MONASH University
Engineering

SAZE-Oz and AACES : First Results

Jeffrey Walker, Christoph Rüdiger, Yann Kerr

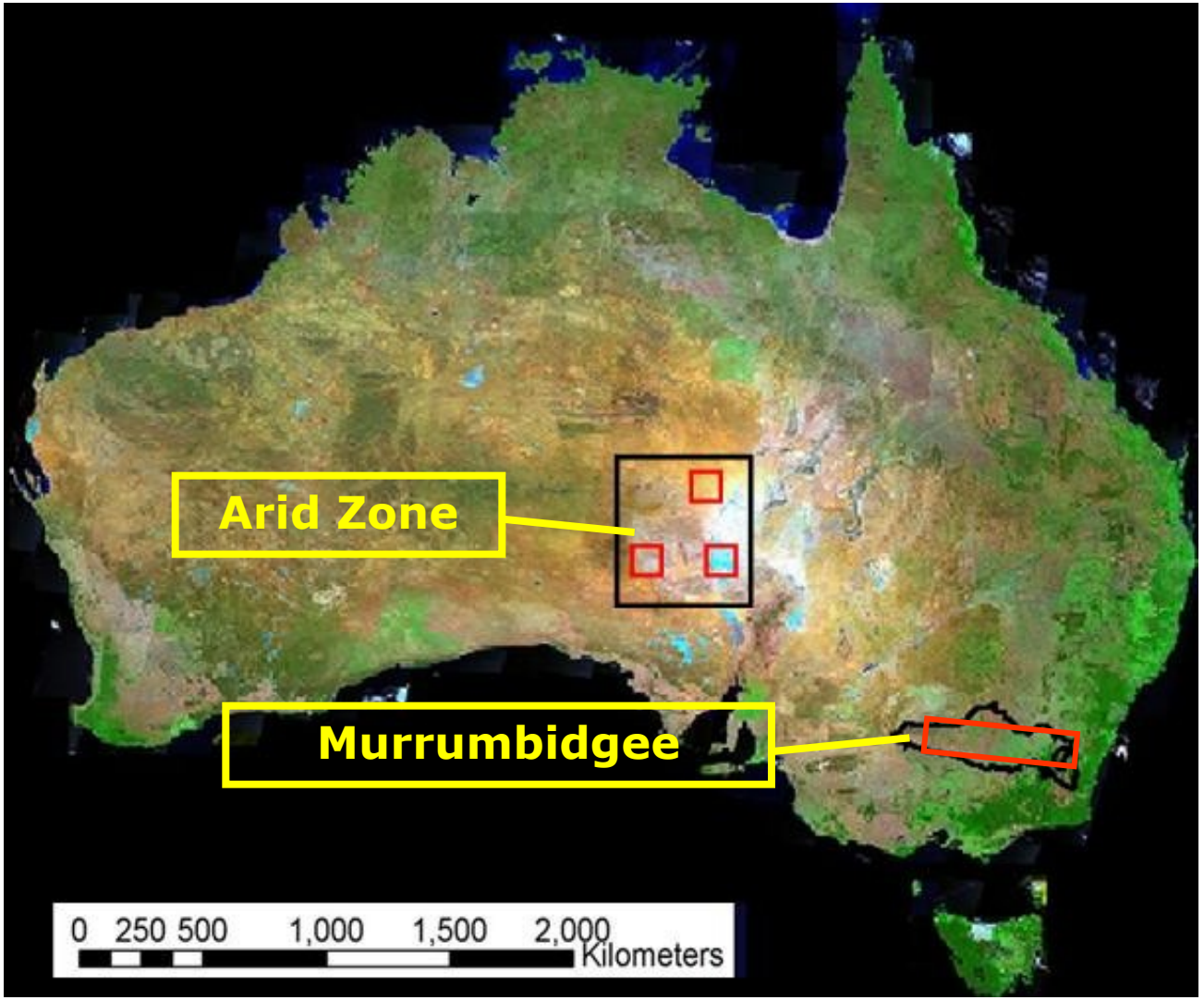
Department of Civil Engineering & CESBIO

Mahdi Allahmoradi, Ranmalee Bandara, Damian Barrett, Robert Gurney, Edward Kim, John Le Marshall, Sandy Peischl, Nan Ye

and

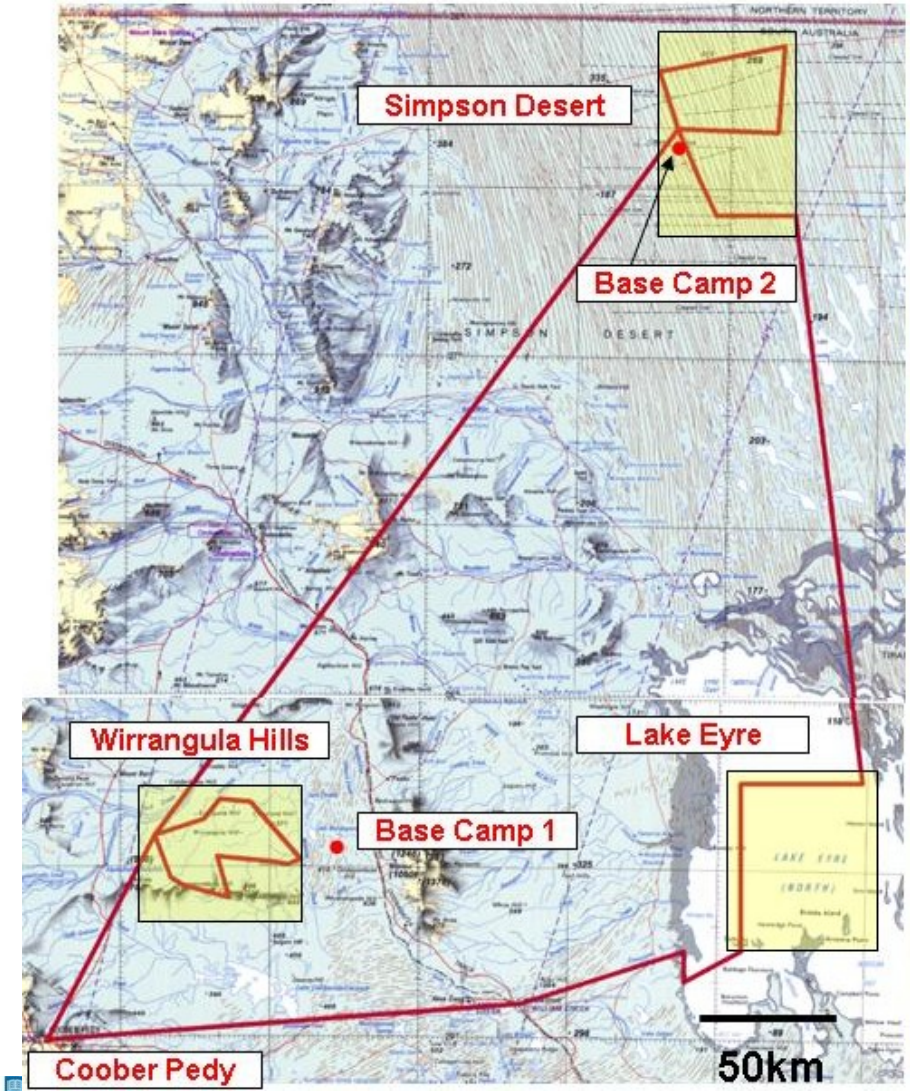
Maria Piles, Arnaud Mialon, Olivier Merlin

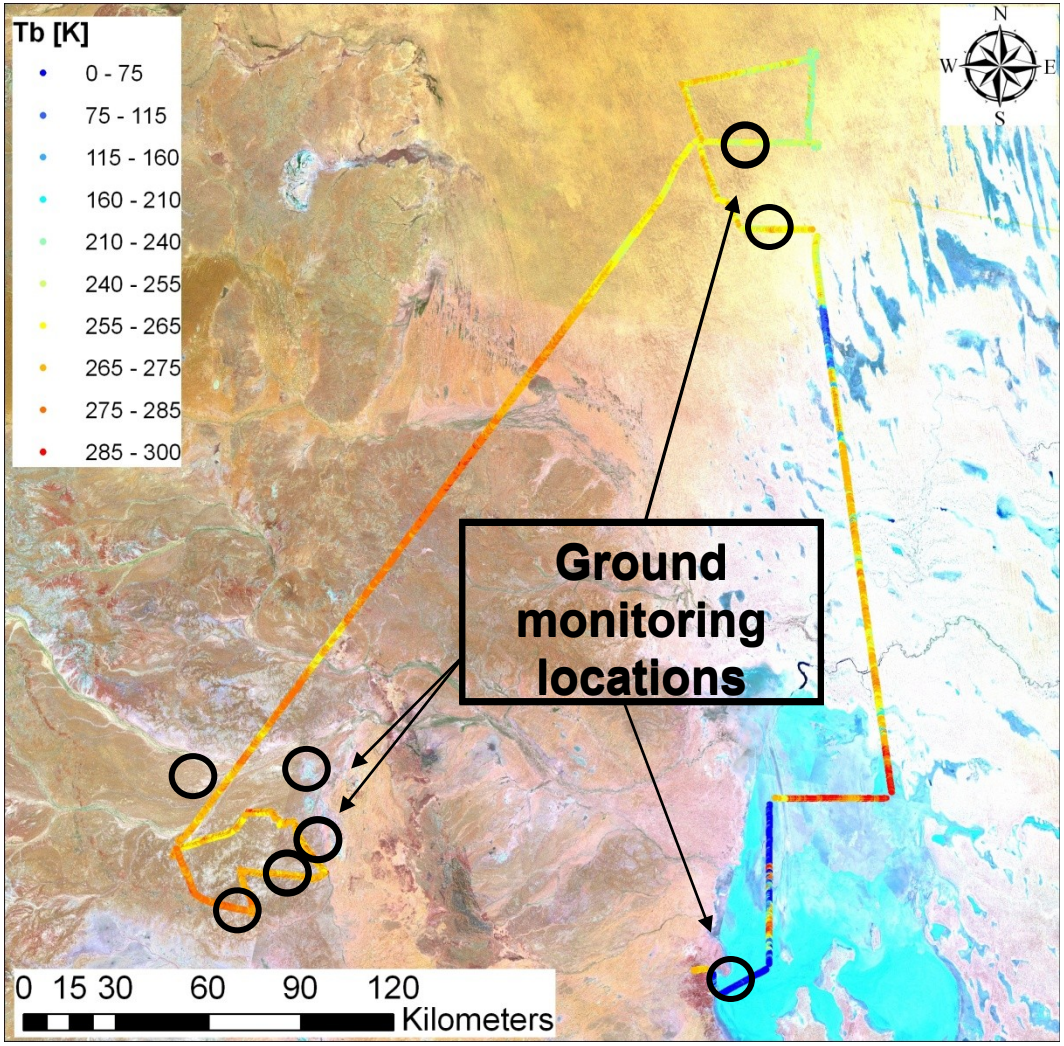
A Potential SMOS ground target …



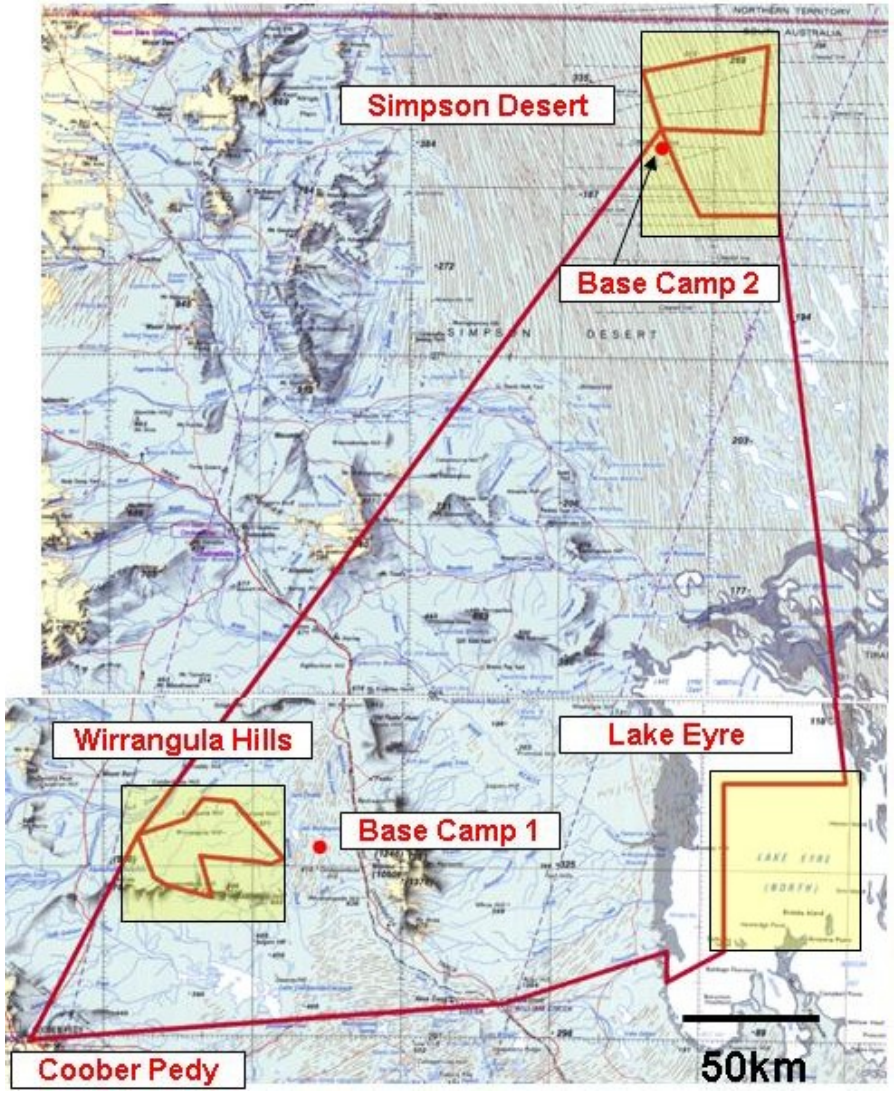
SMOS Arid Zone Experiments in Australia

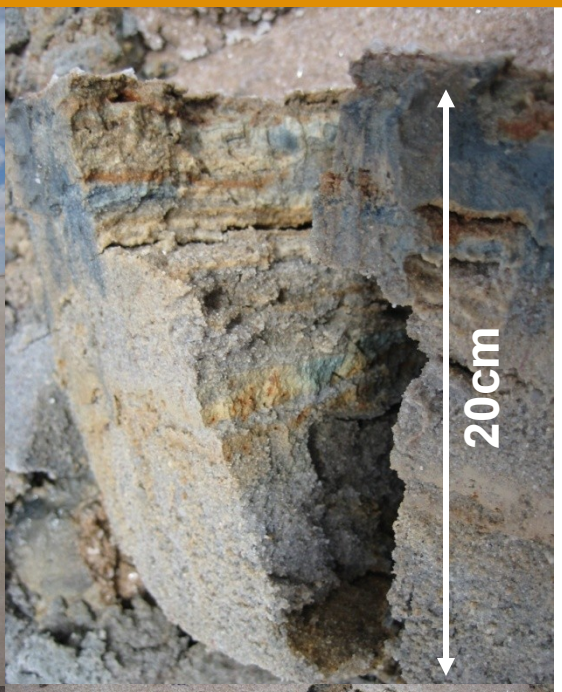
Reconnaissance: 9 Nov 2008





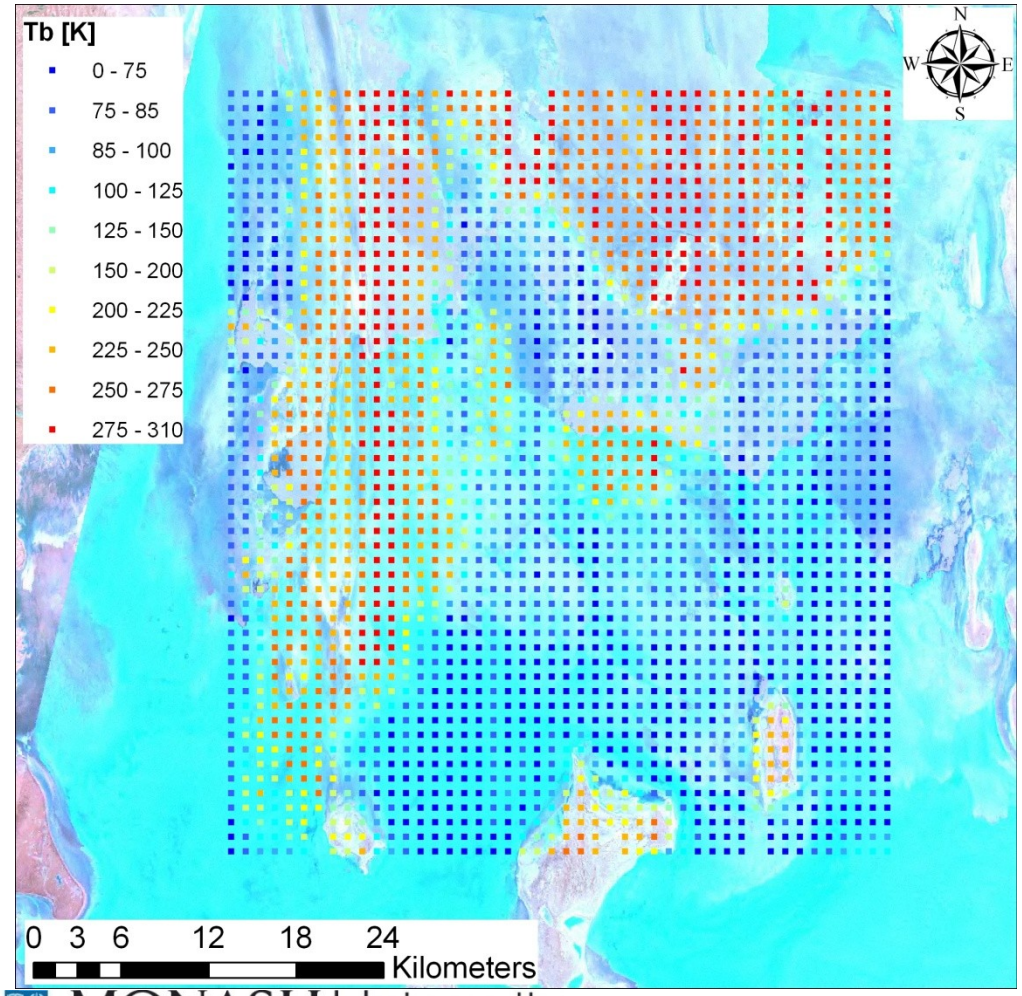
Lake Eyre: 10 Nov 2008



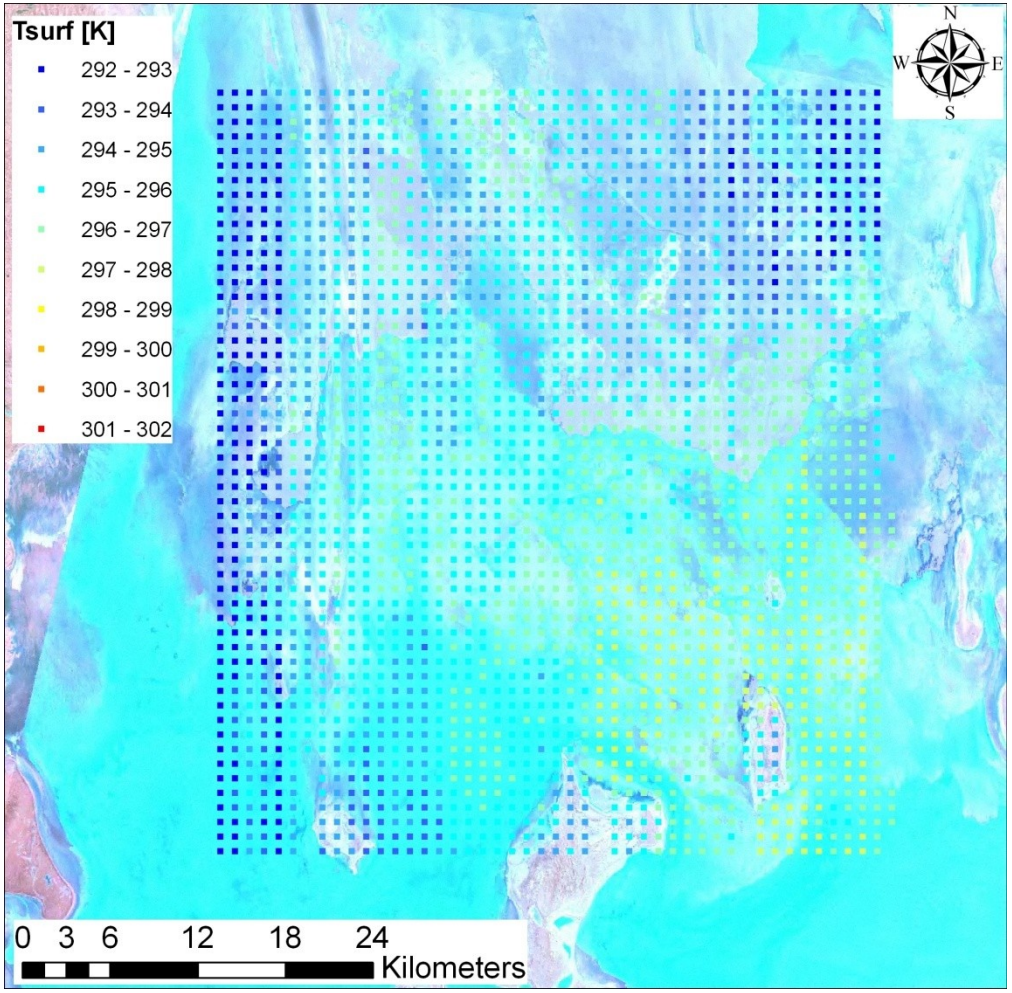


Lake Eyre

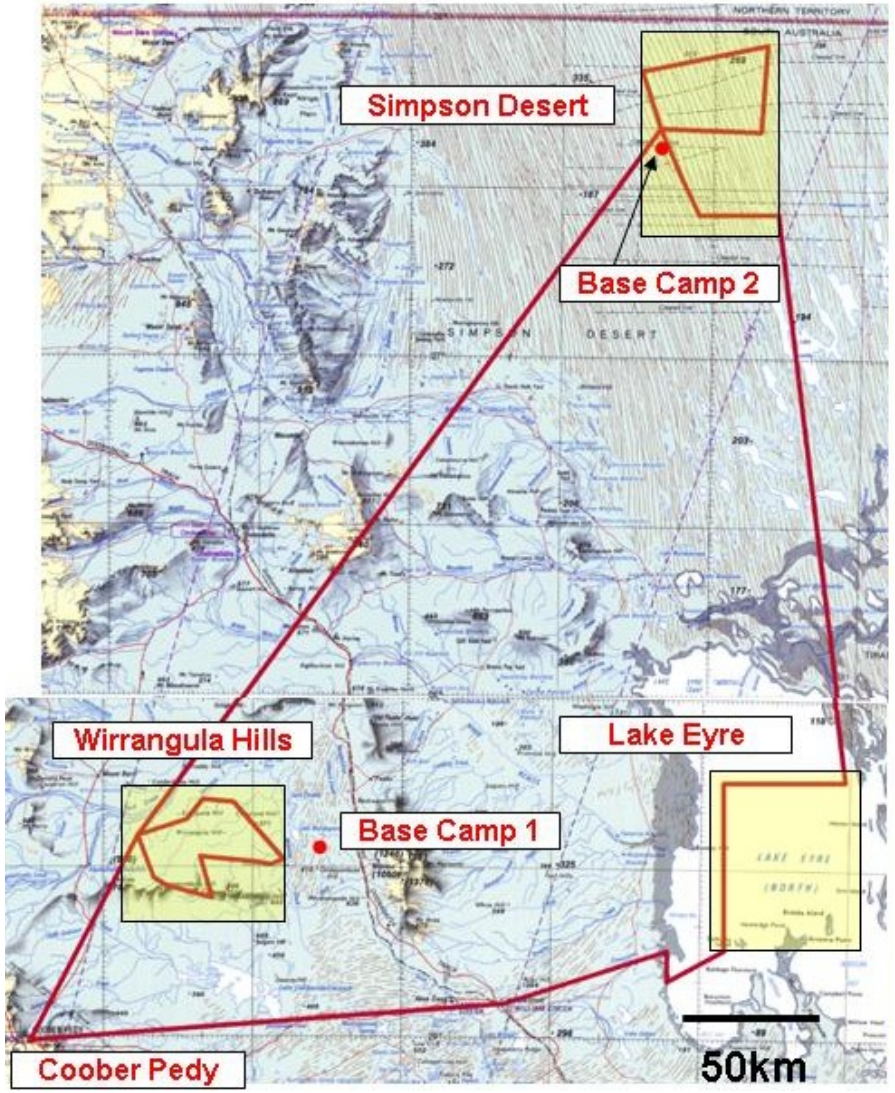
Tb H-polarisation, 38deg 6am

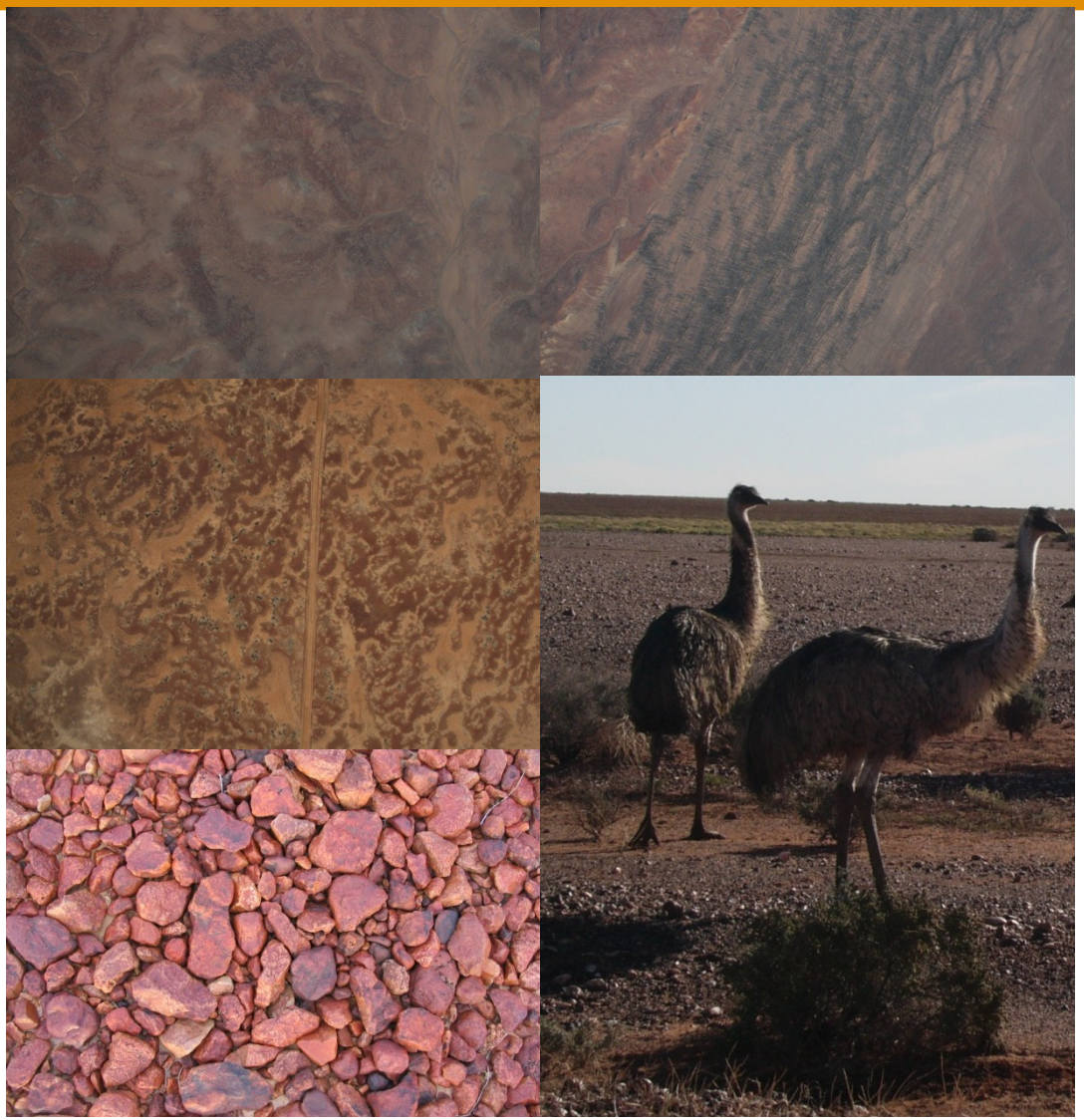


TIR, nadir 6am



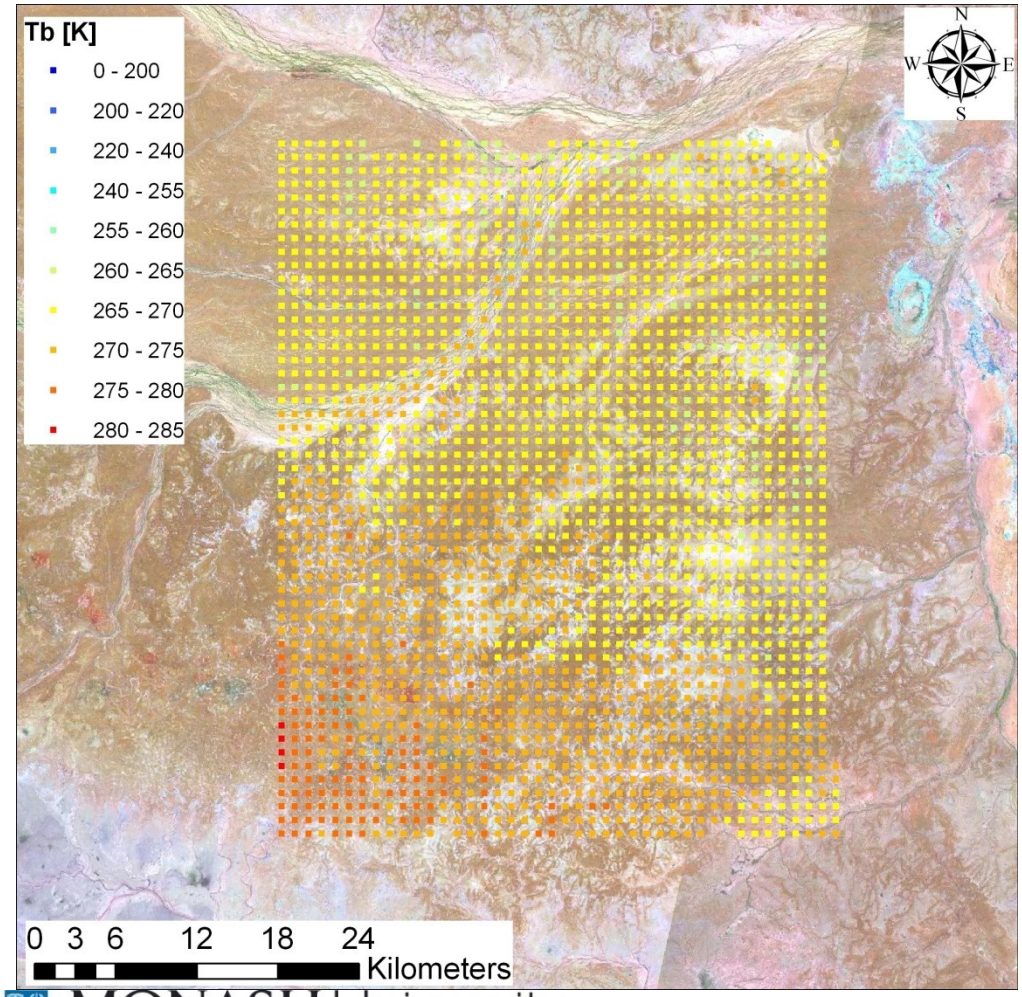
Wirrangula Hills: 12 Nov 2008 / 13 Aug 2009



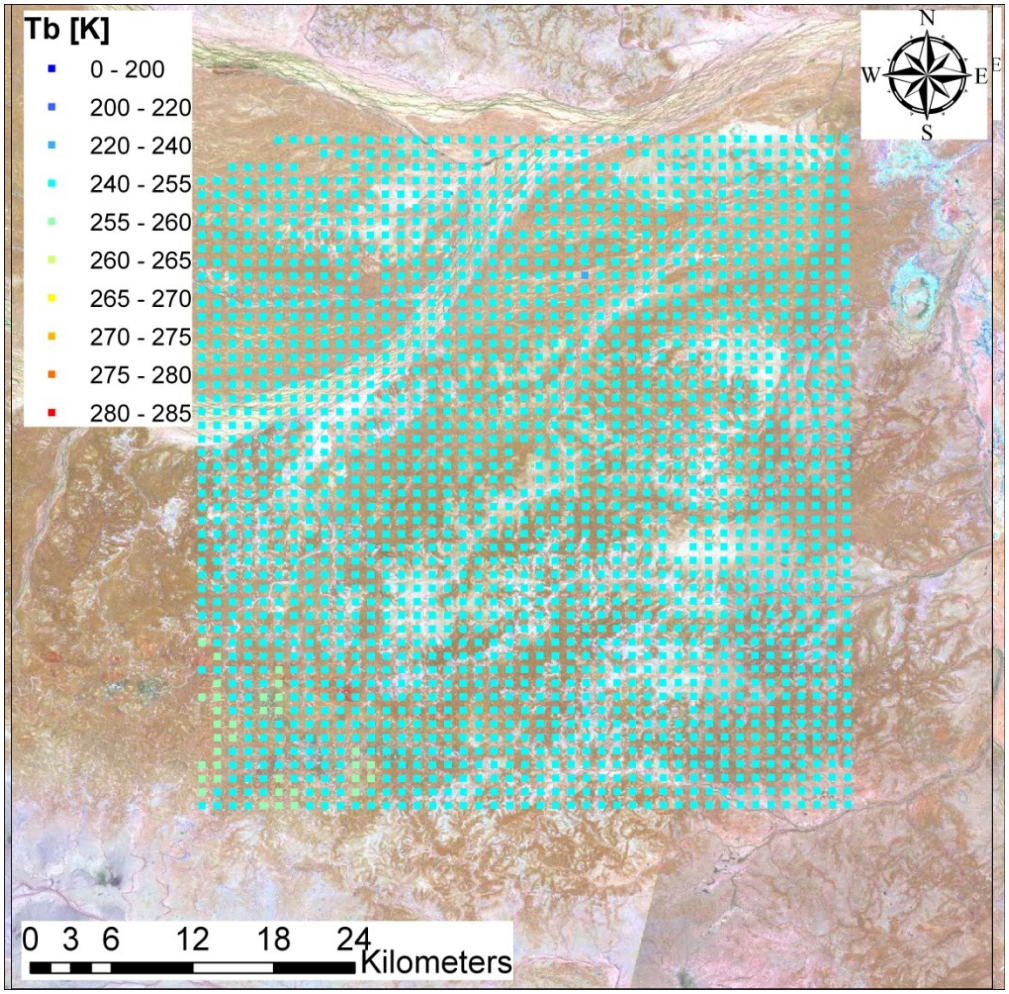


Wirrangula Hills

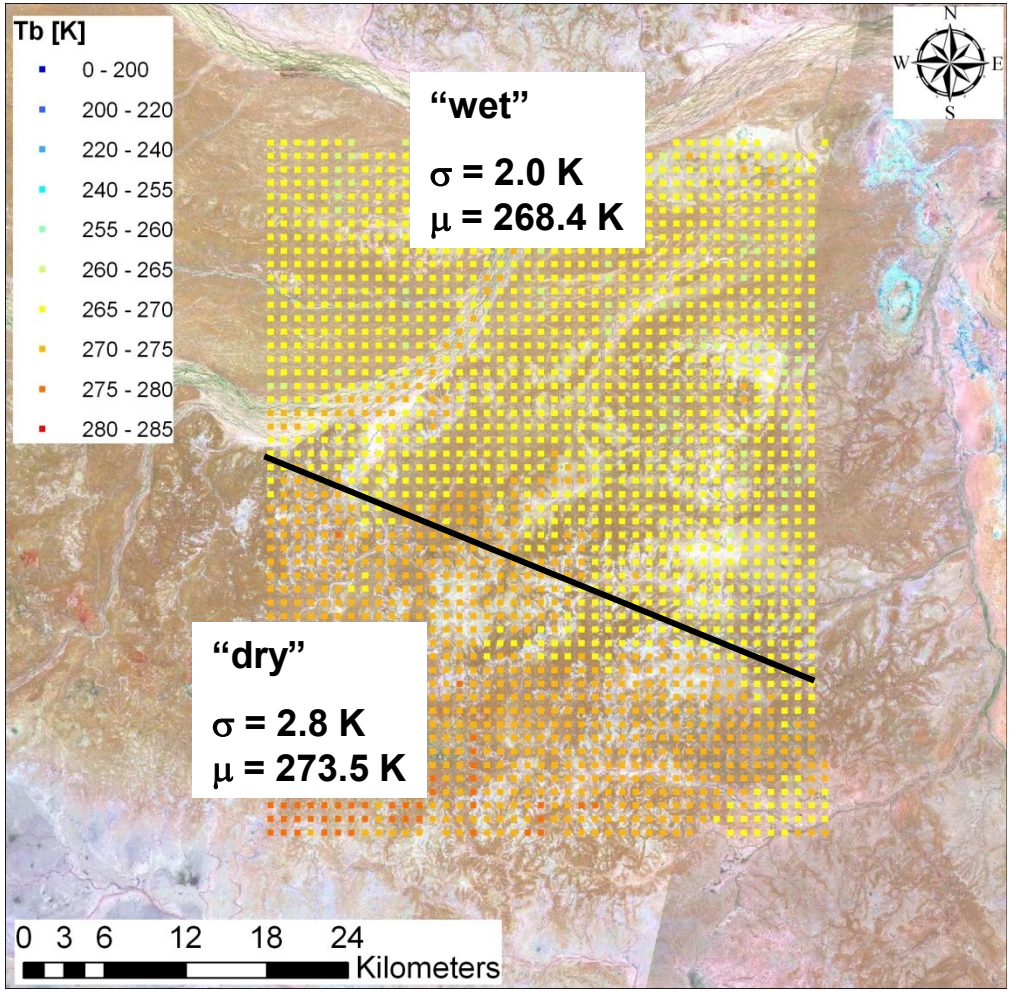
Tb H-polarisation, 38deg 6am

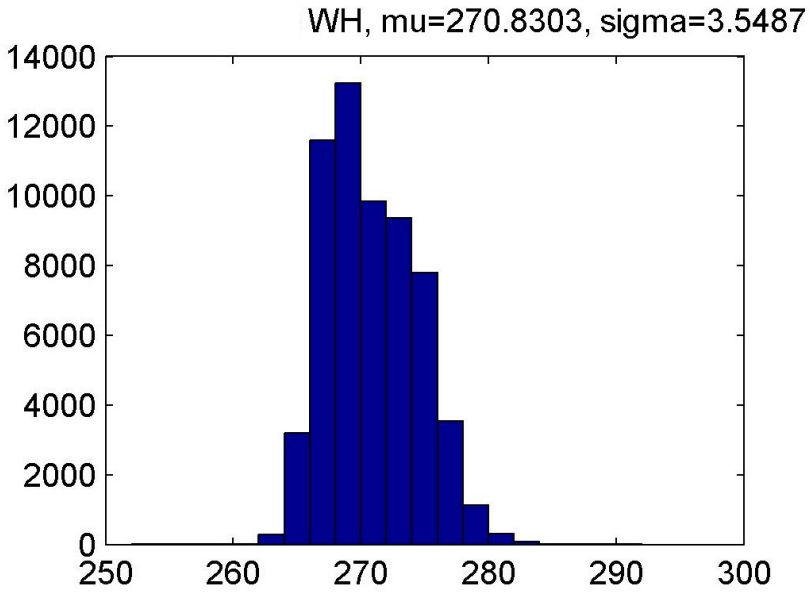


Tb H-polarisation, 38deg 6am (2009)



Wirrangula Hills

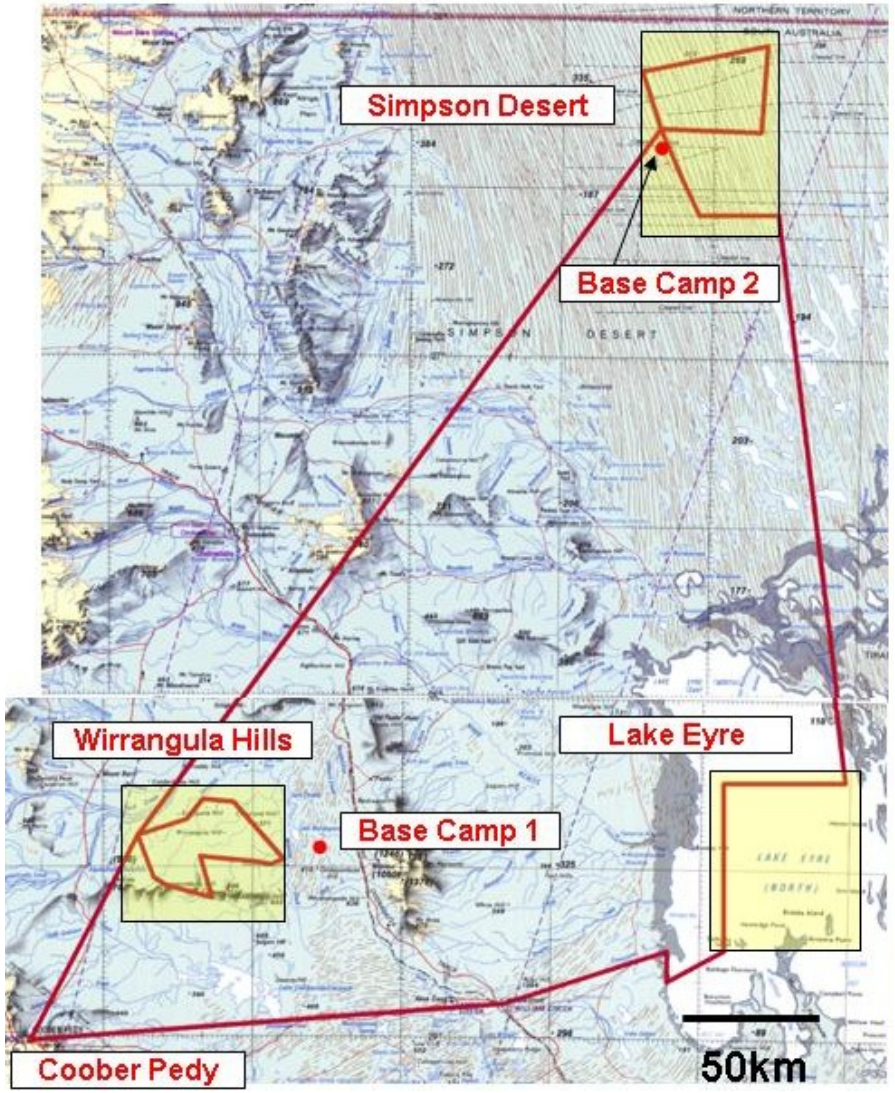


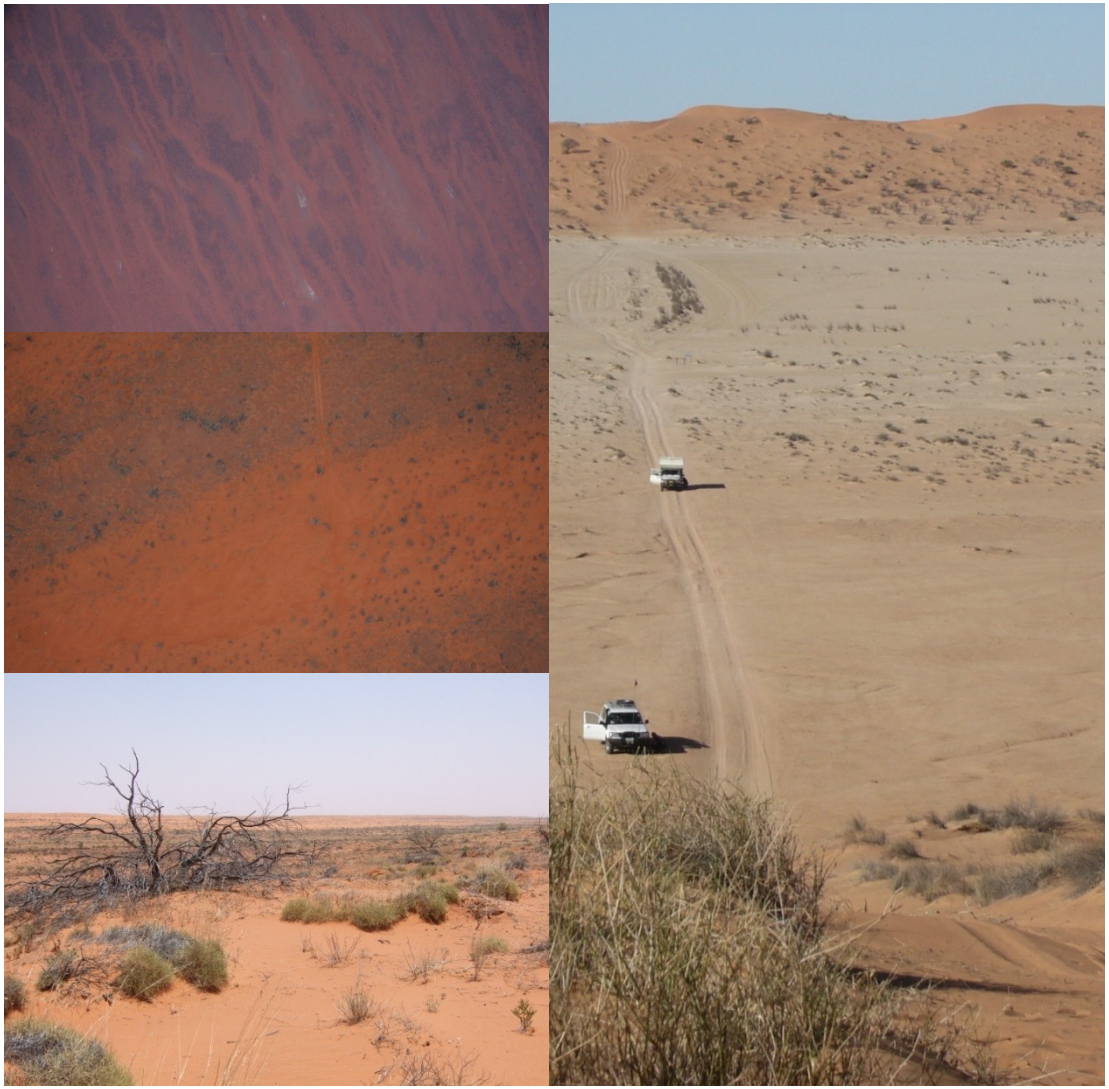


sigma from single high resolution loop transect
4.1K

Note: sigma from reconnaissance flight was 5.2K

Simpson Desert: 14/15 Nov 2008 / 12 Aug 2009





Simpson Desert

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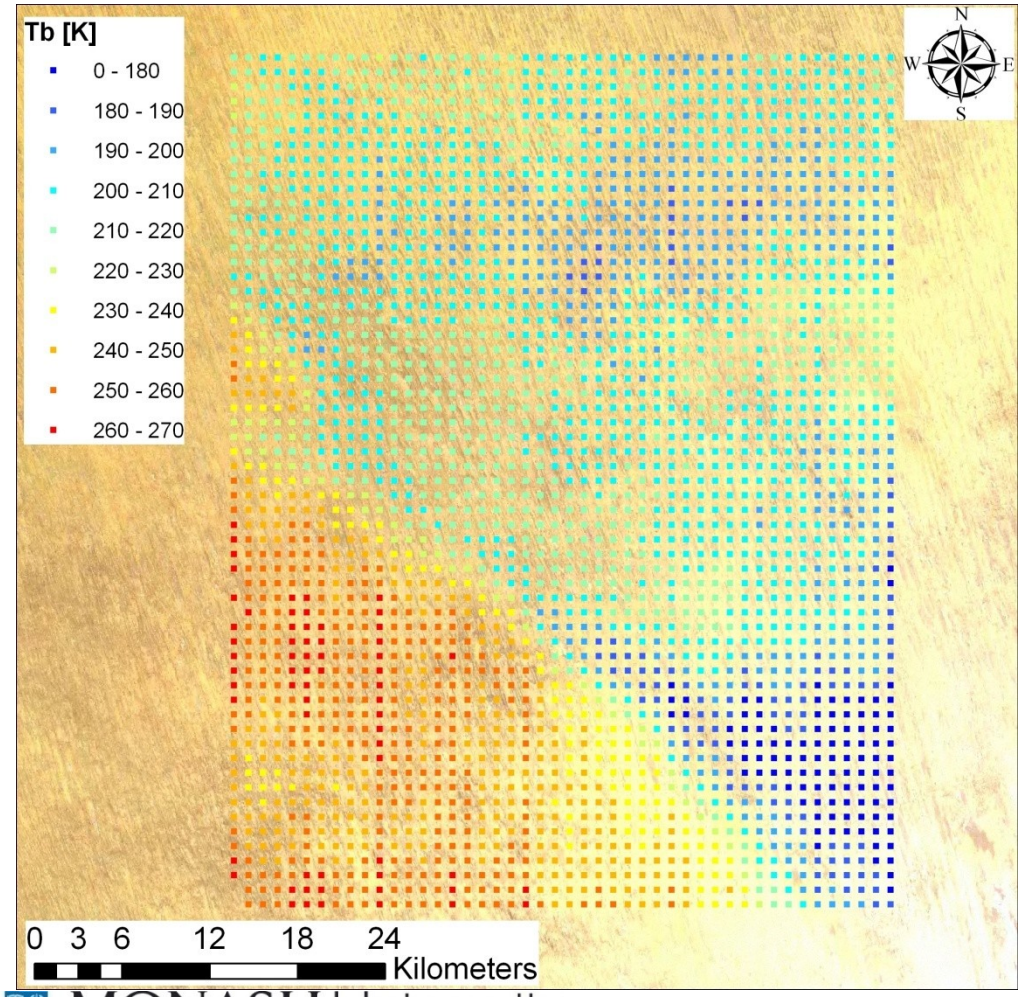
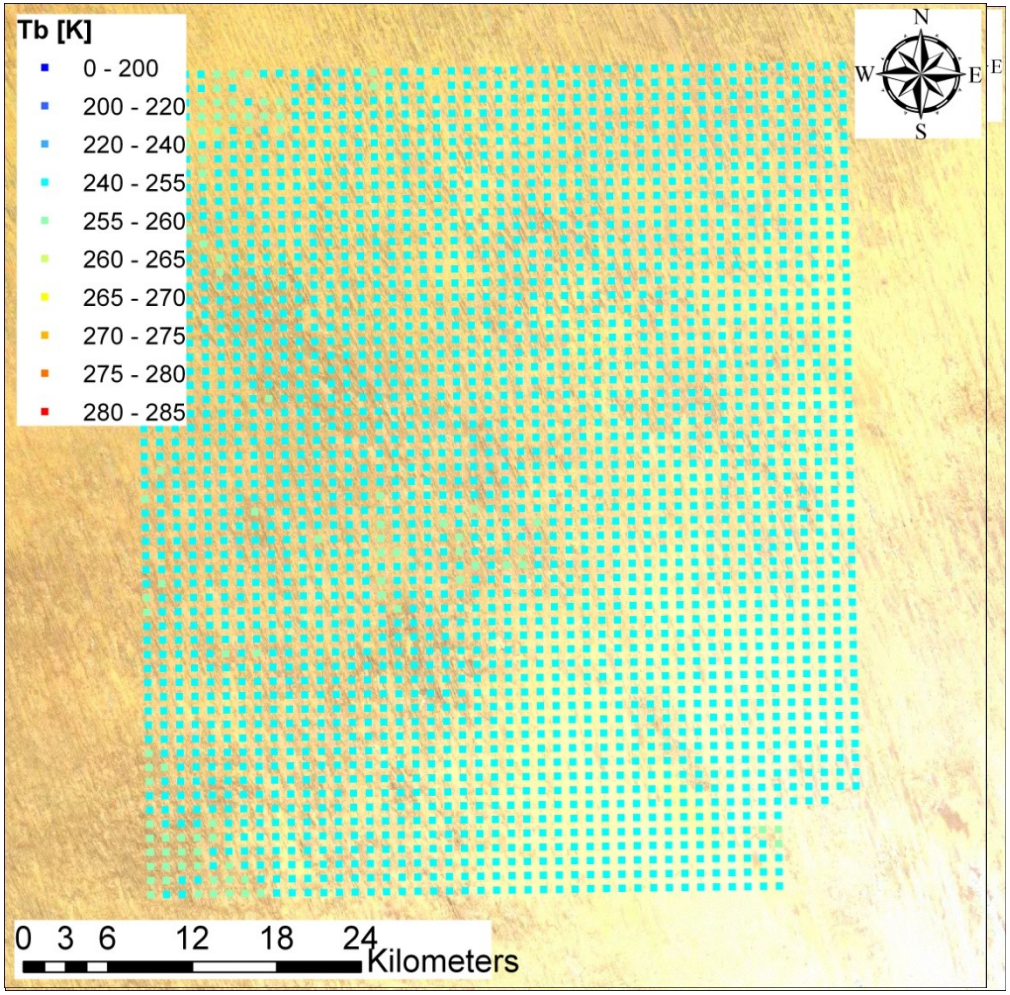
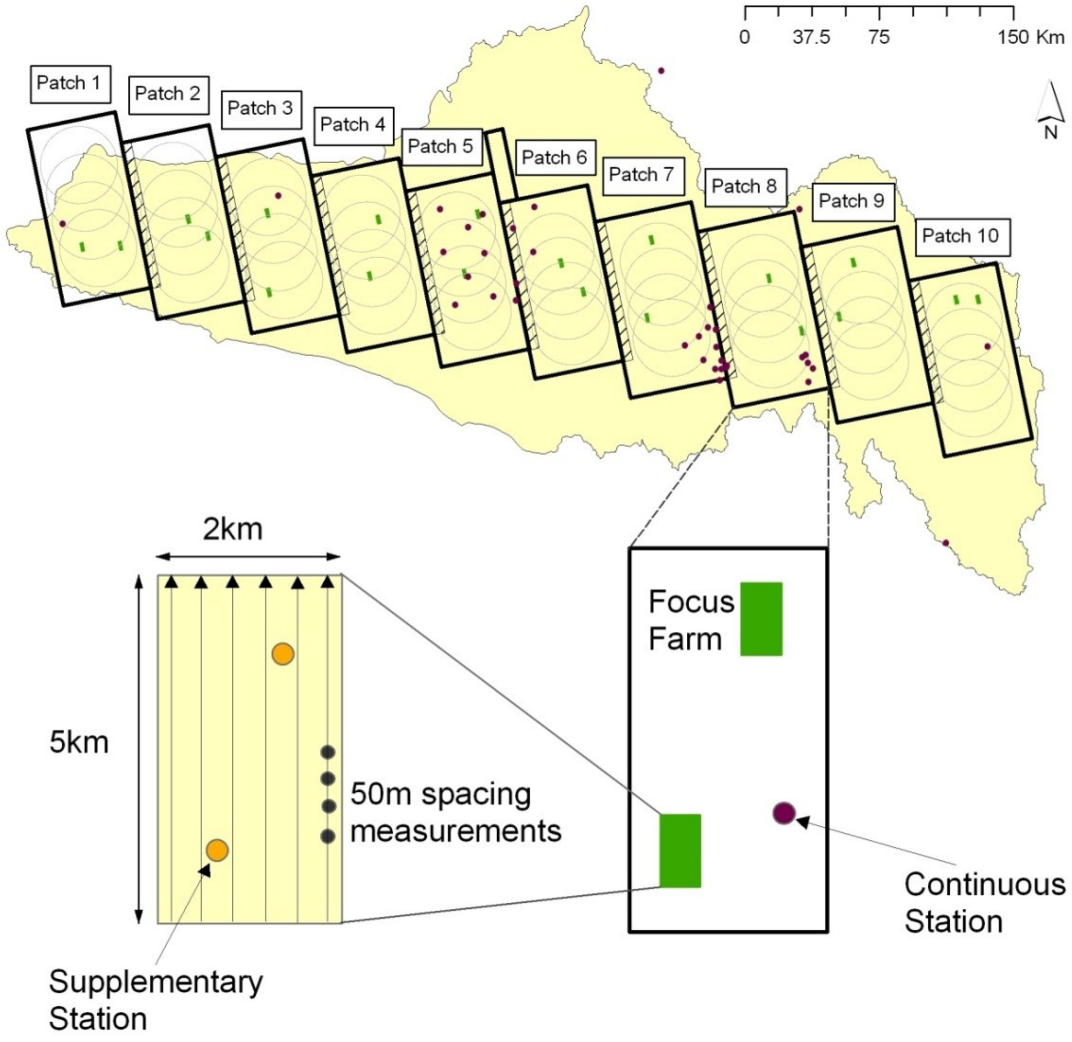


Tb H-polarisation, 38deg 6am (2009)

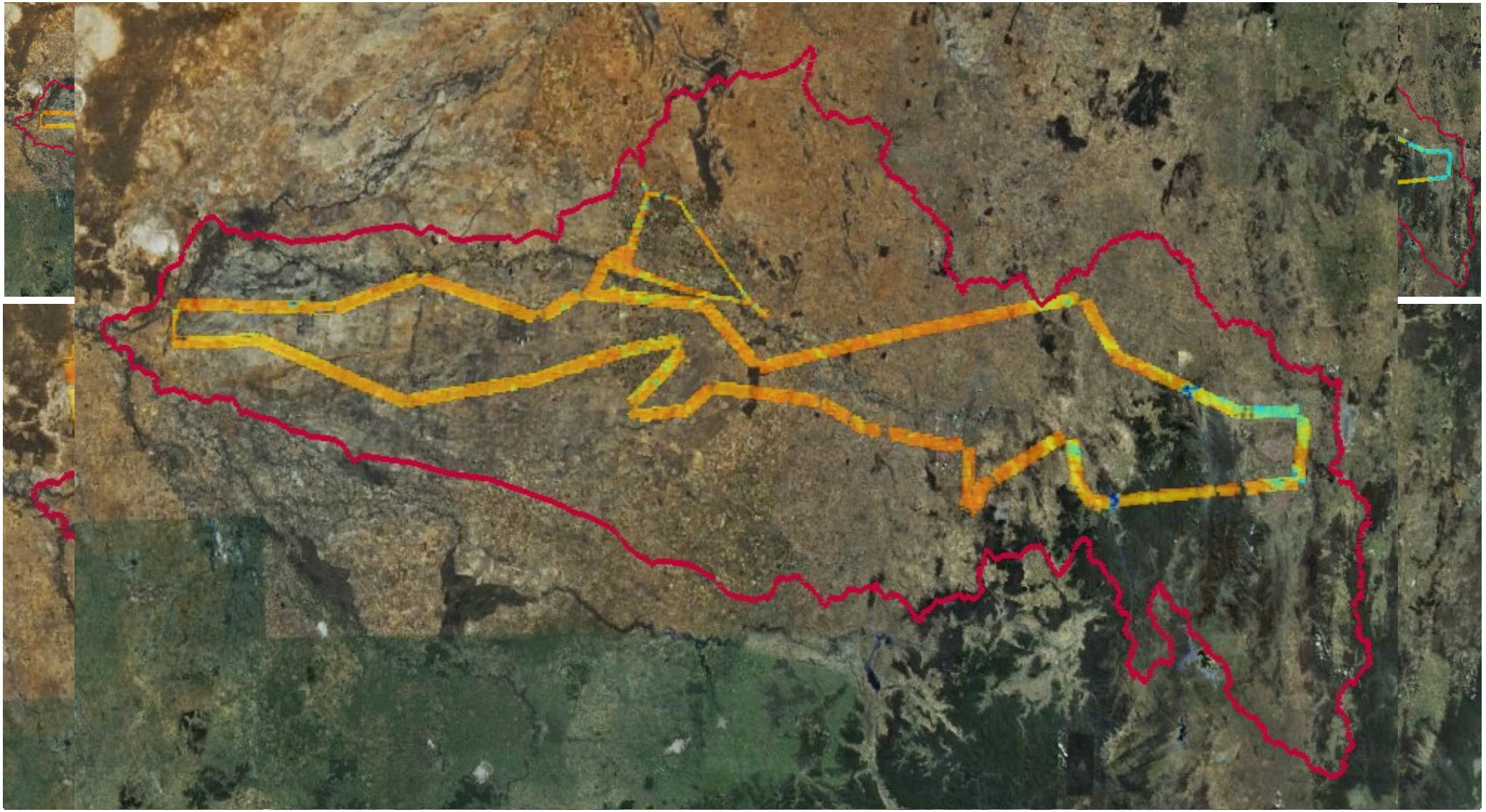


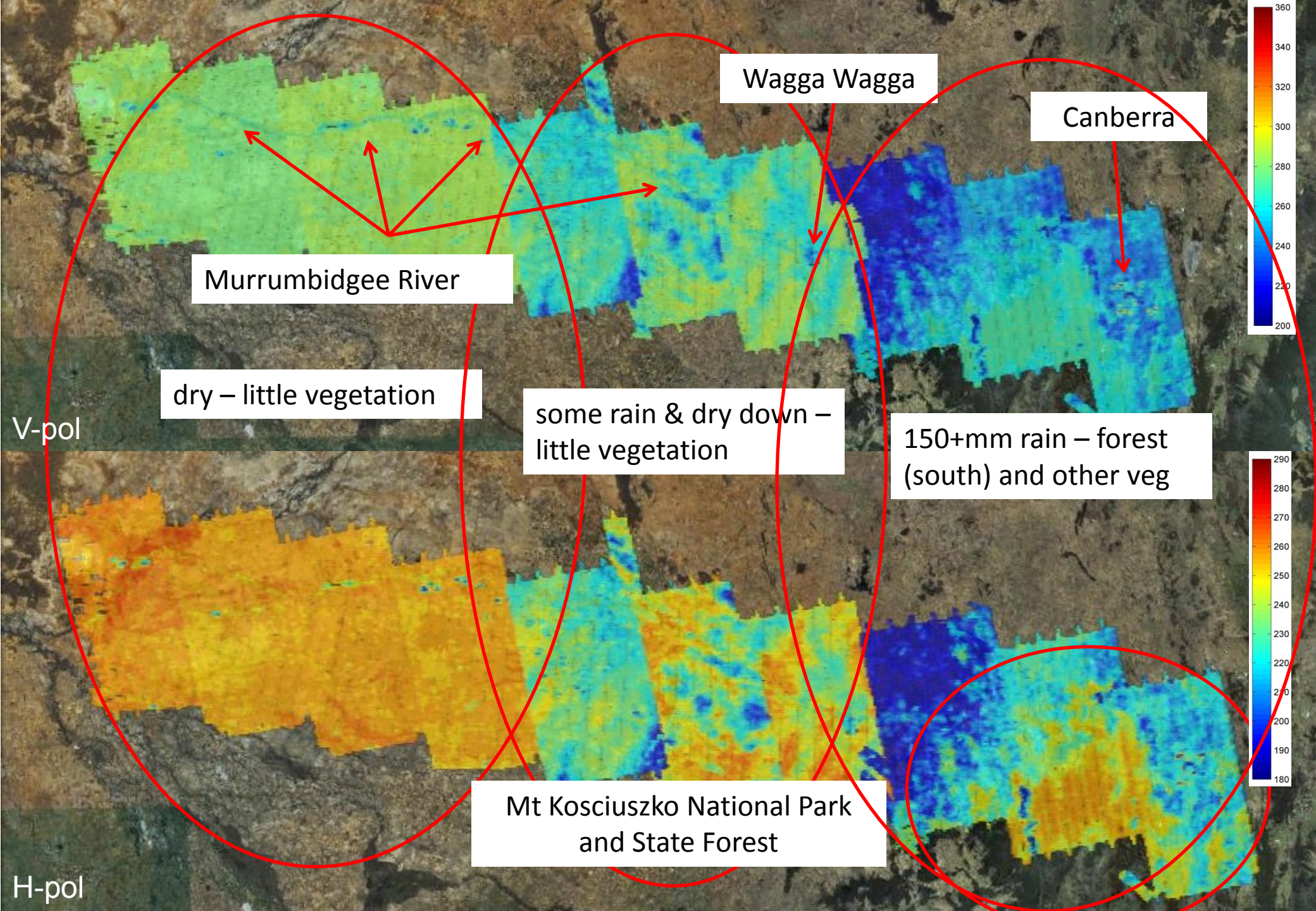
AACES

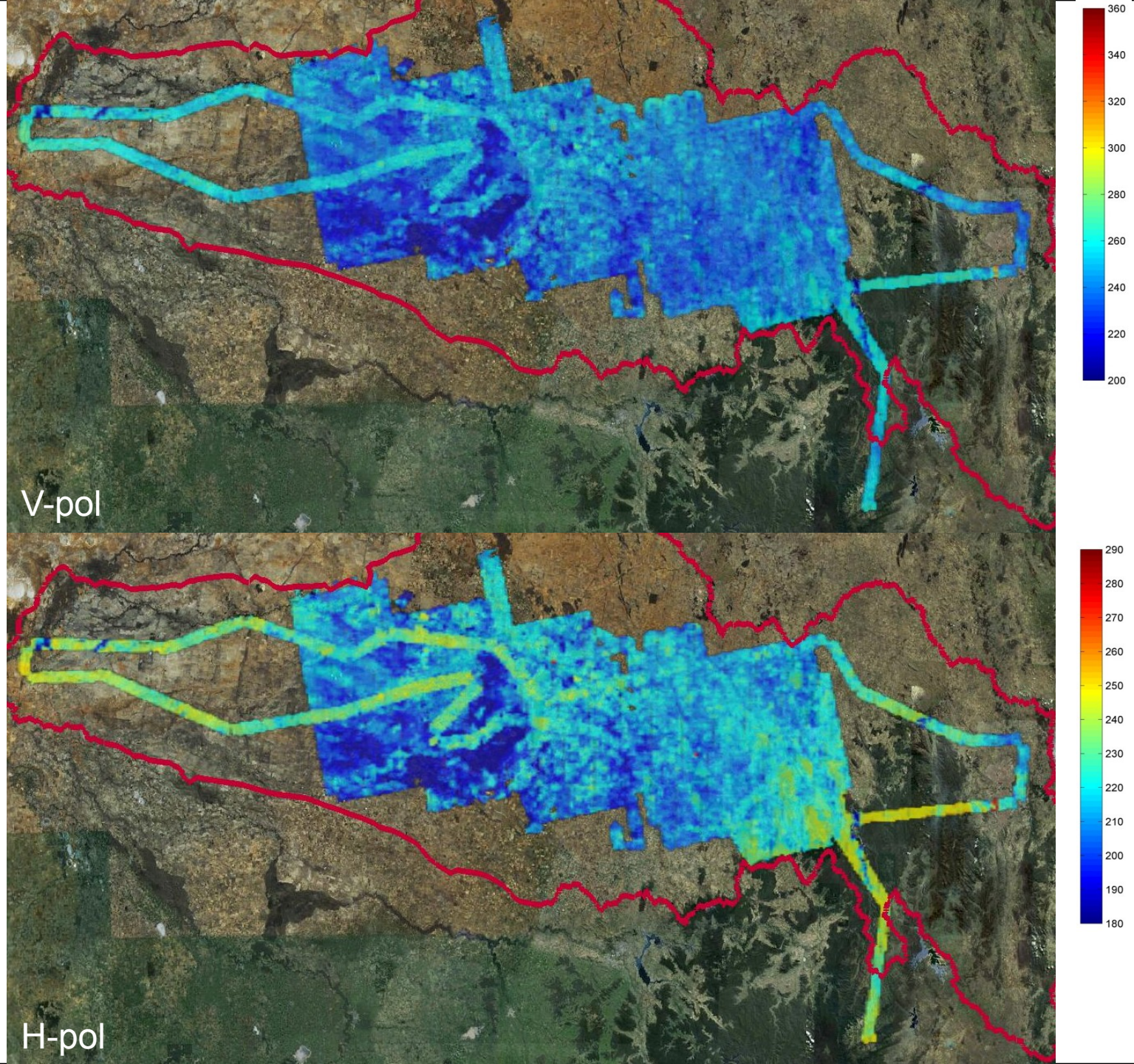
Ground sampling strategy



AACES-1 : 20 January – 20 February 2010




Wagga Wagga
Canberra
Murrumbidgee River
dry – little vegetation
some rain & dry down – little vegetation
150+mm rain – forest (south) and other veg
V-pol
H-pol
Mt Kosciuszko National Park and State Forest
360
340
320
300
280
260
240
220
200
290
280
270
260
250
240
230
220
210
200
190
180


V-pol
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360
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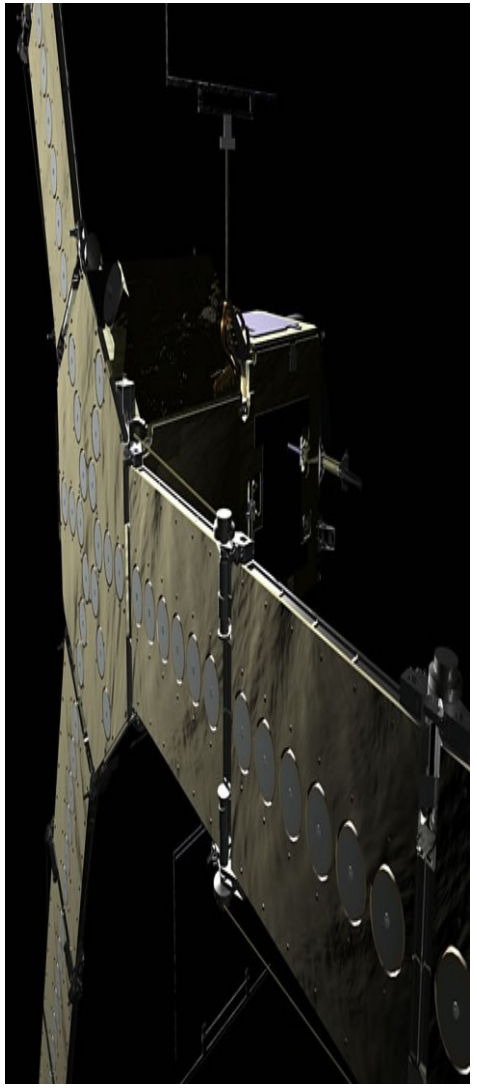
Research questions

- How much of a SMOS pixel needs to be measured to get a reliable brightness temperature average?
- How well do the SMOS L1c and L2 brightness temperatures agree with total coverage aircraft data?
- How accurate is the SMOS L2 soil moisture product?
- How well can we downscale SMOS data?
- How well do our LSMs predict soil moisture variability at 1km resolution?
- Can SMOS improve LSM prediction of soil moisture by data assimilation?



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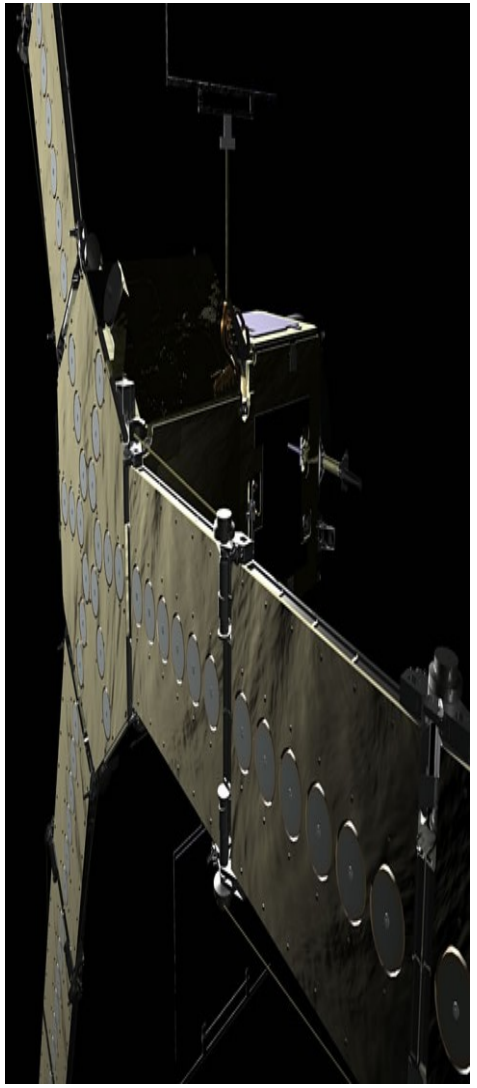
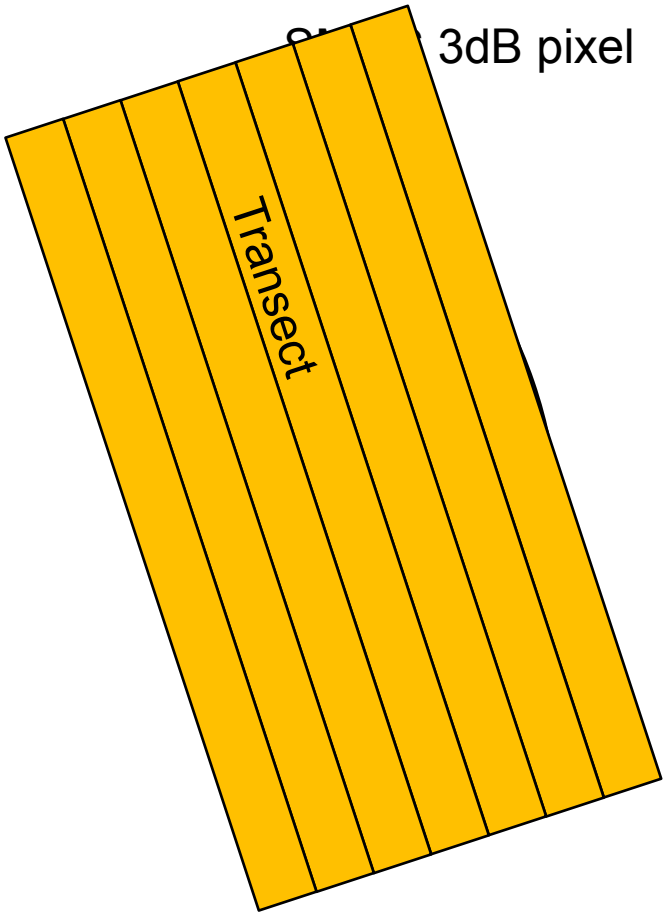
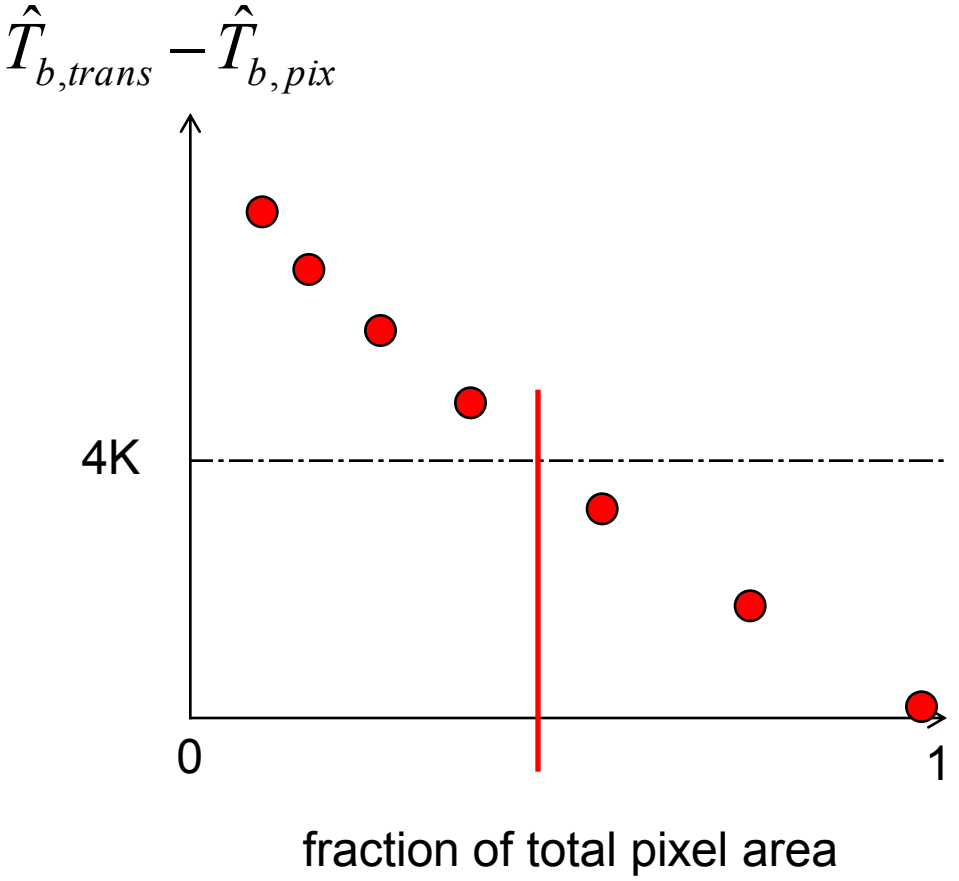
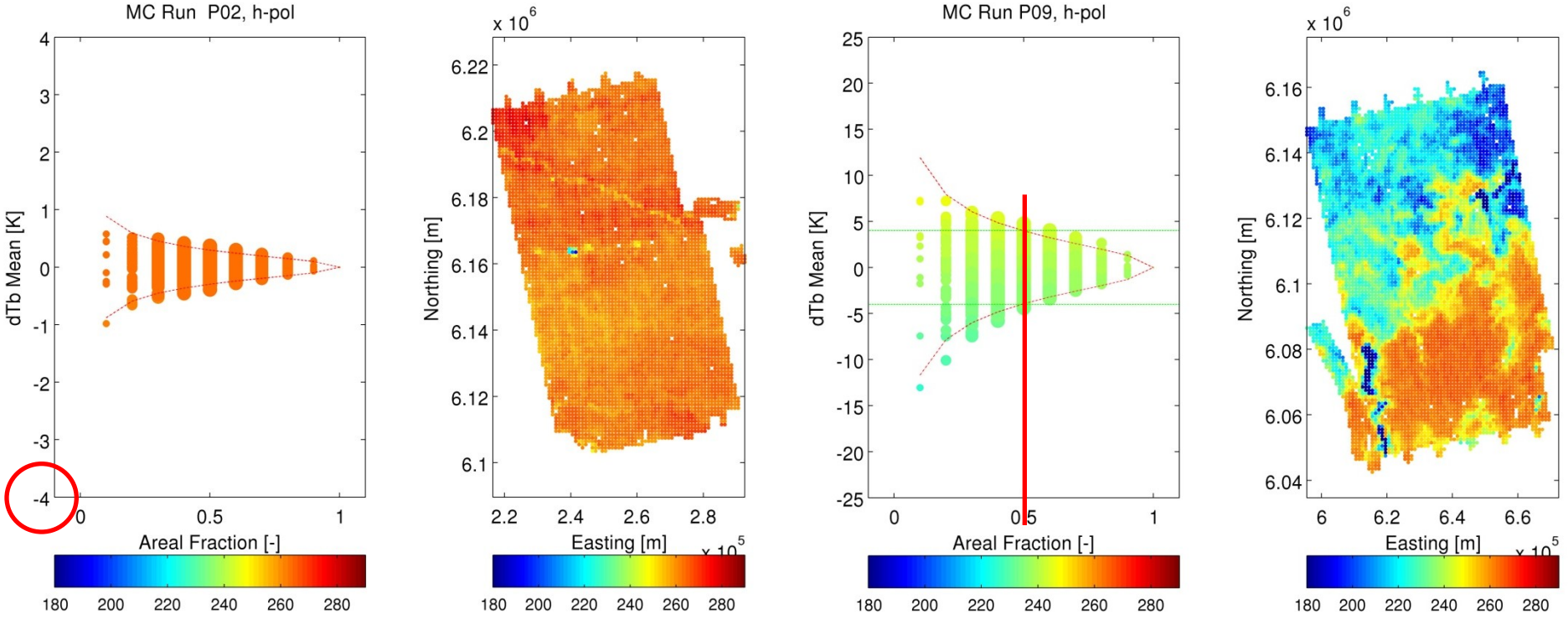


Fractional coverage required?





Fractional coverage required?



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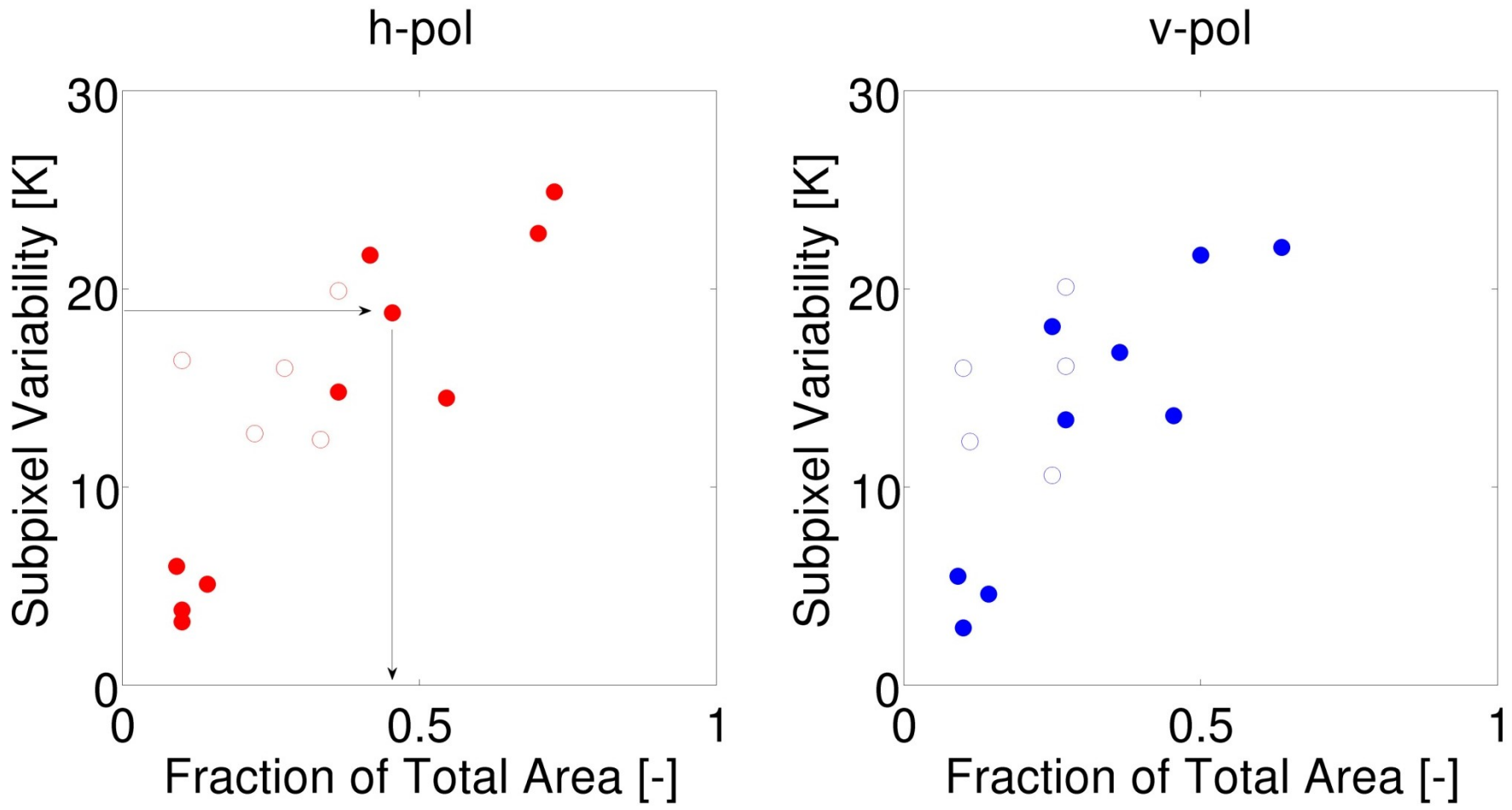

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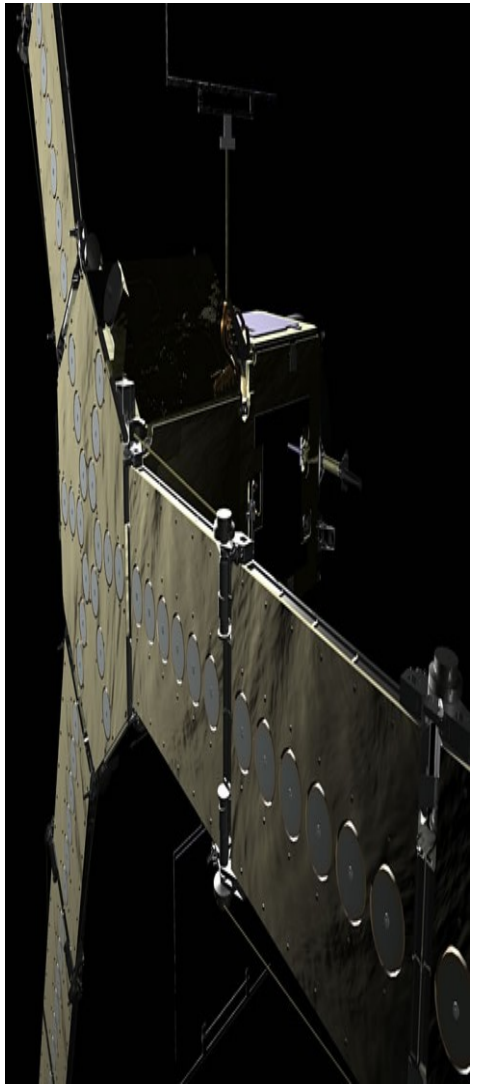
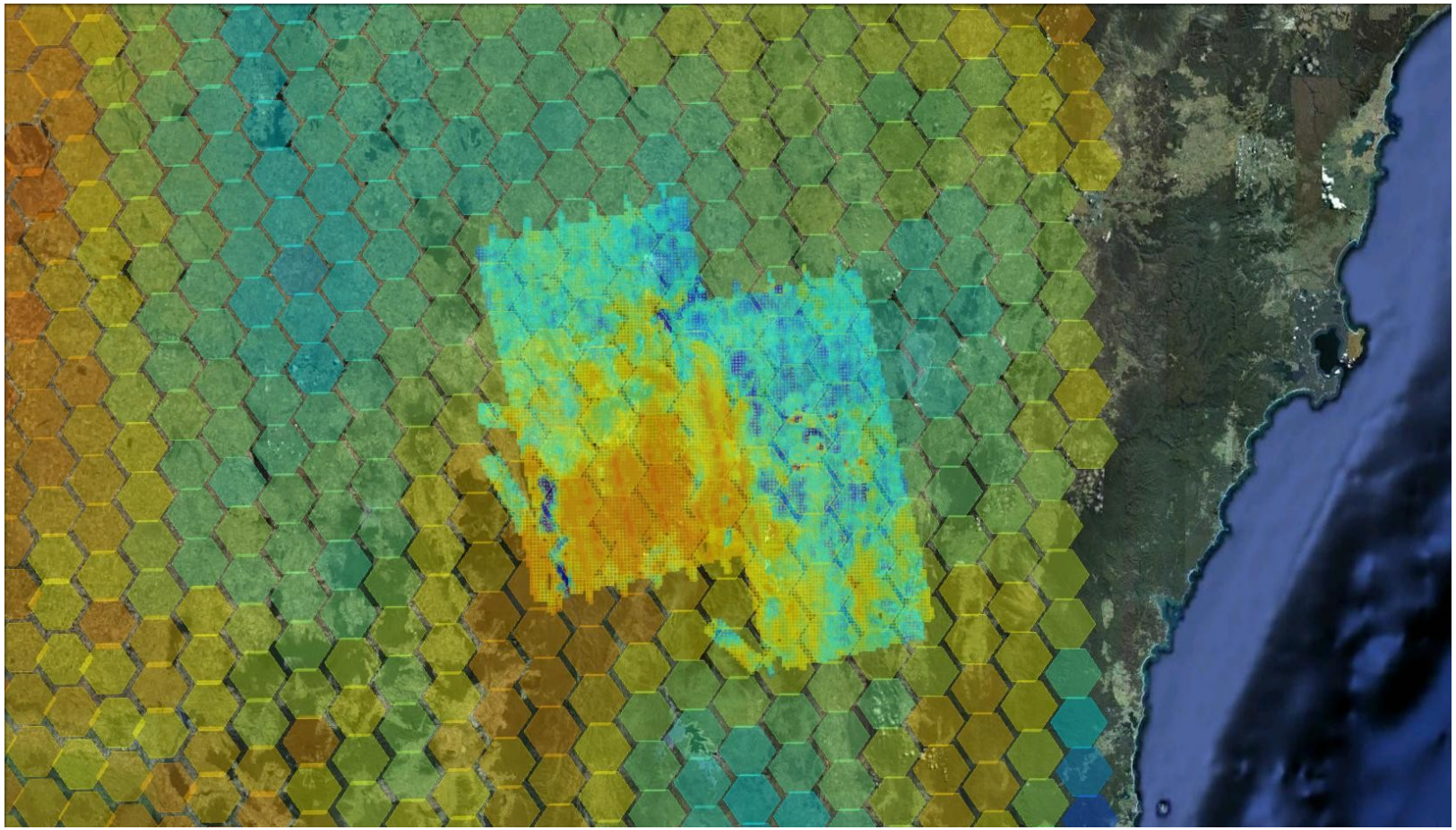


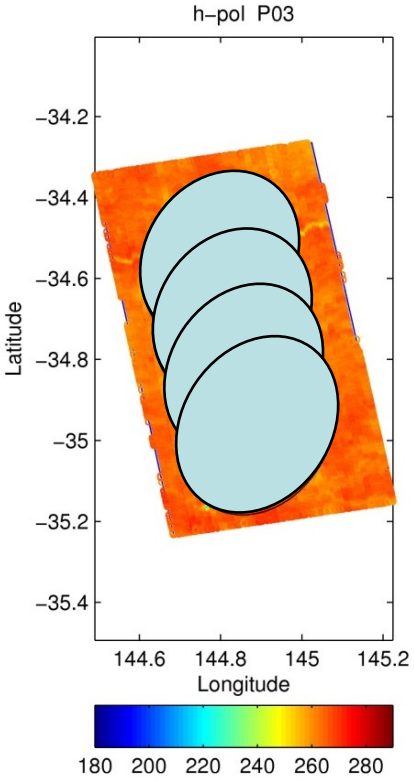
SMOS L1c agreement with aircraft data?

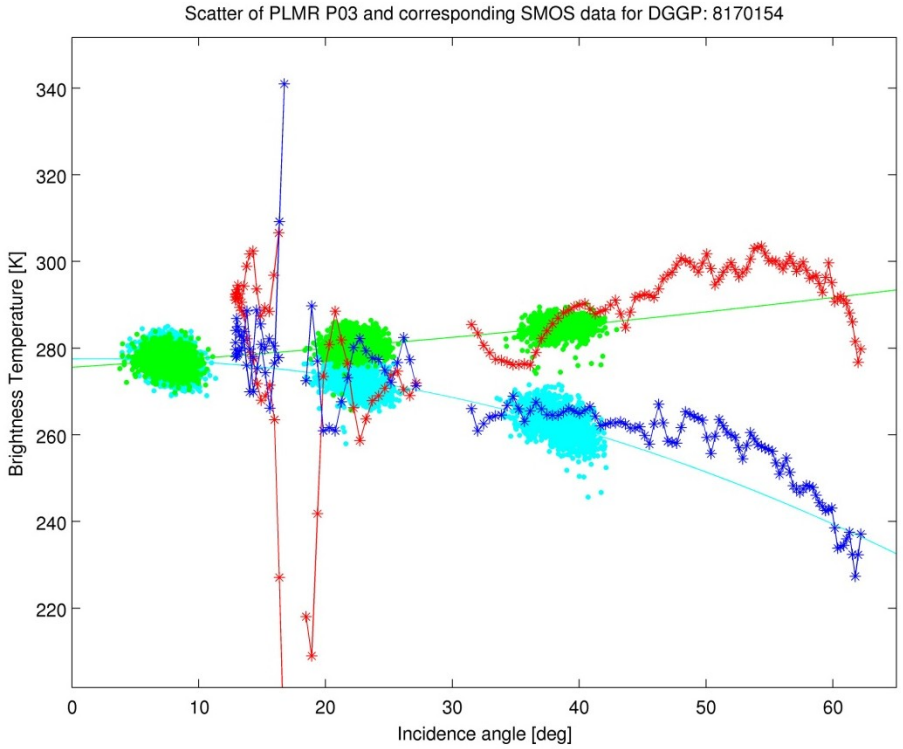
H polarisation: 18 Feb 2010



Level 1c evaluation: patch 3 (summer campaign)

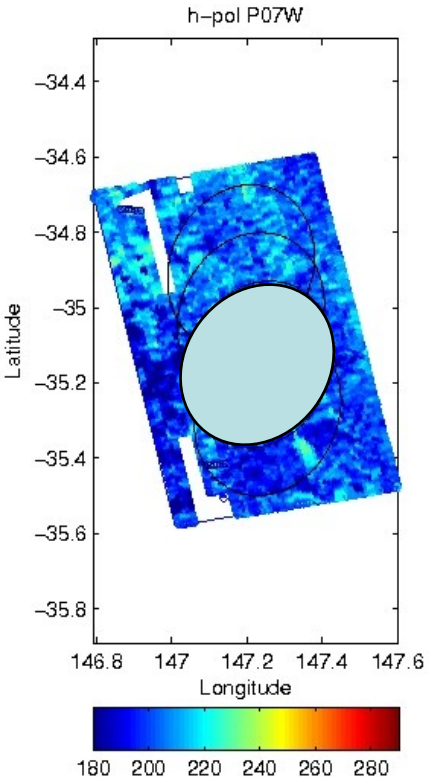
H Polarisation



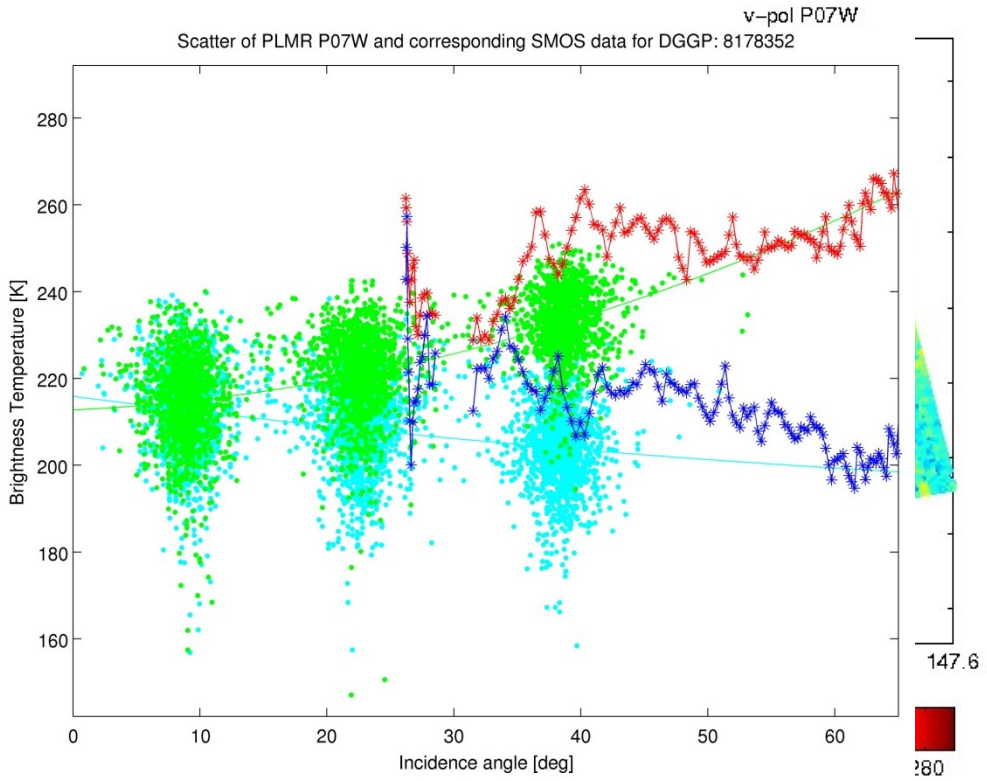


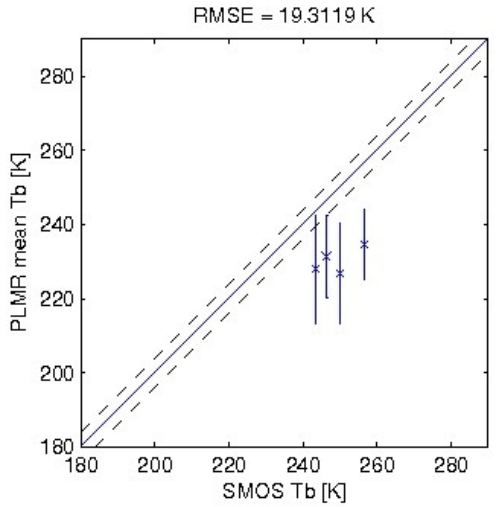
Level 1c evaluation: patch 7 (winter campaign)

H Polarisation

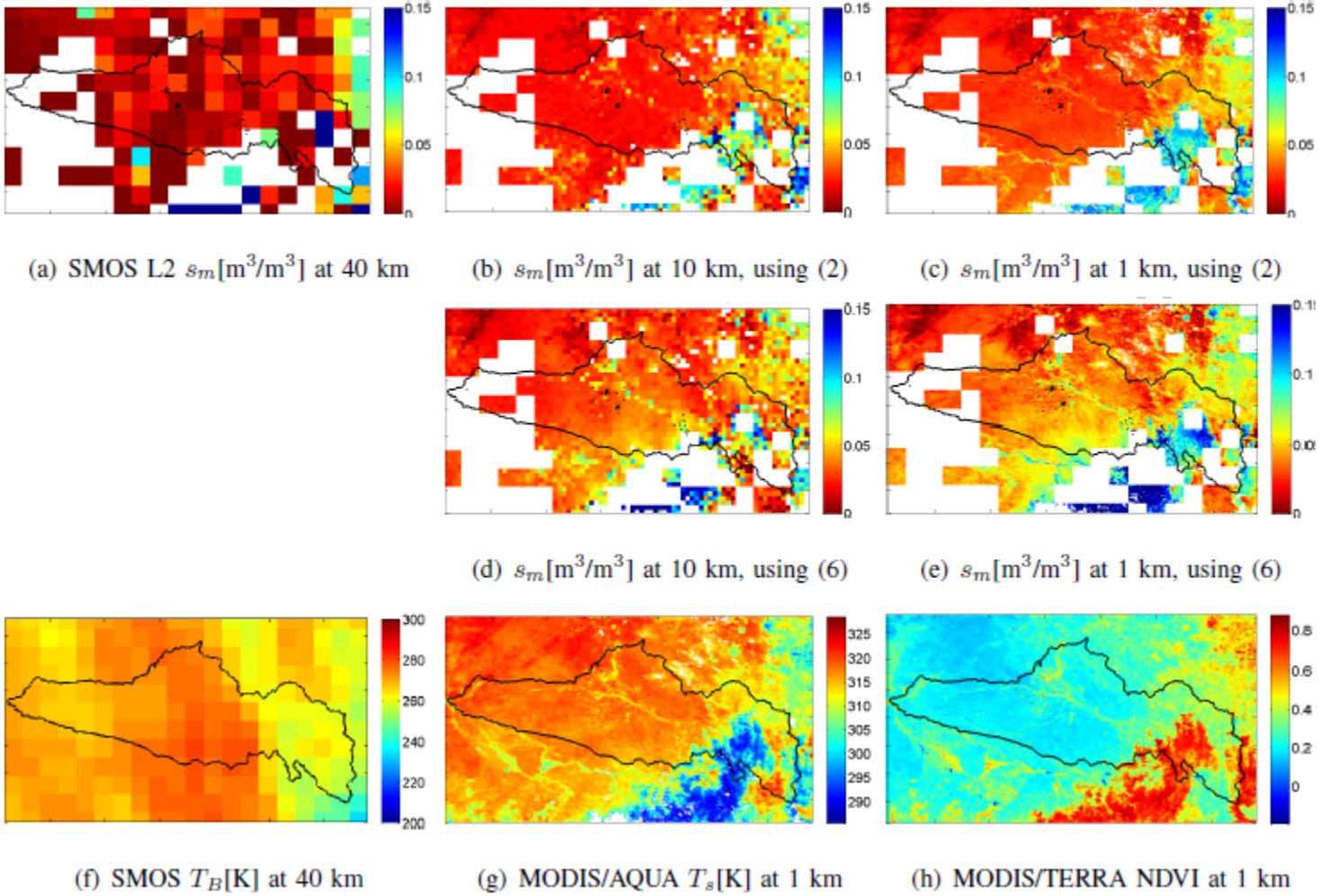


V Polarisation





Disaggregation



(a) SMOS L2 s_m[m^3/m^3] at 40 km

(b) s_m[m^3/m^3] at 10 km, using (2)

(c) s_m[m^3/m^3] at 1 km, using (2)

(d) s_m[m^3/m^3] at 10 km, using (6)

(e) s_m[m^3/m^3] at 1 km, using (6)

(f) SMOS T_B[K] at 40 km

(g) MODIS/AQUA T_s[K] at 1 km

(h) MODIS/TERRA NDVI at 1 km

Piles et al., 2011

Conclusions

Field campaigns for the validation of SMOS should typically aim to cover more than 50% of the SMOS pixel

Preliminary results (ie. waiting on reprocessed L1 data from ESA) show that SMOS brightness temperatures are biased warm by approx 10K with respect to aircraft data

Next steps:

Retrieve L2-type data from PLMR and validate with high-resolution ground-based SM data

Compare L2 SMOS data with PLMR derived SM (some preliminary results are available)