

*The field experiment of energy and mass exchange process  
between the land and atmosphere in semi-arid area,  
northeast china*

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# objective:

- Based on the observation data to analysis the facts and mechanisms of the water and heat flux transfer in the ecosystem in semiarid areas.
- Comparing the different transfer process over different land surface, to study the effects of the land use on the aridification in the north of China.

*. The observation sites:*

*Tongyu, Jilin , Northeast china*

*N44°25' , E122°52' , 184m ASL*

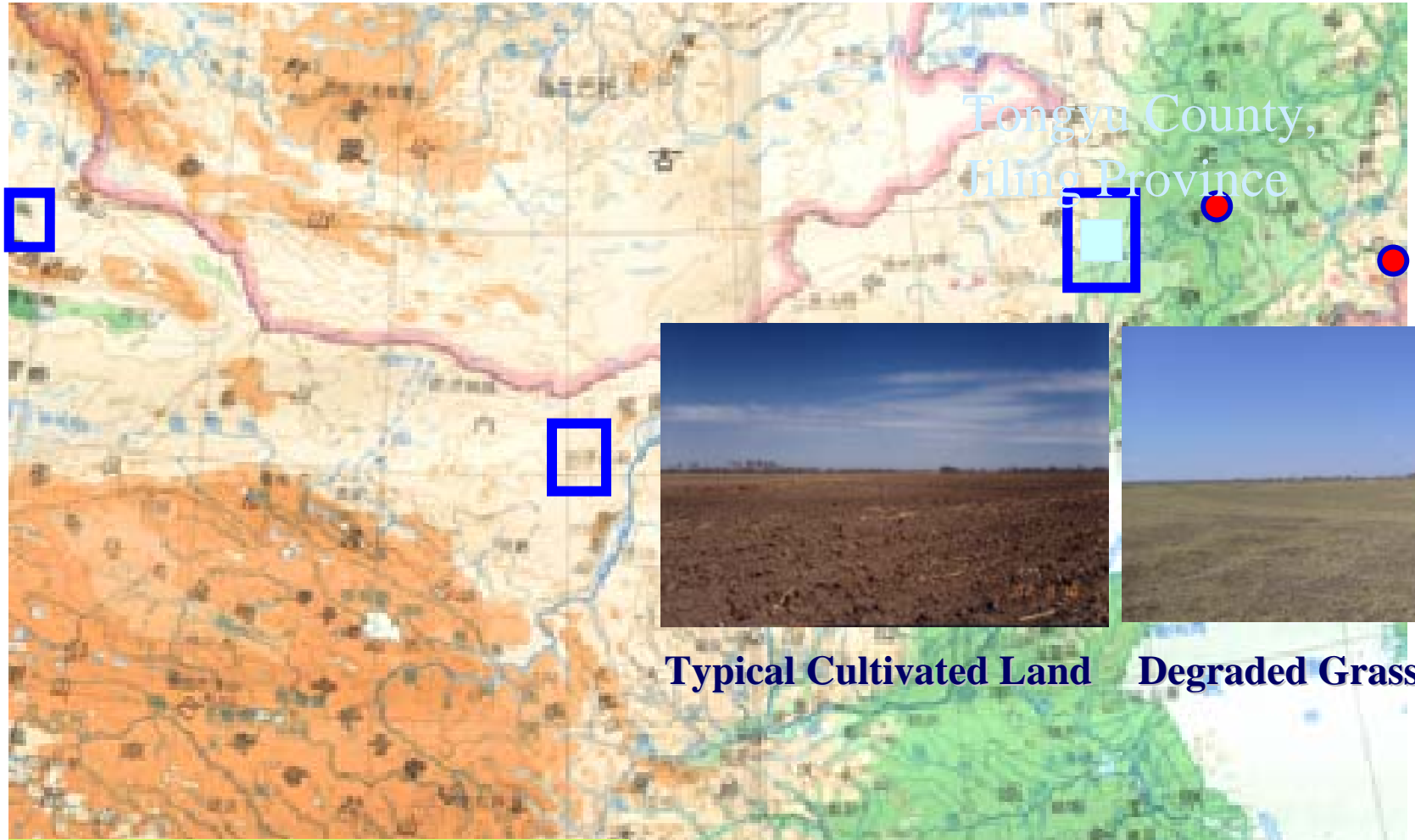
*Cropland/ de-graded grassland*

*(main crop:corn/sorghum)*

*. The observation schedule:*

*Oct., 2002-Oct.,2004*

# Long-term Monitoring in Orderly Human Activity Demonstration Areas



Typical Cultivated Land

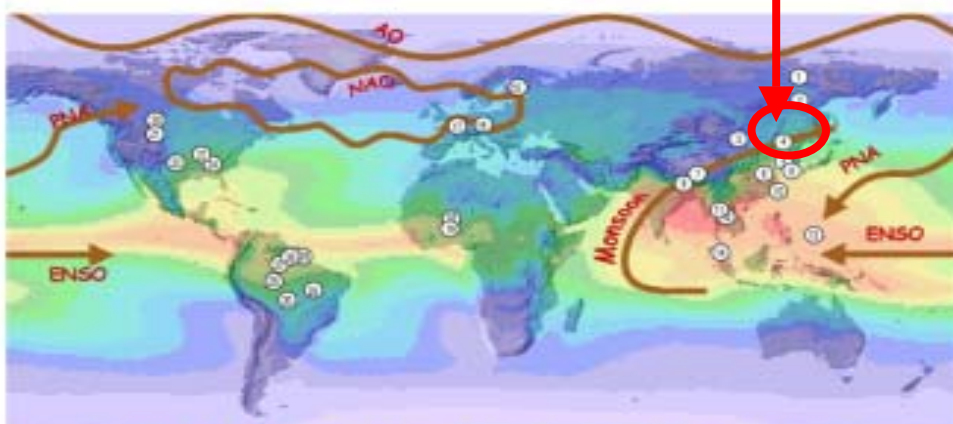
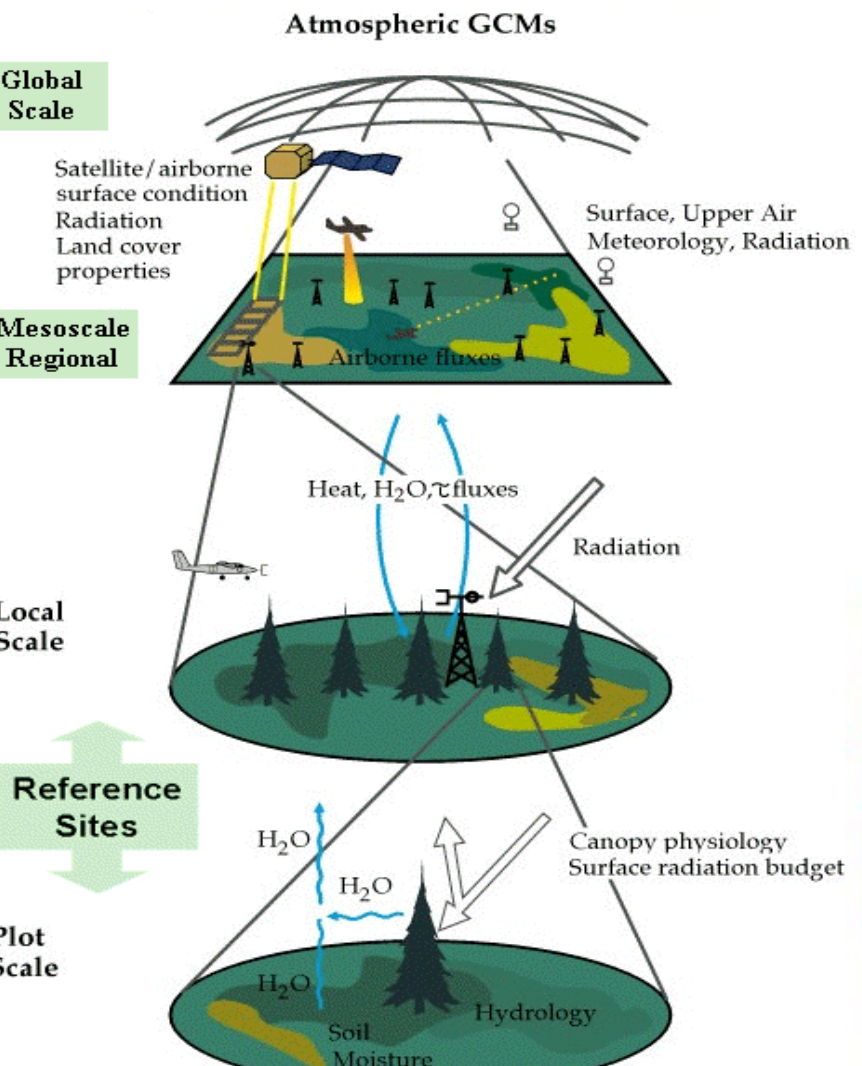
Degraded Grassland

- 样地观测
- 陆面过程和生态加强观测
- 有序人类活动示范区

有序人类活动示范区  
分布示意图



# Monitoring impact of human activity on regional climate and environment (JILING, Oct. 2002--)



**CEOP Reference Sites**

# Fieldwork Design

Long-term observation on

**Land – atmosphere flux exchange process**

**Ecological process (biomass, LAI, productivity)**

**Human Activity (population, education,  
cultivation, herd, income,etal )**

at degradation – recovery - stable ecological phases  
with site instrument monitoring and remote sensing

# Practices of Orderly Human Activity

## Example: Jilin Province

### Support for the Construction of Ecological Province

Data and facts  
Science Consultation

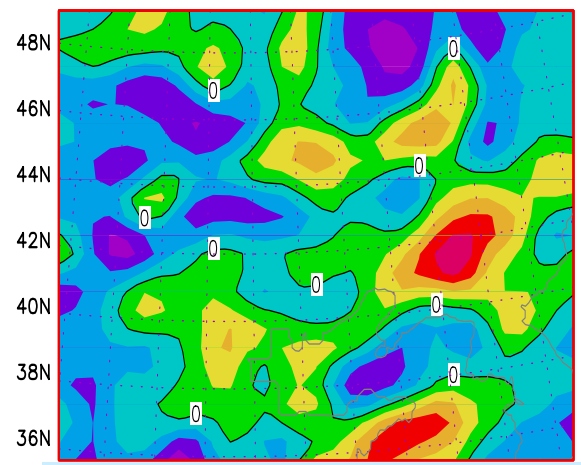
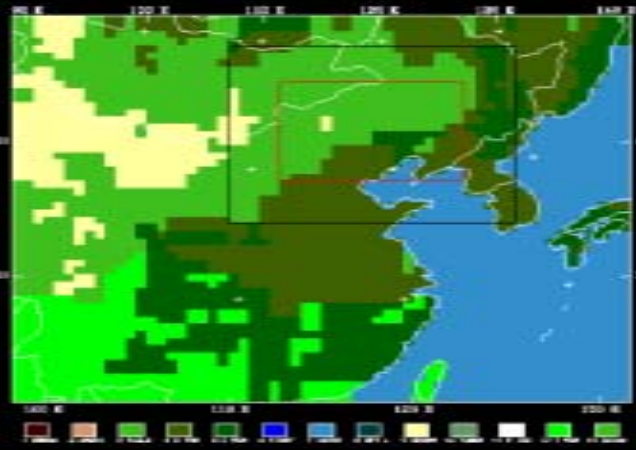
Collaborate Building-up  
of the Field Site  
with Province Project



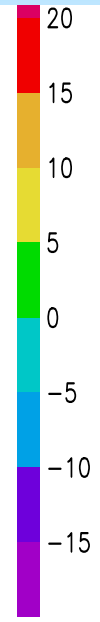


# To Policymaker (JILING, CHINA)

## Domain for Numerical Exp.

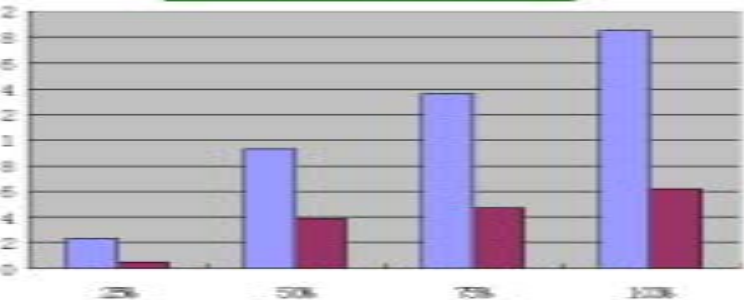


Precipitation Variability if Veg. Recovered



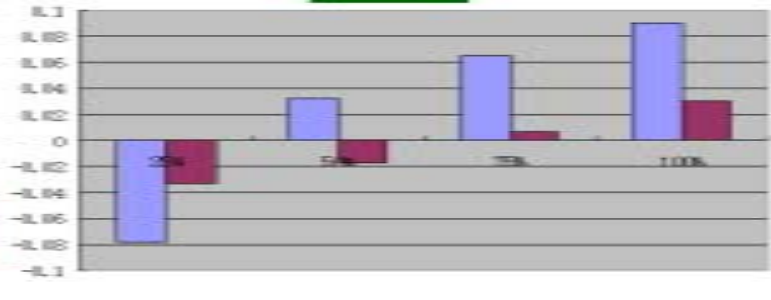
Regional Climate  
Ratio of Land Use on  
Impact of Recovered

上层土壤湿度



Soil Water

降水



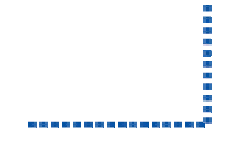
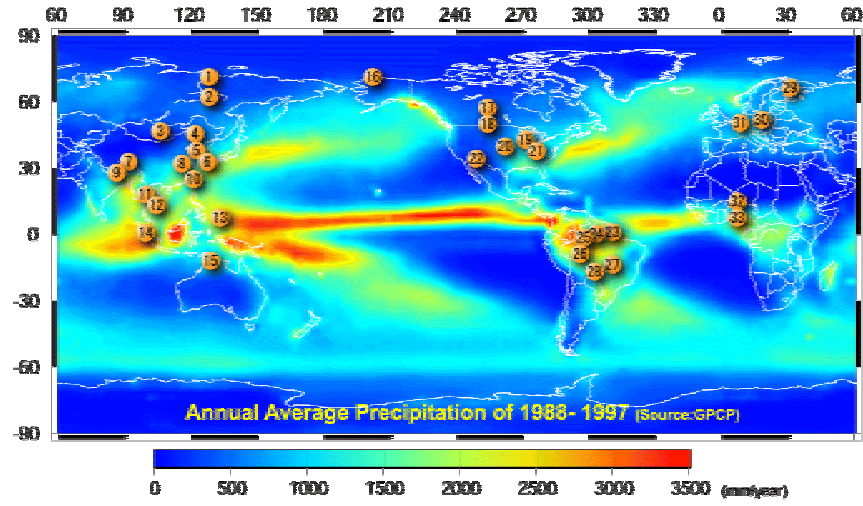
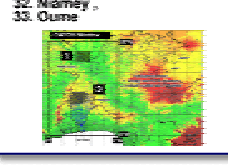
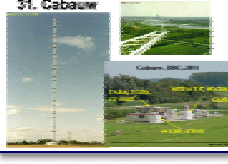
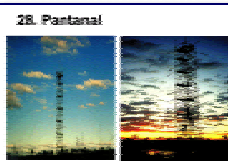
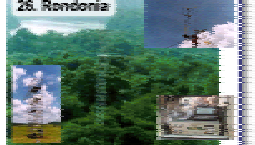
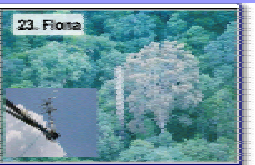
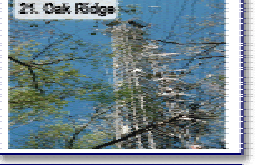
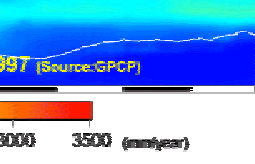
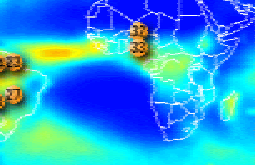
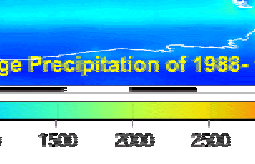
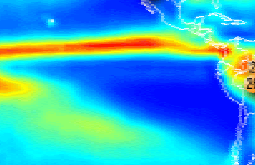
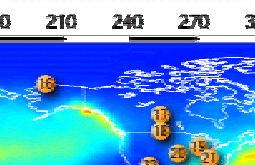
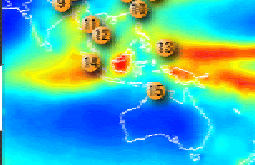
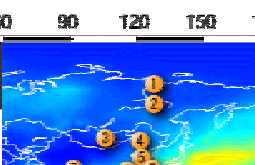
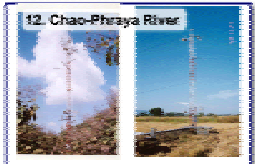
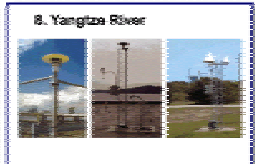
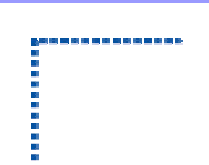
Precipitation





# CEOP REFERENCE SITES

CEOP Reference Site Status: <http://www.joss.ucar.edu/ghp/ceopdm/rsite.html>



# *The main observational elements in the Long-term monitoring*

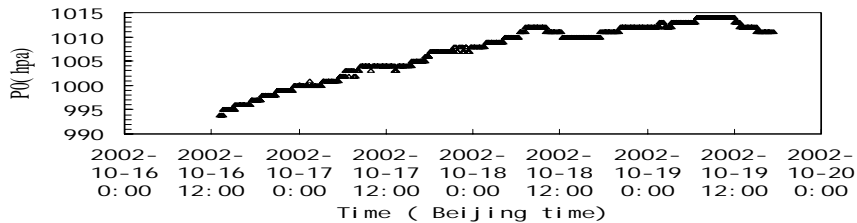
- **The profile of wind speed, wind direction, temperature, and humidity in the surface layer(2m,4m,8m,12m,16m)**
- **The turbulent flux (sensible, latent heat flux, and  $\text{CO}_2$  flux)**
- **The soil temperature and volumetric water content, soil heat flux(0-80cm,6 levels), precipitation and pressure**
- **The radiation flux (upward and downward short-wave/long-wave)**
  
- **20 meters tower**



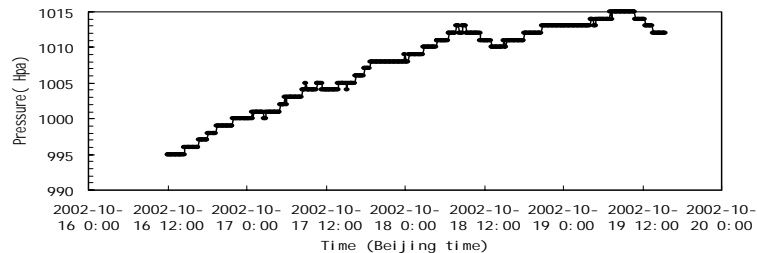




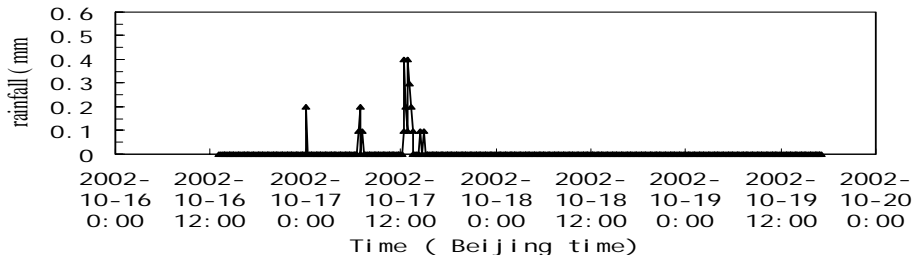
The pressure(hpa) over cropland in Tongyu



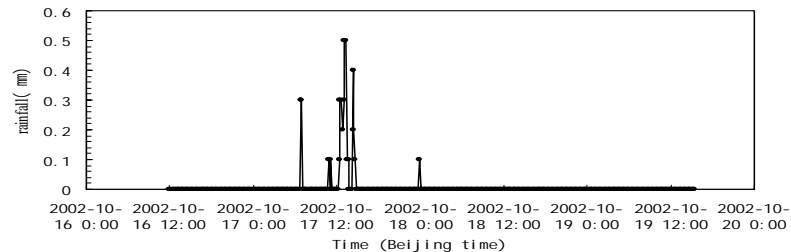
The pressure in degraded grassland in Tongyu



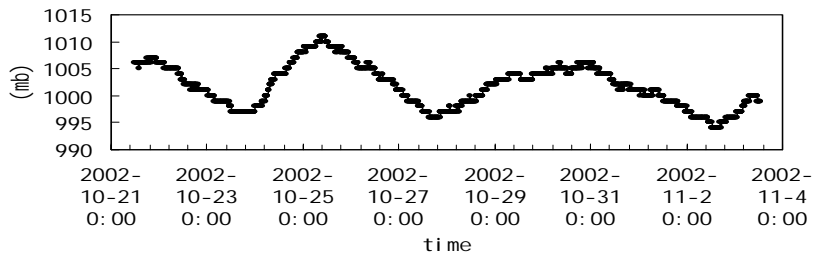
The rainfall (mm) over cropland in Tongyu



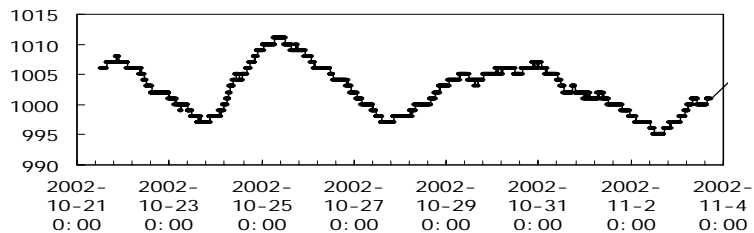
The rainfall(mm) in degraded grassland in Tongyu



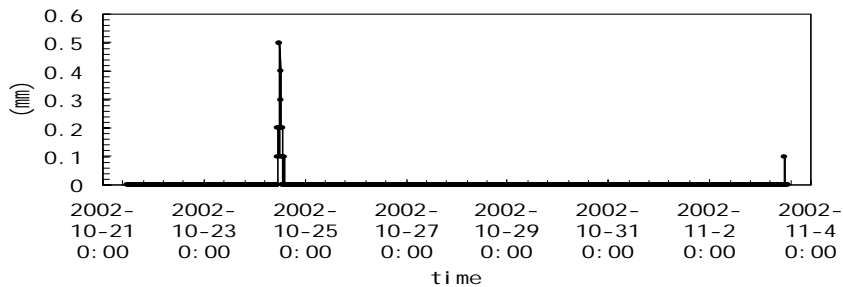
The surface pressure P0(mb) over cropland in Tongyu



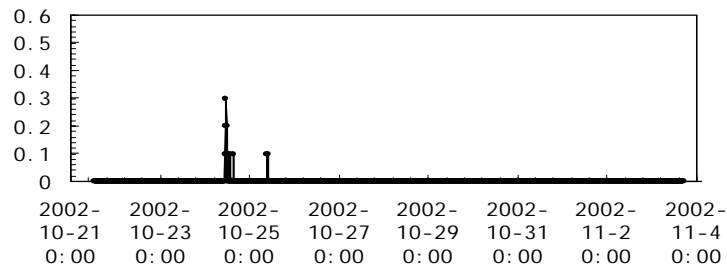
The surface pressure P0(mb) over grassland in Tongyu



The Rainfall (mm) over cropland in Tongyu



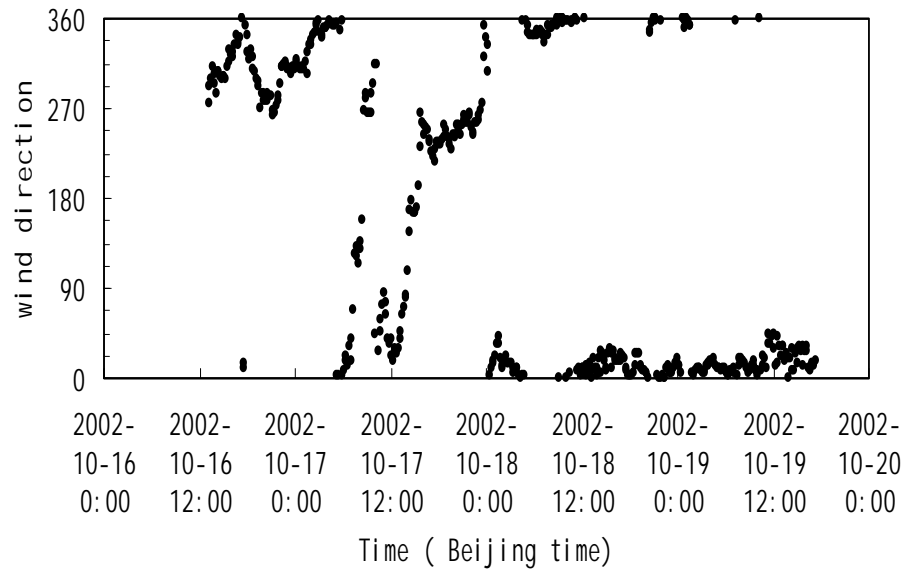
The Rainfall (mm) over grassland in Tongyu



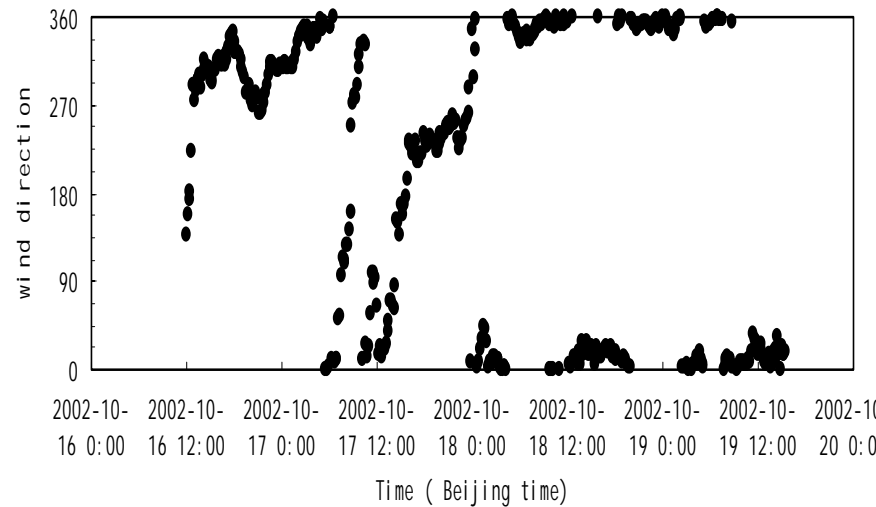
*The preliminary results in the  
field experiment*

*10 Oct. - 28 Feb., 2003  
in Tongyu, Northeast China  
winter*

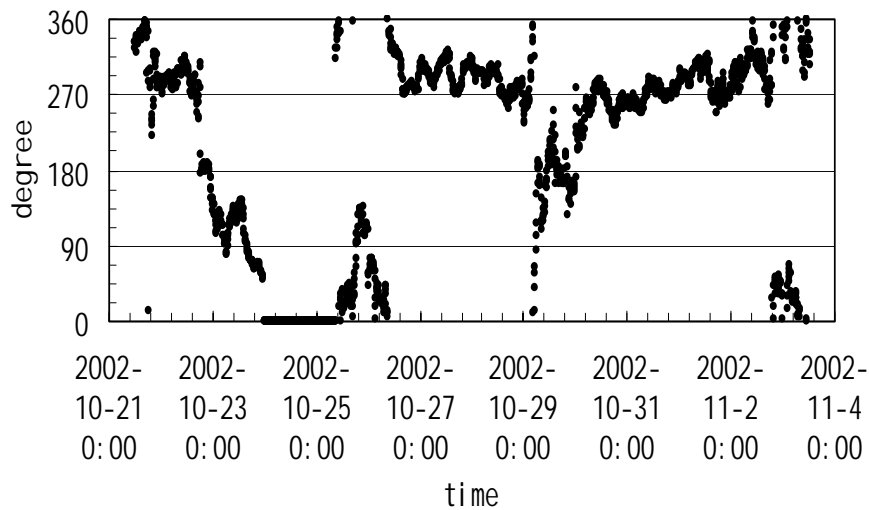
Wind direction over cropland in Tongyu



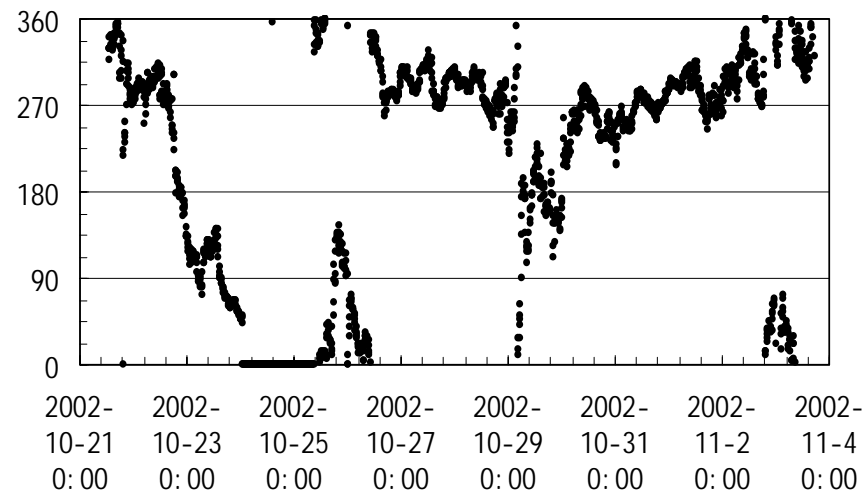
Wind direction in degraded grassland in Tongyu



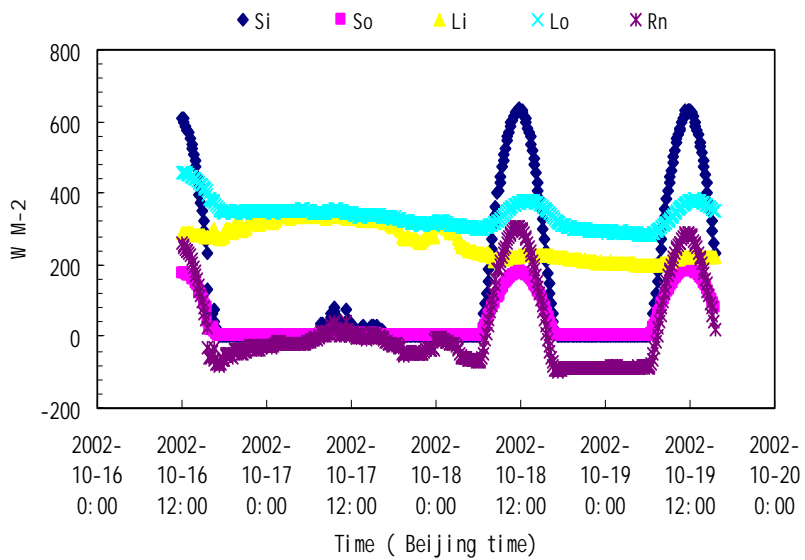
The wind direction over cropland in Tongyu



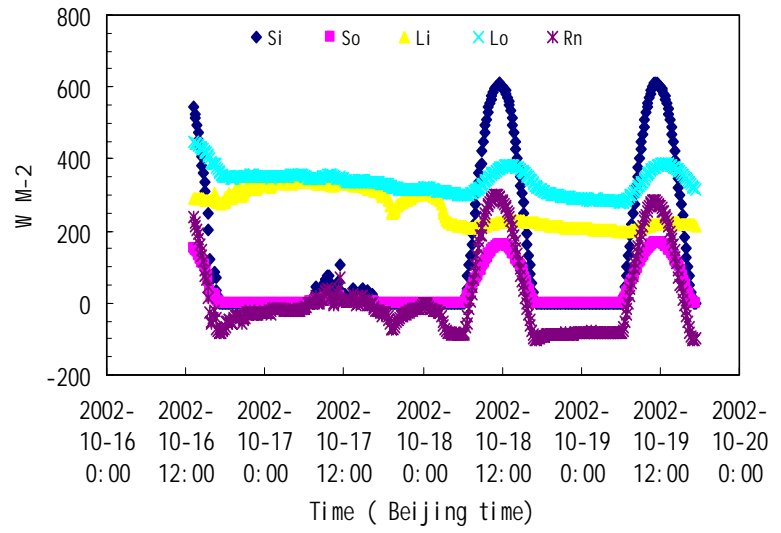
Wind direction over grassland in Tongyu



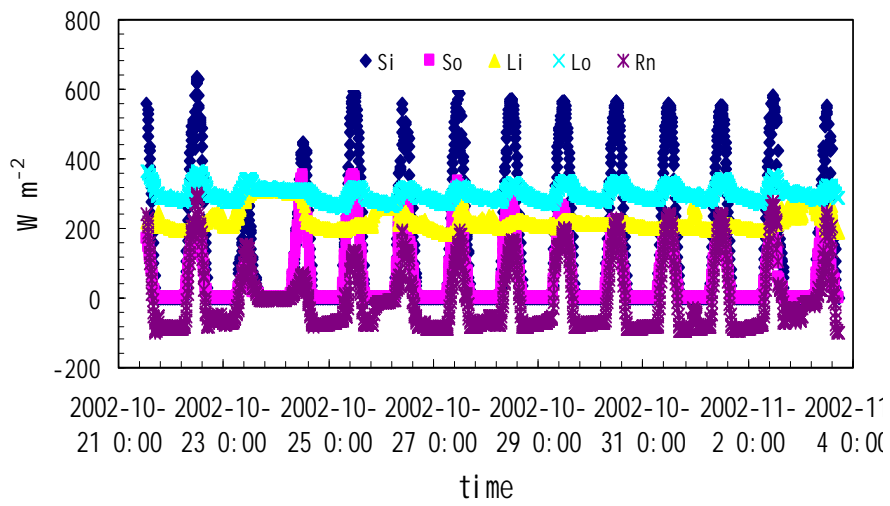
The radiation over degraded grassland in Tongyu



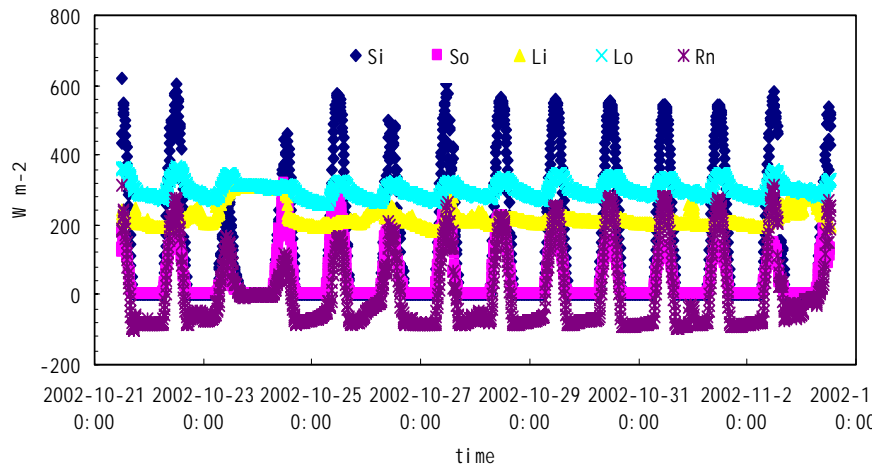
The radiation over cropland in Tongyu

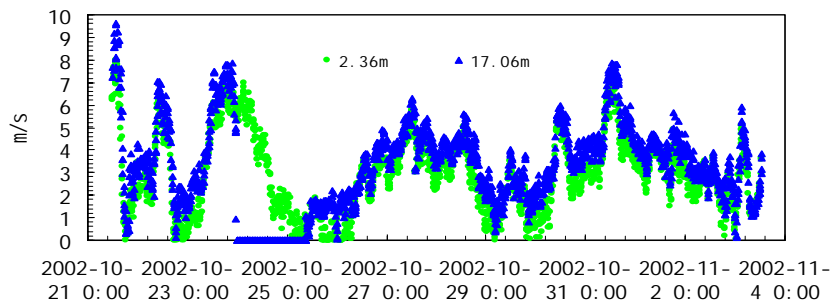


The radiation flux over grassland in Tongyu

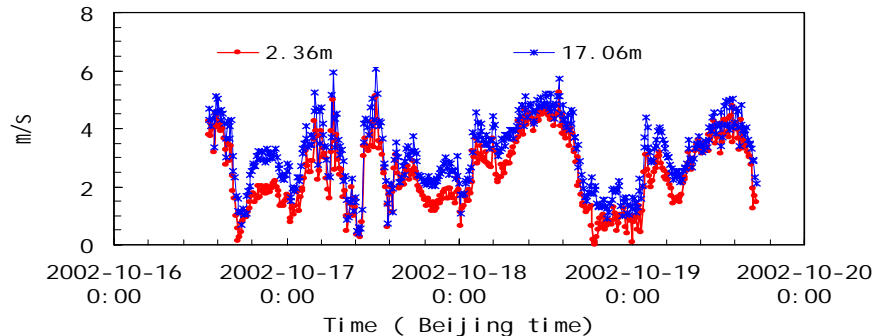


The radiation over cropland in Tongyu

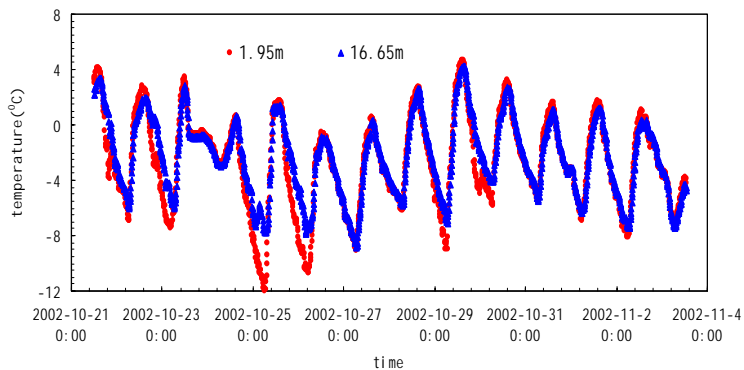




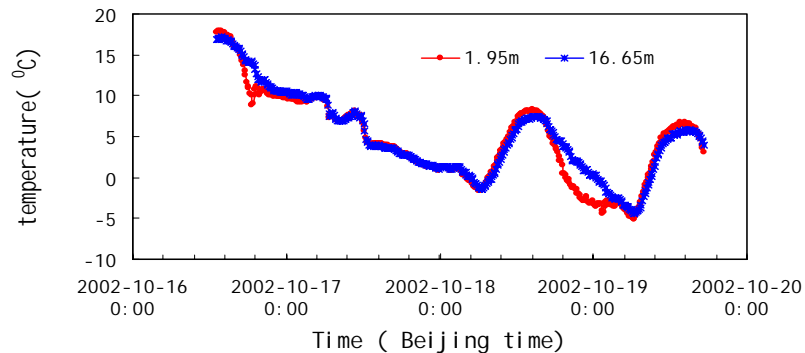
The temperature over cropland in Tongyu



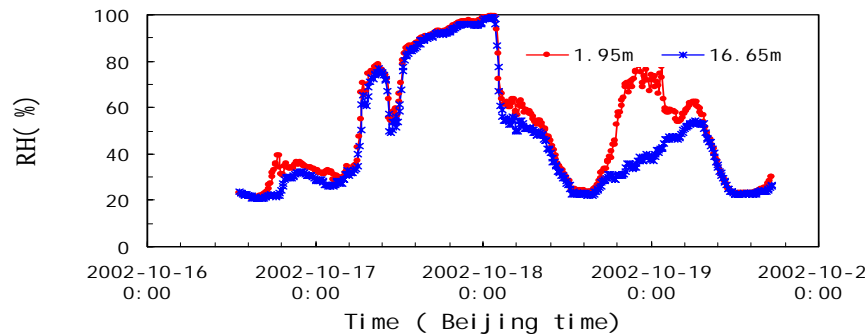
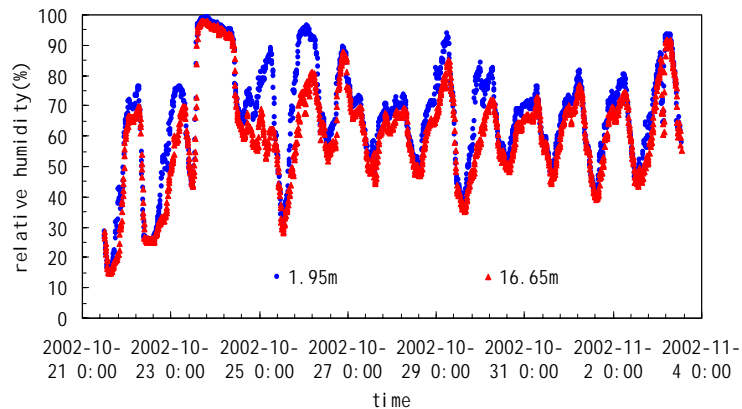
The temperature over cropland in Tongyu



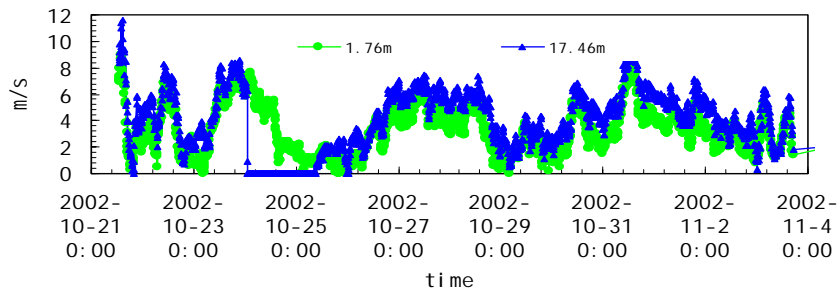
The relative humidity over cropland in Tongyu(%)



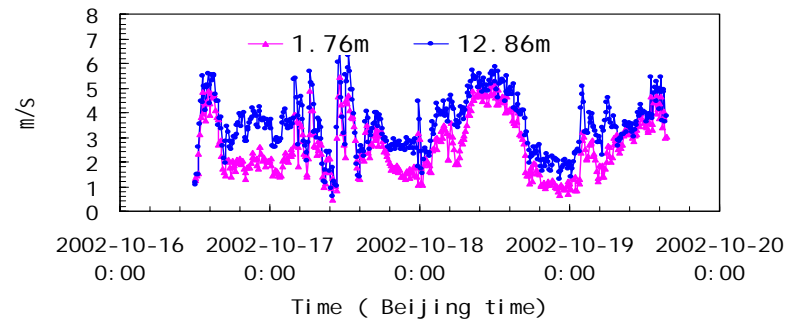
The relative humidity over cropland in Tongyu



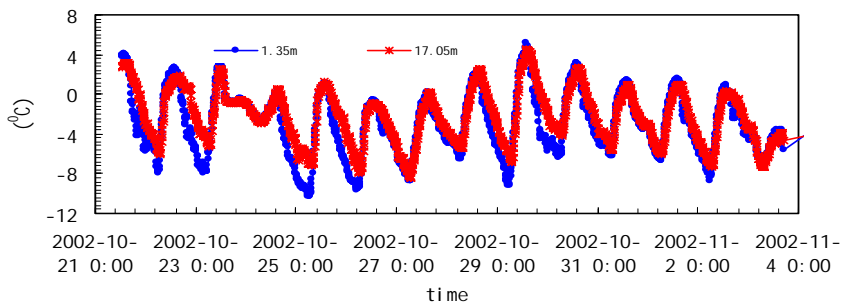
The wind speed over grassland in Tongyu



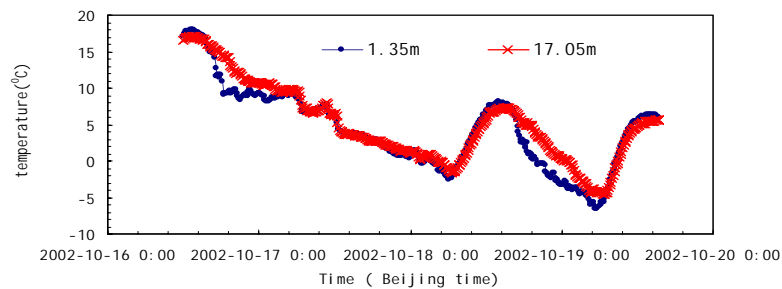
The wind speed over degraded grassland in Tongyu



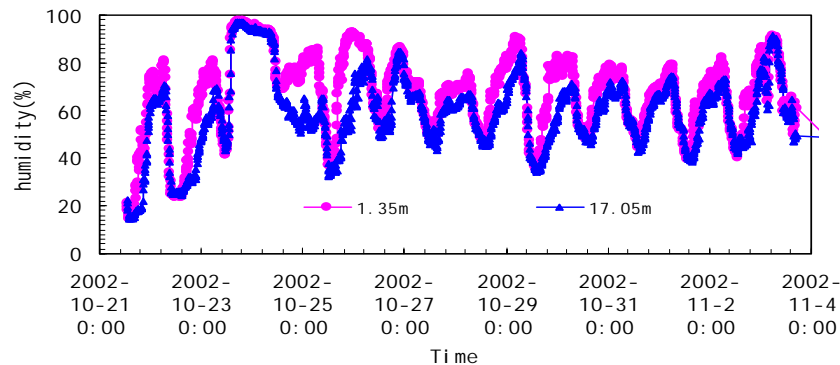
The temperature over grassland in Tongyu



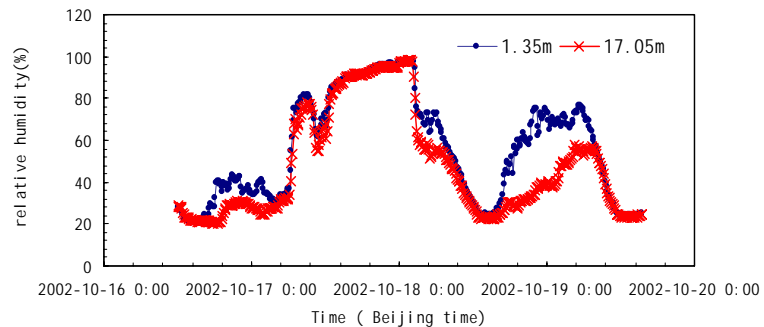
The temperature in degraded grassland in Tongyu



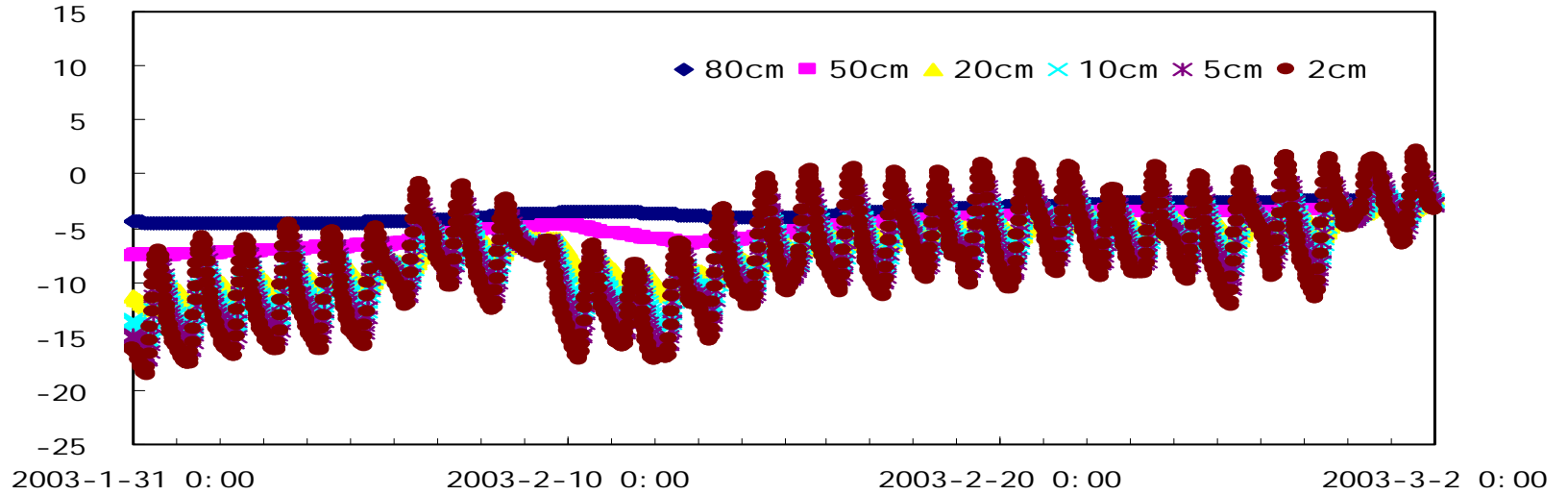
The relative humidity over grassland in tongyu



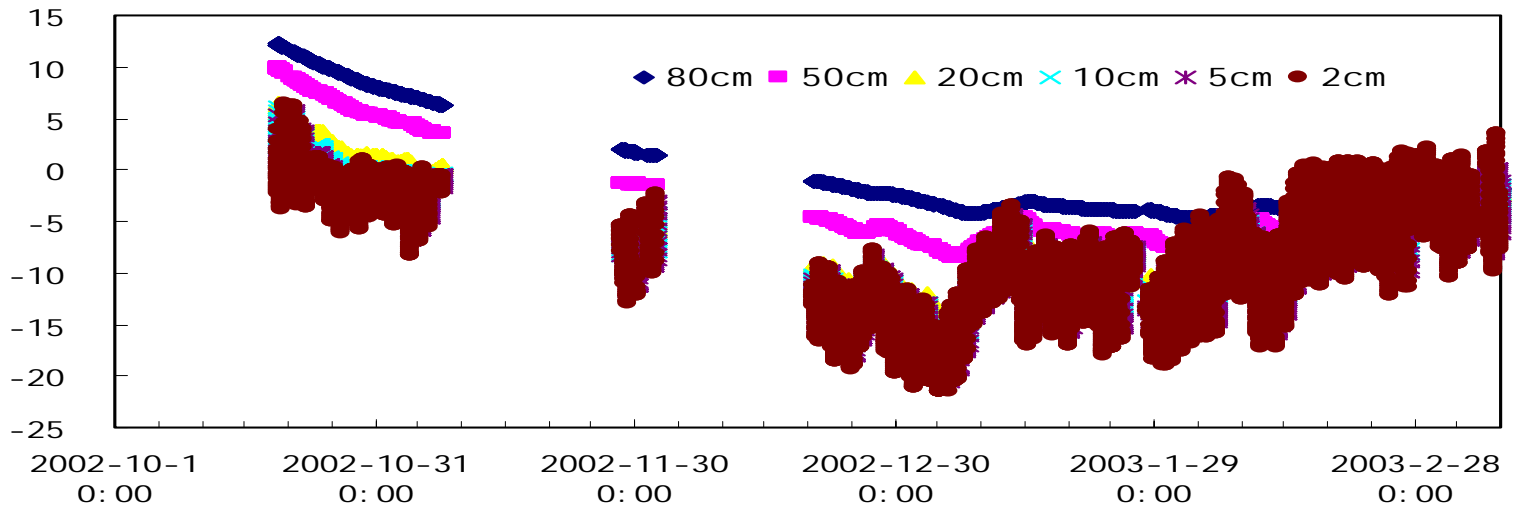
The relative humidity(%) in degraded grassland in Tongyu



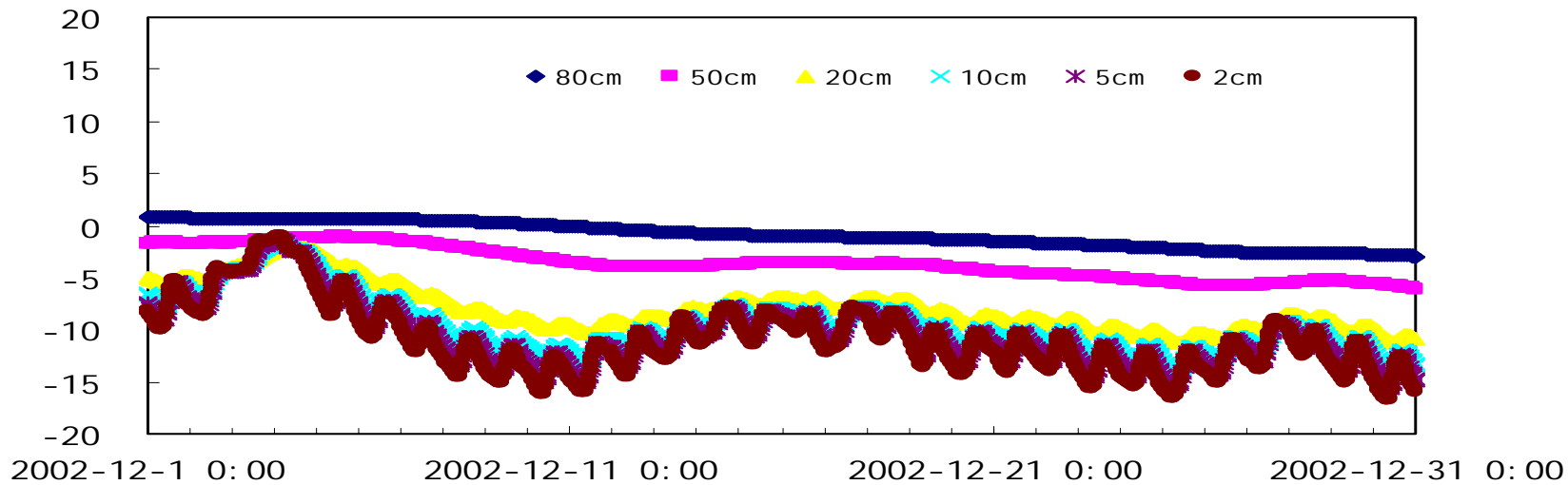
The soil temperature over cropland



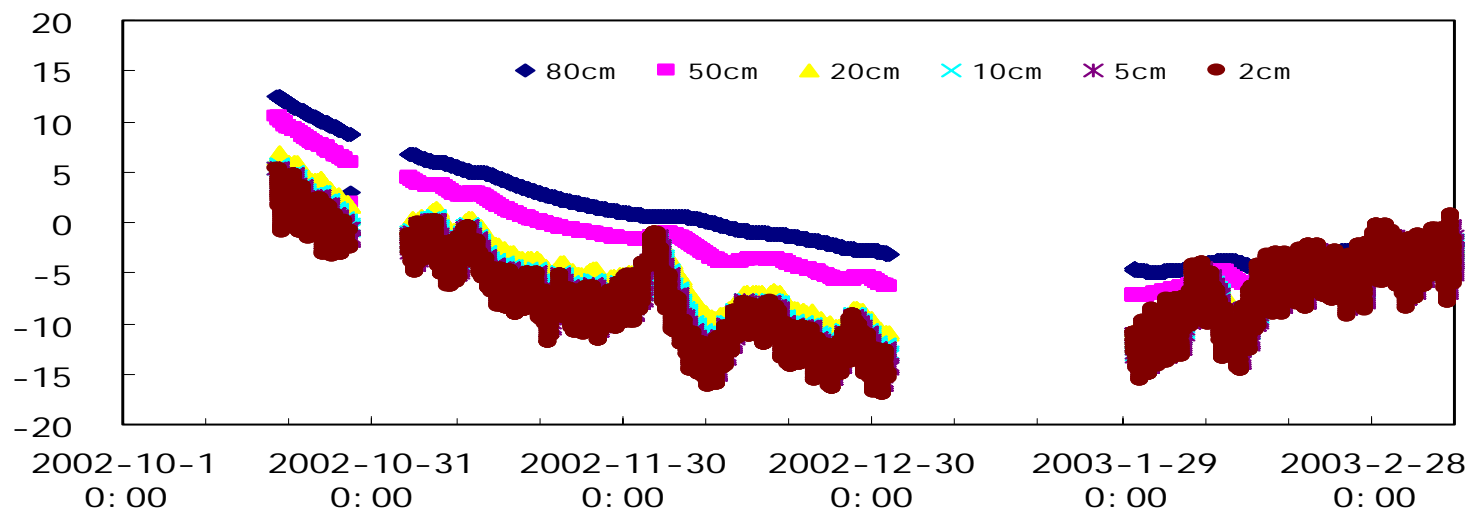
The soil temperature over cropland



The soil temperature over grassland

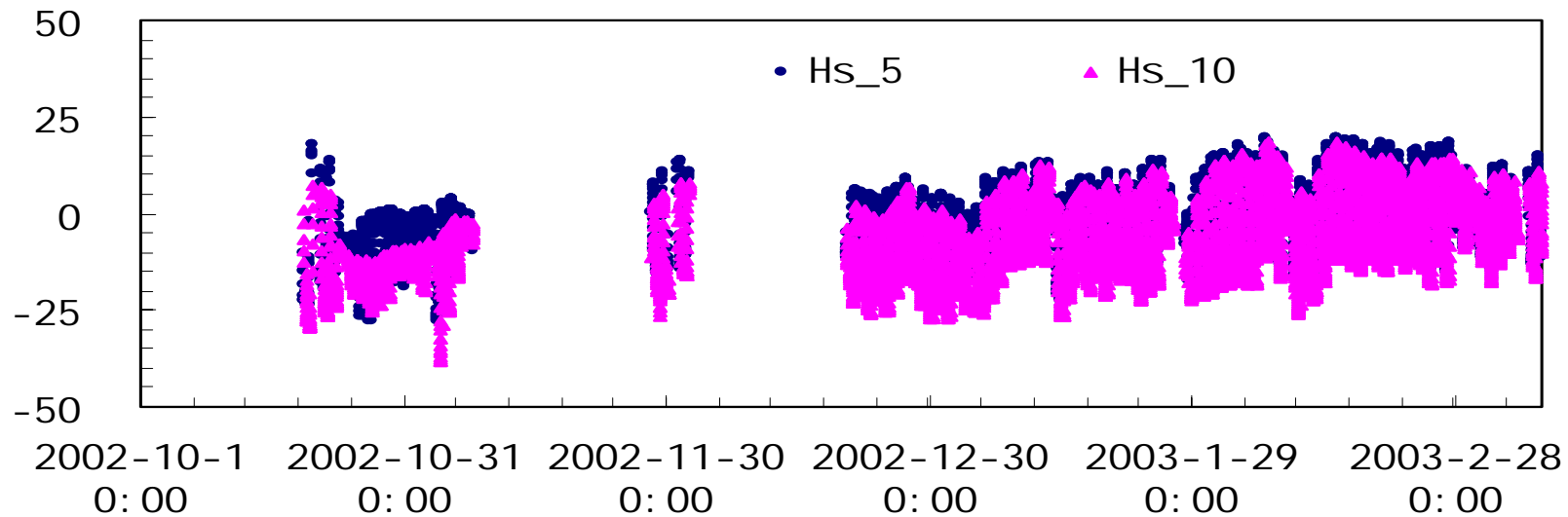


The soil temperature over grassland

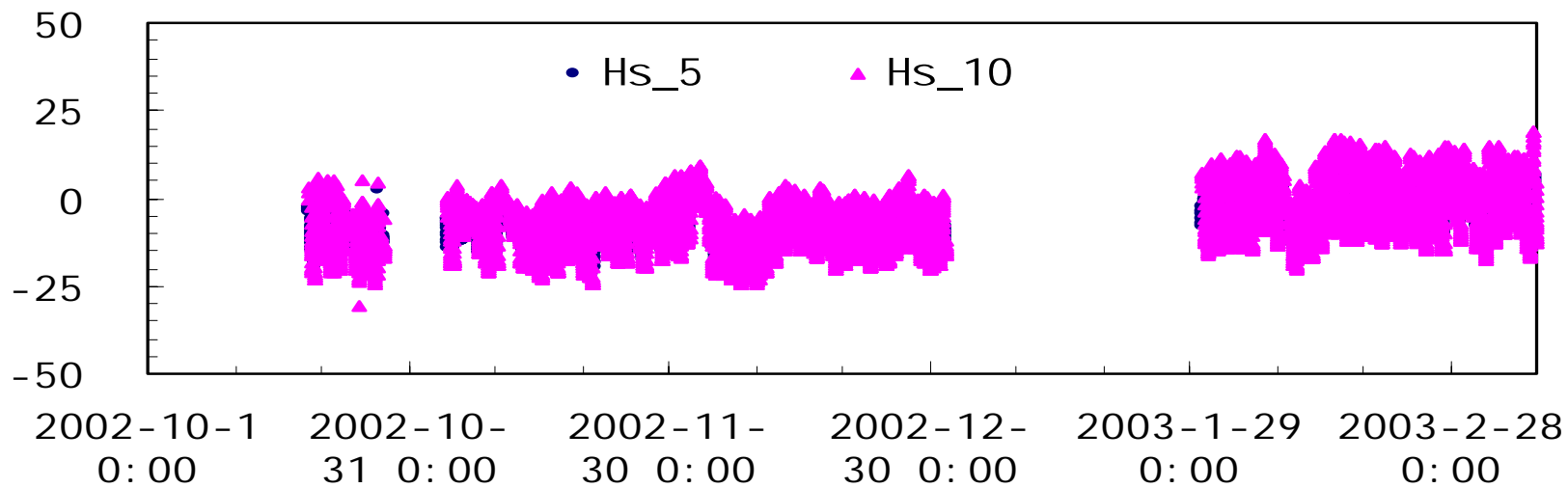




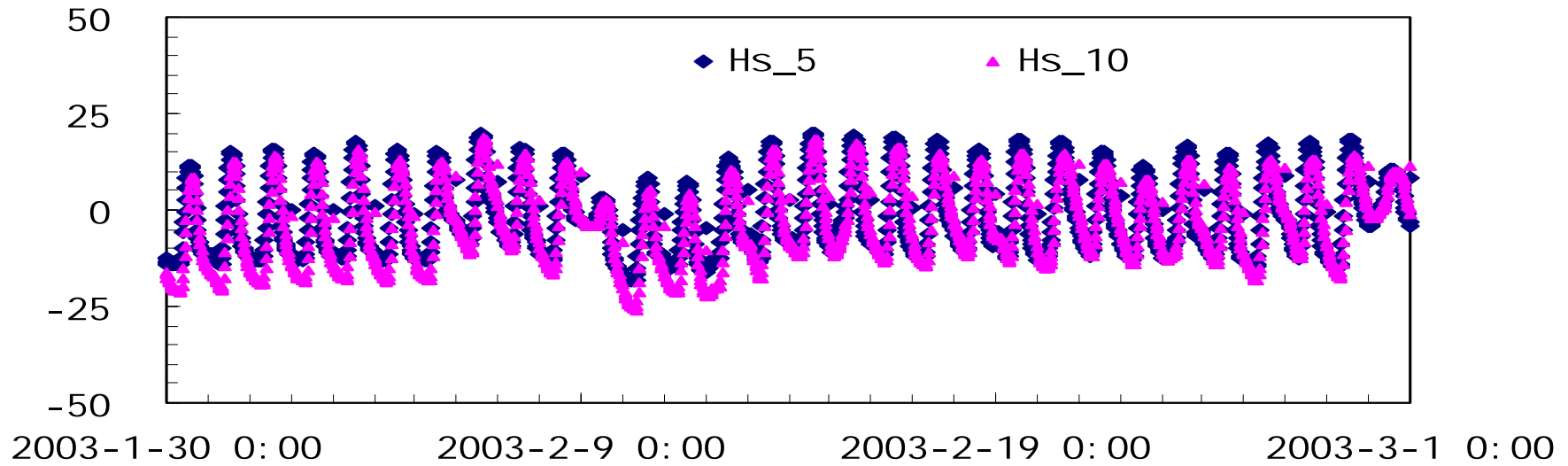
The soil heat flux over cropland



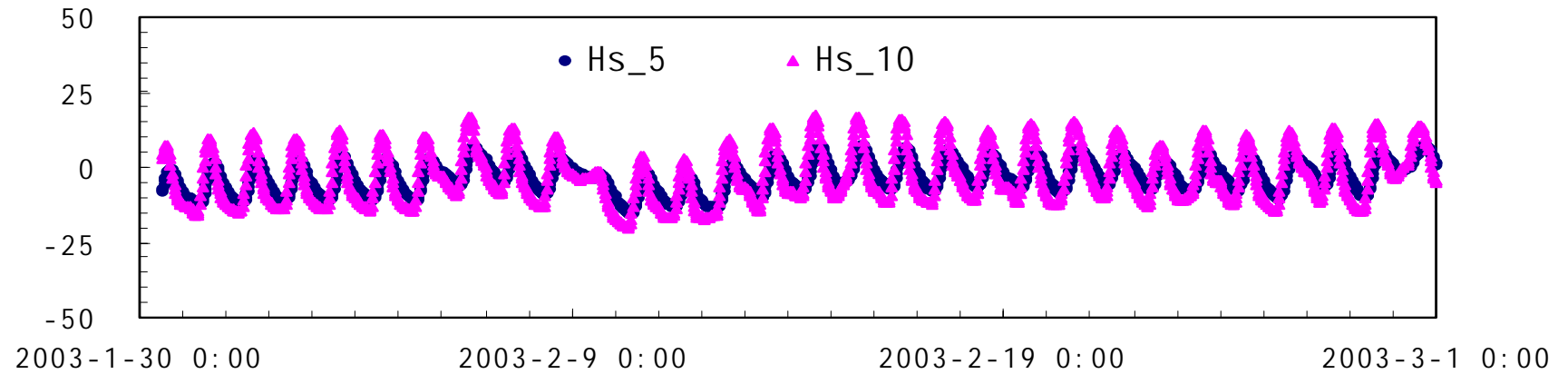
The soil heat flux over grassland



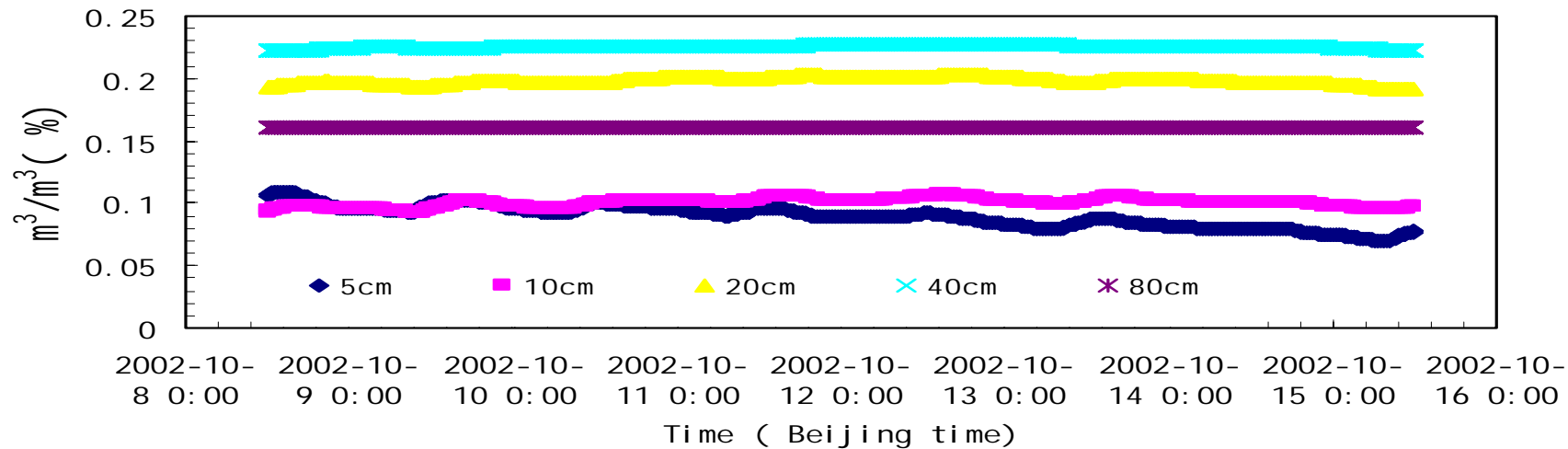
The soil heat flux over cropland



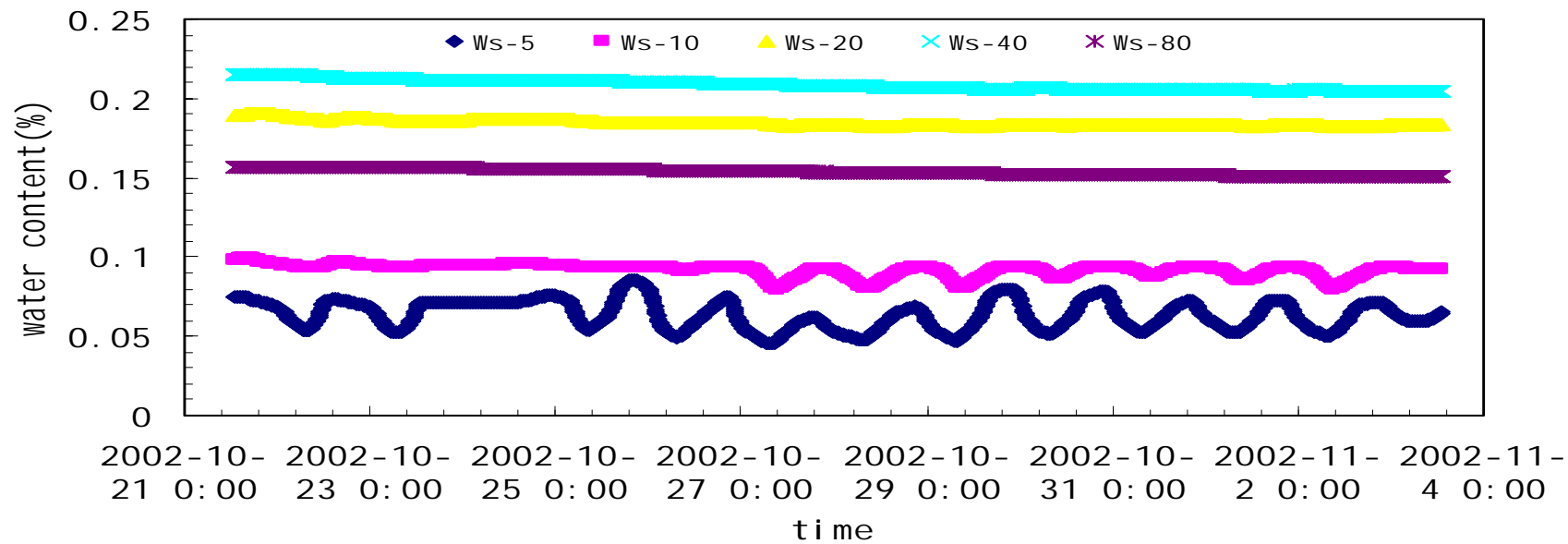
The soil heat flux over grassland



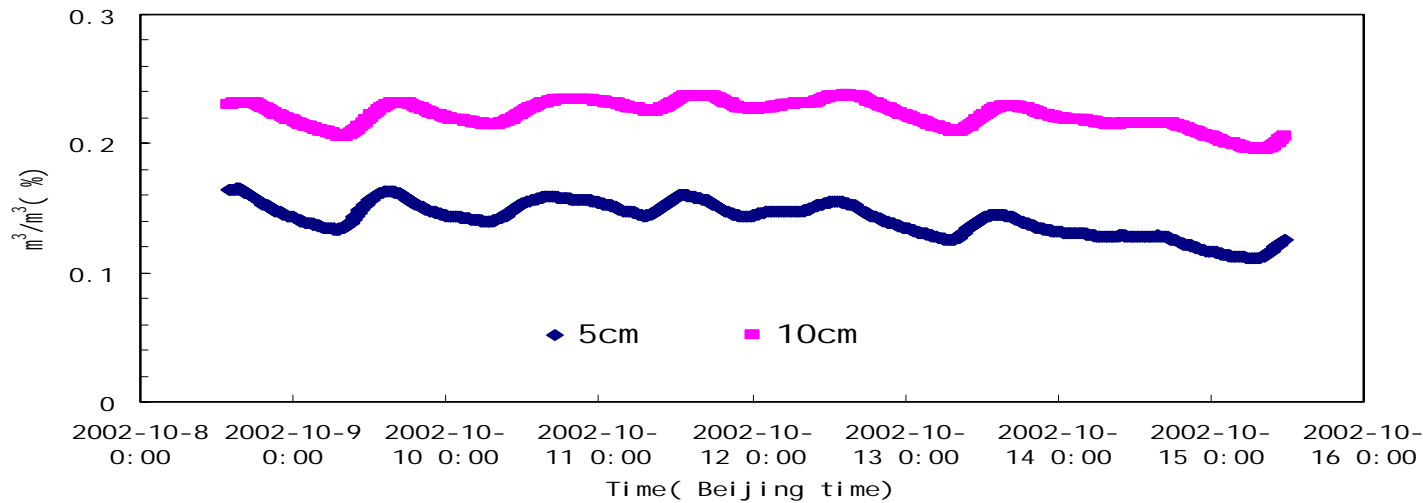
The soil volumetric water content (%) over cropland in tongyu



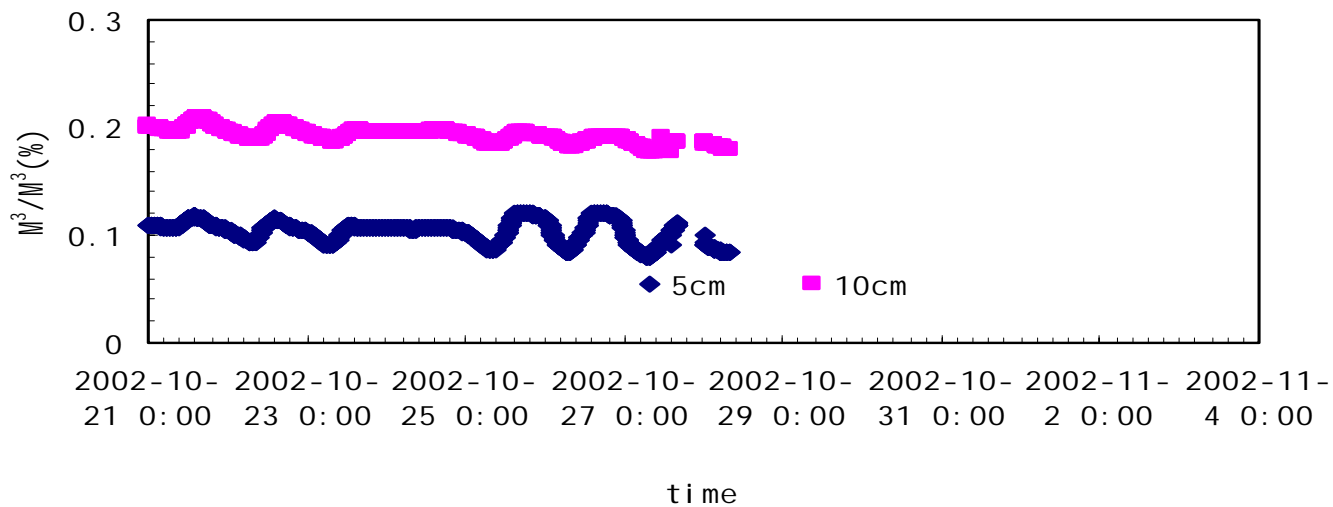
The soil volumetric water content in cropland, Tongyu (%)



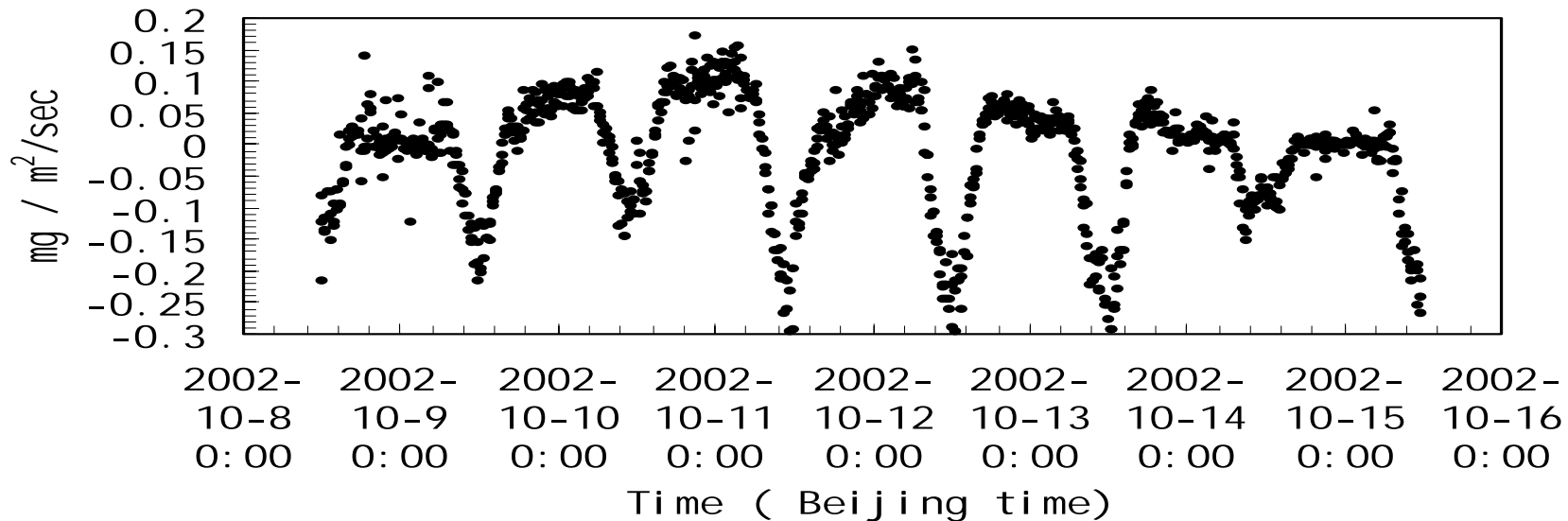
The soil water volumetric content (%) over grassland



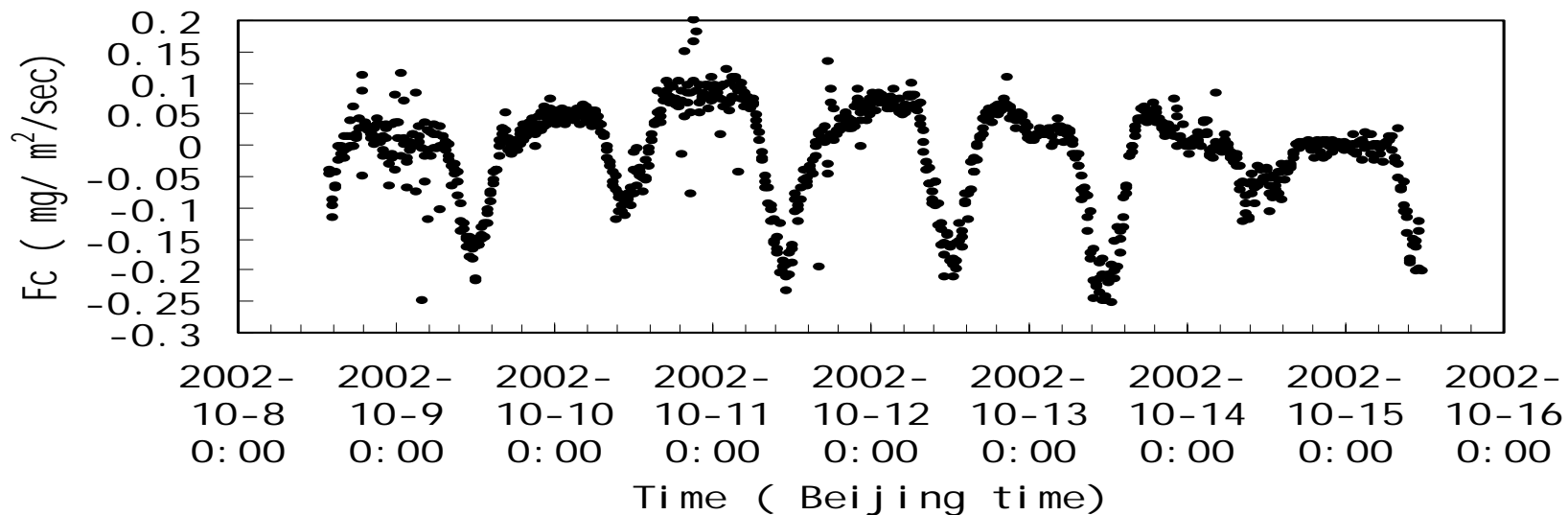
The soil volumetric water content over grassland(%)



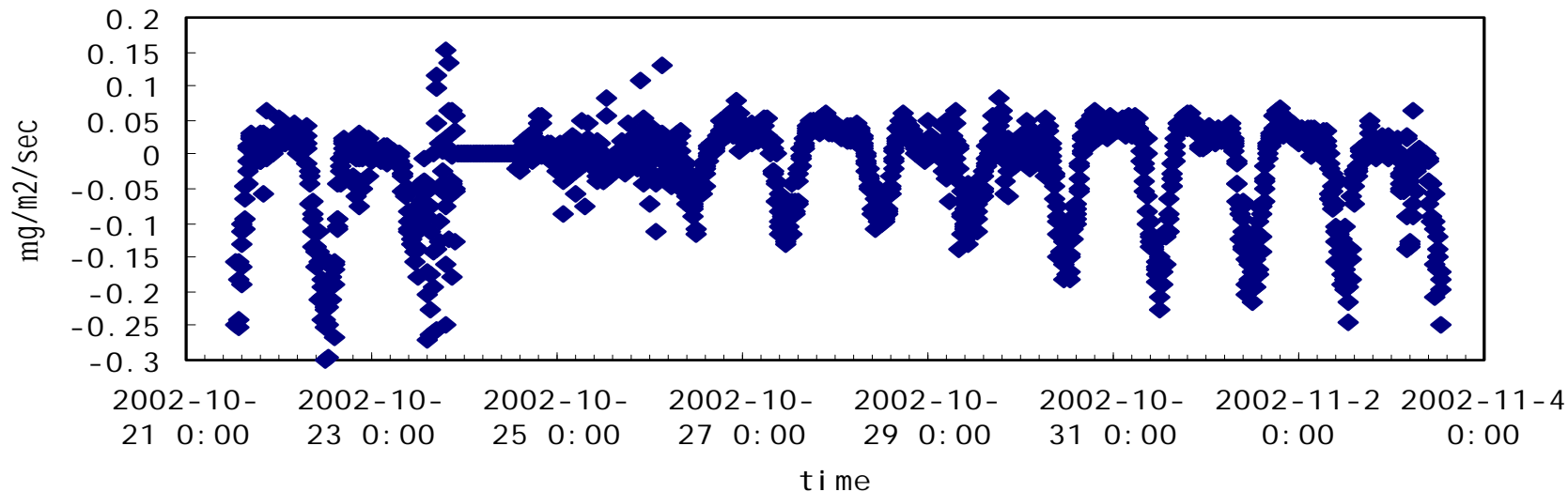
Fc ( CO<sub>2</sub> flux over cropland in Tongyu)



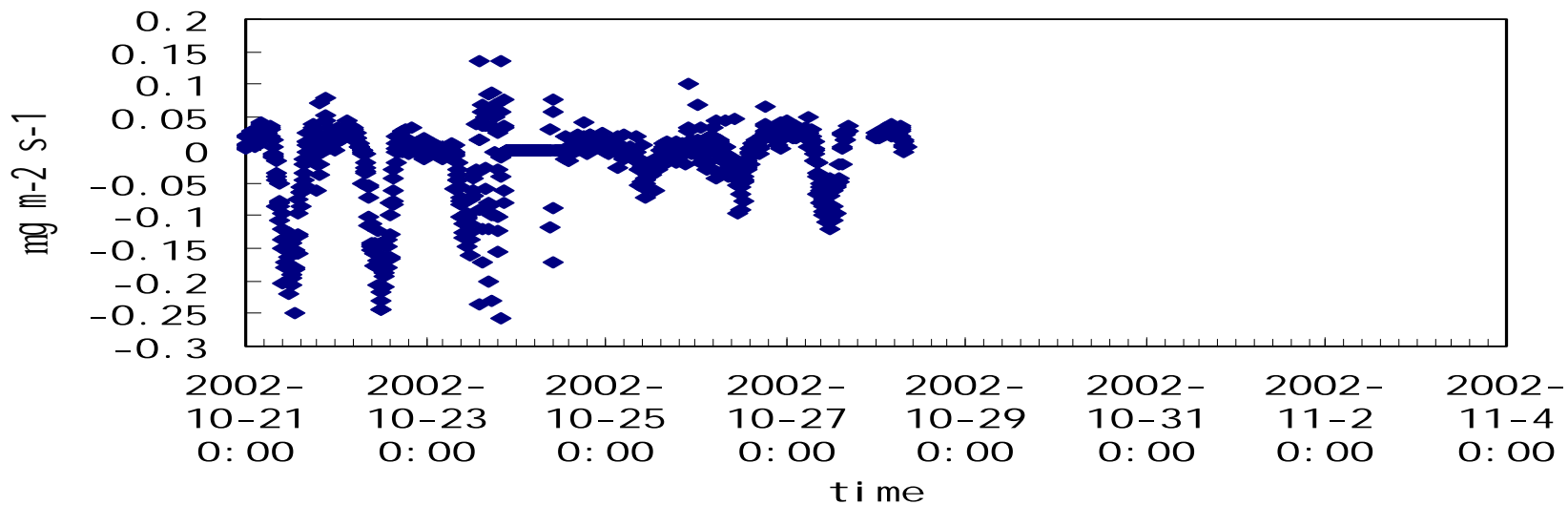
Fc ( CO<sub>2</sub> flux over degraded grassland in Tongyu)



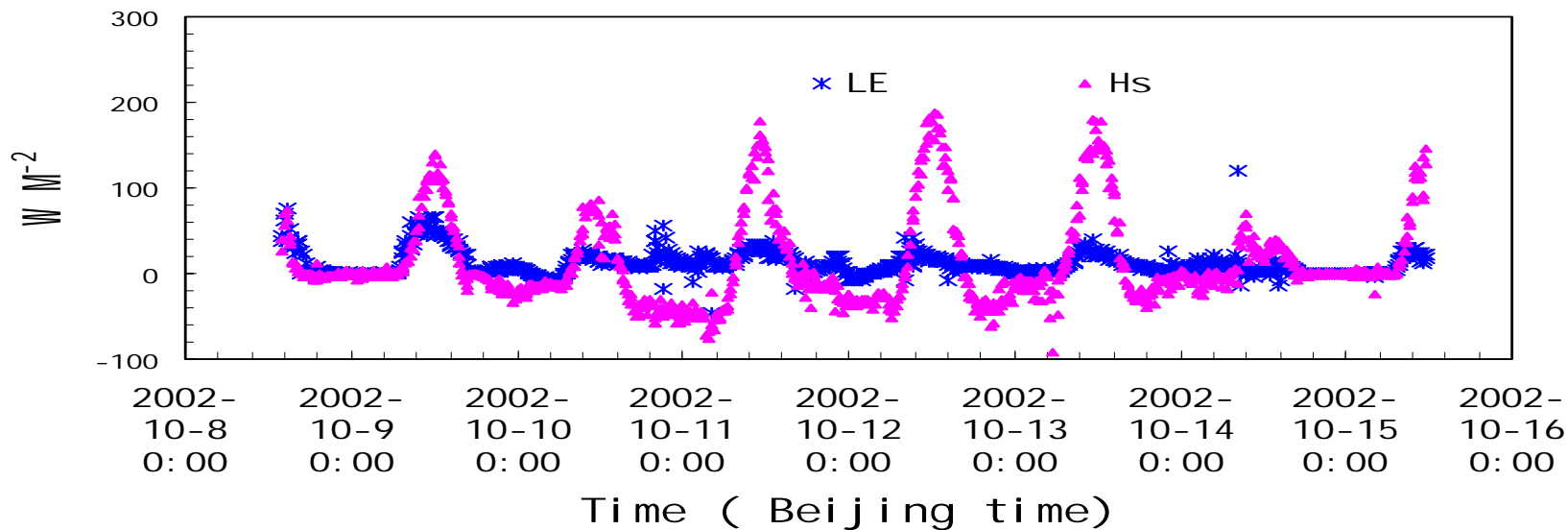
The CO<sub>2</sub> flux over cropland in tongyu



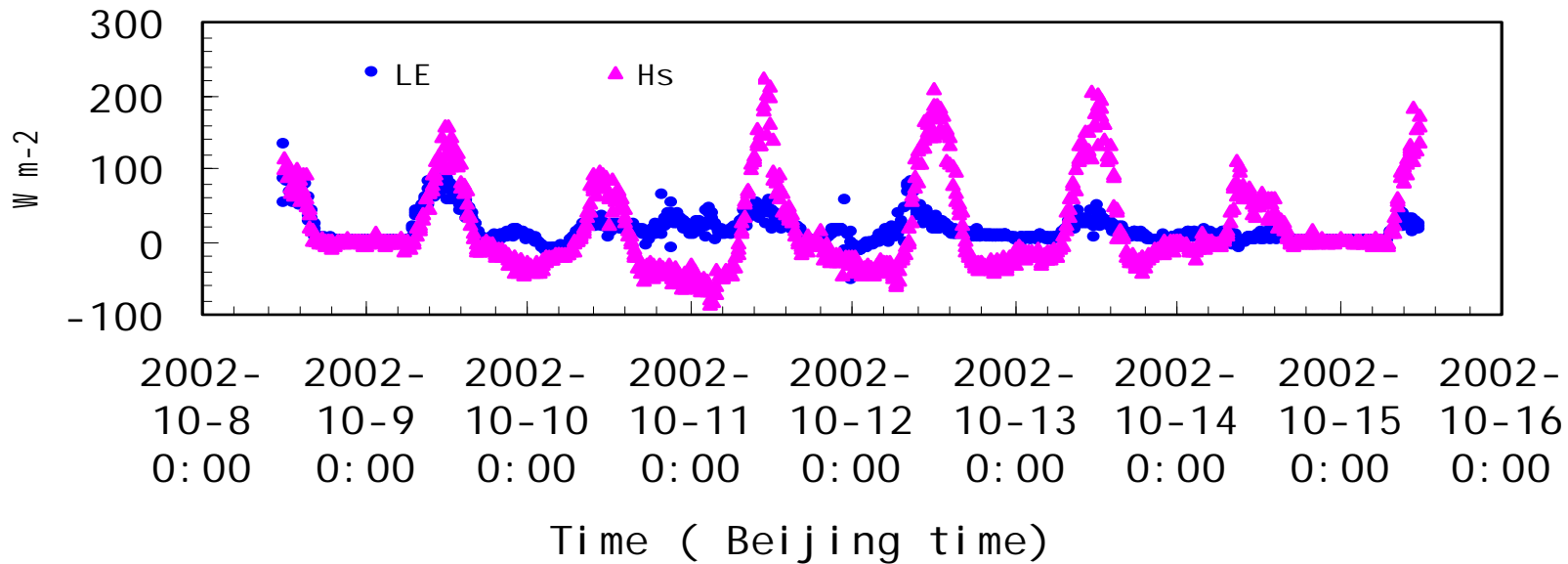
The carbon dioxide flux F<sub>c</sub> over grassland in Tongyu



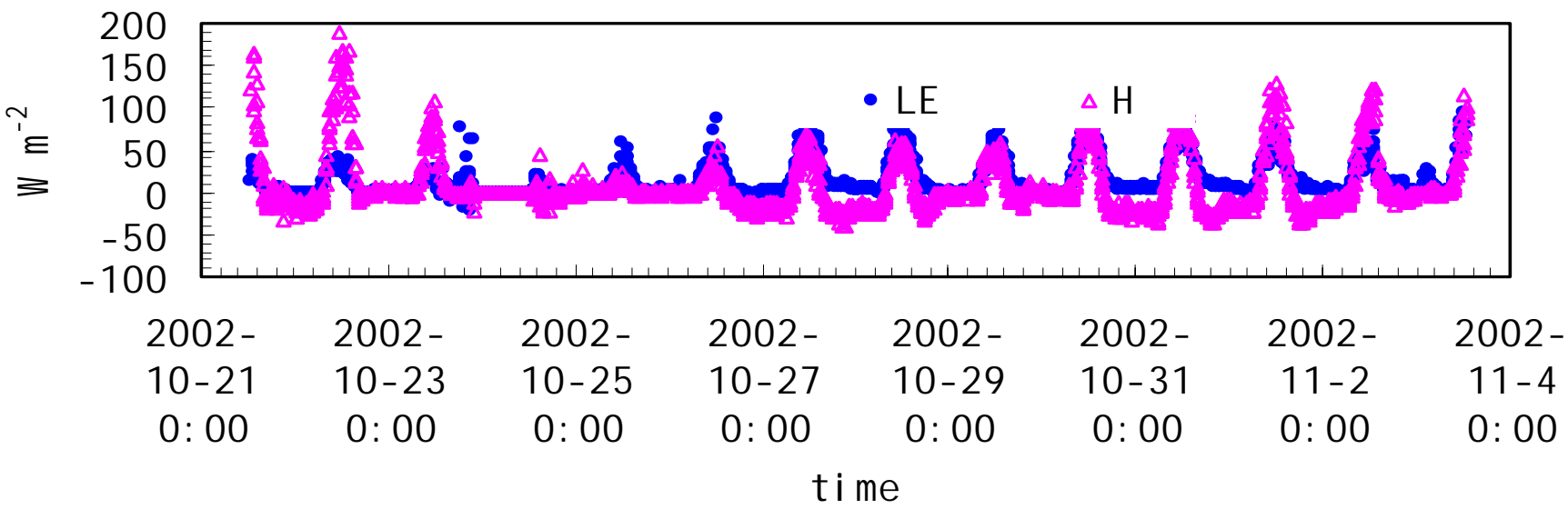
W sensible heat and latent heat flux over cropland



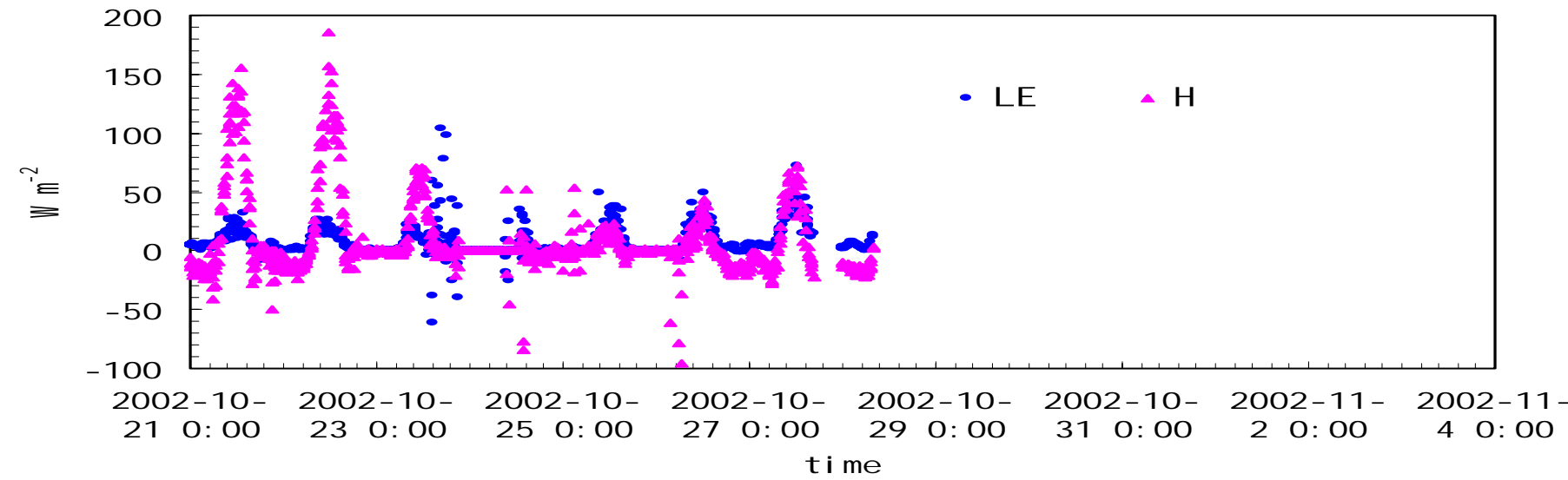
The sensible heat and latent heat flux over cropland



The sensible heat and latent heat flux over cropland



The sensible and latent heat flux over grassland in Tongyu





# Data delivery schedule

- Data policy of CEOP
- Oct.-Dec., 2002, observed period
  - -----→ May., 2003 (common data) ~ 6mo
  - -----→ Nov., 2003 (flux data) ~ 12months
- Jan.-Mar., 2003
  - -----→ Aug., 2003 (common data)
  - -----→ Feb., 2004 (flux data)

# Conclusion and Discussion

Thank you!!!

Beijing 325m Meteorological Tower

