

Soil Moisture Active and Passive Mission (SMAP)

Algorithms & Cal/Val Workshop

Oxnard, CA, June 9-11, 2009

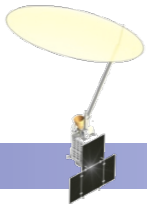
Introduction

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SMAP Mission Context



“Earth Science and Applications from Space: National Imperatives for the next Decade and Beyond”

SMAP is one of four missions recommended by the NRC Earth Science Decadal Survey for launch in the 2010–2013 time frame

- On Feb 2, 2008, NASA announced that SMAP would be one of two new start missions initiated in FY08

Tier 1: 2010–2013 Launch

Soil Moisture Active Passive (SMAP)
ICESAT II
DESDynI
CLARREO

Tier 2: 2013–2016 Launch

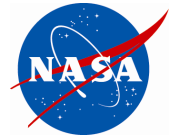
SWOT
HYSPIRI
ASCENDS
GEO-CAFE
ACE

Tier 3: 2016–2020 Launch

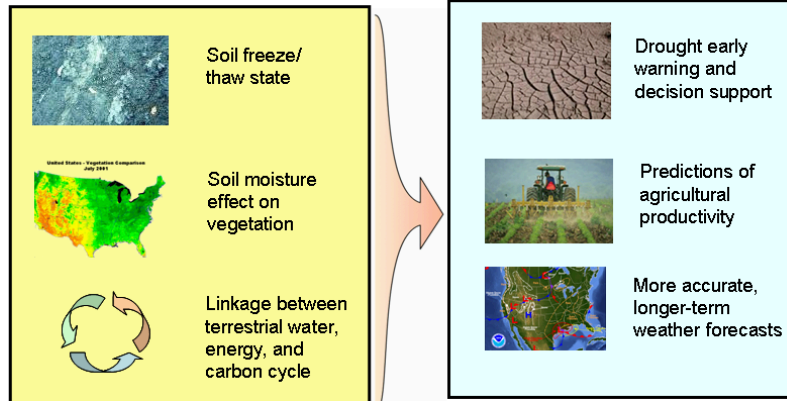
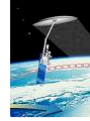
LIST
PATH
GRACE-II
SCLP
GACM
3D-WINDS



SMAP Science & Applications

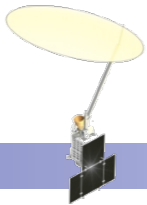


Soil Moisture Active-Passive (SMAP)
Launch: 2010-2013
Mission Size: Medium

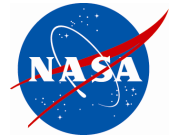


- SMAP is unique because its measurements have applications across a wide range of Earth sciences and their applications
- Disciplinary Decadal Survey panels cite SMAP applications

Decadal Survey Panels #	Cited SMAP Applications
1. Water Resources and Hydrological Cycle	1. Floods and Drought Forecasts 2. Available Water Resources Assessment 3. Link Terrestrial Water, Energy and Carbon Cycles
2. Climate / 3. Weather	1. Longer-Term and More Reliable Atmospheric Forecasts
4. Human Health and Security	1. Heat Stress and Drought 2. Vector-Borne and Water-Borne Infectious Disease
5. Land-Use, Ecosystems, and Biodiversity	1. Ecosystem Response (Variability and Change) 2. Agricultural and Ecosystem Productivity 3. Wild-Fires 4. Mineral Dust Production



SMAP Science Requirements



DS Objective	Application	Science Requirement
Weather Forecast	Initialization of Numerical Weather Prediction (NWP)	Hydrometeorology
Climate Prediction	Boundary and Initial Conditions for Seasonal Climate Prediction Models	Hydroclimatology
	Testing Land Surface Models in General Circulation Models	
Drought and Agriculture Monitoring	Seasonal Precipitation Prediction	Hydroclimatology
	Regional Drought Monitoring	
	Crop Outlook	
Flood Forecast	River Forecast Model Initialization	Hydrometeorology
	Flash Flood Guidance (FFG)	
	NWP Initialization for Precipitation Forecast	
Human Health	Seasonal Heat Stress Outlook	Hydroclimatology
	Near-Term Air Temperature and Heat Stress Forecast	Hydrometeorology
	Disease Vector Seasonal Outlook	Hydroclimatology
	Disease Vector Near-Term Forecast (NWP)	Hydrometeorology
Boreal Carbon	Freeze/Thaw Date	Freeze/Thaw State

Requirement	Hydro-Meteorology	Hydro-Climatology	Carbon Cycle	Baseline Mission		Minimum Mission	
				Soil Moisture	Freeze/Thaw	Soil Moisture	Freeze/Thaw
Resolution	4–15 km	50–100 km	1–10 km	10 km	3 km	10 km	10 km
Refresh Rate	2–3 days	3–4 days	2–3 days ⁽¹⁾	3 days	2 days ⁽¹⁾	3 days	3 days ⁽¹⁾
Accuracy	4–6% **	4–6%**	80–70%*	4%**	80%*	6%**	70%*

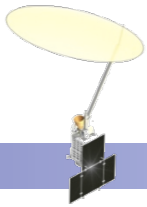
(*) % classification accuracy (binary Freeze/Thaw)

(**) % volumetric water content, 1-sigma

⁽¹⁾ North of 45N latitude

Mission Duration Requirement:

3 Years Baseline; 18 Months Minimum

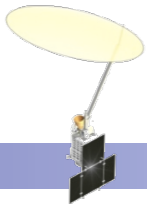


SMAP Baseline Science Data Products



Abbreviation	Description	Grid Type and Spacing	Spatial Resolution	Latency*
L1B_S0_LoRes	Low Resolution Radar Backscatter (σ^0)	Time Order	~ 30 km	12 hours
L1C_S0_HiRes	High Resolution Radar Backscatter (σ^0)	Earth Grid 1 km	~ 1–3 km	12 hours
L1B_TB	Radiometer Brightness Temperature (T_B)	Time Order	~ 40 km	12 hours
L1C_TB	Radiometer Brightness Temperature (T_B)	Earth Grid 36 km	~ 40 km	12 hours
L3_F/T_HiRes	Freeze/Thaw State	Earth Grid 3 km	~ 1-3 km	24 hours
L3_SM_HiRes	Radar Soil Moisture (internal product)	Earth Grid 3 km	~ 1-3 km	-----
L3_SM_40km	Radiometer Soil Moisture	Earth Grid 36 km	~ 40 km	24 hours
L3_SM_A/P	Radar/Radiometer Soil Moisture	Earth Grid 9 km	~ 10 km	24 hours
L4_C	Carbon Net Ecosystem Exchange	Earth Grid 9 km	~ 10 km	14 days
L4_SM	Surface & Root Zone Soil Moisture	Earth Grid 9 km	~ 10 km	7 days

***The SMAP Project will make a Best Effort to reduce the data latencies beyond those shown in this table.**



SMAP SDT Working Groups

<http://smap.jpl.nasa.gov/science/wgroups/>



- Working Groups established to enable broad community participation in the SMAP mission
- Provide forums for interaction on issues related to SMAP science and applications goals and objectives
- Communicate via email and at meetings, conference sessions, workshops, and other venues

