Soil Moisture Active Passive

SMAP

Mission

LANCE UWG June 22, 2023

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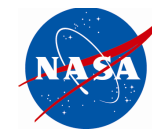# Project Overview

SMAP Prime Mission
Ended on June 11, 2018
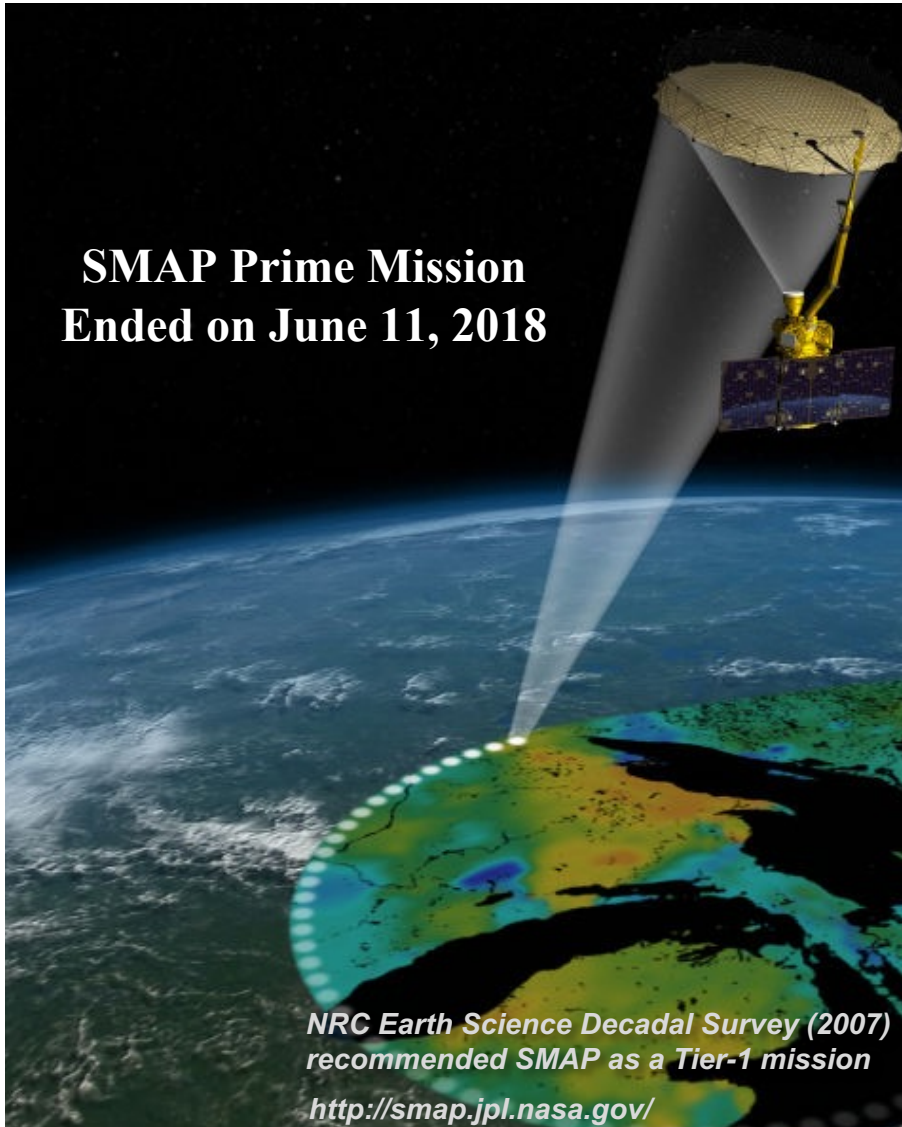
Primary Science Objectives

- Global, high-resolution mapping of soil moisture and its freeze/thaw state to
  - Link terrestrial water, energy, and carbon-cycle processes
  - Estimate global water and energy fluxes at the land surface
  - Quantify net carbon flux in boreal landscapes
  - Extend weather and climate forecast skill
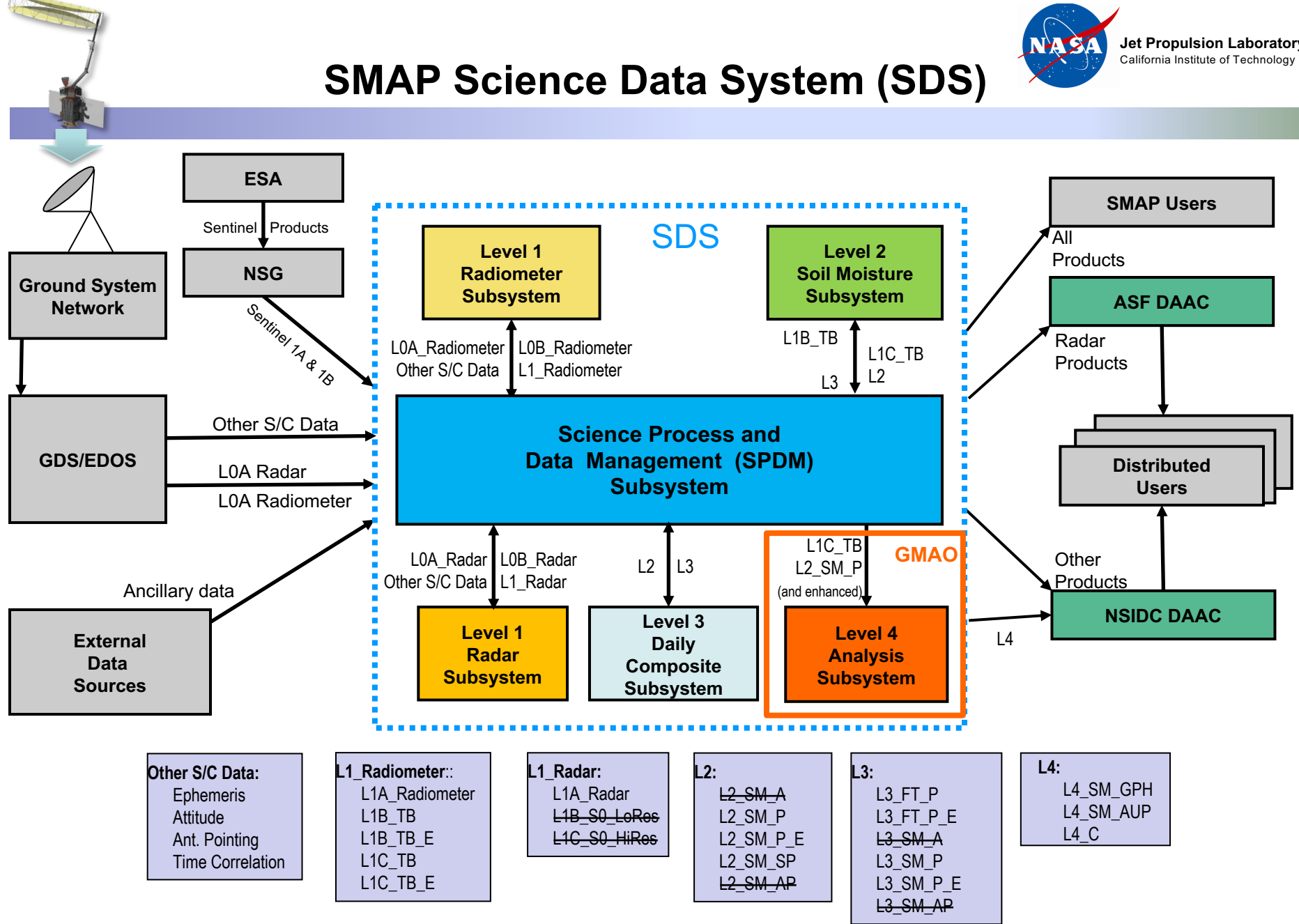 - Develop improved flood and drought prediction capability

Mission Implementation

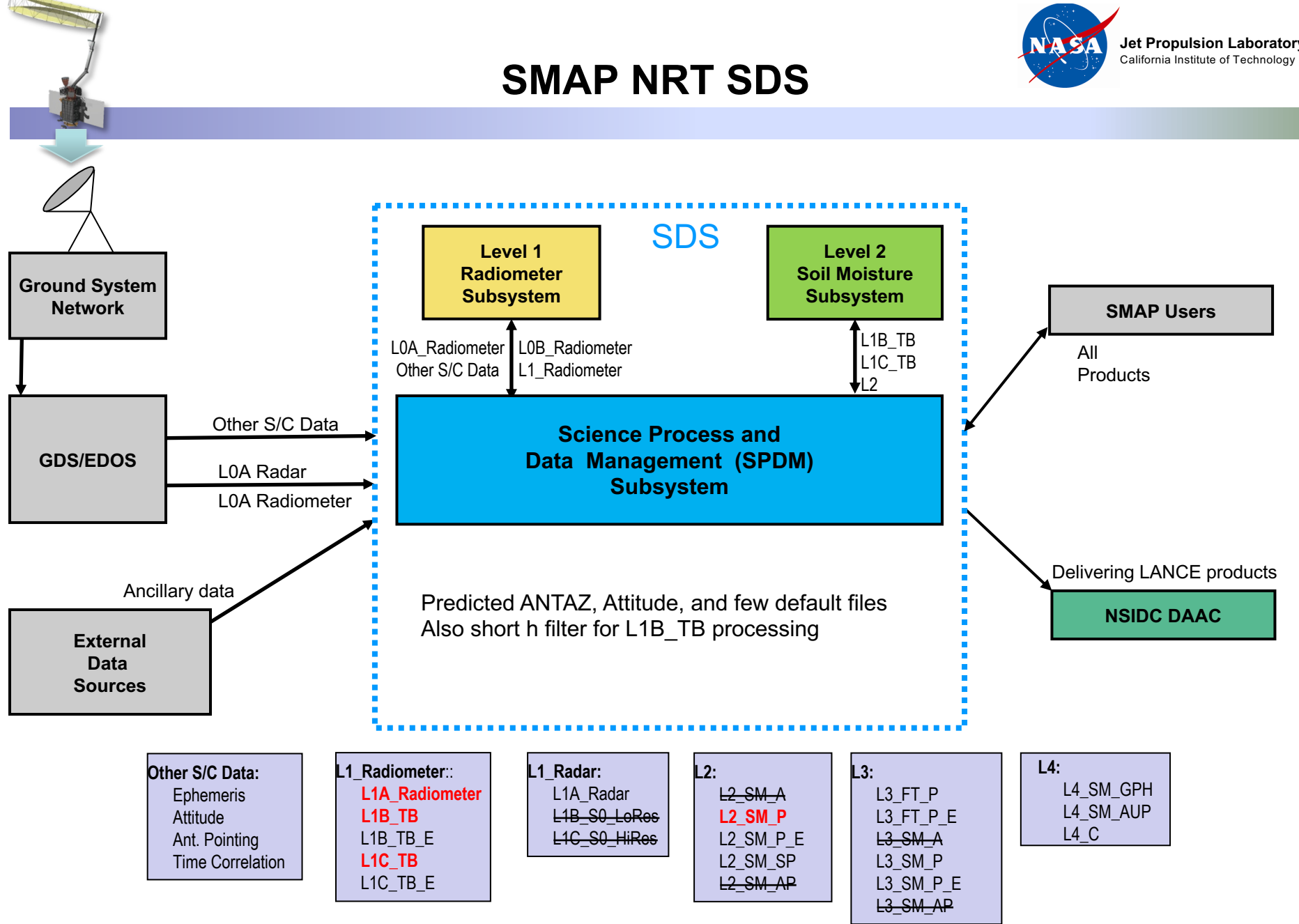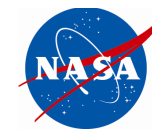| Partners	• JPL (project & payload management, science, spacecraft, radar, mission operations, science processing) • GSFC (science, radiometer, science processing)
Risk	• NPR 7120.5E Category 2; NPR 8705.4 Payload Risk Class C
Launch	• January 31, 2015 on Delta II 7320-10C Launch System
Orbit	• Polar Sun-synchronous; 685 km altitude
Duration	• 3-year Primary Mission (May'15 - Jun'18) w/ 3-year extended mission (Jun'18 – Sep'20) approved w/ 6-year extended extended mission (Oct'20 – Sep'26) approved
Payload	• L-band radar (JPL) – ceased operation since July'15 • L-band radiometer (GSFC) • Shared 6-m rotating (13 to 14.6 rpm) antenna (JPL)

NRC Earth Science Decadal Survey (2007) recommended SMAP as a Tier-1 mission

http://smap.jpl.nasa.gov/

SMAP Science Data System (SDS)

SMAP NRT SDS

NASA | **Jet Propulsion Laboratory**
California Institute of Technology

SDS

Level 1 Radiometer Subsystem

Level 2 Soil Moisture Subsystem

Ground System Network

GDS/EDOS

External Data Sources

L0A_Radiometer | L0B_Radiometer
Other S/C Data | L1_Radiometer

L1B_TB
L1C_TB
L2

Science Process and Data Management (SPDM) Subsystem

SMAP Users

All Products

Other S/C Data

L0A Radar

L0A Radiometer

Ancillary data

Predicted ANTAZ, Attitude, and few default files
Also short h filter for L1B_TB processing

Delivering LANCE products

NSIDC DAAC

Other S/C Data:
Ephemeris
Attitude
Ant. Pointing
Time Correlation

L1_Radiometer::
L1A_Radiometer
L1B_TB
L1B_TB_E
L1C_TB
L1C_TB_E

L1_Radar:
L1A_Radar
~~L1B_S0_LoRes~~
~~L1C_S0_HiRes~~

L2:
~~L2_SM_A~~
L2_SM_P
L2_SM_P_E
L2_SM_SP
~~L2_SM_AP~~

L3:
L3_FT_P
L3_FT_P_E
~~L3_SM_A~~
L3_SM_P
L3_SM_P_E
~~L3_SM_AP~~

L4:
L4_SM_GPH
L4_SM_AUP
L4_C

SMAP Product Use Cases

- Monitor drought
- Predict floods
- Assist crop productivity
- Weather forecasting
- Linking water, energy and carbon cycles

- Existing NRT customers
  - NOAA
  - REMSS
  - Canadian government shared services
    - SMAP data being used for soil moisture and sea ice thickness monitoring
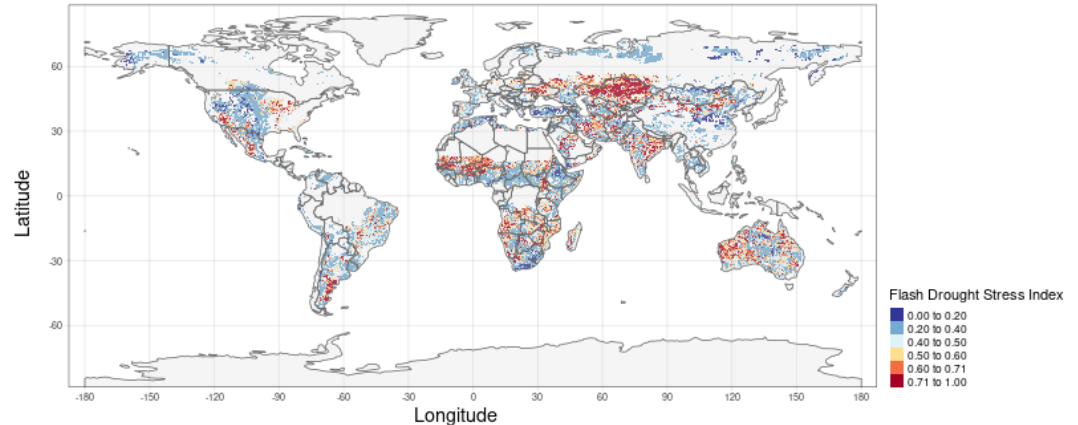 - Air Force
  - Navy

FLASH

- **FL**ash drought **A**ssessment using **S**MAP **H**ydrology (FLASH) uses SMAP soil moisture for drought monitoring (https://vadosezone.tamu.edu/flash/)

Welcome to FLASH — A platform for operational near-real-time global flash drought monitoring using SMAP soil moisture.

SMAP LANCE Current Status

- NRT data products from primary stream is being delivered to NSIDC

- Imagery from NRT data products is being generated by SDS and delivered to GIBS

- Archival redundancy has been established at NSIDC
  - https://daacdata.apps.nsidc.org/pub/DATASETS/SMAP/
    - Some additional work required to roll-off antiquated data
    - This archive is not impacted by NSIDC weekly maintenance downtime

NSIDC SMAP LANCE Use Metrics

SMAP NRT Product Metrics, Oct 2022-May 2023

NSIDC SMAP LANCE Use Metrics

- Overall increase in the number of users and monthly data downloads since the Oct 2022 initial release

- Large spike in March 2023 in downloaded file count and volume that has continued through May 2023

  - Attributable to a few repeat users downloading 1000's of files each
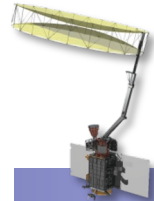   - Suggestive of "operational" use (?)
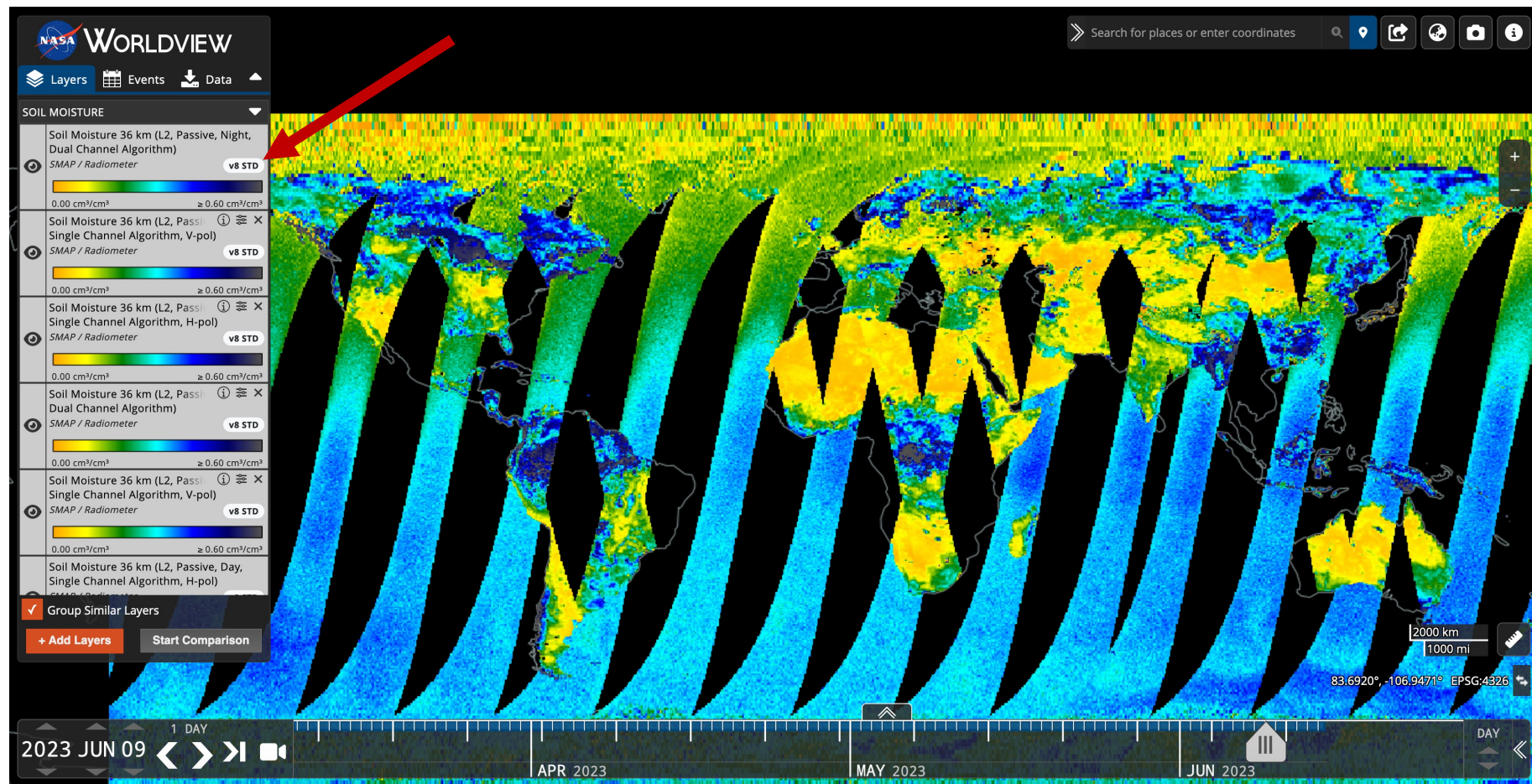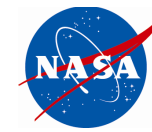
Worldview

- SMAP NRT imagery
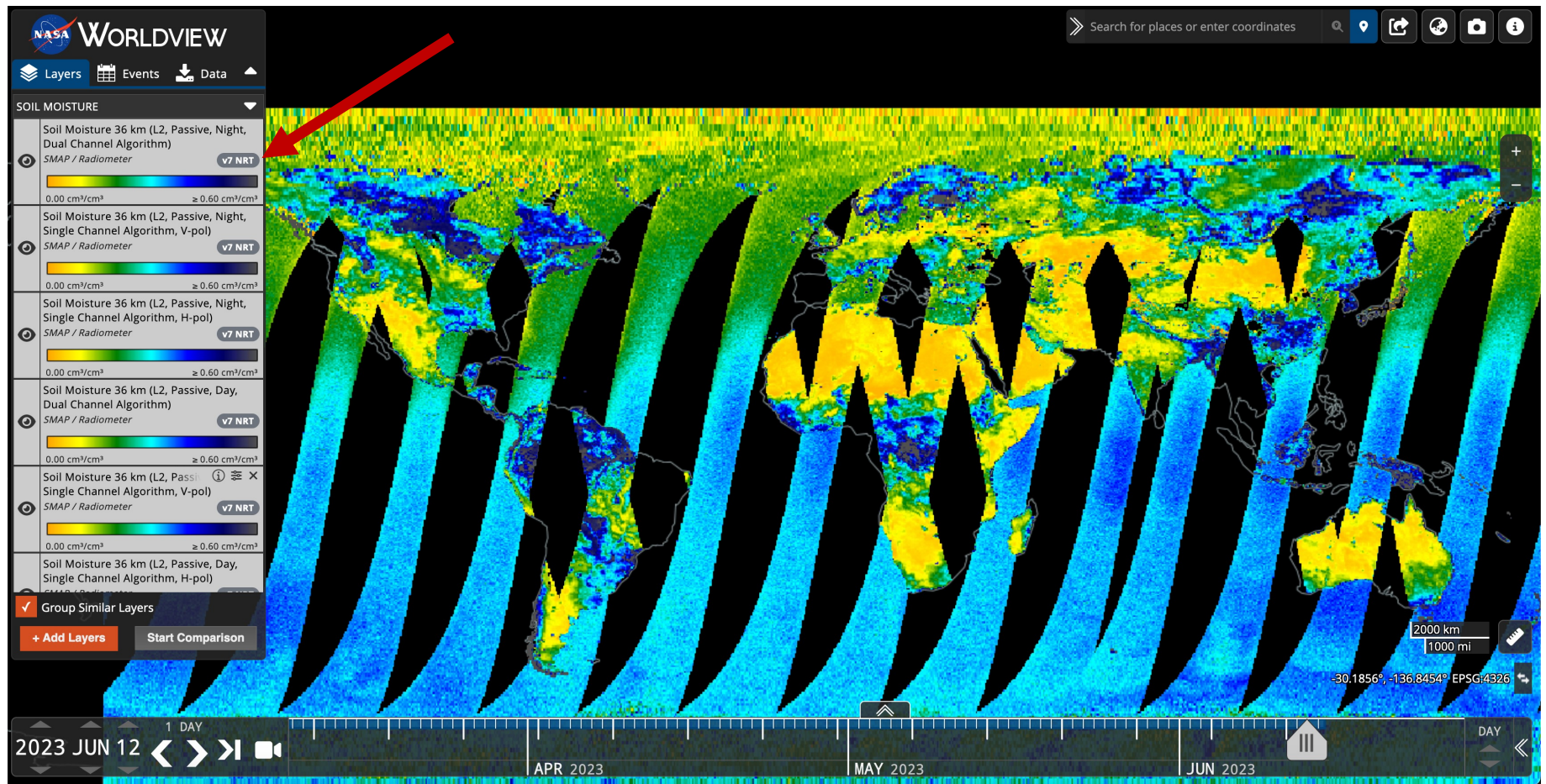
Worldview

- SMAP standard (STD) imagery
  - STD image will overwrite NRT image when all STD granules found for that day are older than 24 hours
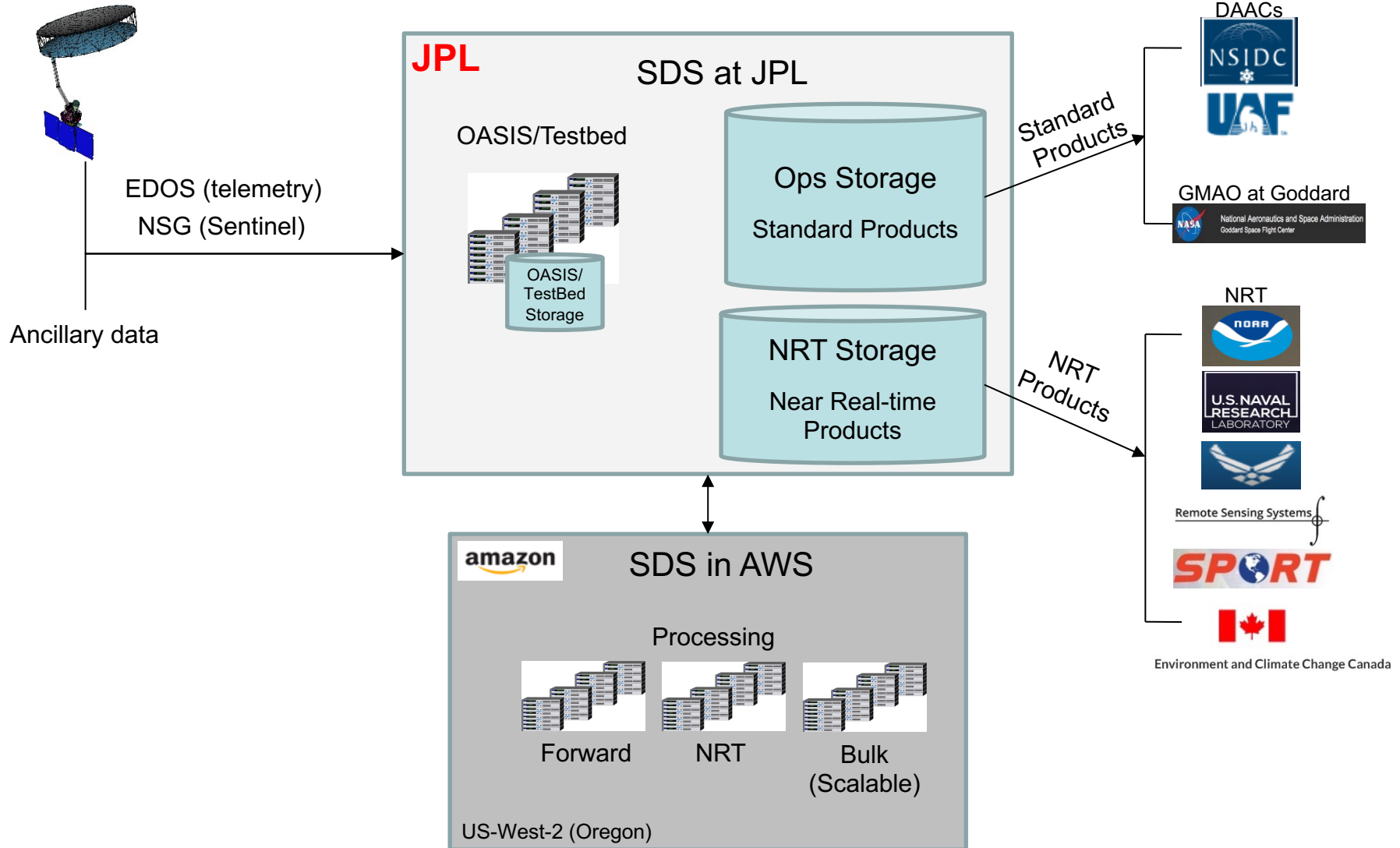
- SDS/NSIDC: Migrate current SDS NRT customers to pull NRT data from NSIDC

SDS Hybrid Architecture

NRT SDS Data Processing Cloud Migration Plans

- Migration of STD data processing to cloud to be completed Summer 2023

- R19 updates to STD data products and R19 reprocessing campaign to begin Fall 2023

- Migration of NRT data processing to cloud to follow

Thank You

Questions?