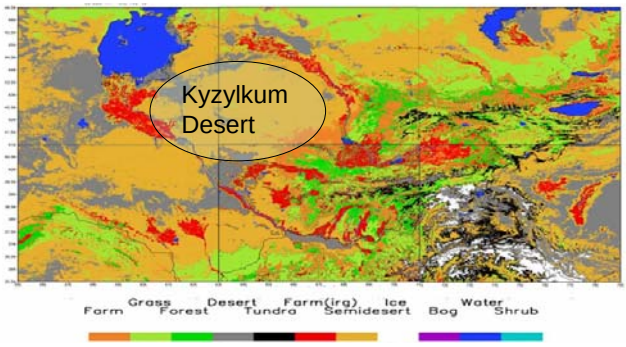
University of Yamanashi Global COE Program, International Symposium
"Contributing to the Solution of Water Issues in Asia through Human Resources Development"

LAND SURFACE MONITORING IN THE KYZYL KUM DESERT, CENTRAL ASIA

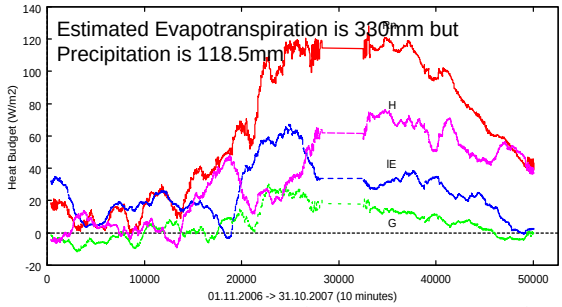
Osamu Kozan (Kyoto Univ.), Naoko Matsuo (Mie Univ.),
Satoru Oishi Kengo Sunada and Kristina Toderich (ICBA-CAC, Uzbekistan)
Email: kozan@cseas.kyoto-u.ac.jp

INTRODUCTION

The Kyzylkum desert is a typical desert area and has unique climate condition and ecosystems. There are small oases in this area and local people use them for crop irrigation. To understand the hydrological cycle is important for local people and sustainable farming, however there are not enough data for scientific analysis.



USGS Landuse map



Heat budget (Rn, H, lE, G)（Nov. 2006 -> Oct. 2007）

OASIS PROVIDE HUMID ATMOSPHERE

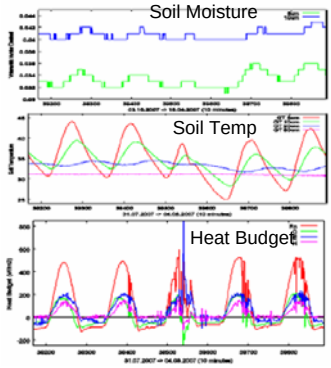
(SOME VEGETATION CAN USE DEW CONDENSATION?)

- Estimated Evapotranspiration is 1.76 mm/d in July and August (2.25mm during day time, -0.494mm night time)
- Soil moisture decrease is 0.23-0.35 mm/d for 2 months
- 80% water come from outside for 2 months
- Downward Evapt. in nighttime is 0.494mm/night, Soil Absorption is about 0.35mm/n and Dew Condensation is 0.15mm/n
- Downward Evapt. on Aug. 2nd is 0mm/n after 1mm rain in daytime

ICBA EXPERIMENTAL FARM

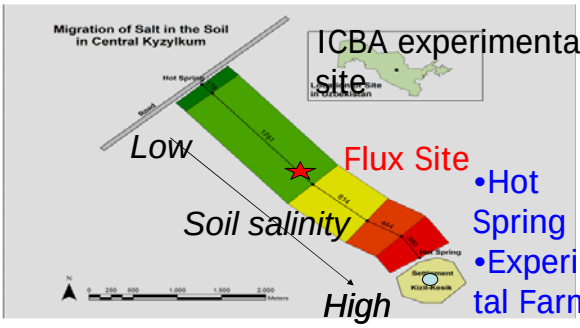
Marginal resources includes saline water and salt-affected lands

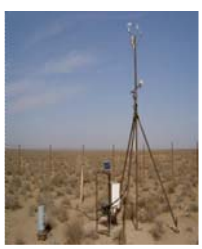
Cotton has been the major crop in this region for number of years, but due to salinity and other problems, many areas have very low productivity. As a result, there is a need to look for other alternate agricultural production systems that can sustain under such marginal conditions and can provide economical and environmental benefits to the farmers.

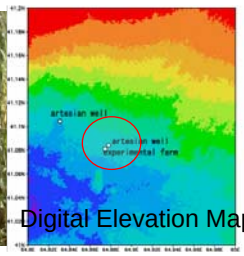


Period	Evapt.
2007/7/31 day	2.327mm
night	-0.489mm
8/1 day	2.402mm
night	-0.518mm
8/2 day (1mm rain)	2.711mm
night	-0.090mm
8/3 day	2.372mm
night	-0.401mm
8/4 day	2.347mm
night	-0.568mm

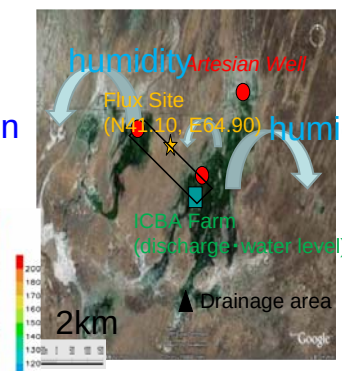
Soil Moisture (5,10cm), Soil Temp (4 depth), Heat budget (Rn,H,lE, G) and Est. Evapotranspiration for 5 days (from Jul 31st to Aug 4th)

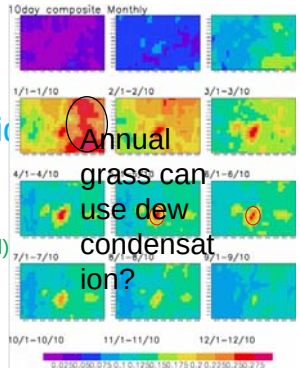






Digital Elevation Map





ICBA Experimental Farm (google earth 2006.8) and NDVI in 2006

HEAT AND WATER FLUX OBSERVATION

Table 1 Kyzyl ke sek Surface Observation Elements

Start time	Element	Information
03.11.2006	Air Temperature (3)	100, 400cm
	Humidity (3)	, validation
	Air Pressure (1)	
	Shortwave Radiation(2)	Up and Down
	Longwave Radiation(2)	Up and Down
	Ground heat flux (1)	Heat Flux Plate
	Precipitation (1)	resolution 0.5 mm
	Soil Moisture (1)	30cm, TDR
	Wind Velocity (1)	
16.03.2007	Quantum Sensor (2)	Up and Down
	Soil Moisture(4)	5, 10, 20, 80cm
	Soil Temperature(4)	5, 10, 20, 80cm
	Wind Direction(1)	
15.06.2007	Ground Water Level	Experimental Farm
14.10.2007	Battery Change	Sealed Battery

CONCLUSION

- Estimated Evapotranspiration using Bowen Ratio is 330mm, however Observed Precipitation is less than 180mm taking into account Snow Capture Trouble
- In this study, downward Evapotranspiration is -0.494 mm/ night
- Agam(2004) reported -0.17mm/night using soil moisture obs. in the Negev desert in Israel, Kalthoff (2006) reported less than -0.1/night using Bowen Ratio in Chili.
- What kinds of effect are there for vegetation around oases?