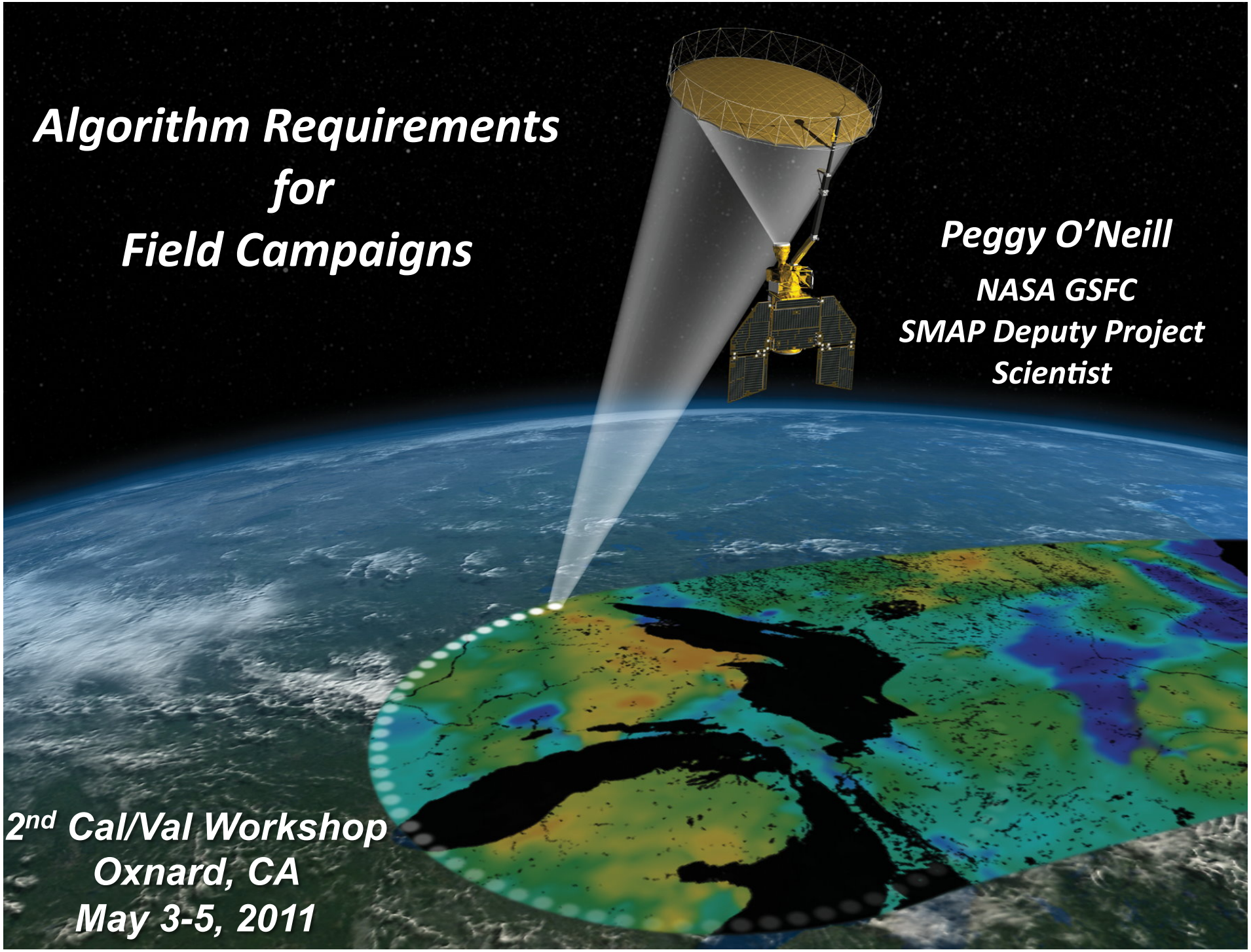
Algorithm Requirements for Field Campaigns



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2nd Cal/Val Workshop

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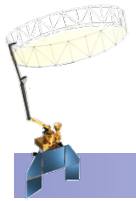


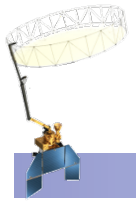
Algorithm Requirements for Field Campaigns – L1

- **L1B_TB [E. Kim, P. Mohammed]**

  1. Fly OSU, UMich & GSFC RFI-detecting backends on future SMAPVEX flights
     -- continue RFI surveys of environment through pre-launch period
  2. Repeat three SMAPVEX08-RFI flights: VA, PA, NY (Long Island Sound most important)
     -- repeat exact RFI flights to look at time evolution of RFI environment
  3. Overpass of Delaware Bay NOAA buoy with low surface wind speeds on multiple days
     -- could be used to test APC (antenna pattern correction) over ocean
  4. Airborne measurement of T_B spatial scaling in Dome-C vicinity
     -- for scaling up from Dome-C tower to 400-800 m box around Dome-C
  5. Continue tower-mounted T_B measurements at Dome-C (ESA has stopped theirs)
     -- #4 & #5 both useful for calibration of L1B_TB (both point and area T_B)
     -- intercalibration of SMAP with SMOS & Aquarius

- **L1C_S0 [R. West]**

  -- Need more polarimetric L-band radar data over Amazon target areas (esp. VV, HV)
     -- currently checking existing satellite radar data
     -- used as reference target for removing long-term trends & biases



Algorithm Requirements for Field Campaigns – L2

- **L2_SM_P [P. O'Neill, E. Njoku, T. Jackson, S. Chan]**

  -- Needed for cal/val:

  -- measurements of 0-5 cm soil moisture, effective temperature, VWC

  -- measurements applicable to 36-km SMAP grid

  -- sites covering a variety of land covers & crops

  -- data acquired throughout the year to assess seasonality of algorithm parameterizations

  -- Priorities for Cal / Val pre-launch are developing good vegetation parameterizations for different land cover classes, including their seasonal & polarization variations

- **L2_SM_A [M. Moghaddam, S. Kim]**

  -- Needed for cal/val:

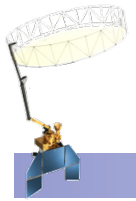
  -- soil moisture and roughness varying over expected ranges

  -- many classes of vegetation cover

  -- measurements of vegetation geometry and fractional cover

  -- dynamic vegetation to test time series algorithms

  -- long time series radar data of sufficient accuracy (better than 0.5 dB)



Algorithm Requirements for Field Campaigns – L2/3

- **L2_SM_A/P [D. Entekhabi, N. Das]**

  -- **Needed for cal/val:**

  -- **new PALS data sets (in conical scan mode) over diverse landscapes and land covers**

  -- **long time series active/passive data (at least one month)**

  -- **large dynamic range of soil moisture conditions**

- **L3_F/T_A [K. McDonald, S. Dunbar]**

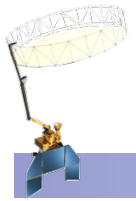
  -- **Needed for cal/val:**

  -- **focused campaigns using available a/c (UAVSAR) and satellite L-band radar data spanning F/T transitions over regional gradients (climate, land cover, terrain)**

  -- **initialization of algorithm parameters (e.g. F/T reference states) over L3_F/T domain**

  -- **test site with distributed measurements to capture sub-grid scale temperature variability and continuous measurements to characterize diurnal and daily variability**

  -- **coincident measurements of surface meteorology & fluxes (water, CO_2)**



Algorithm Requirements for Field Campaigns – L4

- **L4_SM [R. Reichle]**

  -- **Needed for cal/val:**

  -- **9 km sites w/ distributed measurements of both surface (0-5 cm) & profile (0-100 cm) soil moisture**

  -- **as many climate/vegetation/terrain combinations as possible**

  -- **need multi-year time series to obtain robust climatologies**

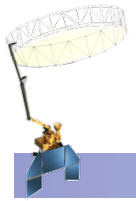
- **L4_C [J. Kimball]**

  -- **Needed for cal/val:**

  -- **will use subset (~ 40 towers) of FLUXNET tower network in pre-launch algorithm development activities along with MERRA and MODIS inputs**

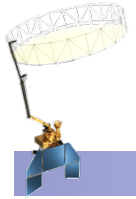
  -- **remaining tower network reserved for post-launch validation**

  -- **will collaborate with AirMOSS efforts on carbon modeling & a/c campaigns in regional windows around 6-8 Ameriflux tower sites**

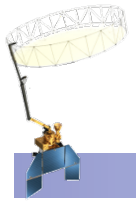


Algorithm Requirements in Common

- **F/T requirements unlikely to be met by soil moisture campaigns which avoid frozen soil conditions**
  - -- separate campaigns for F/T and SM [F/T campaign on agenda Wed AM]
- **Soil moisture campaigns should strive for:**
  - -- long time series of active / passive microwave data
    - -- to collect full dynamic range of soil moisture conditions
    - -- to provide changing biomass conditions
    - -- to assess seasonality of parameterizations
  - -- new vegetation types / diverse landscapes
  - -- test sites scalable to SMAP grid cells
    - -- sites with sufficient number of ground measurement locations to provide good average at SMAP spatial scales
  - -- availability of needed ancillary data (measurements of temperature, vegetation (type, water content, fractional cover, & geometry), surface roughness, etc.)
  - -- should fly RFI backends on any cal/val flight



BACKUP



L2_SM_A Requirements for Cal/Val

- **Ground samples of soil and biomass should include:**

  -- To validate the forward model:

  - **Soil moisture & soil texture**
  - **Surface roughness profiles 5-10 at pixel scale and description of row pattern if it exists**
  - **Density of vegetation (e.g., # trunks or stalks)**
  - **Leaf geometry (shape and sizes) and water content (5-10)**
  - **Stalk or woody part geometry (length and radius) (5-10)**
  - **Leaf and Stalk orientation distribution characteristics**
  - **Ratio of stalks to leaves**
  - **Dielectric properties of vegetation**
  - **Fraction of vegetation cover in a given pixel**

  -- For validation of the retrieval:

  - **Soil moisture & soil texture**
  - **Surface roughness**
  - **Biomass level**
  - **Vegetation class**
  - **Fraction of vegetation cover in a given pixel**