MONASH University

Engineering

Intercomparison of Alternate Soil Moisture Downscaling Algorithms Using Active-Passive Microwave Observations

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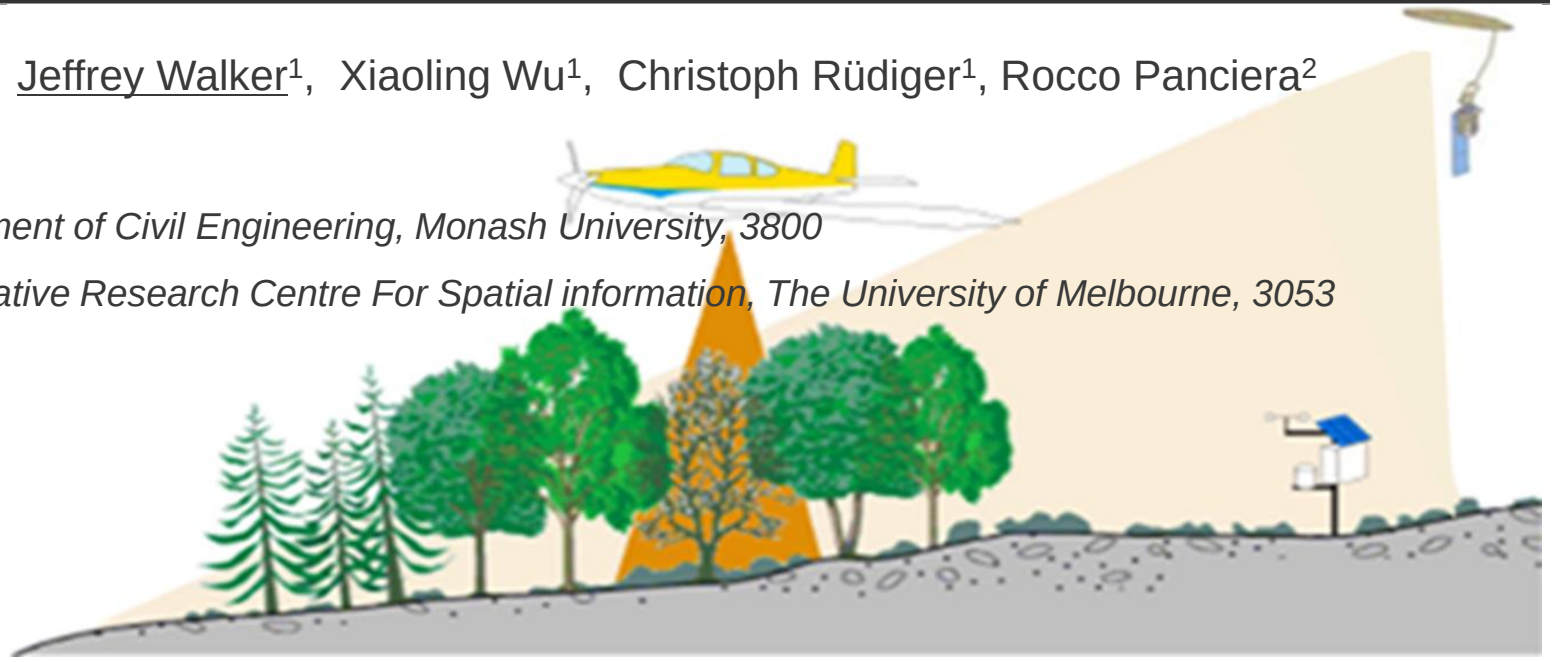
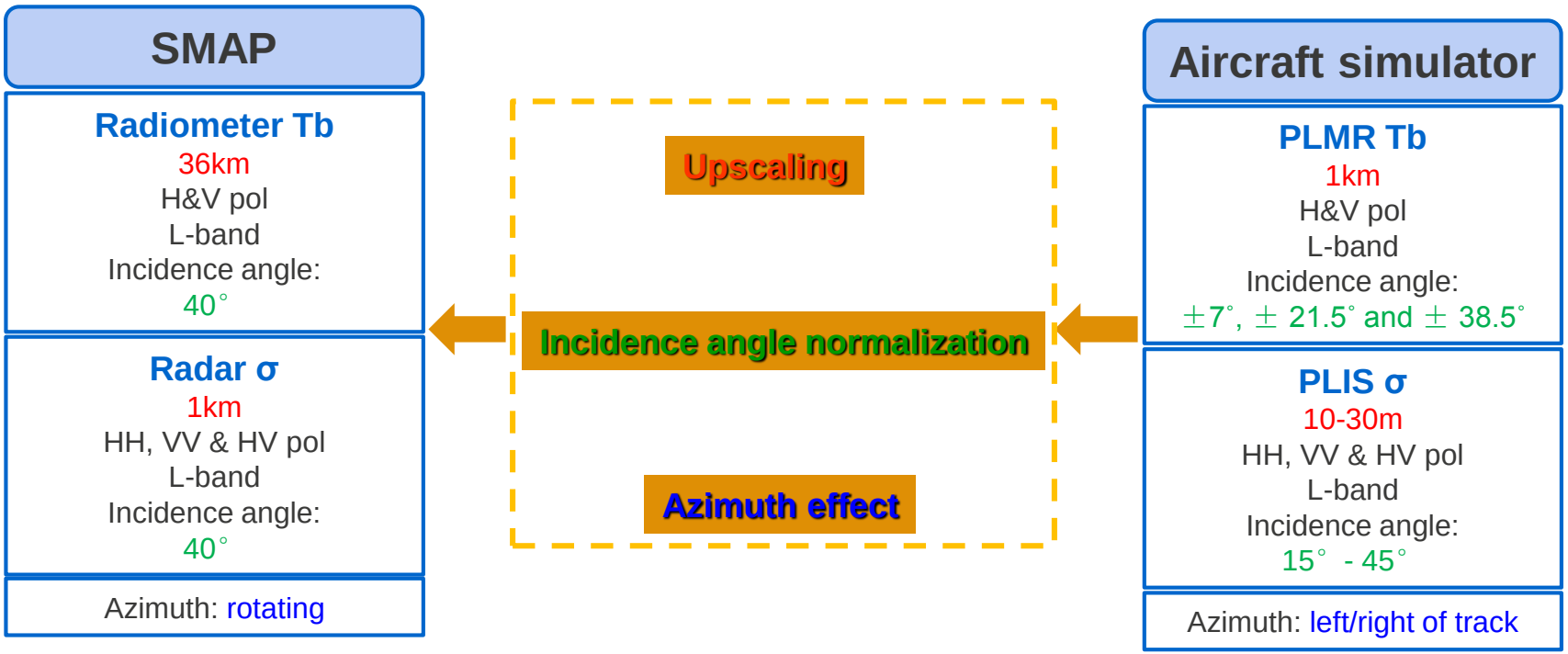
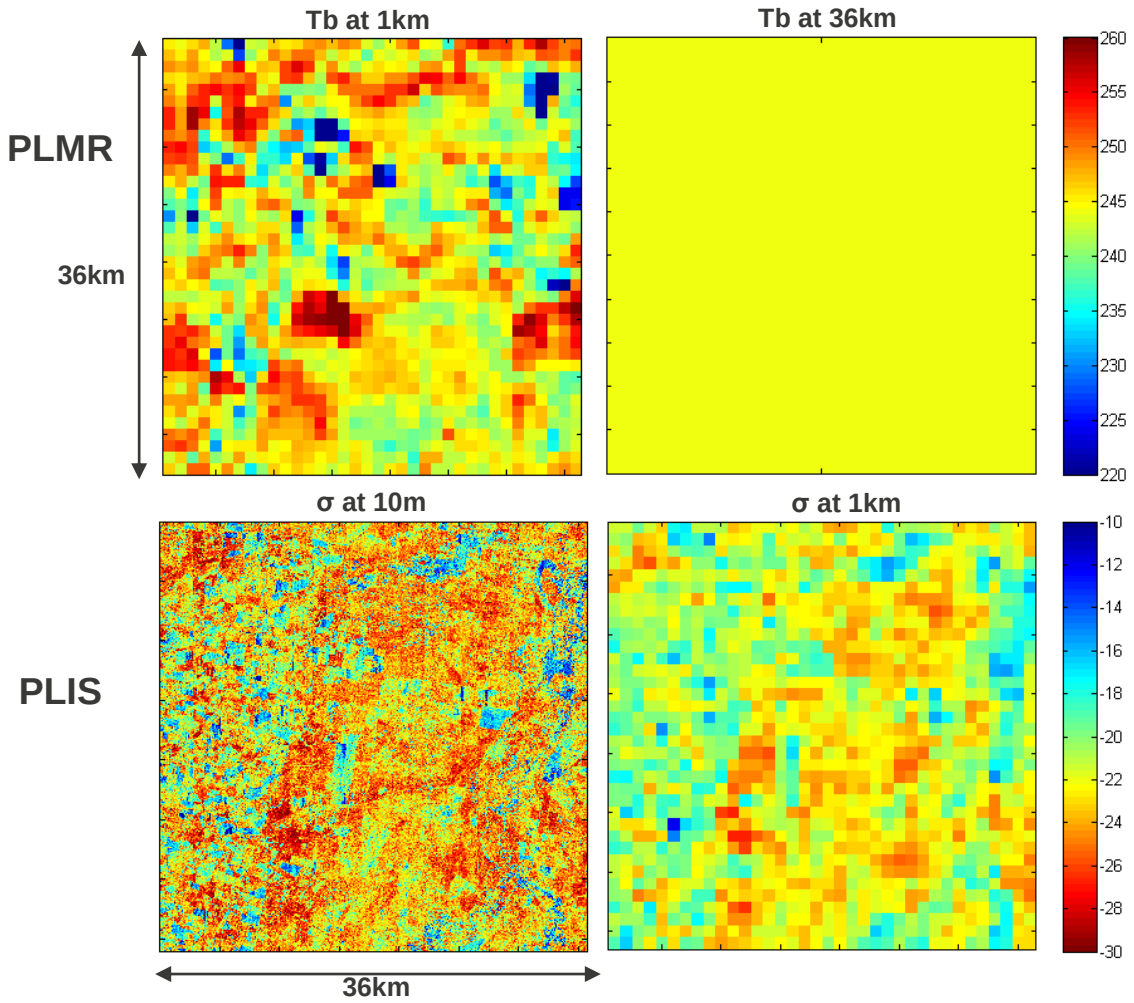


Data Set: Simulation of the SMAP data stream from SMAPEx field campaigns



Simulated Data



Incidence-angle normalized to 40°;

PLMR *Tb* upscaled to 36km;

PLIS *σ* upscaled to 1km

(Data collected on 21st Sept. 2011)

Downscaling Algorithms

SMAP Baseline Downscaling Algorithm + Passive Retrieval Algorithm

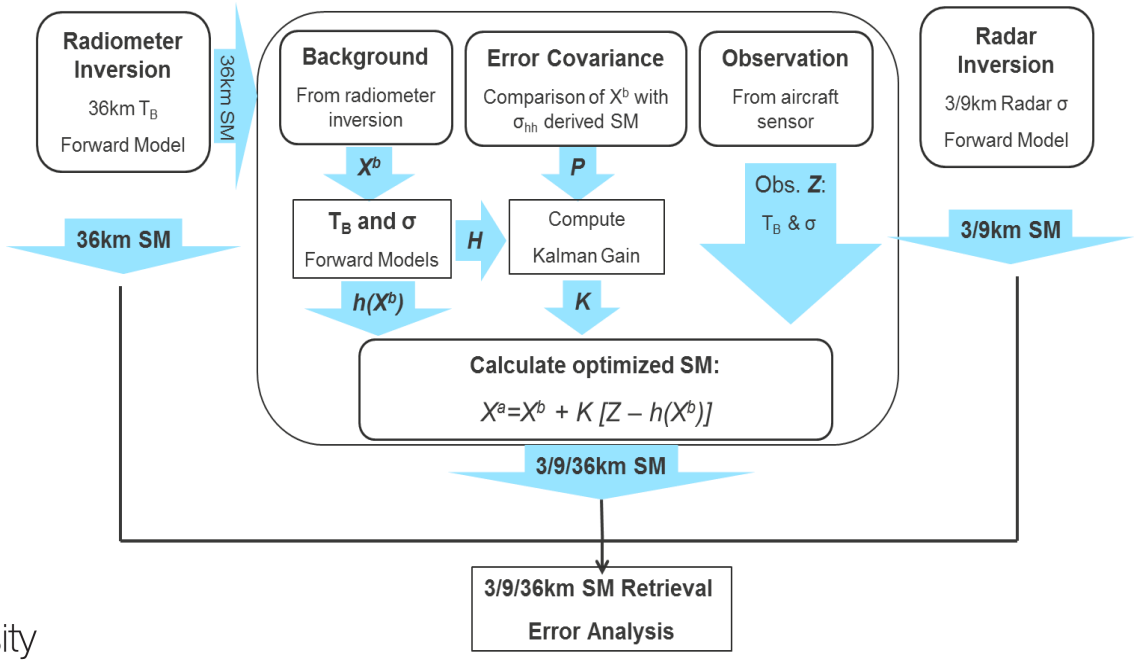
- Based on linear relationship between radiometer (*Tb*) and radar (σ) observations

SMAP Optional Downscaling Algorithm

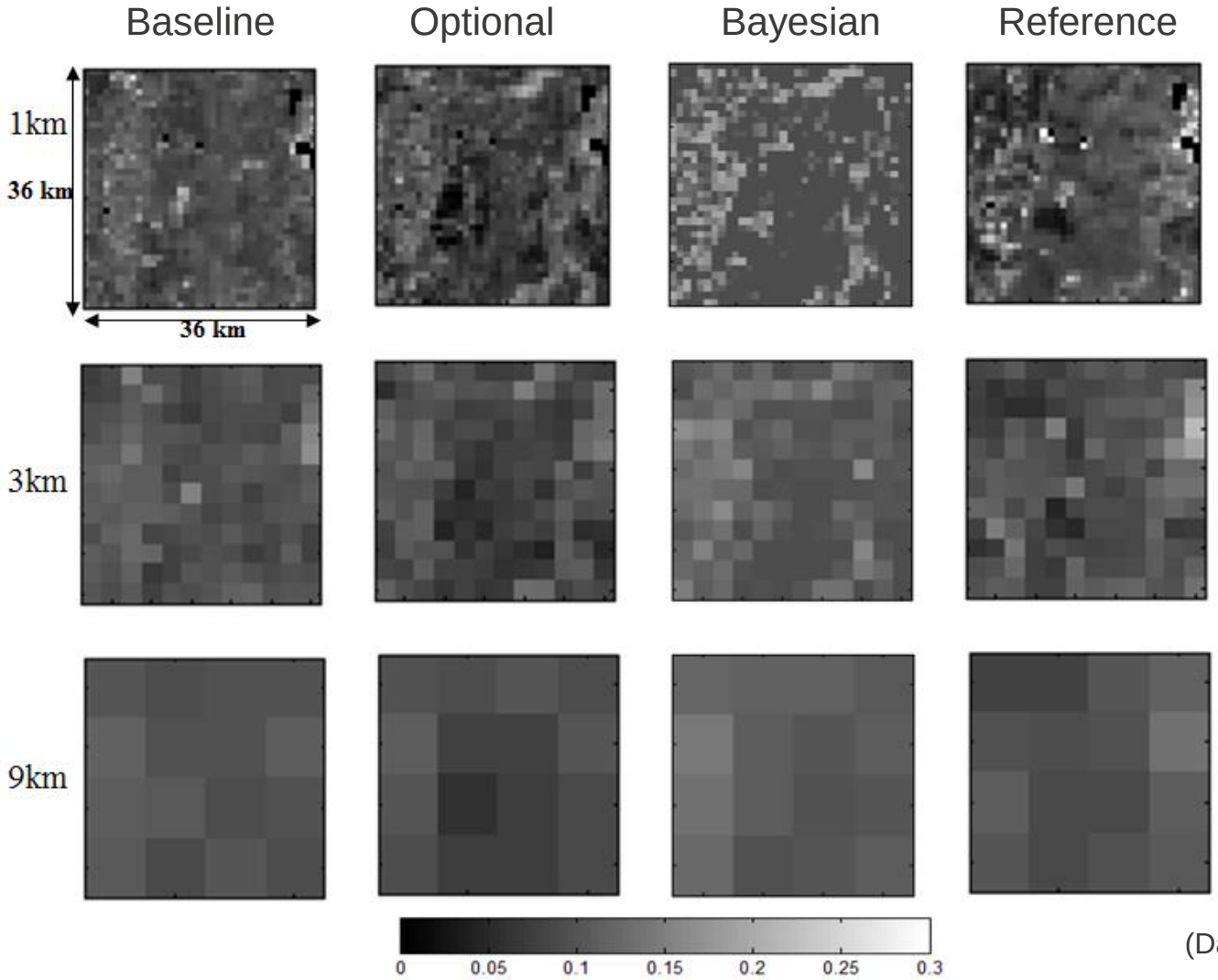
- Based on linear relationship between soil moisture (θ) and radar (σ) observations

Bayesian Merging Method

- Based on the concept of Kalman filter; The final medium-resolution soil moisture product is obtained using background soil moisture estimates updated with the observations and model predictions.

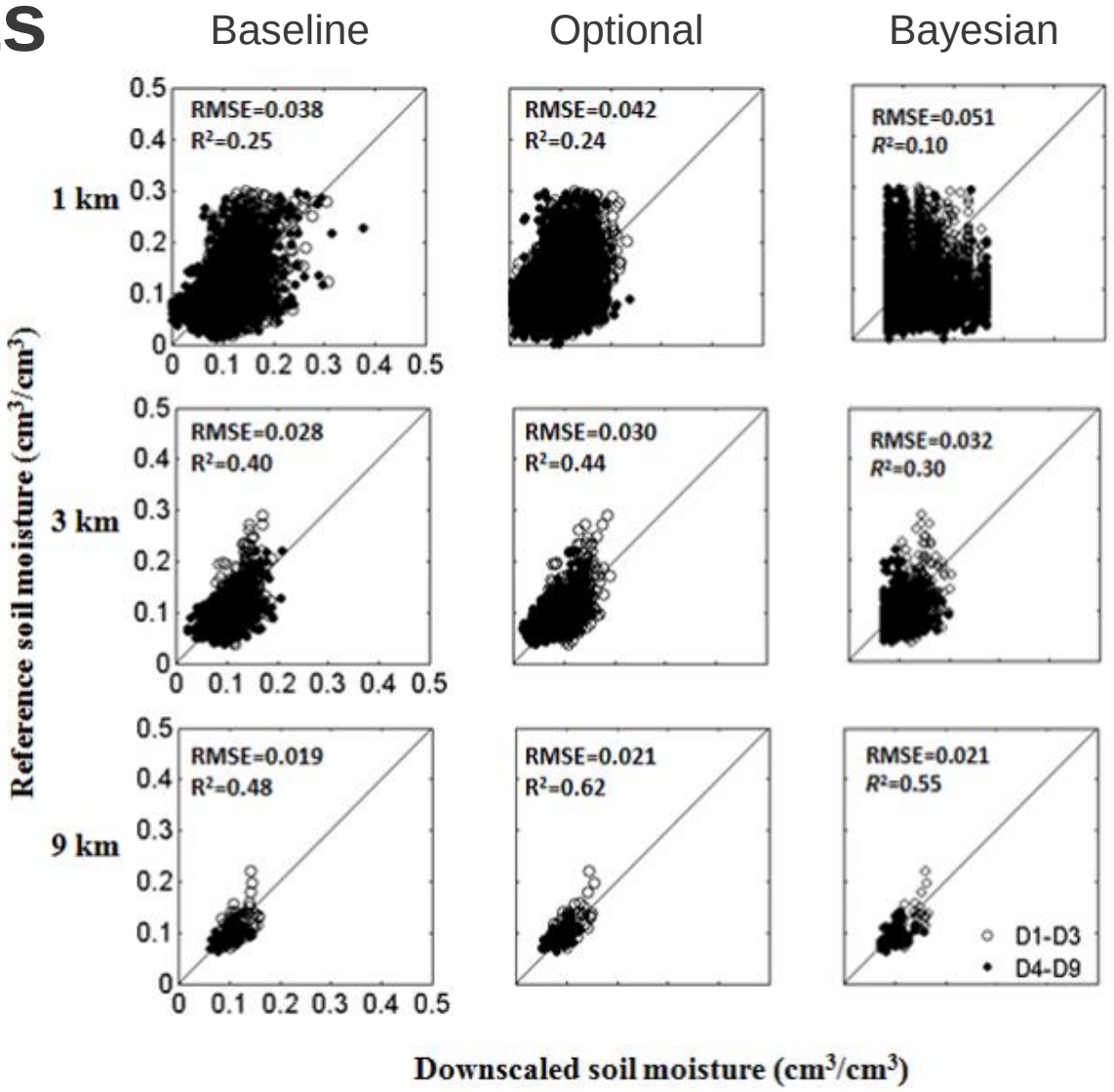


Results



(Data: 21st Sept. 2011)

Results


Baseline
Optional
Bayesian
1 km
3 km
9 km
RMSE=0.038
R²=0.25
RMSE=0.042
R²=0.24
RMSE=0.051
R²=0.10
RMSE=0.028
R²=0.40
RMSE=0.030
R²=0.44
RMSE=0.032
R²=0.30
RMSE=0.019
R²=0.48
RMSE=0.021
R²=0.62
RMSE=0.021
R²=0.55
D1-D3
D4-D9
Reference soil moisture (cm³/cm³)
Downscaled soil moisture (cm³/cm³)

Conclusion

- Optional algorithm is expected to give better results than the baseline algorithm
- Bayesian results are still “work in progress”. Likely to give better results but at a higher computational cost.