



Leveraging Existing Satellite Precipitation Missions for AOS Applications Development

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AGU Fall Meeting
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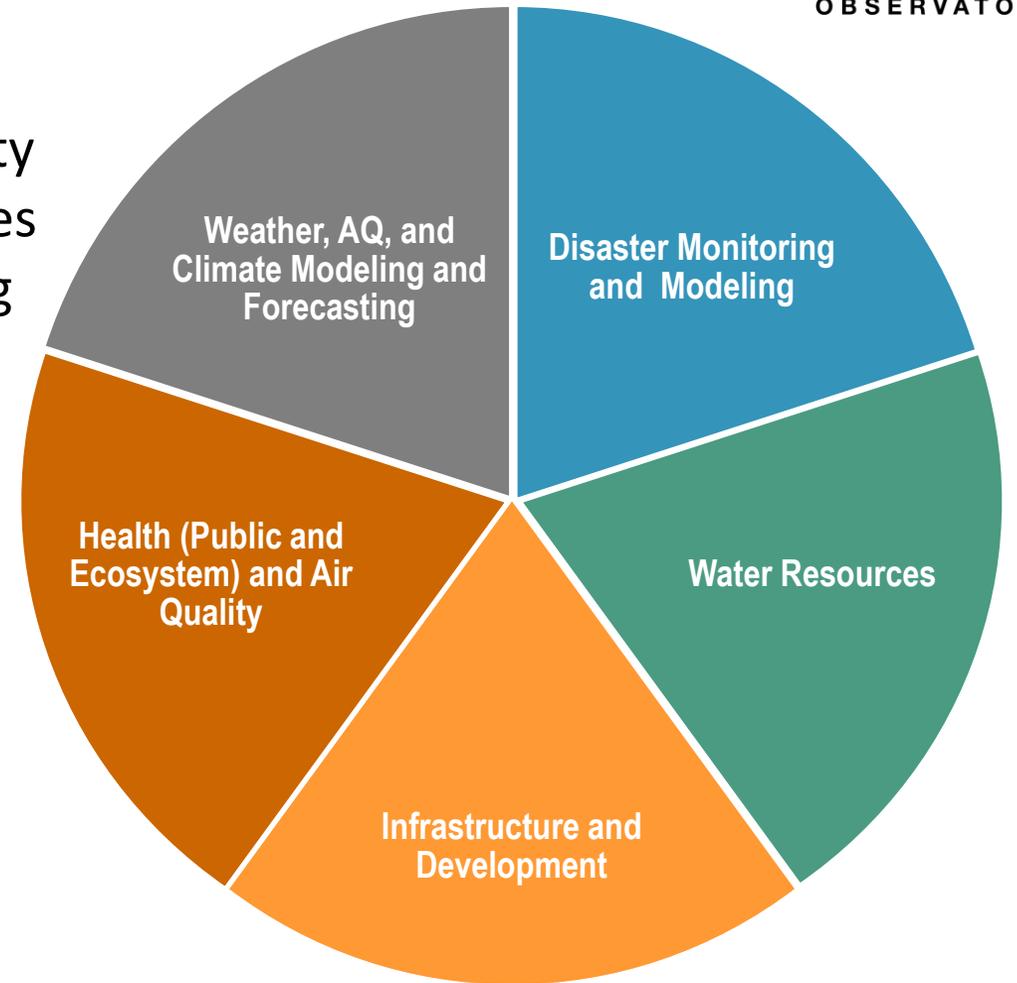


AOS Applications

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

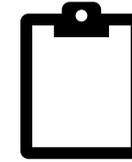


ACCP Stakeholder Workshops

- 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

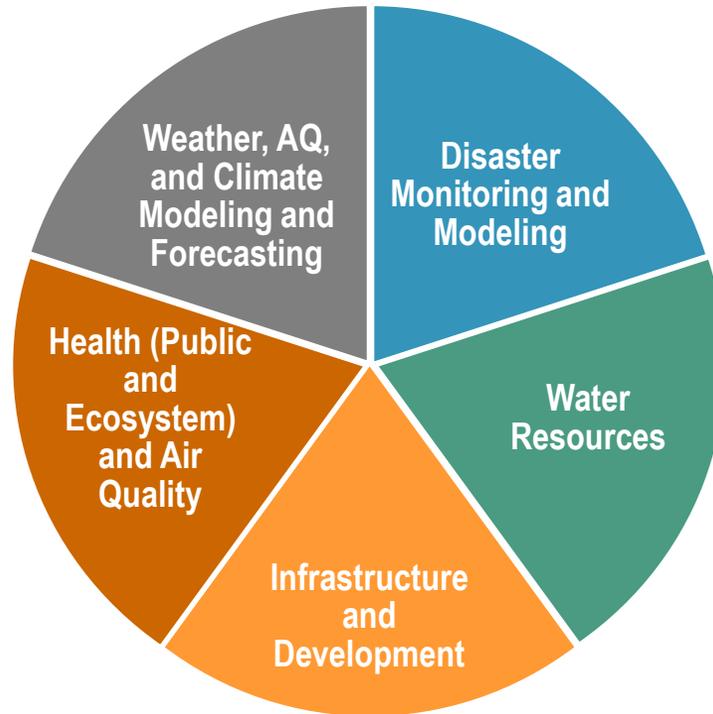
GPM



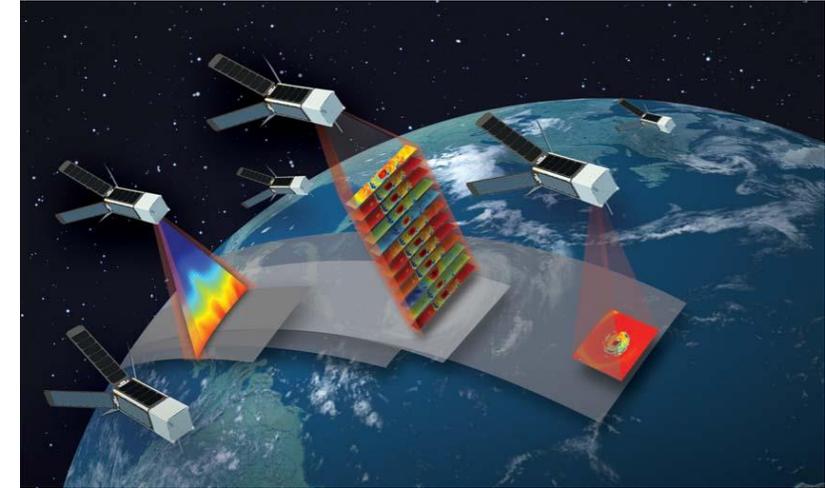
- Weather forecasting
- Climate modeling
- Water resources
- Agriculture
- Disasters
- Energy
- Public Health



AOS



TROPICS



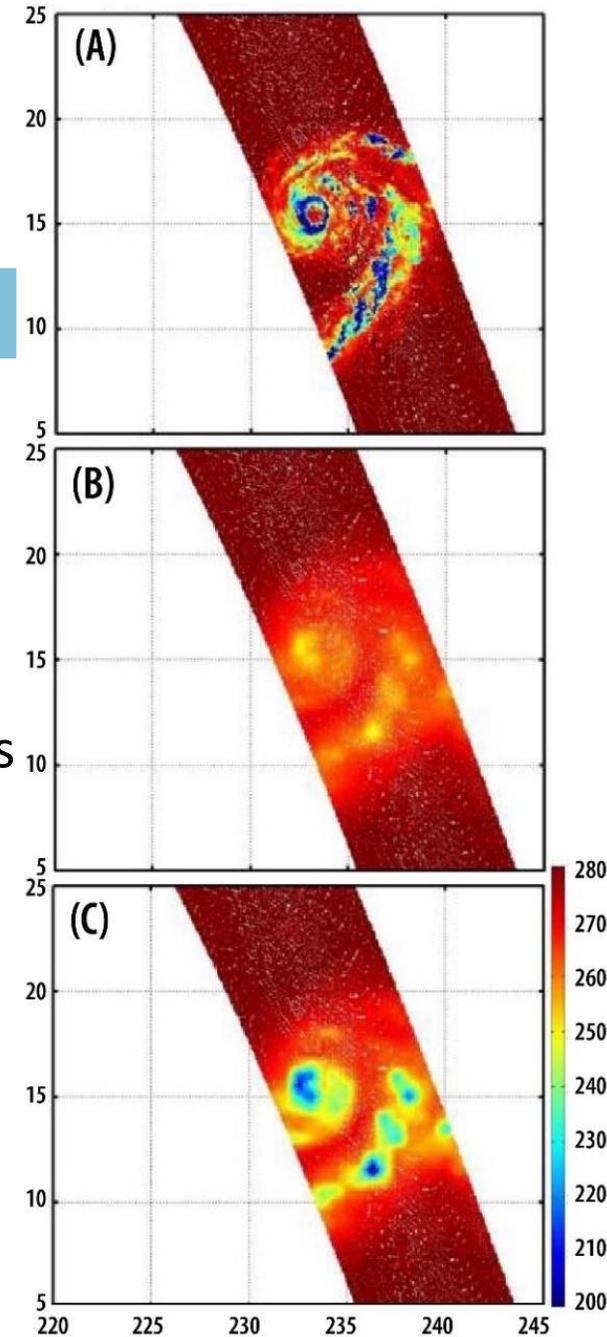
- TC analysis and nowcasting
- TC modeling and data assimilation
- TC and dynamics
- Terrestrial/ disasters



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

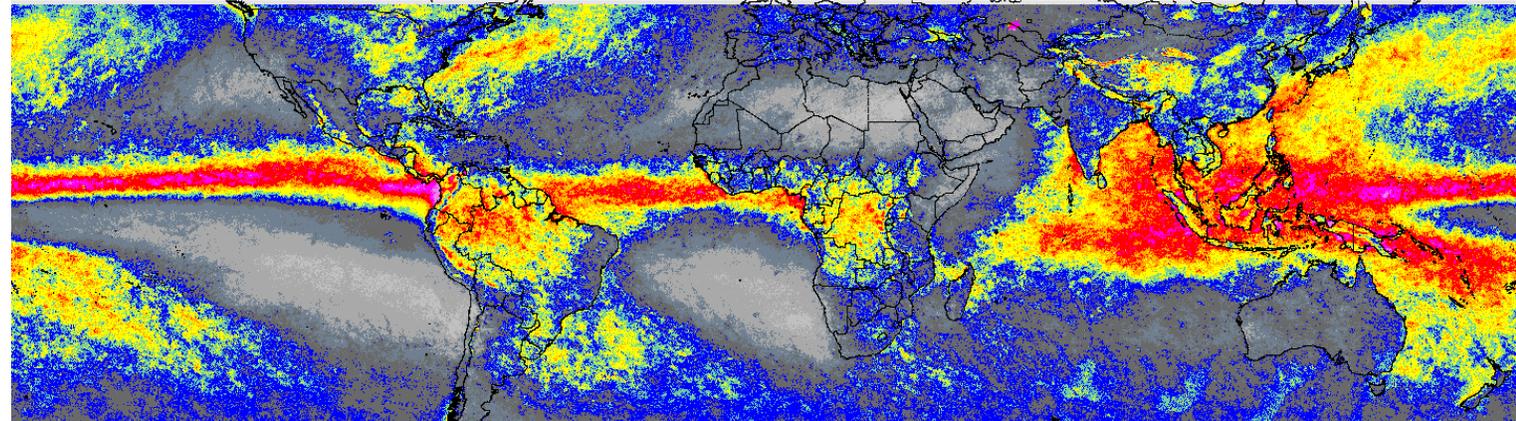


Observed and simulated GPM GMI Tb using different scattering assumptions; an example of data assimilation in NASA GEOS model, which benefits from improved microphysical retrievals to constrain initial conditions in the presence of clouds and precipitation.

Aviation

What can we learn about this community of users?

TROPICS
precipitation
retrieval

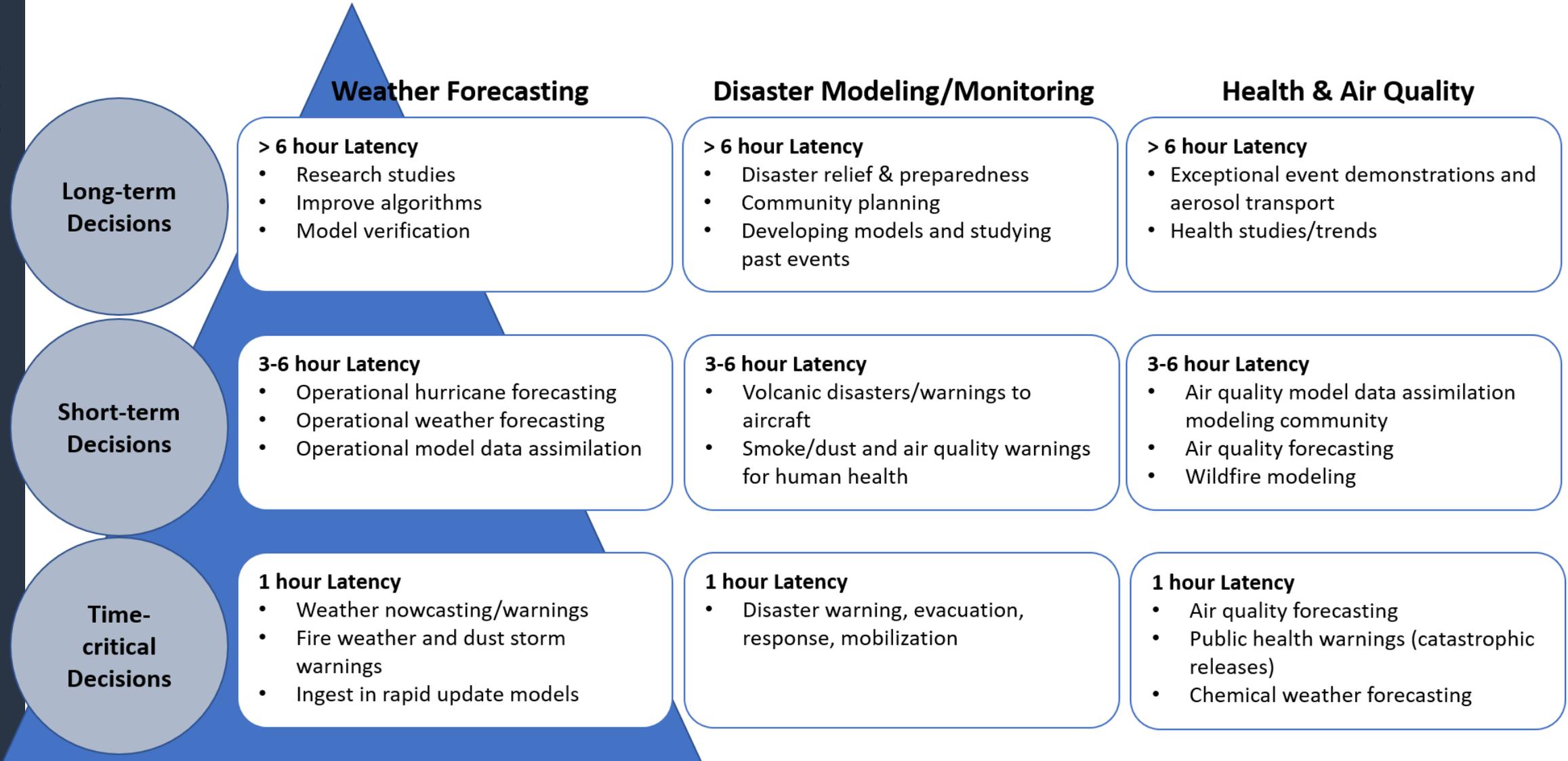


2021.08.08
-
2022.07.31

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)

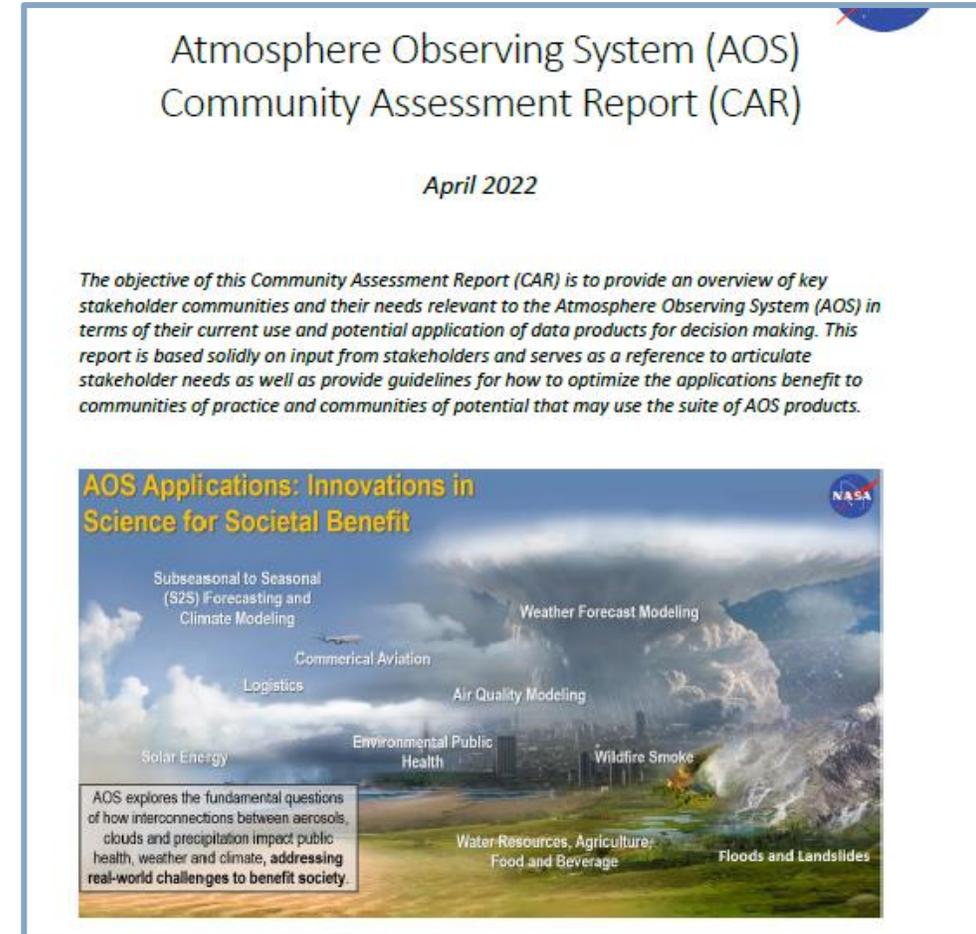
- Able to ingest a wide range of data into system (L1 to L3 data products)
- Data needs:
 - formats that are compatible with graphical displays and models + < 3 hours latency
- Integration and testing new data takes time:
 - 7- 8 years
- A4A + FAA can help facilitate training and communicating opportunities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



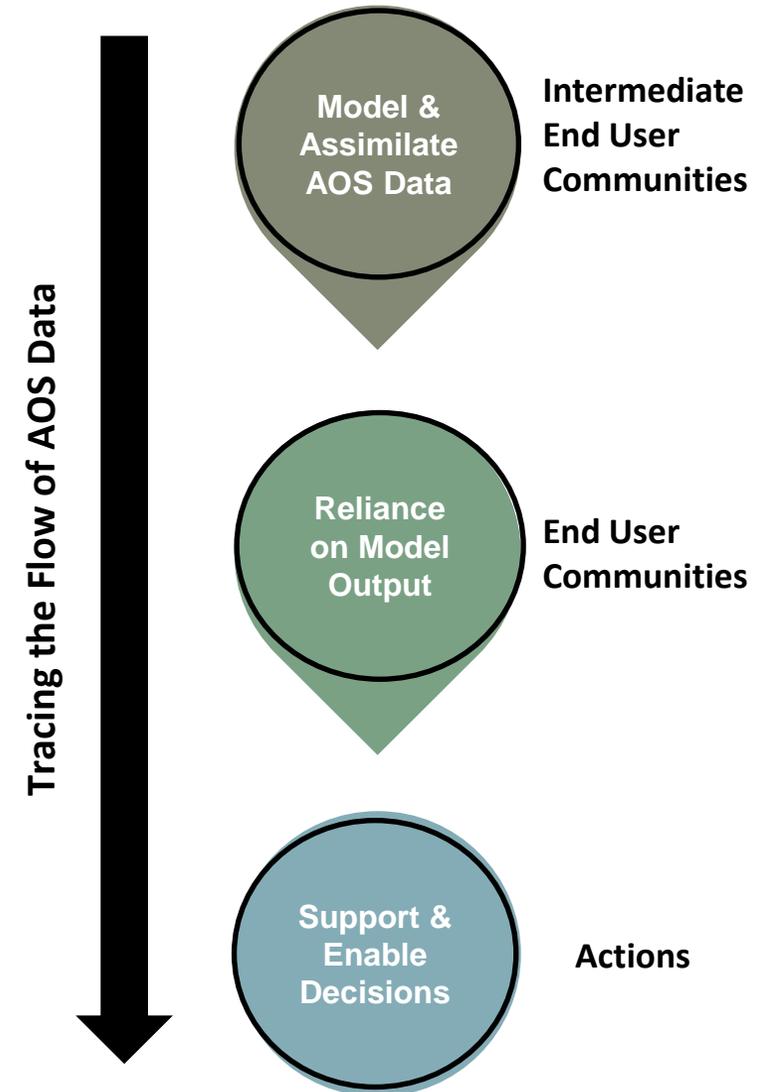
CAR Findings

- **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_{2.5}) 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

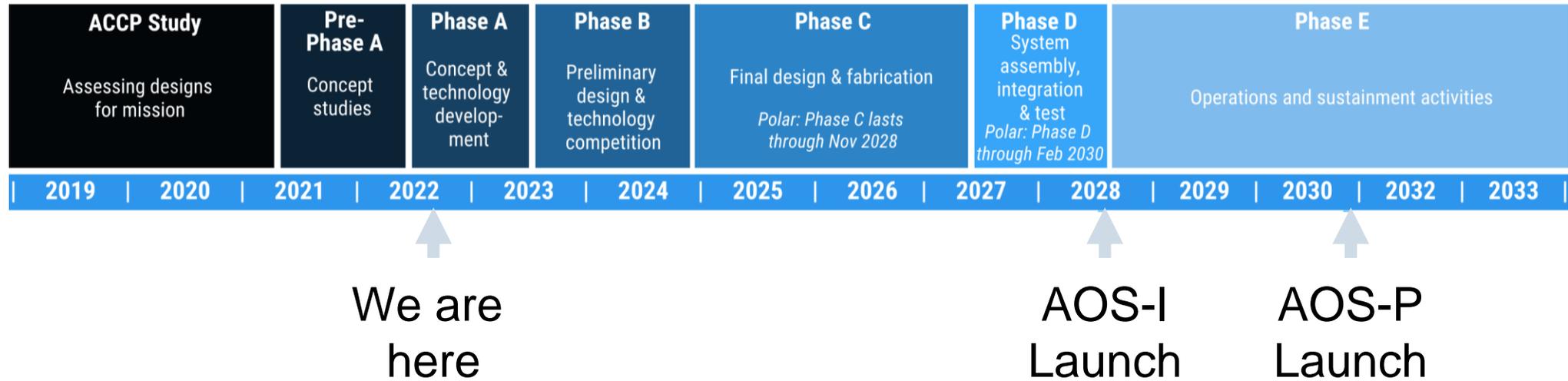
Monthly seminar to foster dialogue on:

- 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 to get on our mailing list