SMAPEx Comments

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SMAPEx Motivation (Original)

- Field campaigns with airborne and ground data are required for SMAP pre-launch activities:
  - testing of SMAP baseline radar algorithm for bare and vegetated soil;
  - development/testing of SMAP radar and radiometer algorithm for vegetated surfaces;
  - development/testing of SMAP merged active and passive algorithm;
- Availability of a low-cost active and passive L-band airborne facility & ongoing soil moisture monitoring network in the Murrumbidgee catchment.
- Development of an Australian cal/val site for post-launch verification of SMAP products over Australia

SMAPEx (Original)

- SMAPEx: Support from the Australian Research Council
  - SMAP support for ground sampling
- Details
  - *4, 1-week long campaigns across one seasonal cycle*
  - Semi-arid, irrigated & dryland cropping, dryland grazing
  - *Airborne: L-band Radiometer & Radar, VIS/IR/NIR/SWIR And Thermal IR*
  - Ground: soil moisture, vegetation biomass/VWC/LAI/VIS&NIR, surface roughness, soil temperature
  - Personnel: 10 (soil moisture sampling), 3 (vegetation sampling)
  - Monitoring Network: 29 semi-permanent soil moisture stations (On SMAP 36km/9km/3km Nested Grids)

Objectives (Original)

- Radar-only soil moisture retrieval (L3_HiRes, 3km)
  - Verify baseline algorithms proposed for SMAP (Dubois et al., 1995 for bare soil and various options for vegetated surface)
- Radiometer-only soil moisture retrieval (L3_SM_40km)
  - Use the SMAP radar information on surface roughness and vegetation structure (3km) to aid the soil moisture retrieval from the SMAP radiometer (40km)
- Active Passive soil moisture product (L3_SM_AP, 10km)
  - Use the high resolution (3km) but noisy SMAP radar observations to downscale the accurate but low resolution (40km) radiometer footprint (downscaling algorithm Das et al., 2009; Bayesian algorithm, Zhan et al., 2006; change detection algorithm Piles et al., 2009)

Issues

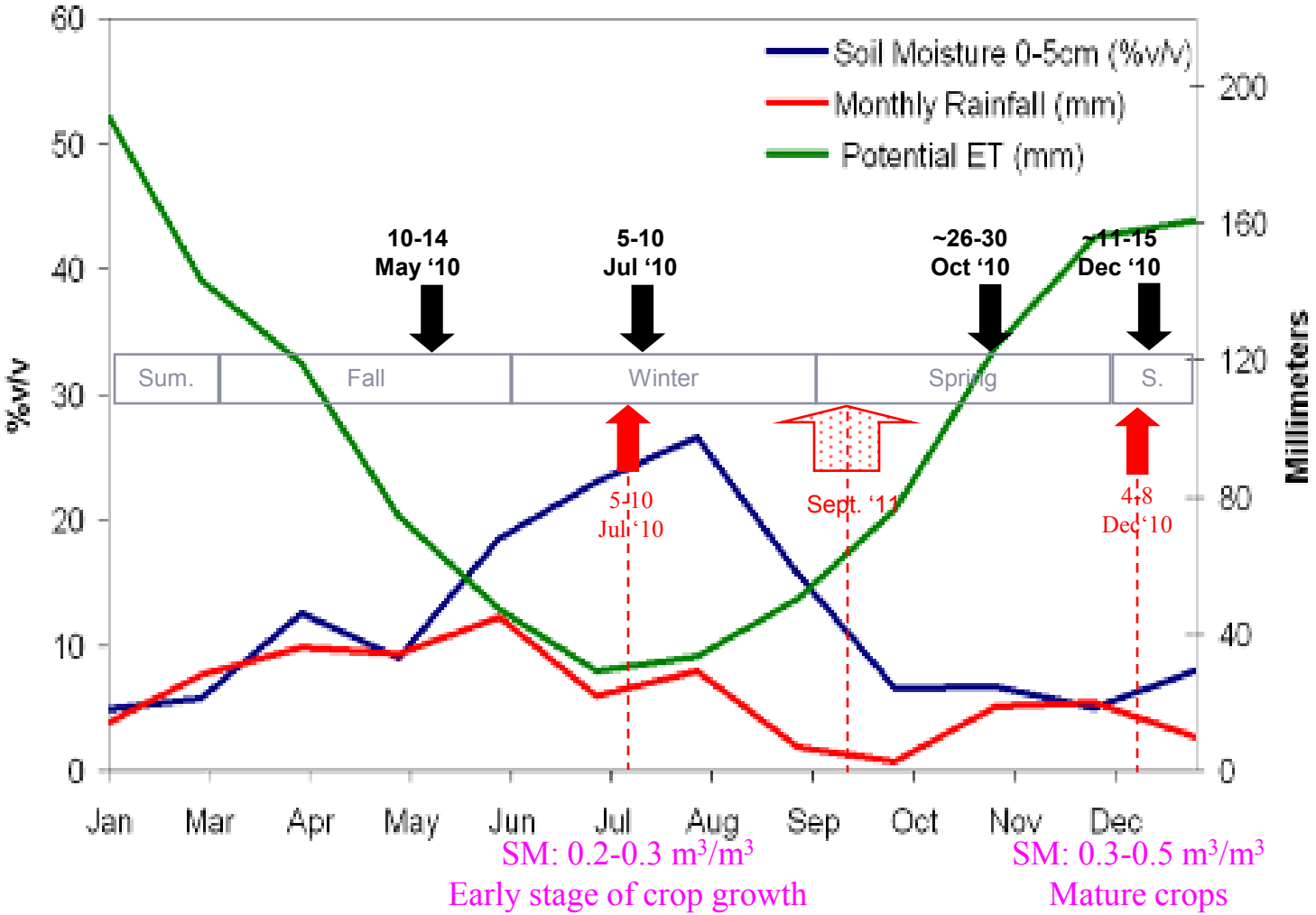
1. September 2011 campaign acceptable?
2. Has the plan evolved with the SMAP algorithms?
3. Is the PLIS data OK?
4. Balance of ground sampling activities.
5. Management and data.
6. Aquarius?

Issue 1

- In the context of resources and what has been observed, is the decision on the extended September 2011 campaign acceptable?

Four, 1-week Long Campaigns Across One Seasonal Cycle

Three Campaigns Across One Seasonal Cycle



Issue 2

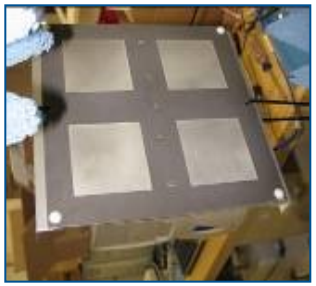
- Has the plan evolved with the SMAP algorithms?
  - Consider Peggy's presentation.
  - Does everyone understand the radar and combined options under consideration?

Issue 3

- Have we spent enough time looking at the radar data?
  - Verified performance and calibration?
  - Data collection design?
  - PLIS to SMAP conversion?

Airborne Facility

L-band Radar (focused SAR)



L-band Radiometer (6 beams)

6 x SWIR
6 x Vis/NIR
6 x TIR

PLMR:
Polarimetric L-band Multibeam Radiometer

Frequency/bandwidth: 1.413GHz/24MHz

Polarisations: V and H

Resolution: 1km at 3km flying height,

Incidence angles: +/- 7 , +/-21.5 , +/- 38.5 across track

Antenna type: 8x8 patch array

PLIS:
Polarimetric L-band Imaging Scatterometer:

Frequency/bandwidth:1.26GHz/30MHz

Polarisations: VV, VH, HV and HH

Resolution: 10m

Incidence angles 15º -45º on both sides of aircraft

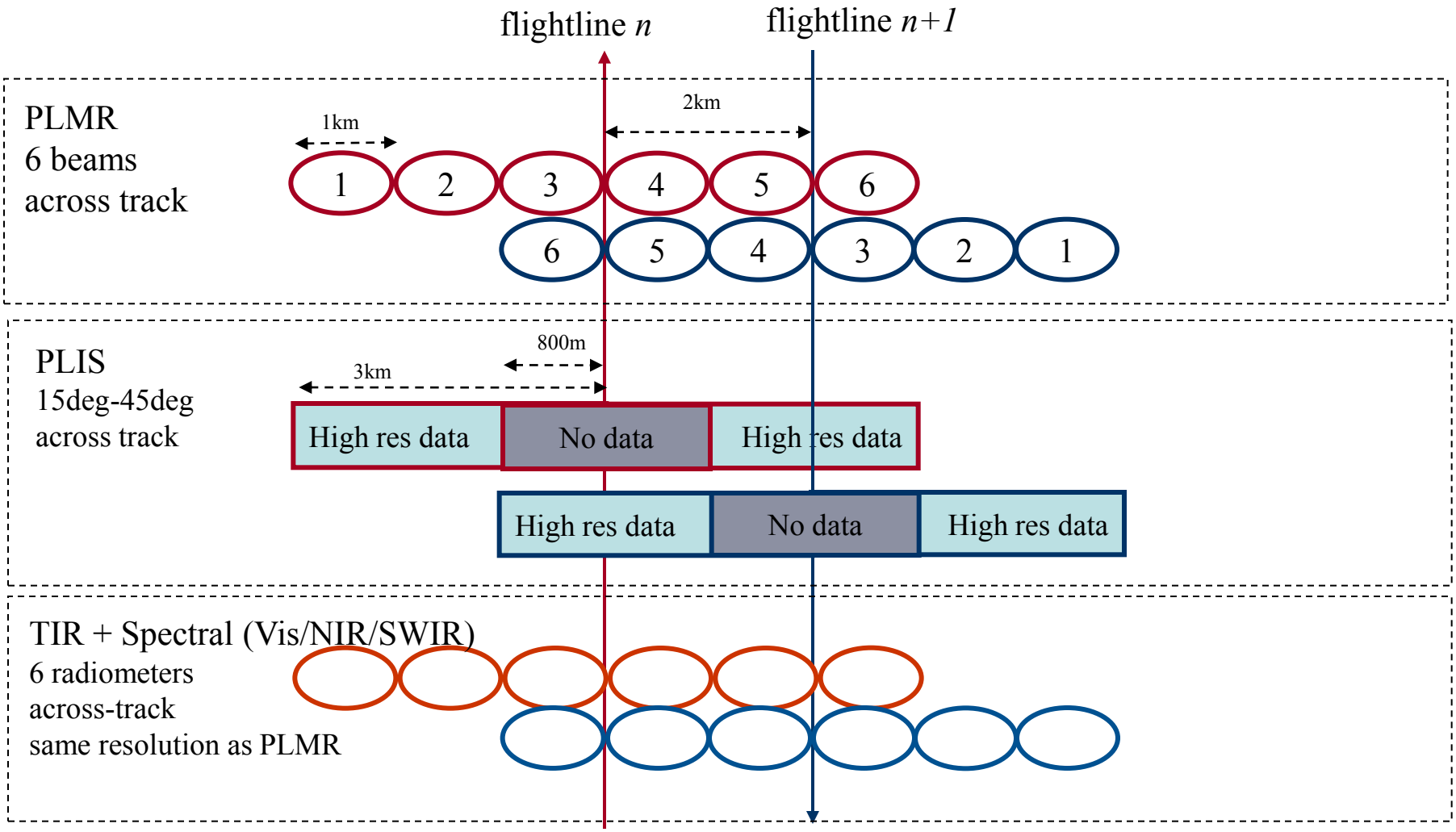
Antenna type: 2x2 patch array

Planned PLIS Test Program/Schedule

- Factory internal testing + truck test (ongoing, MA, USA)
- Delivery: mid-Feb (TBC)
- Ground based tests (mid-Feb - May, UoA/DSTO).
- Software testing (mid-Feb - May, UoA).
- Aircraft integration (mid-Feb - mid-Mar, ARA)
- Flight tests near Adelaide (mid-Mar - mid-Apr, UoA/DSTO)
- Post flight Analysis (mid-Apr - early May, UoA/DSTO)
- Field deployment in Murrumbidgee area (May 10-14)

Have delays and repairs impacted the QC?

Airborne Monitoring Design

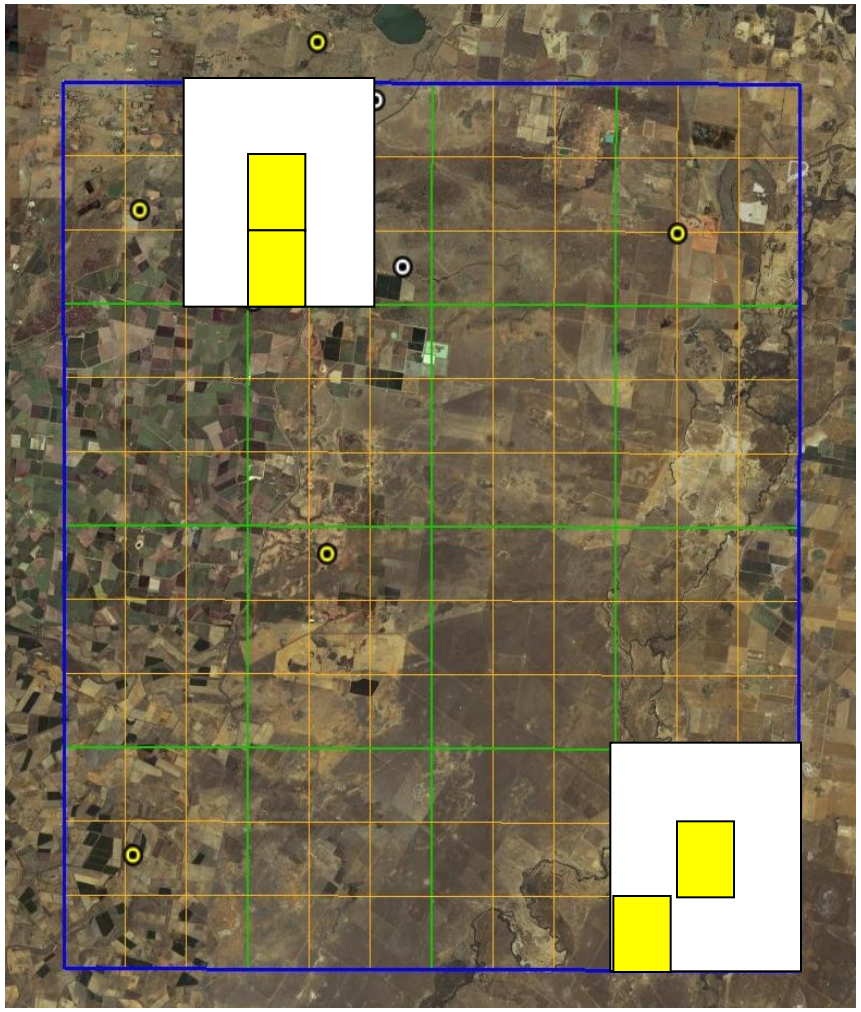


Need to verify calibration and angle normalization before next campaign!

Issue 4

- Do we have the right balance of ground sampling to meet the multiple objectives?
  - Supporting the three SM products with the airborne system
  - Verifying the network for post-launch validation of the three SM products
  - More effort on SM, less on other?
- Do we need to change things for the longer campaign?

Example of a SMAP Soil Moisture Core Validation Site (J. Walker Univ. Monash)



Augmenting an existing radiometer scale network to support SMAP

- SMAP Radiometer Pixel – 34x38km
- SMAP Radar pixels ~ 3x3km
- SMAP joint radiometer/radar soil moisture – 9x9km
- Existing stations
- New stations

Monitoring Strategy

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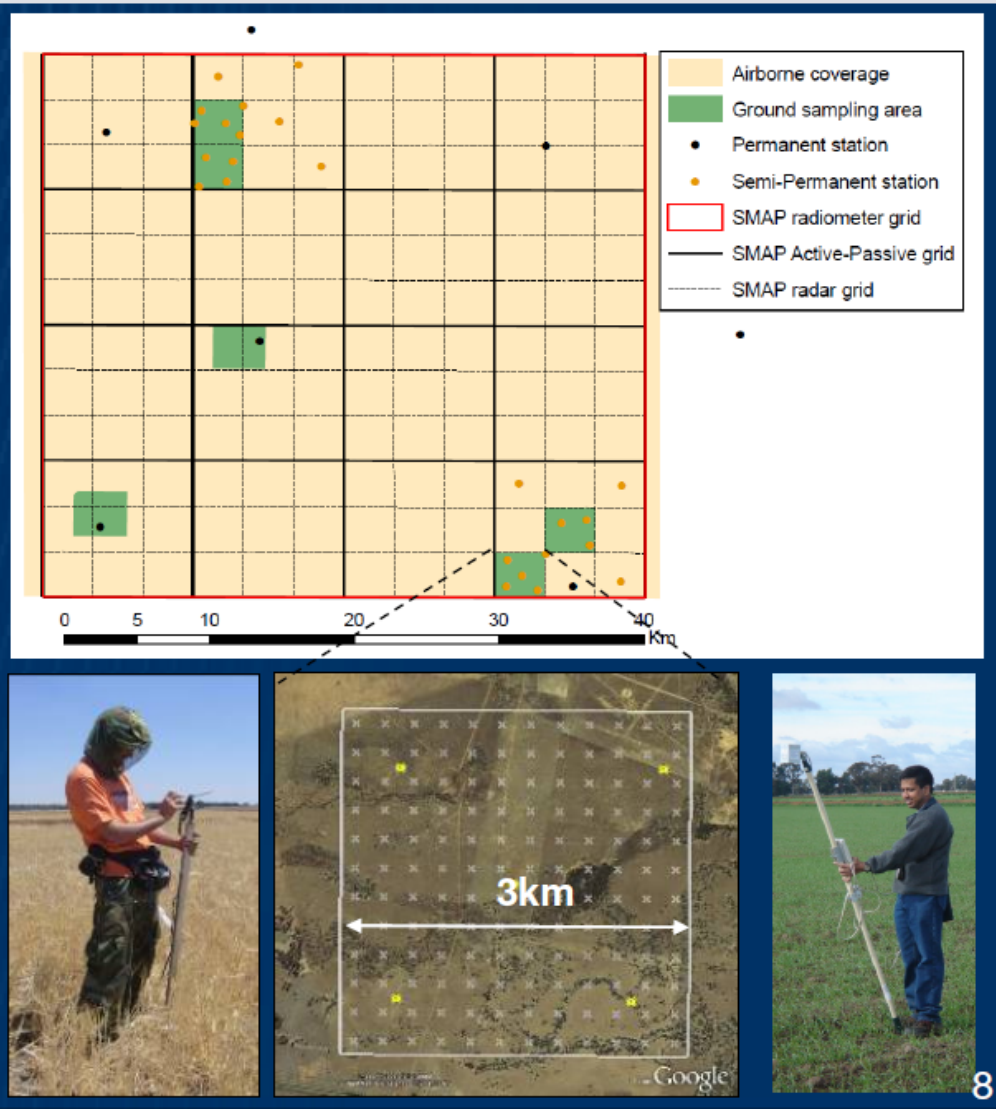
- Airborne
  - 40km x 40km coverage
  - 2 days "revisit'
  - Ground resolution

    1km (passive)/ 10m (active)

- Ground validation data
  - Six 3km x 3km focus areas
  - Soil moisture at 250m spacing
  - Surface roughness, vegetation biomass, water content, LAI, reflectance



From Rocco's Fall 2010 AGU Presentation

Issue 5

- Changing management….
- Data processing and QC clearly defined and scheduled?
- Archival…public?

Issue 6

- If Aquarius is launched before September, this campaign would obviously support radiometer, radar, and soil moisture validation.
- What might we be able to tweak in the design to better match Aquarius?
  - Extent of domain: use strategic design of flight lines?
  - Schedule matched to overpasses.
  - Surface temperature observations.