Estimation of land surface heat fluxes over the Tibetan Plateau using GMS data

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A Surface Energy Balance System (SEBS)[1] originally developed for NOAA/AVHRR is applied to GMS/VISSR data in combination with meteorological information. Land surface temperature and precipitable water obtained from GMS data[2] are input to SEBS to estimate hourly regional distribution of land surface heat fluxes over the Tibetan Plateau. In SEBS, latent heat flux is obtained as the residual of the energy budget. Estimated fluxes are validated by corresponding field observations measured by sonic anemometer-thermometer with using the eddy correlation methodology at Amdo. Diurnal cycle of estimated fluxes is in good agreement with the field measurement. For example, diurnal range of estimated sensible heat flux decreases from June to August, which reflects the change of surface characteristics from dry to wet due to frequent precipitation in the summer monsoon. Over the Tibetan Plateau, the diurnal range of land surface temperature is as large as the annual range, so that the resultant sensible heat flux has large diurnal variation. Hence, the hourly estimation with GMS data may contribute better understanding of land surface-atmosphere interaction of this important area.

Keywords: surface energy balance; land surface heat flux; satellite remote sensing; GMS

Table 1. Statistics of estimated versus measured land surface heat fluxes at Amdo (91.6°E, 32.2°N, 4700mASL). (*R*: correlation coefficient, RMSE: root mean square error in W/m^{-2}, *N*: number of data used)

	R_n	G_0	H	lE
R	0.944	0.903	0.807	0.659
RMSE (*N*)	91.4 (786)	44.3 (411)	77.1 (724)	113.7 (724)

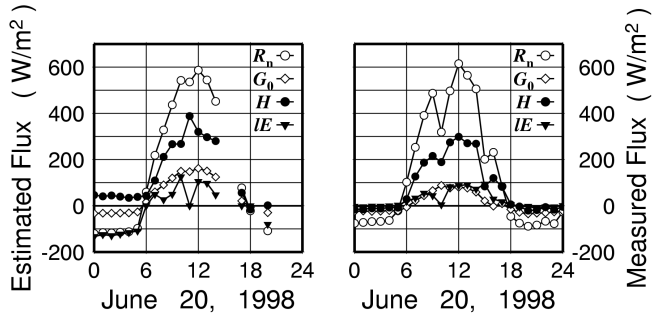

Figure 1. Diurnal variations of estimated (left) and measured (right) land surface heat fluxes ($\boldsymbol{R_n}$: net radiation, $\boldsymbol{G_0}$: soil heat flux, $\boldsymbol{H}$: sensible heat flux, $\boldsymbol{lE}$: latent heat flux) at Amdo on June 20, 1998.

References

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