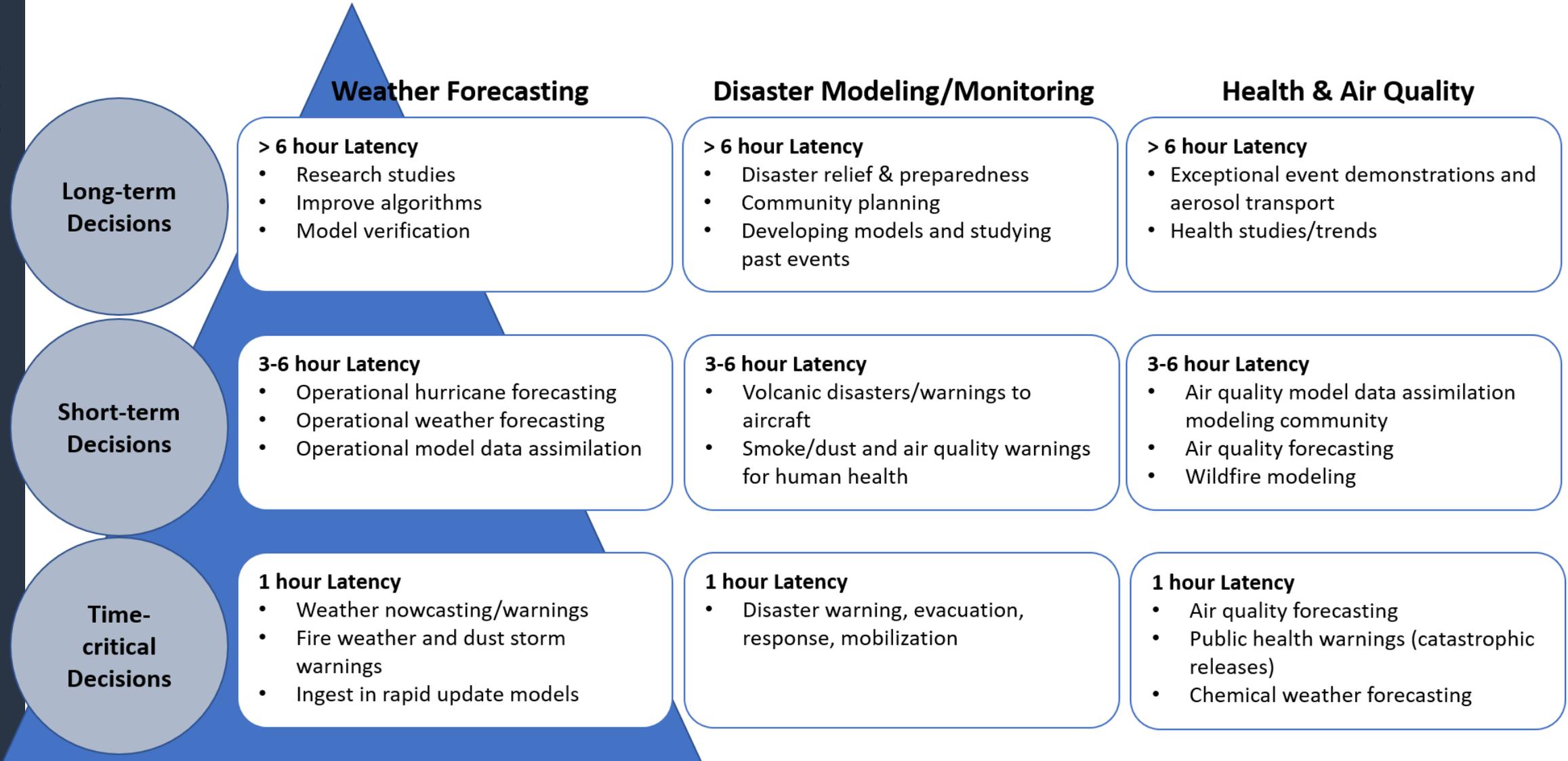


2021.08.08  
-  
2022.07.31

0.0 0.1 0.2 0.5 1.0 2.0 3.0 4.0 6.0 8.0 12.0 16.0  
Mean daily precipitation (mm/day)

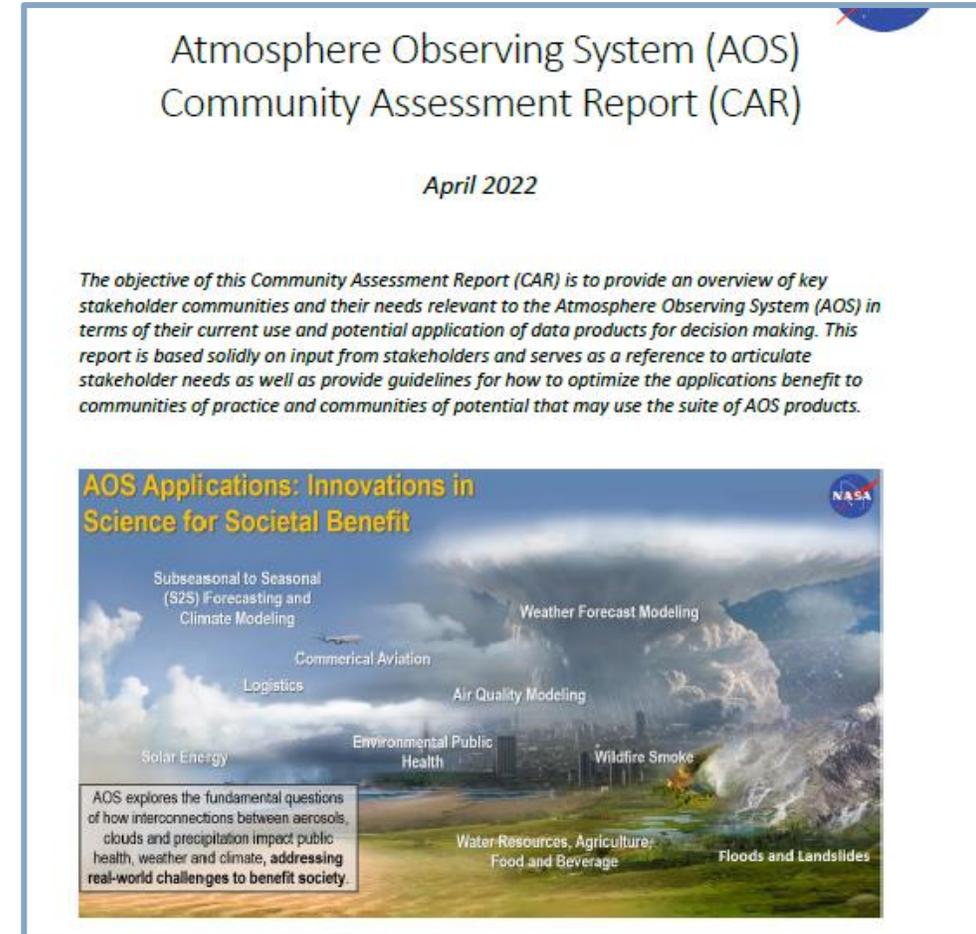
- Able to ingest a wide range of data into system (L1 to L3 data products)
- Data needs:
  - formats that are compatible with graphical displays and models + < 3 hours latency
- Integration and testing new data takes time:
  - 7- 8 years
- A4A + FAA can help facilitate training and communicating opportunities in anticipation of new data from AOS

# Latency



# Pre-Phase A

- **Pre-Phase A- Community Assessment Report (CAR)**
  - Documents and synthesizes information and **needs from applications communities relevant to AOS**
  - CAR makes recommendations and provides suggested guidelines for how **components of the AOS mission may be optimized** for enhanced applications value
  - CAR is a living document that will be **maintained throughout the mission life cycle**



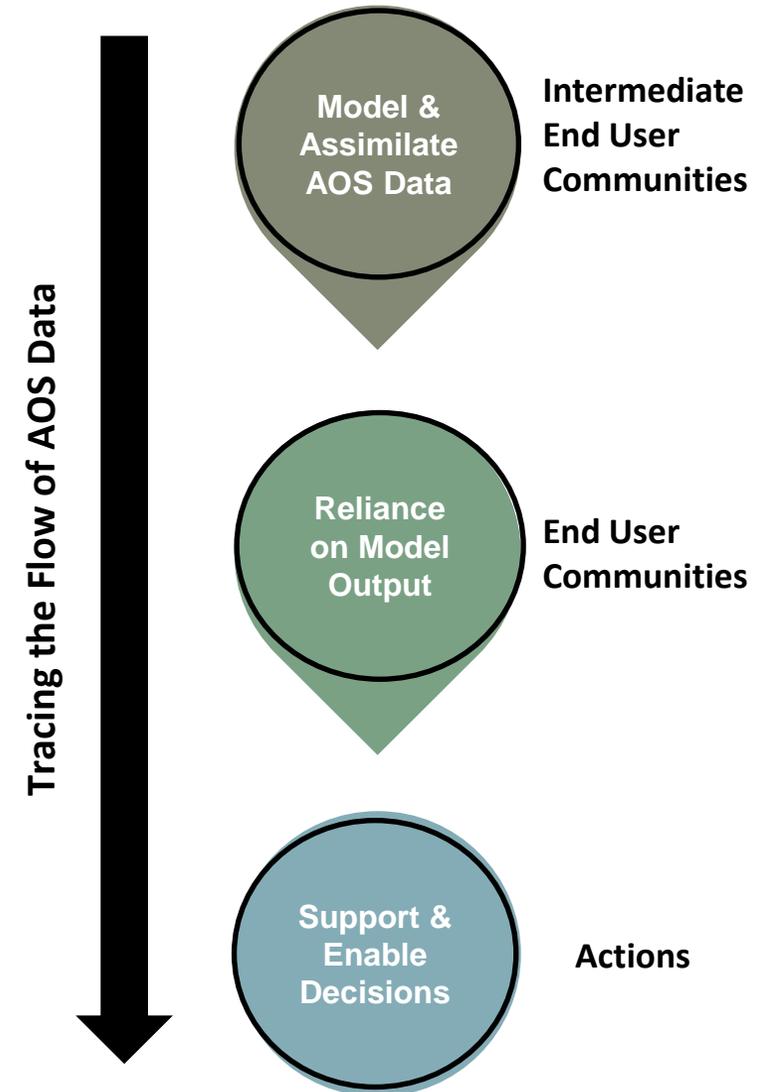
# CAR Findings

- **No "One Size Fits All" Approach:** Stakeholder needs vary significantly, even within the same community
- **Capacity and capabilities vary:** Largely dependent on organizational resources and capacity
- **Measurement Uncertainty is important:** Accuracy and knowledge of uncertainties is a major driver impacting likelihood to use data or products for decision making
- **Intermediate data product/service providers are vital:** many stakeholder communities rely on value added service providers for their information rather than going directly to the data sources
- **Reliance on models:** presents an opportunity to assimilate and/or incorporate data to improve models

# Community Reliance on Model Output and Gridded Products

*The AOS mission design that “raises the bar” for science also does the same for applications.*

- Many communities would benefit from improved forecasts
- Providing gridded datasets for desired observables (precip + PM<sub>2.5</sub>) is the single most impactful opportunity that NASA could take
  - Stakeholder agencies do not have resources to hire experts to download and process satellite data



# AOS Applications Seminar Series

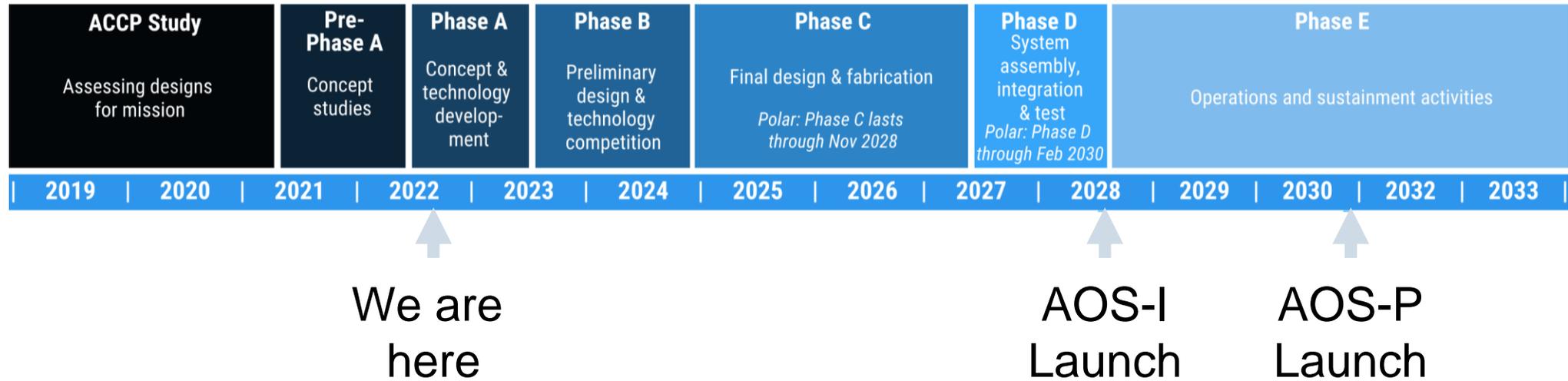
## Monthly seminar to foster dialogue on:

- Opportunities to leverage AOS data products in stakeholder applications and research
- Existing gaps in data needs that may present future opportunities for ESO and AOS
- Engagement of communities to increase awareness of and participation in AOS
- Expand breadth of thematic areas covered in preparation for future activities, including Early Adopter Program

- High seminar attendance (~>70 participants)
- 10 seminars covering a wide range of topics



# How can I get involved with AOS?



<https://aos.gsfc.nasa.gov/>

- Attend AOS events forums
  - AOS Application Seminars
  - Thematic Workshops
- Email applications coordinator [andrea.m.portier@nasa.gov](mailto:andrea.m.portier@nasa.gov) to get on our mailing list