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Engineering

Go Boldly.

Rock cover fraction and its influence on soil moisture retrieval

Presented by YE Nan

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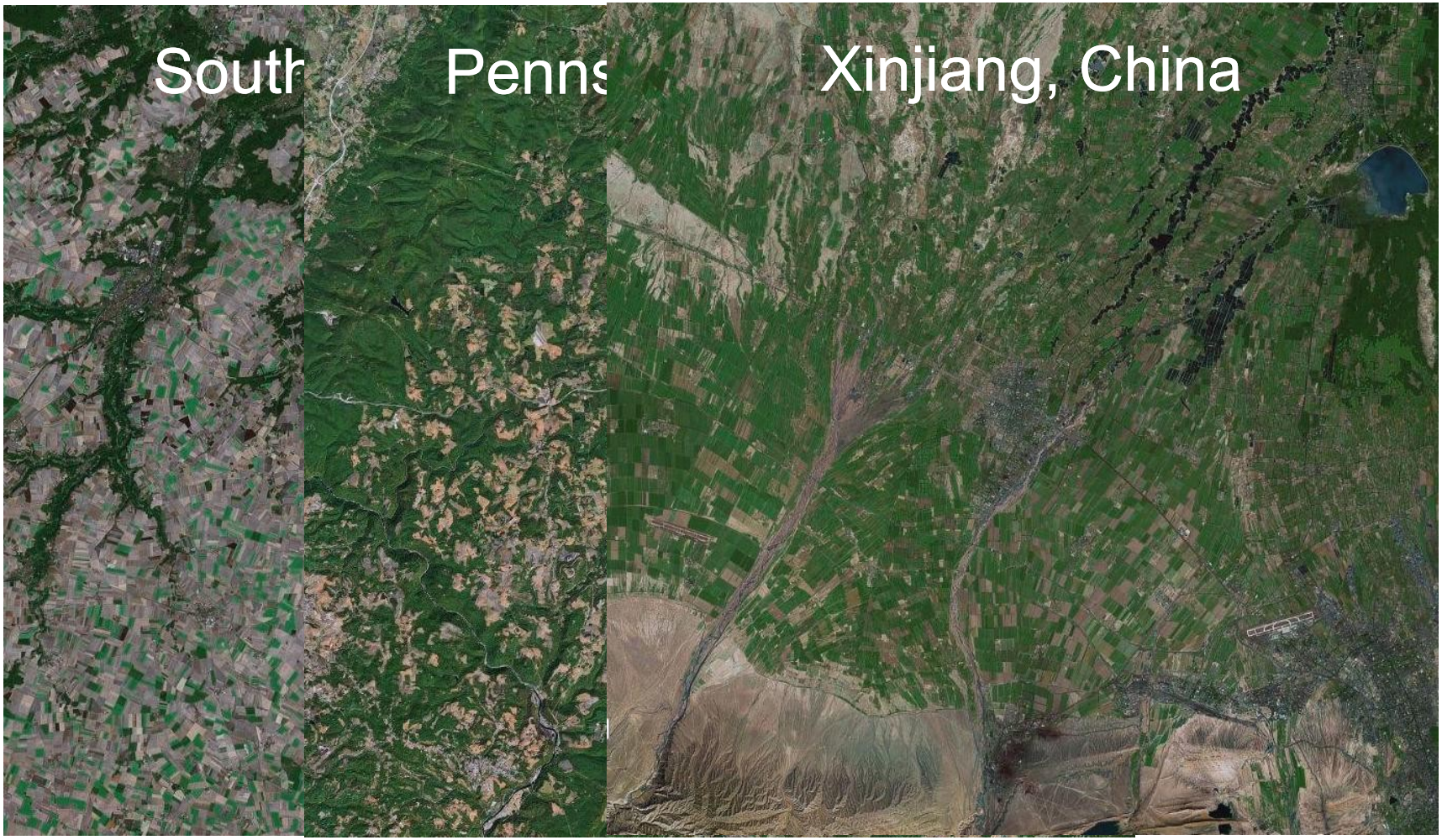
Soil Moisture and Ocean Salinity (SMOS)

Source: http://www.cesbio.ups-tlse.fr

Satellite:	SMOS
Launch Time:	2nd, Nov. 2009
Type:	Passive Microwave
Frequency:	L-Band (~1.4 GHz)
Revisit Time:	2 – 3 days
Spatial Resolution:	< 50 km
SM Accuracy:	0.04 m^3/m^3
VWC Accuracy:	0.2 kg/m^2

(Kerr et al., 2001)

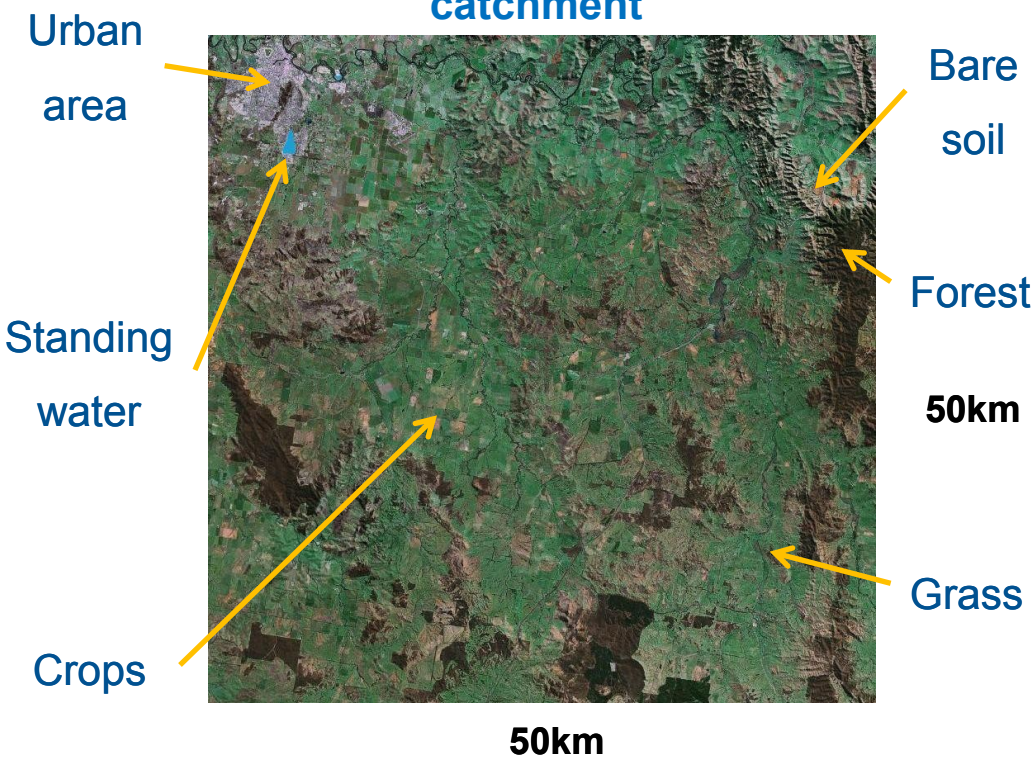
Land surface heterogeneity in FOV



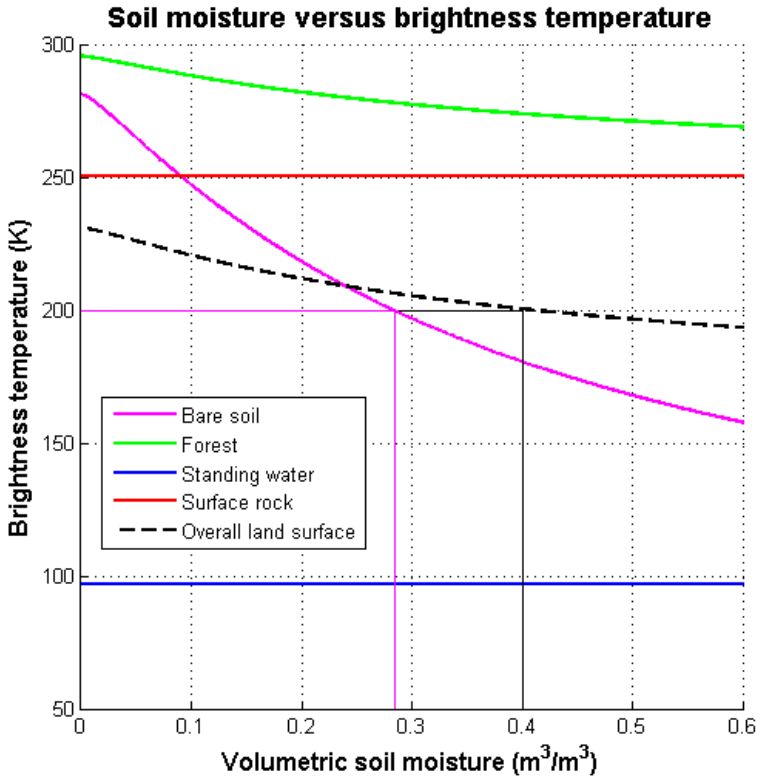
Source: http://maps.google.com.au

Mixed-pixel problem

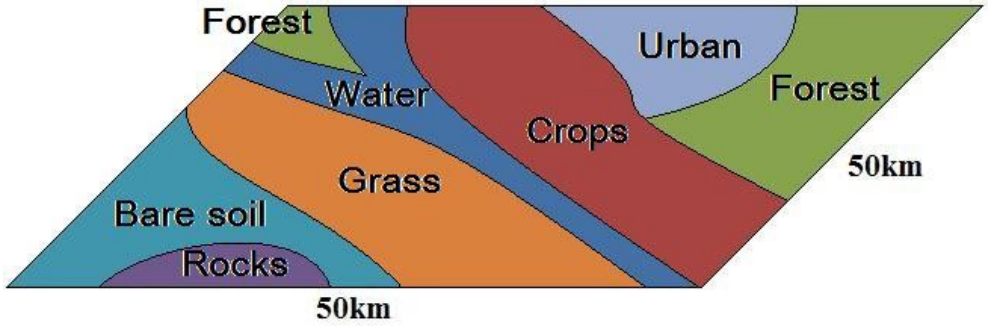
NAFE'06 Study Area-Kyeamba catchment



Source: http://maps.google.com.au



Methods



$$TB_{all} = \sum_{N}^{i=1} f_i \cdot TB_i$$

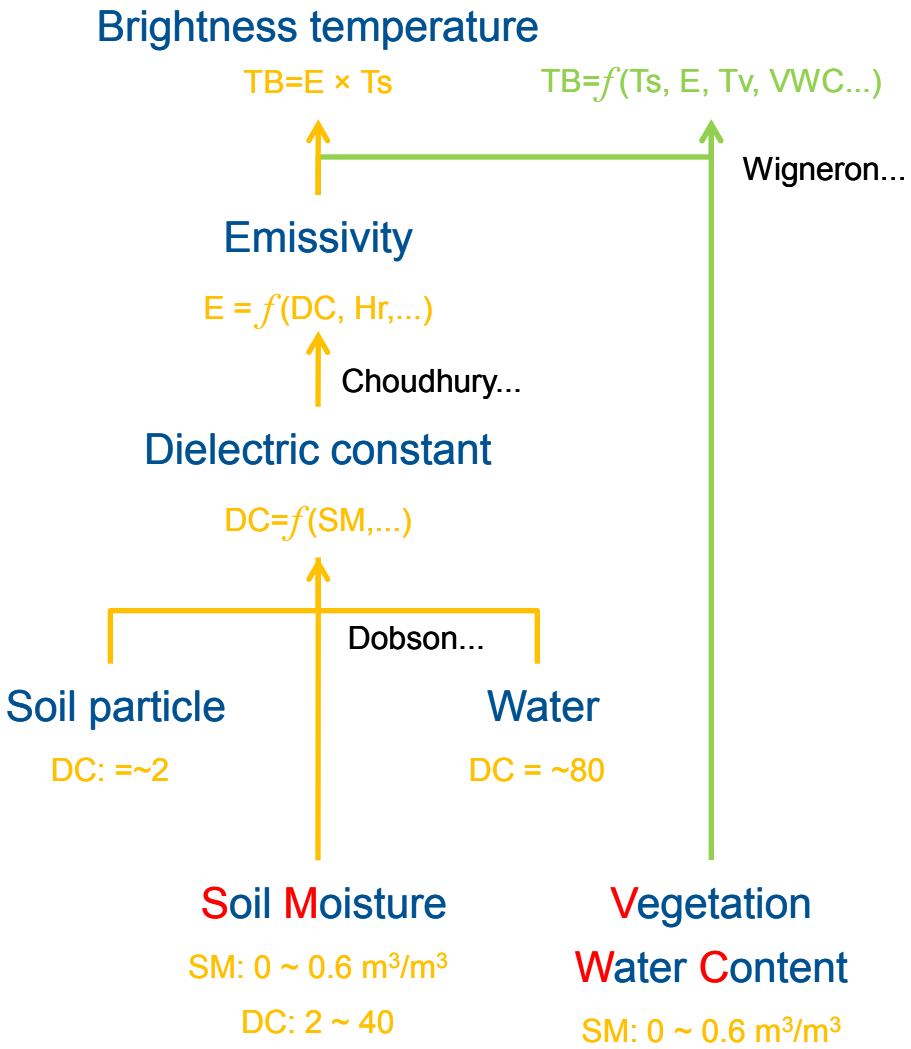
$$TB_{soil} = \frac{TB_{all} - \sum_{N-1}^{i=1} \cdot TB_j}{1 - f_{soil}}$$

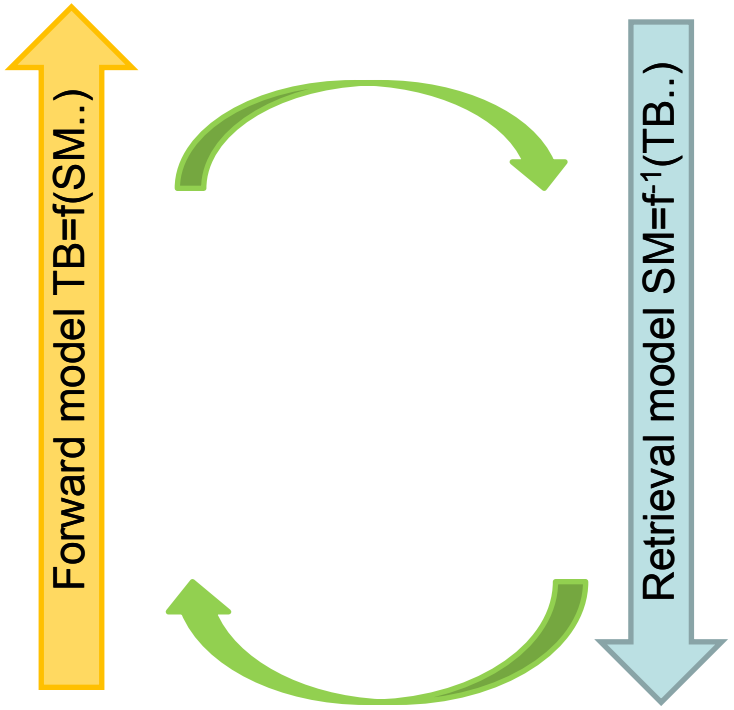
- f **is cover fraction**
- TB **is brightness temperature**

Objective

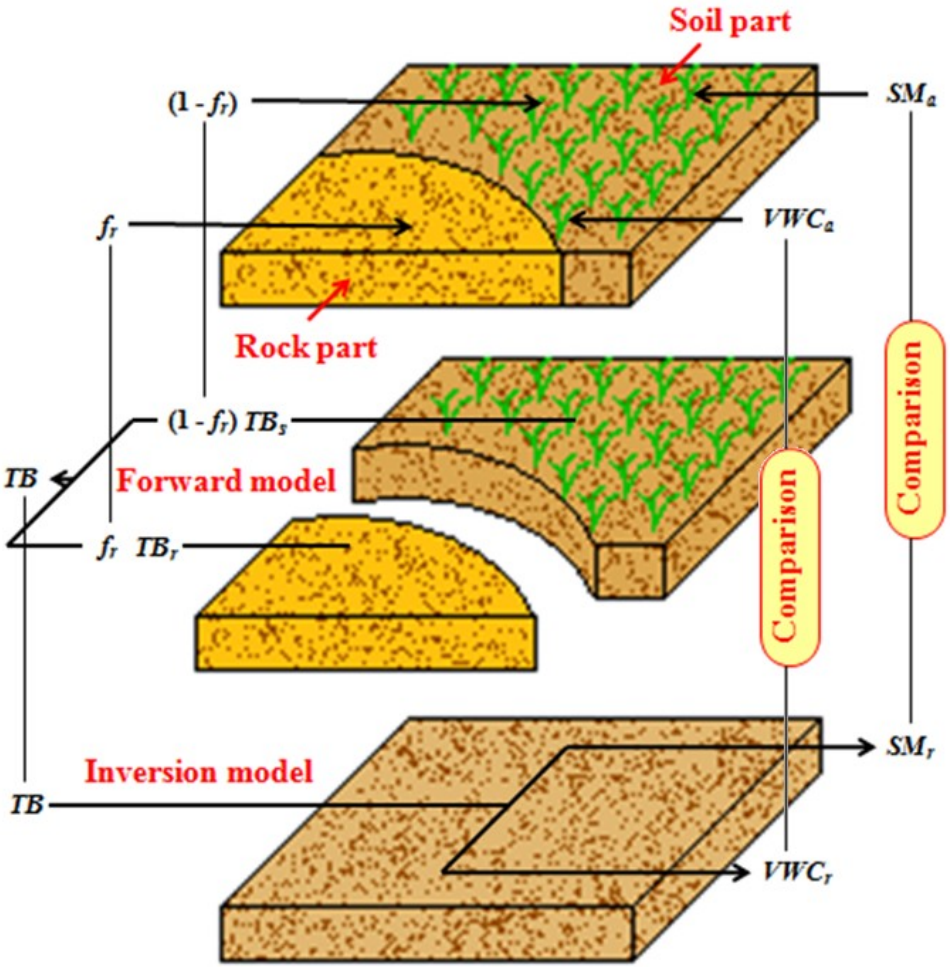
Address the effect of land surface heterogeneity conditions in L-band passive microwave satellite footprints, in order to minimize the error in soil moisture retrieval from space-borne observation.

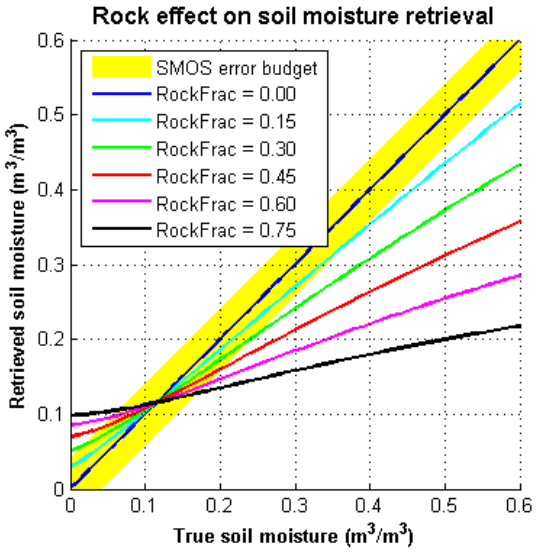
Retrieval model

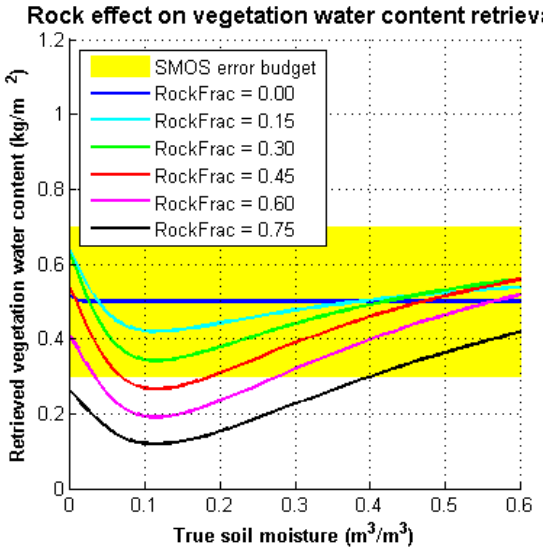




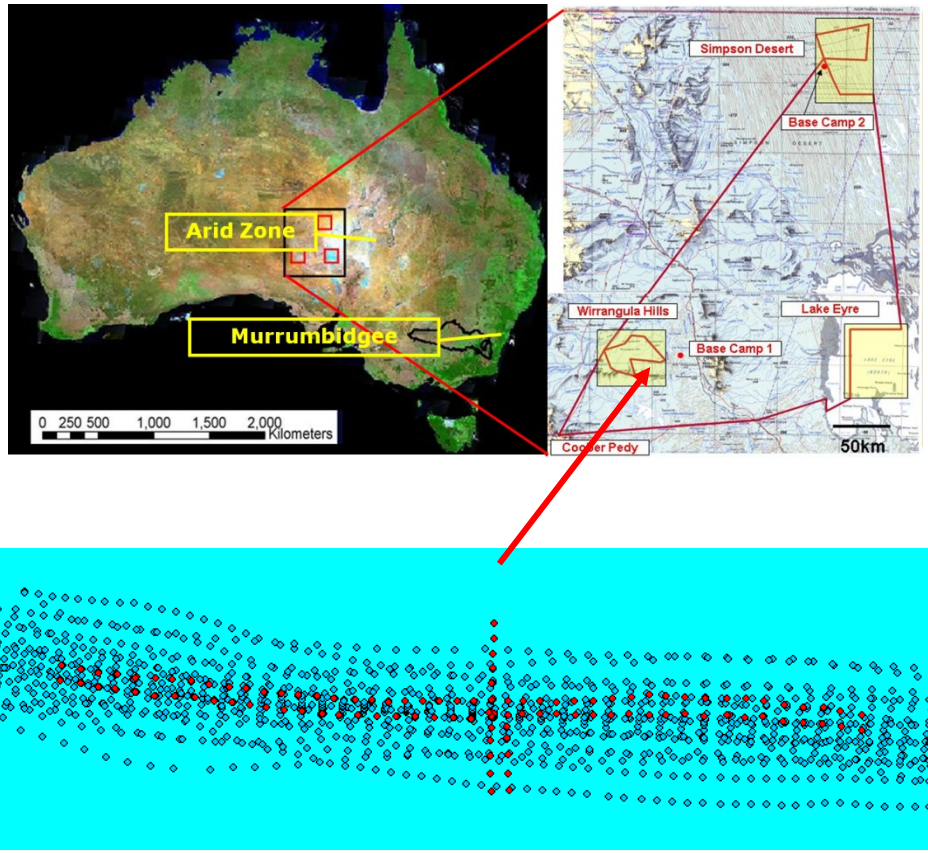
Rock effect simulation

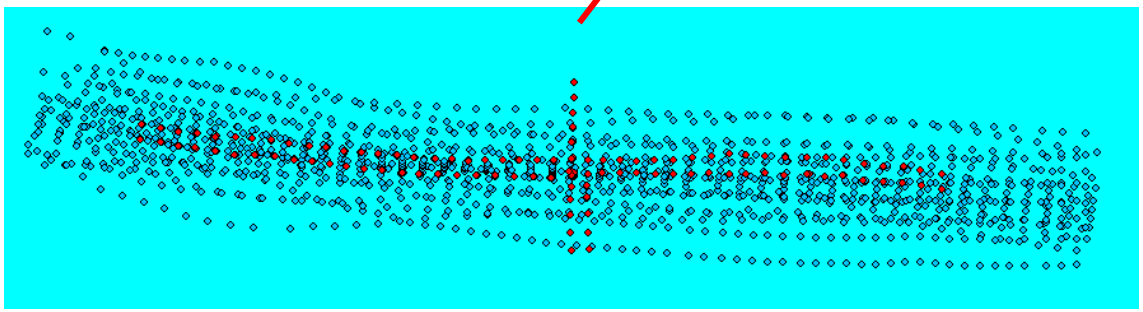






The Semi-Arid Zone Experiment of Australia (SAZE-Oz)





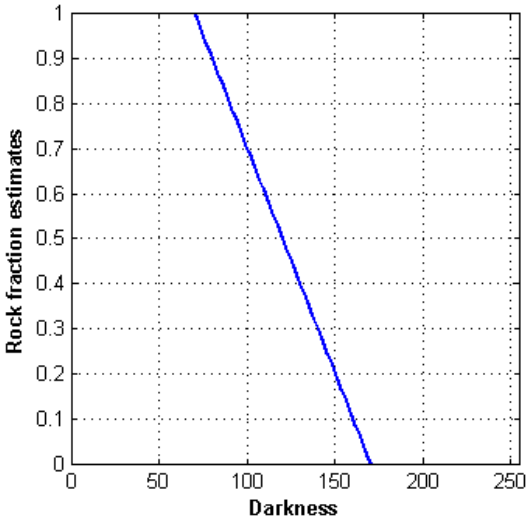
High rock fraction

Low rock fraction

Rock fraction estimation

High rock fraction

Low rock fraction



Roughness parameter Hr estimation

Surface RMS height ≈ Rock Fraction * mean of squares of rock heights

Zribi, M. and et al. (2003)
Modelling of ERS-2 radar backscattering over rocky arid regions,
INT. J. REMOTE SENSING, VOL. 24, NO. 24, 5229–5242

Preliminary result