

# Spatial assessment of atmosphere-ecosystem exchanges via micrometeorological measurements and footprint modeling

## Atmospheric turbulent energy flux measurements in South Korea 2010

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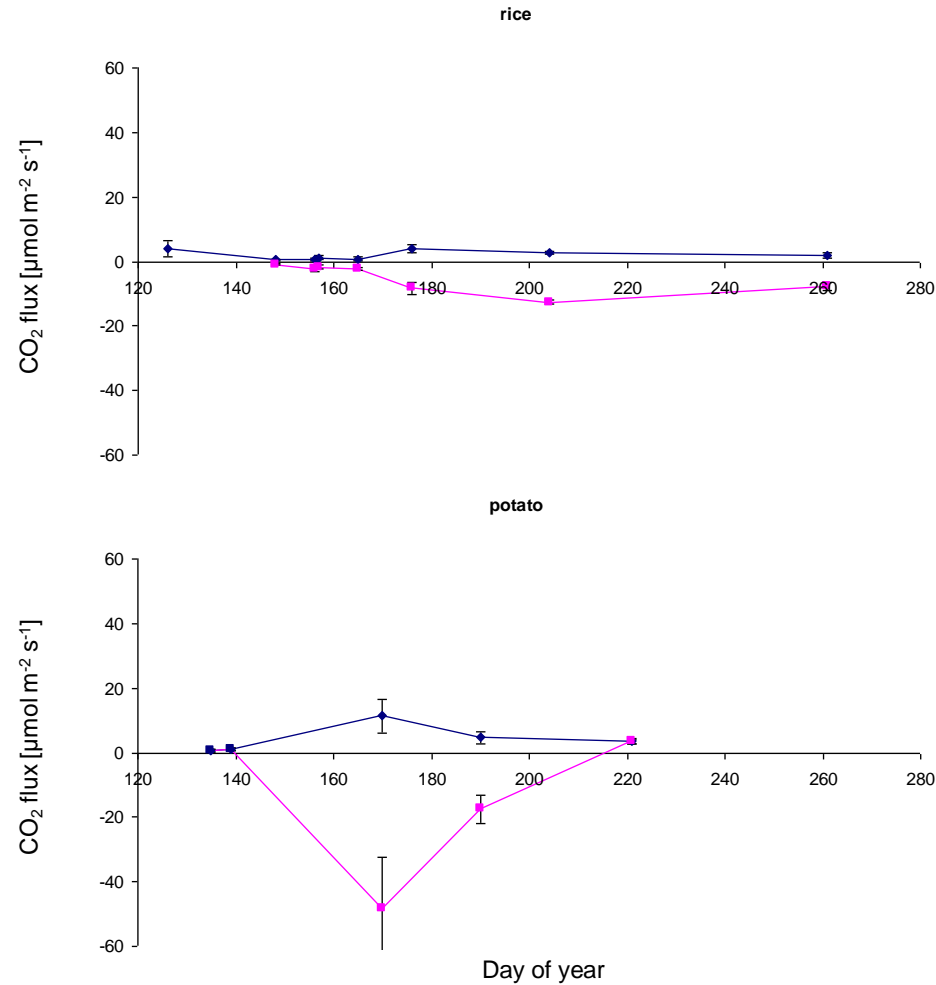
## Objectives

- To understand the sensible and latent heat fluxes in such a complex terrain as Haean Basin, South Korea
- To better understand the energy exchange above farmlands (rice fields and dry crops) during the whole growing period including monsoon seasons in Korea
- To determine reliable evapotranspiration and net ecosystem exchange (NEE) of carbon above farmlands
- To determine reliable information about near surface atmospheric stratification conditions, including convective events in Haean Basin



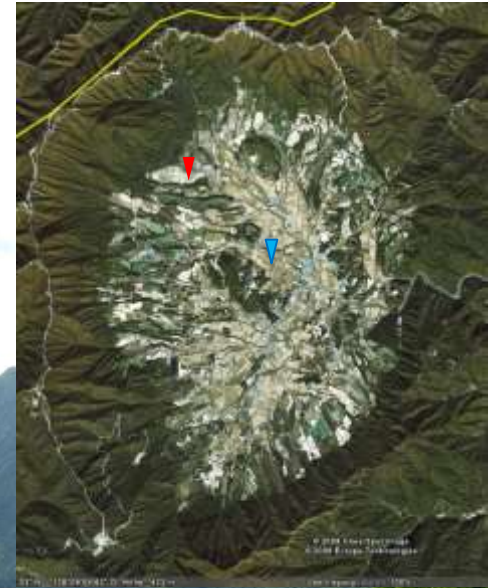
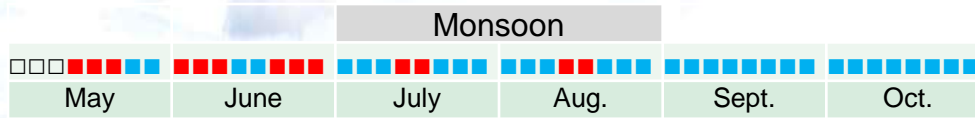
# Plant production studies in Haean in 2009

Steve Lindner



# SITE SELECTION

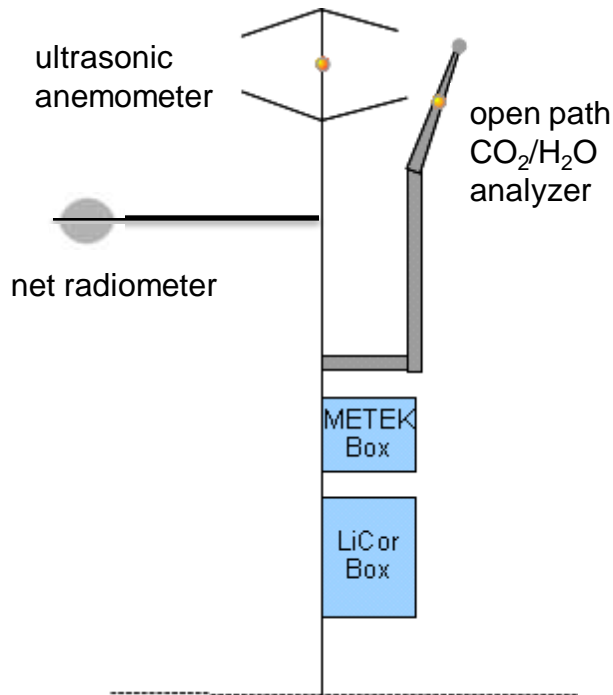
Schedule 2010:



panorama of rice field



## Eddy covariance complex



Parameter	Instrument	Sampling frequency
Wind vector	Ultrasonic anemometer (USA-1)	20 Hz
Sonic temperature		
Humidity (H <sub>2</sub> O concentration)	open path CO <sub>2</sub> /H <sub>2</sub> O analyzer (LiCOR 7500)	
CO <sub>2</sub> concentration		
Net radiation	Net radiometer (NR lite)	



## Data processing and QA/QC

### Flux corrections

- Coordinate rotation: Planar fit, double rotation
- Buoyancy correction (Schotanus/Liu)

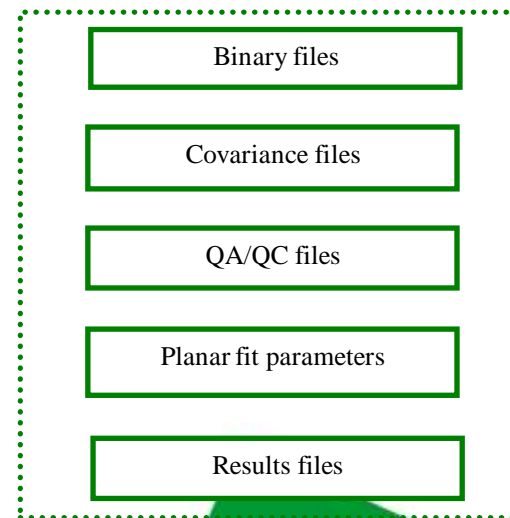
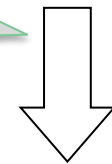
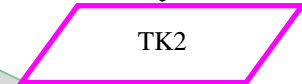
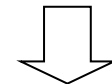
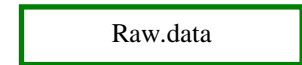
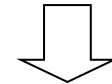
$$\overline{w'T'} = \overline{w'T'_s} - 0.51T\overline{w'q'}$$

- WPL correction

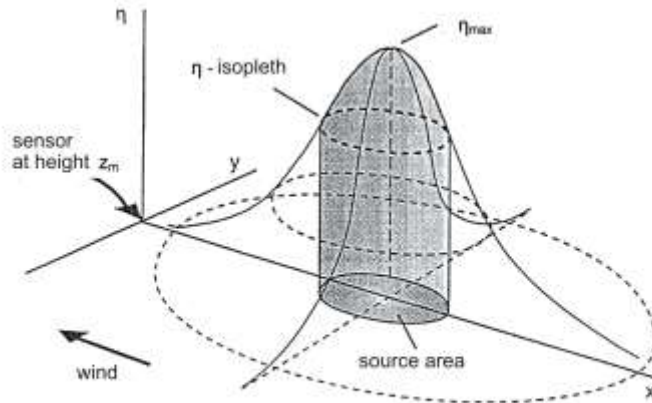
$$F_c = \overline{w'\rho'_c} + \overline{q_c} \cdot \frac{H}{c_p \cdot \overline{T}} \cdot \left[ 1 + 1.61 \cdot \frac{c_p \cdot \overline{T}}{\lambda} \cdot (1 - 0.61 \cdot \overline{q}) \cdot \frac{1}{Bo_{turb}} \right]$$

- Spectral correction (Moore)

$$\frac{\Delta F}{F} = 1 - \frac{\int_0^\infty T_{wx}(f) \cdot S_{wx}(f) df}{\int_0^\infty S_{wx}(f) df}$$



# Footprints with TerraFex

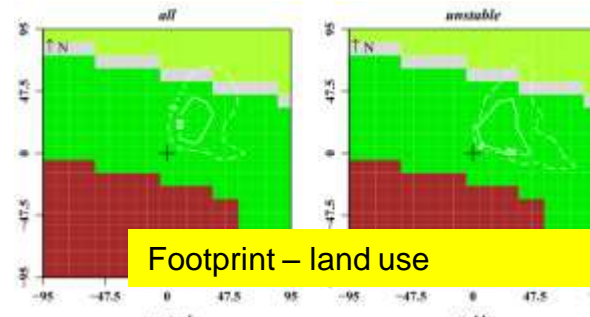
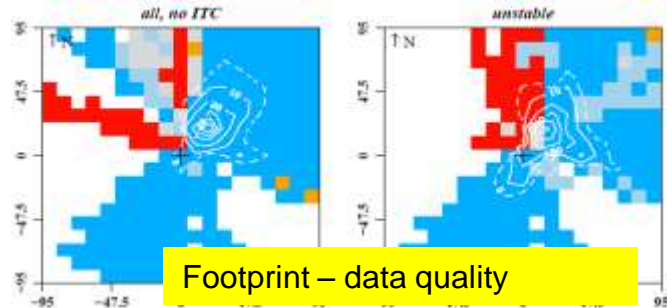


- Raw Covariances
- QA/QC (flags 1-5)
- Resultfile (flags 1-5)



Matrix Landuse

Matrix Roughness Length



- meadow
- maize field
- bare soil
- buildings and the main tower
- path with trees and hedges

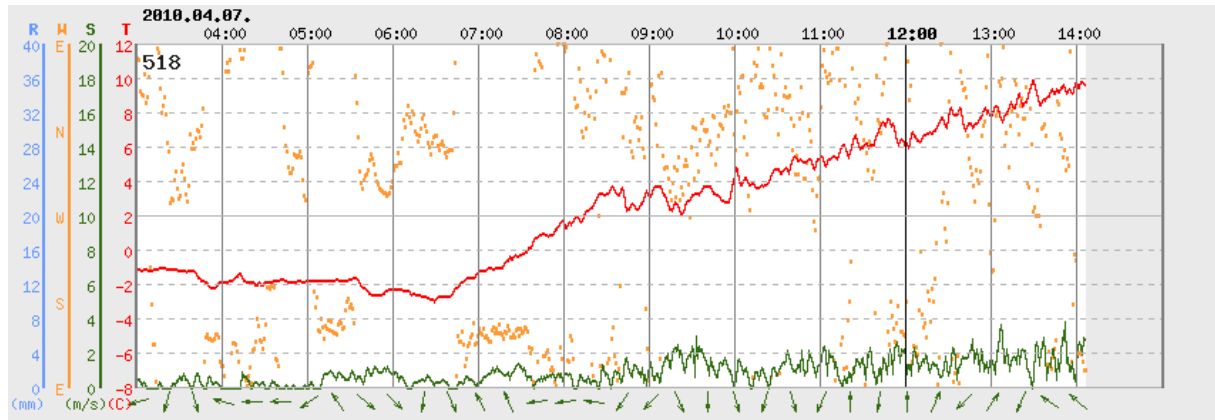


# Automatic Weather Stations

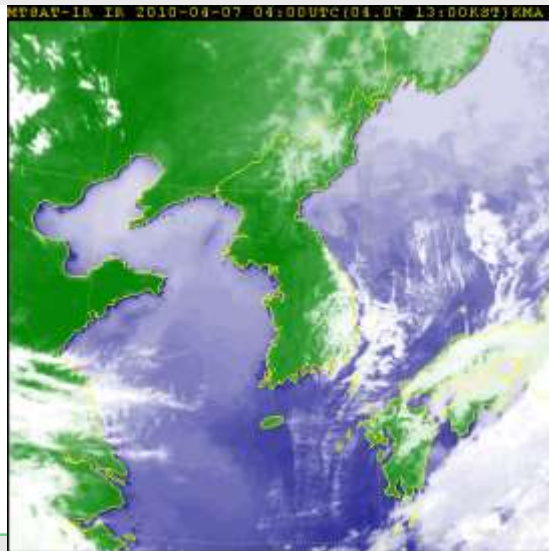




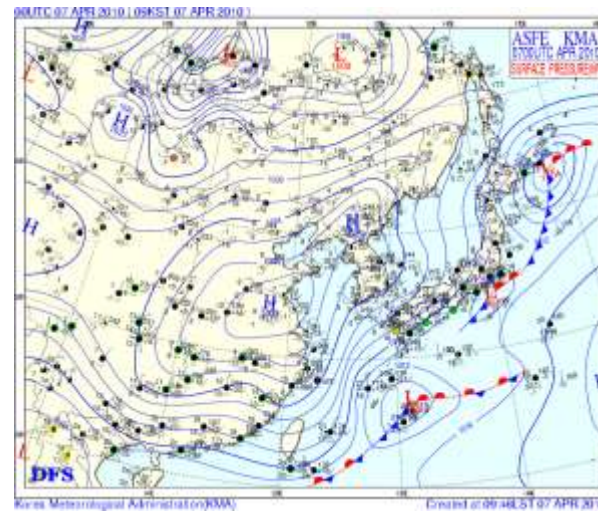
# KMA Weather information as supporting data



AWS of KMA



Satellite image



Synoptic weather chart



# Thank You

