



Analyze CEOP Research Site Data In Semi-arid Region

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Background

Why Semi-arid Region?

- It's the most vulnerable and sensitive areas.
- The human-induced land cover changes in it are the largest.
- The land surface processes in it are significantly different.
- There is highest bias of simulated precipitation in these regions.

Goals of CEOP Semi-arid Region Study

- Understand the **water and energy cycles** of semi-arid regions and their role in climate system by globally integrated analysis of CEOP **reference sites data, satellite observations and the model outputs.**
- Assist in better prediction of water resources and management in semi-arid regions.

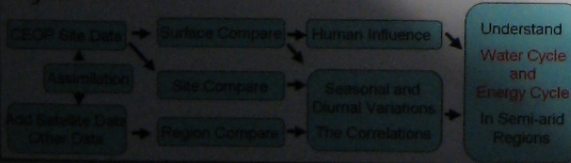
Data and Projects



Data Situation

Site Name	Direction	Data Time (Begin - End)
CAMP Tongyu	44.417N, 122.867E	2002-10-01 - 2005-10-31
GAPP Ft. Peck	48.310N, 105.100E	2002-10-01 - 2005-05-31
GAPP Bondville	40.010N, 88.290E	2002-10-01 - 2006-10-31

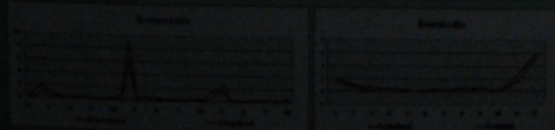
Projects



Results (Surface Compare)

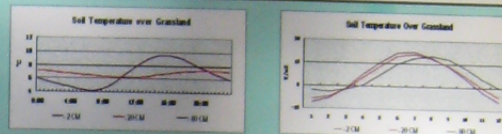
Energy Flux

- The sensible heat flux is the main part of the available energy except that in the wet season.
- The observation errors and energy translation can cause energy imbalance. The factor $(H+LE)/(Rn-G)$ which represents the energy balance is about 0.75 in Tongyu.



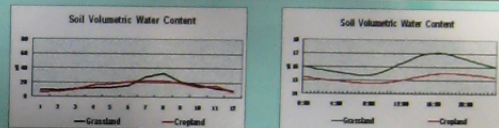
Soil Temperature

- Soil temperature has a close correlation with the air temperature, the soil heat flux, the sensible heat flux and the CO₂ flux.
- The diurnal variation of the soil temperature is just in the upper 20cm soil layer. The soil temperature below 20cm has little diurnal variation, but has season variation.



Soil Moisture, CO₂ Flux

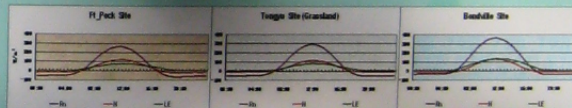
- In the dry season the soil volumetric water content is less than 15% in the surface soil layer (0-20cm).
- It has been proved that the soil volumetric water content in the upper 10cm over degraded-grassland surface is larger than that over the cropland surface.
- The CO₂ flux is less than 0.2mg.m⁻².s⁻¹ except the growing season.
- During the growing season, the CO₂ flux over the cropland ecosystem is a little larger than that over the degraded-grassland ecosystem.



Results (Site Compare)

Energy Flux

- With the increasing of aridity, the percentage of sensible heat flux will become larger.



Problems

Energy Unbalance

- All the data indicates that energy of one site is unbalance. What cause the unbalance? The observation errors? Energy translation? Or something else?

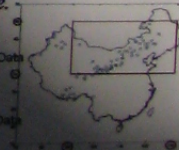
Common or Special

- We have got many seasonal and diurnal variations, and find the correlations between factors. But are these the special conclusions to all the semi-arid regions?

Current and Future Works

Make Research Regions and Compare.

In Asia (35N-50N, 90E-130E)
Based on the Data from
The CEOP Site Data, The China-Flux Station, The Satellite Data
The Weather Station in This Semi-arid Region (right cycle)
In North America (35N-50N, 80W-120W)
Based on the Data from
The CEOP Site Data, The China-Flux Station, The Satellite Data
The Weather Station in This Semi-arid Region



Do Research in Energy Unbalance