**Results of the AMPEX Project**

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**Introduction**

ADEOS II (Advanced Earth Observing Satellite II) equipped two sensors was launched in December, 2002. The sensors were AMSR (Advanced Microwave Scanning Radiometer) and GLI (Global Imager), which were expected to acquire the necessary data to make clear the mechanism of the circulation of water and energy and to know the vegetation production. AQUA with a sensor AMSR-E was launched in May, 2002. To obtain the match up data for validation of the sensors (AMSR and GLI) of ADEOS II and AQUA and to grasp the real conditions of water cycle in the Mongolian plateau, long-term monitoring by many water cycle stations started in 2000 in the study area where is located in 250 km southwest of Ulaanbaatar. We called this study project AMPEX (ADEOS II Mongolian Plateau Experiment for ground truth).

The main purposes of AMPEX were as follows:

- To carry out ground-based monitoring of soil moisture with fundamental Hydrological and phenological observation in the study area in the Mongolian plateau.
- To investigate the validity of the standard algorithm of soil moisture of AMSR/AMSR-E.
- To estimate the spatial distribution of soil moisture in the Mongolian plateau using the validated algorithms of AMSR/AMSR-E.

**Method**

We have been carrying out the validation study in the AMPEX study area between Mandalgobi (45°46.175’ N, 106°16.539’ E) and Choyr (46°21.133’ N, 108°22.509’ E). The surface condition was mostly flat and covered with the pasture grass with small shrub. It was located in the Mongolian plateau and the central part of Mongolia. The area size was 120 km by 160 km.

A long-term monitoring of fundamental elements of meteorology and hydrology by AWS and ASSH has been successfully carrying out since 2001 (Kaihotsu, 2005). In order to know temporary surface conditions and various parameters of soils and plants, complementary intensive field observation was performed several times.

**Results and discussion**

The ground-based monitoring data of AWS and ASSH in the period from September 2000 to August 2005 were successfully obtained. The mean value of annual rainfall in the period was about 116.3 mm. Daily air temperature varied widely from 39.1 °C to -37.2 °C and the mean annual air temperature was about 2.4 °C at AWS sites. The mean annual volumetric water content of soil at the 3 cm depth varied between 3 and 5%. This results implies that the study area soil was clearly dry, hot and cold. The Evapotranspiration values were in the range from 75 to 85% of the annual rainfall.

Fundamental physical properties data of the AWS site soils were obtained in laboratory. The data of soil particle distribution, porosity and saturated hydraulic conductivities showed that characteristics of the study soil is similar to those of sand.

We discussed interaction between plant growth and rainfall/soil moisture change in a year and vegetation condition (plant water content, land cover, net primary production etc.) using the satellite data (data of NOAA, Landsat 7, GLI etc.).

In order to make a validation of the soil moisture algorithm, we tried to compare the soil moisture data by AMSR/AMSR-E observations to the soil moisture at the 3 cm depth of AWS and ASSH. Figure 1 shows relationship between AMSR-E soil moisture (Descending SM) and areal soil moisture at the 3 cm depth of all AWS/ASSH (In-situ SM) in 2003. AVE was 2.138.
The estimation of Descending SM was done by the soil moisture algorithm of ISW/PI model (Koike et al. 2000). The results showed that there was a good correlation between them and suggested that the algorithm was good.

Figure 2 shows the soil water content estimated by the algorithm in Mongolia. The distribution pattern in Fig. 2 was shown to also be reasonable in comparison with the soil, and similar to that of precipitation (Batima and Dagvadorj, 2000).

Comparing with two figures in Fig. 2, we can point out that soil in 2003 was wetter than that in 2004. Especially, we can see that the northern-central part of Mongolia in 2003 was relatively higher than that in 2004. This can be considered because we had bigger precipitation from June to July in 2003.

**Conclusions**

We obtained the following conclusions:
1) Long-term ground-based monitoring of soil moisture and hydrological elements were successfully done in the study area from September 2000 to March 2005 and we obtained various data for the satellite validation.
2) We succeeded spatially in good estimation of soil moisture by AMSR-E in Mongolia.

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**Reference**


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