National Aeronautics and Space Administration

NASA Cloud Remote Sensing

Agency Report to the International Cloud Working Group

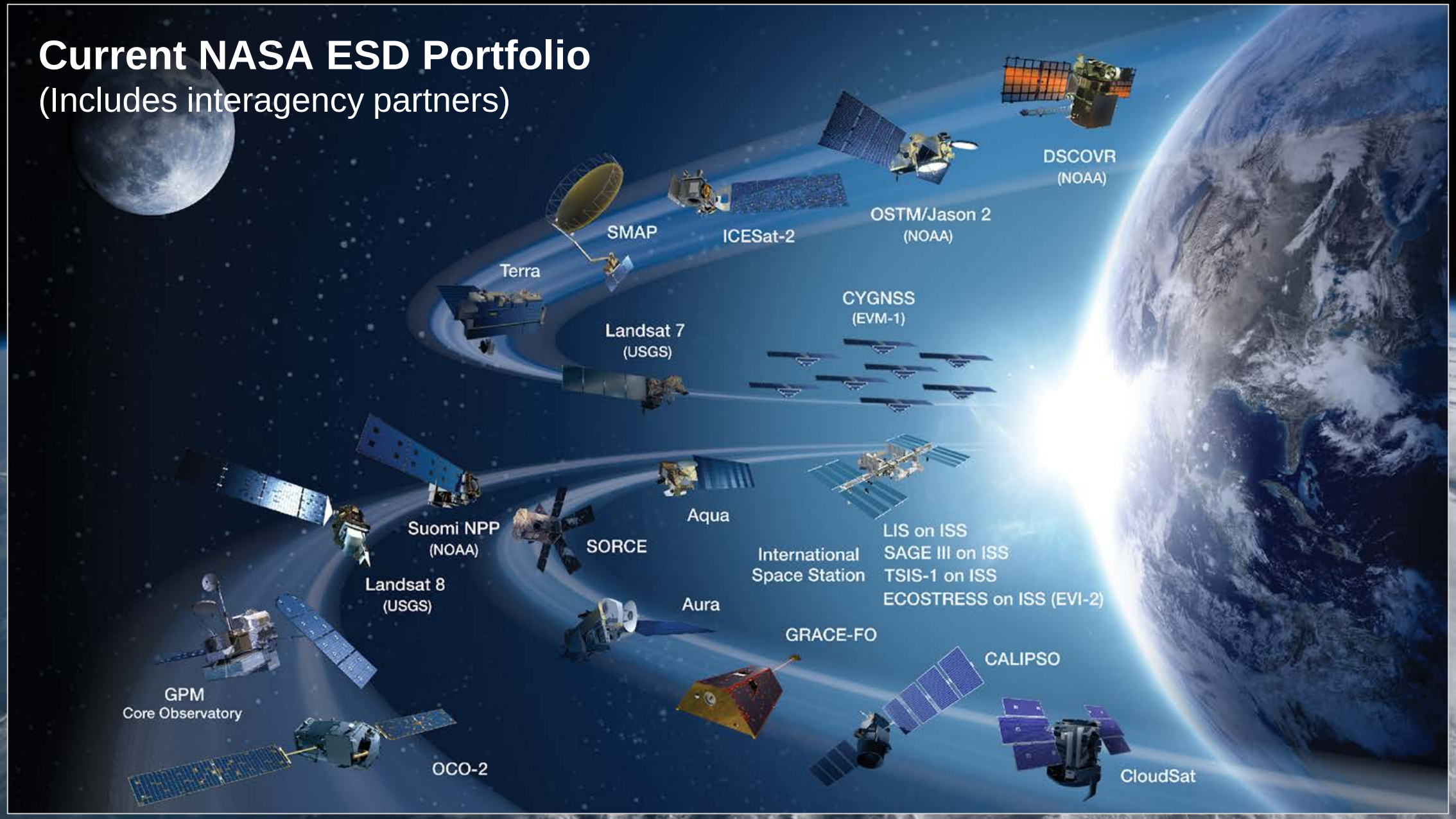
Kerry Meyer (NASA/GSFC), Hal Maring (NASA/HQ)

NASA Space-borne Cloud Instruments

- Current prime capabilities
  - Imagers: MODIS, VIIRS (ST and CERES products); DSCOVR-EPIC
  - IR Sounders: AIRS, CrIS
  - Lidar: CALIPSO-CALIOP; CATS (no longer operating, but dataset publicly available)
  - Radar: CloudSat
- Customers
  - NASA R&A and Applications programs, as well as the larger scientific and applications communities
  - Primary scientific interest is in process studies and climate analyses
  - Free and open access to all NASA products

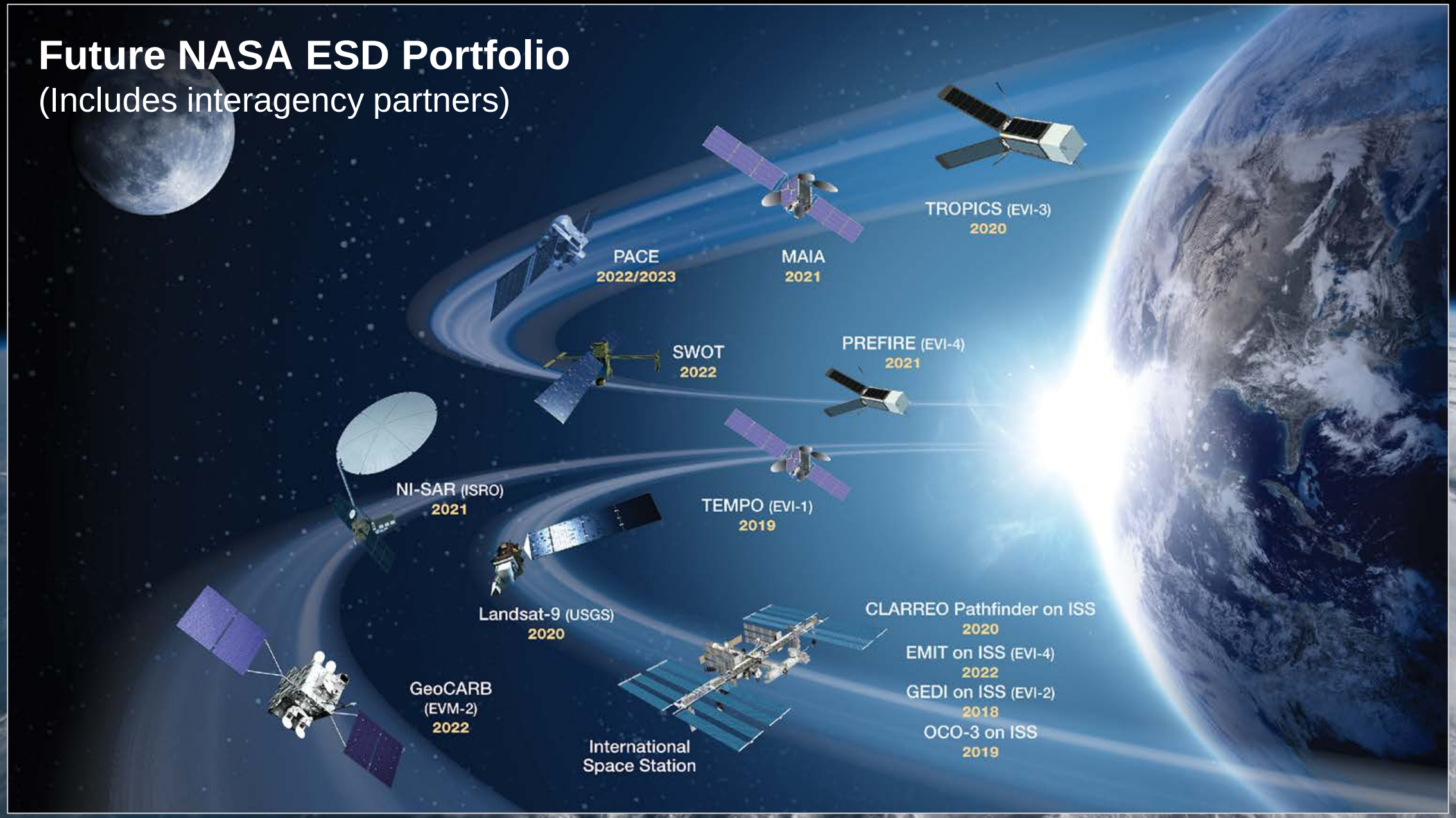
Current NASA ESD Portfolio

(Includes interagency partners)



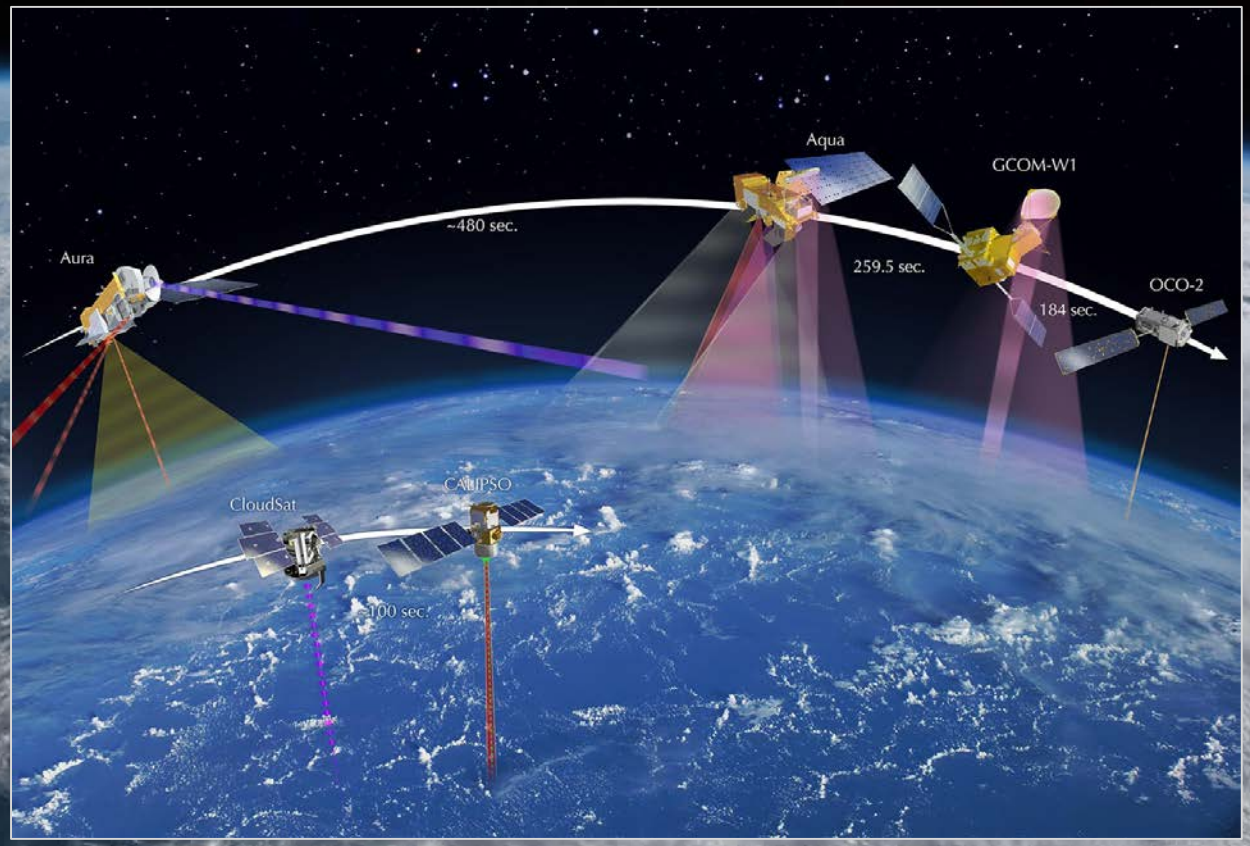
Future NASA ESD Portfolio

(Includes interagency partners)



Notable Updates

- CloudSat and CALIPSO have exited the A-Train
  - CloudSat executed maneuvers to lower it beneath the A-Train on 22 Feb 2018 following the loss of one of four reaction wheels in June 2017
  - CALIPSO followed with maneuvers 13-20 Sep 2018.
- The “C-Train” is flying 16.5km below the A-Train. With a 1330 LT MLT, it intersects the A-Train ground track roughly every 19 days.
- All instruments remain in operation



Notable Updates

- CATS
  - Operations aboard the ISS ended late 2017 after 33 months.
  - Due to ISS orbit, was the only space-borne lidar with diurnal sampling capabilities.
- Current end-of-mission plans for Terra, Aqua, and Aura
  - Terra: Exits morning constellation Aug 2022. Remaining fuel will be used to lower perigee prior to passivation in early 2026.
  - Aqua: Exits A-Train in Mar 2022 (approximately 4km below A-Train). Investigating options to extend mission to 2025+ time frame.
  - Aura: Currently working on long-term plans.

Extending the Imager Climate Data Record

- MODIS/VIIRS Science Team cloud and aerosol algorithms (ROSES TASNPP)
  - Continuity products on VIIRS
    - Current efforts focused on SNPP; plans include NOAA-20+
  - Geostationary
    - Seed money from HQ to port continuity algorithms
    - Demonstration on Himawari AHI, planned work on GOES-16 ABI
- CERES-MODIS team's core cloud efforts supported through CERES Science Team funding
  - Intrinsically includes LEO and GEO imagers coupled with CERES observations
- PACE
  - OCI and polarimeters (SPEX, HARP-2)

2017 Earth Science Decadal Survey

- U.S. National Academies report on “Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space”
  - Publicly released 5 Jan 2018
  - Provides guidance on priority observations for the coming decade
- Snapshot:
  - 5 “Designated” observables for mandatory missions
    - Aerosols; Clouds, Convection, & Precipitation; Mass Change; Surface Biology & Geology; Surface Deformation & Change
  - New competed “Explorer” flight line
  - Expand Earth Venture-class with new “Continuity Measurement” strand
  - “Incubator Program” to mature technologies for important measurements

Aerosols and Clouds, Convection, & Precipitation (A-CCP) Designated Observables

- NASA HQ requested inter-center study plans for all Designated Observables
- A joint study plan, led by GSFC, was selected and includes JPL, LaRC, MSFC, and other centers and universities
  - Delivery of study plan report to HQ in early 2022
- A-CCP Study Plan Objectives
  - Define focused science questions
  - Define measurement requirements (to include advanced remote sensing capabilities)
  - Leverage 2007 DS Aerosol-Cloud-Ecosystems (ACE) studies
  - Perform multiple architecture studies

National Aeronautics and Space Administration