Current Status of Ground-Based Observation of Soil Moisture for the PALSAR Algorithm Validation in the Mongolian plateau

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1. Purposes
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3. Area soil moisture change in the study area
4. A trial soil moisture observation by PALSAR
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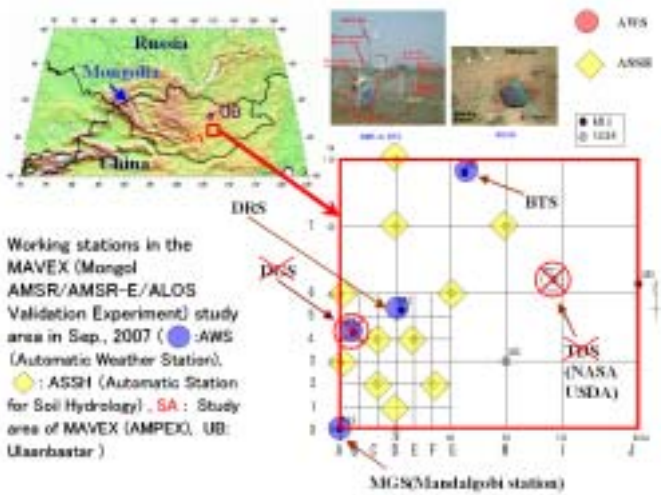
Purposes

? To obtain the ground truth data for the algorithm validation of the PALSAR soil moisture observation

? To make a trial estimation of soil moisture in the study area by PALSAR observation



Working stations in the MAVEX (Mongol AMSR/AMSR-E/ALOS Validation Experiment) study area in Sep., 2007 (:AWS (Automatic Weather Station), : ASSH (Automatic Station for Soil Hydrology) , SA : Study area of MAVEX (AMPEX), UB: Ulaanbaatar)

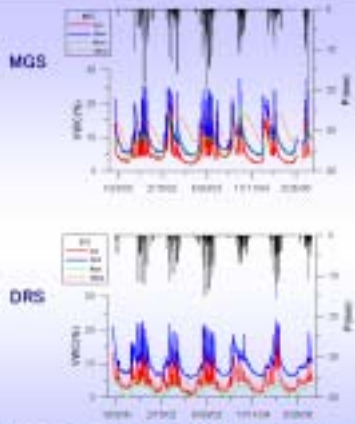
Activities of soil moisture research for AMSR-E validation

A long-term monitoring by AWS and ASSH since 2001

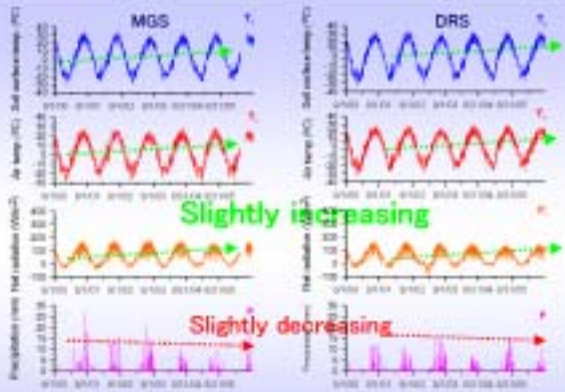
Data sets

[AMSRGRDATA02, 03, 04, 05, 06]
[AMSRGRDATA07]

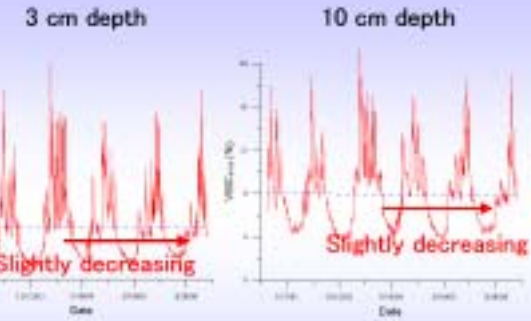
AMSR-E soil moisture estimation
Successful results of AMSR-E validation,
Reasonable estimation of soil moisture in Mongolia



A time series of precipitation (P) and the daily mean soil moisture (VWC) at MGS and DRS from Sep. 2000 to June 2006



A time series of daily mean temperatures of soil surface and air, daily mean net radiation and precipitation at MGS and DRS from Sep. 2000 to June 2006

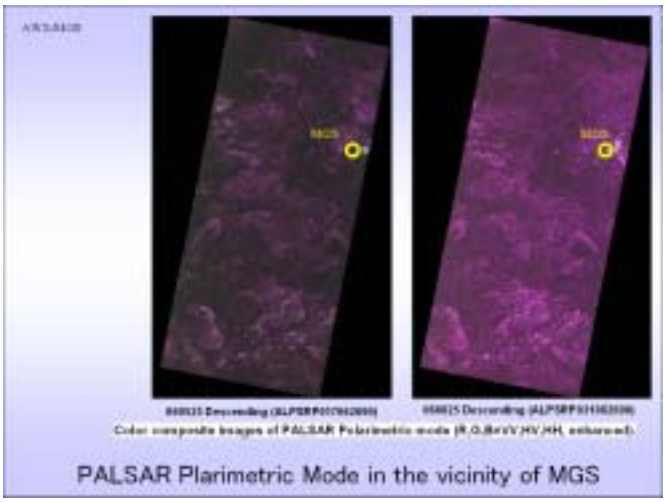


A time series of the daily area-averaged soil moisture (VWCarea) at the 3cm and 10 cm depths in the study area (120 km by 120 km) from June 2001 to Sep. 2006

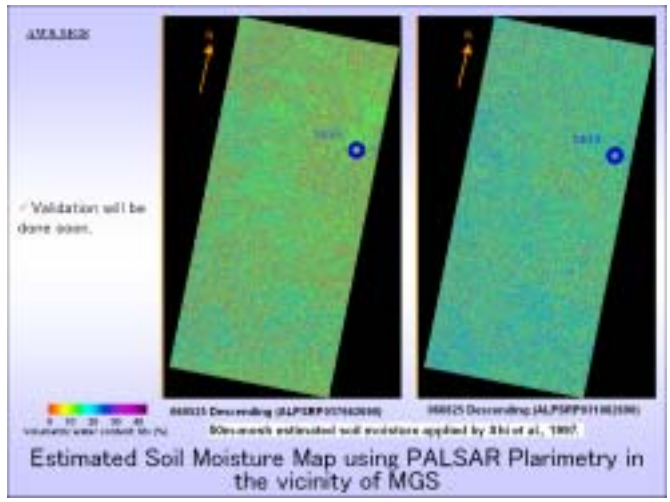
- Algorithm based on regression analysis using single-scattering IEM model and applied to SIR-C/XSAR data (Shi *et al.*, 1997).
- For estimating soil moisture (MV):
- For estimating roughness parameter (*Z*):
- including effect of θ, ε, and ρ.
- where, $\sigma_{pq}(\theta,\varepsilon,k)$: polarization amplitude, k: wave number, J_n: the Bessel function, and coefficients $a_{pq}(\theta)$, $b_{pq}(\theta)$ were defined.
- Condition for applying: Pixels for which $\sigma^0_{hh}(\sigma^0_{vv})$ > -11dB corresponding to NDVI of about 0.4, and $\sigma^0_{hh} > \sigma^0_{vv}$ for bare surface were excluded.
- Validity range:

Soil parameters	Min.	Max.	Interval	Unit
Moisture	2.0	50	2	% by volume
RMS height	0.2	3.6	0.2	cm
Correlation length	2.5	35	2.5	cm
Incidence angle	25	70	1	degree
Correlation function	Exponential, 1.5 power, and 2.0 power			

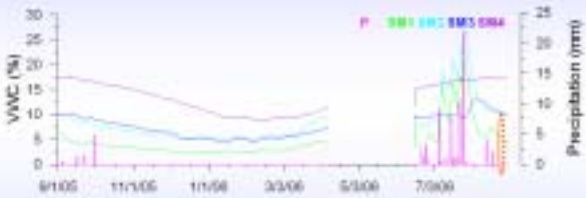
Estimation of Moisture and Roughness Using Polarimetric Data



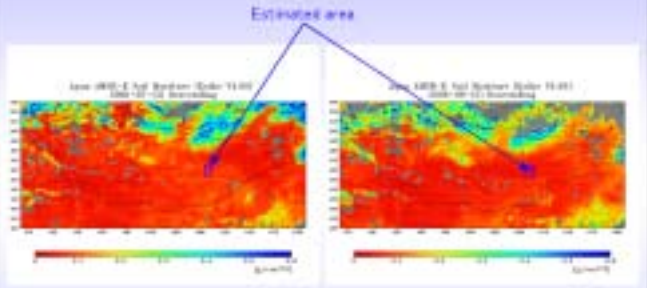
PALSAR Plarimetric Mode in the vicinity of MGS



Estimated Soil Moisture Map using PALSAR Plarimetry in the vicinity of MGS



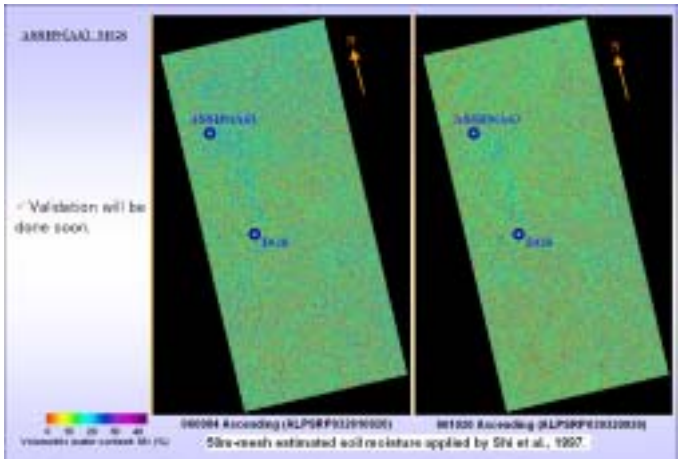
Soil moisture and precipitation by AWS at MGS from Sep. 2005 to Aug. 2006.



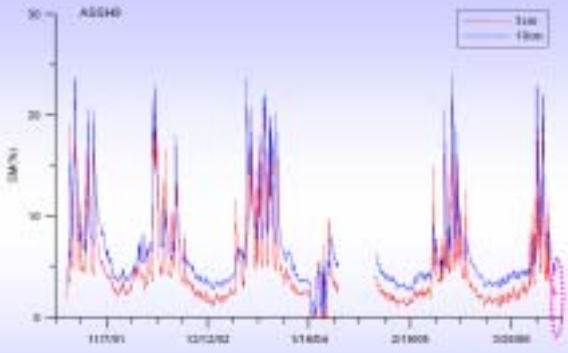
AMSR-E Soil Moisture Map in late May and August, 2006

Color composite images of PALSAR Polarimetric mode (R,G,B=VV,HV,HH, enhanced)

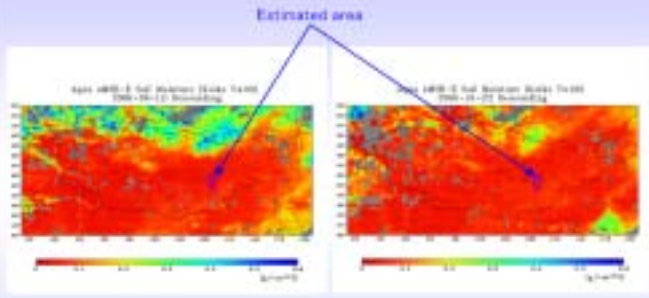
PALSAR Plarimetric Mode in the western part (near A6 and DGS) in the study area



Estimated Soil Moisture Map using PALSAR Plarimetry



Monitoring results of soil moisture (SM) of ASSH9 (A6) from 2001 to 2006



AMSR-E Soil Moisture Map in late August, 2006

Conclusions

? Successful monitoring in the study area by AWS and ASSH from 2006 to 2007

? Advancing of soil moisture drying in the study area plateau

? Overestimation of soil moisture in the study area by PALSAR observation

? Continuing ground-based monitoring by AWS and ASSH

? Optimal tuning and validation of PALSAR soil moisture measurement algorism as soon as possible