Measurement of carbon dioxide and heat fluxes using the eddy covariance technique at Rzecin wetland.

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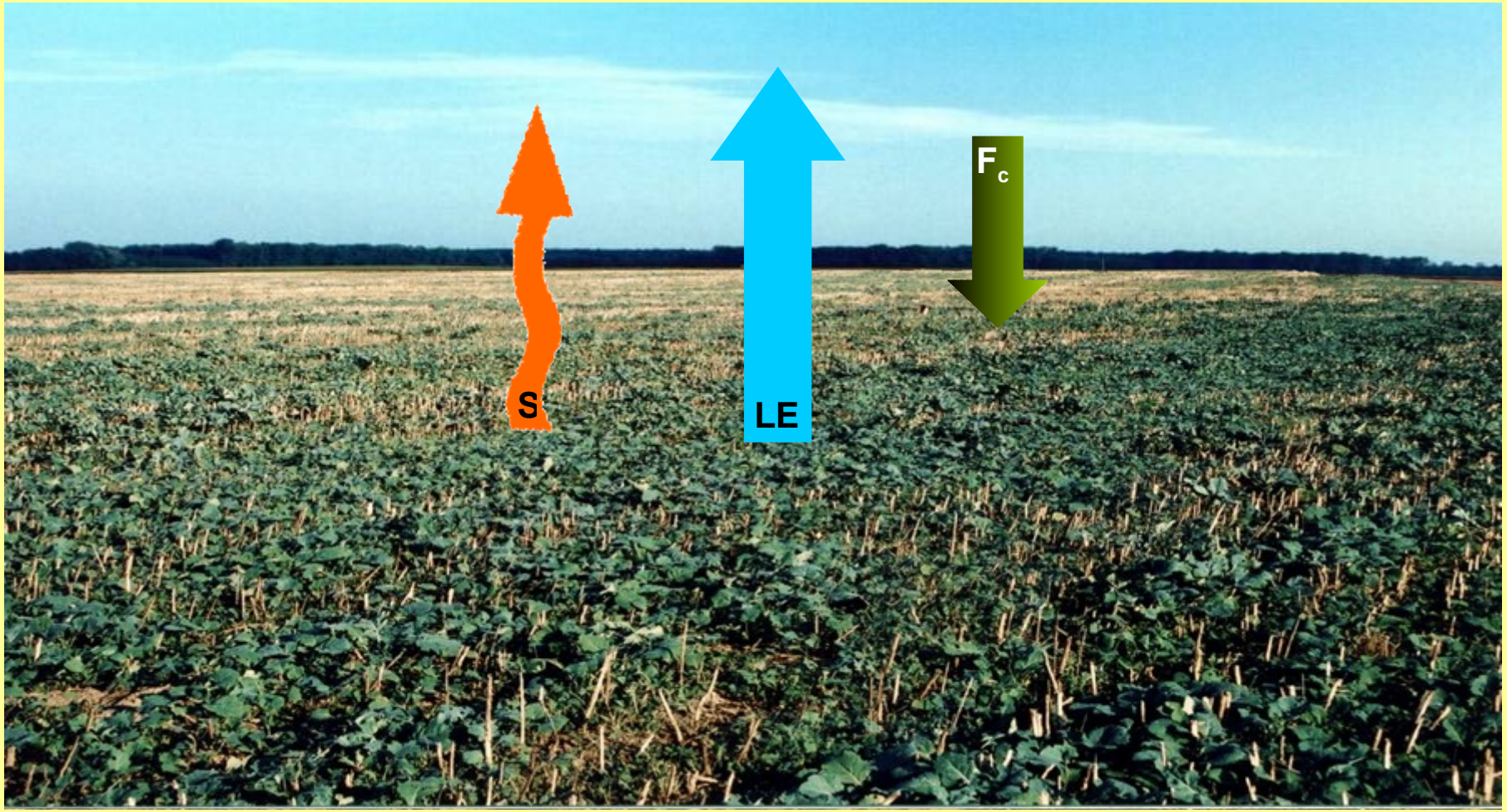
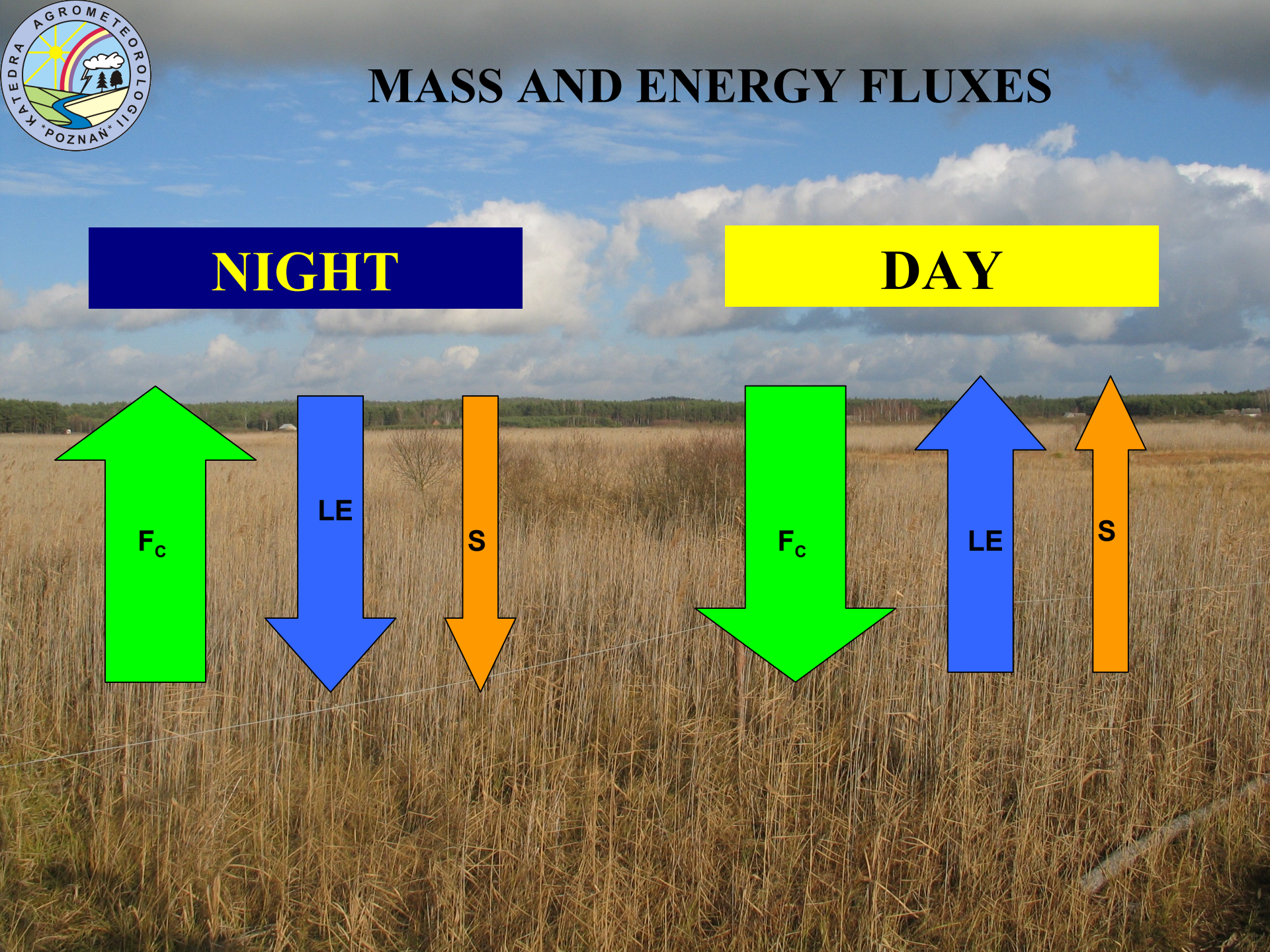
Objectives of the styudy

Energy and mass exchange in relation to:

- **Vegetation development stage**
- **Meteorological conditions**
- **Habitat moisture**

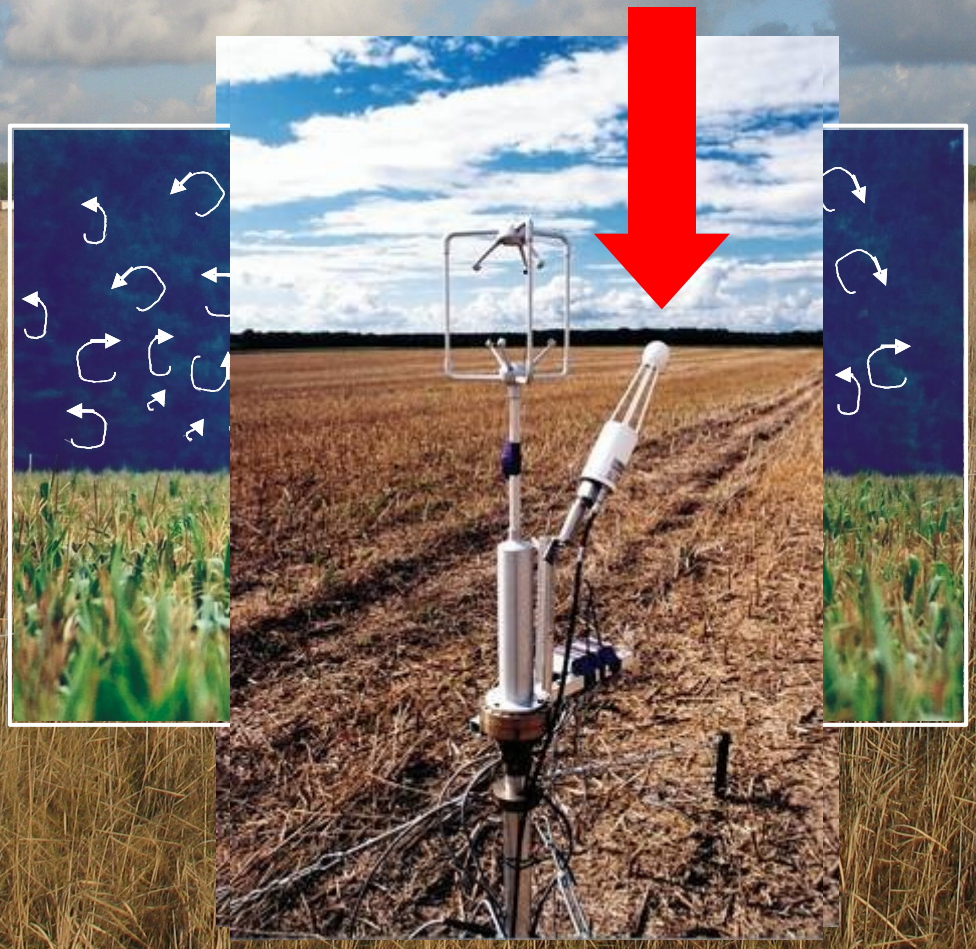


MASS AND ENERGY FLUXES



TURBULENCE IN THE ATMOSPHERE

Wind speed



Active surface

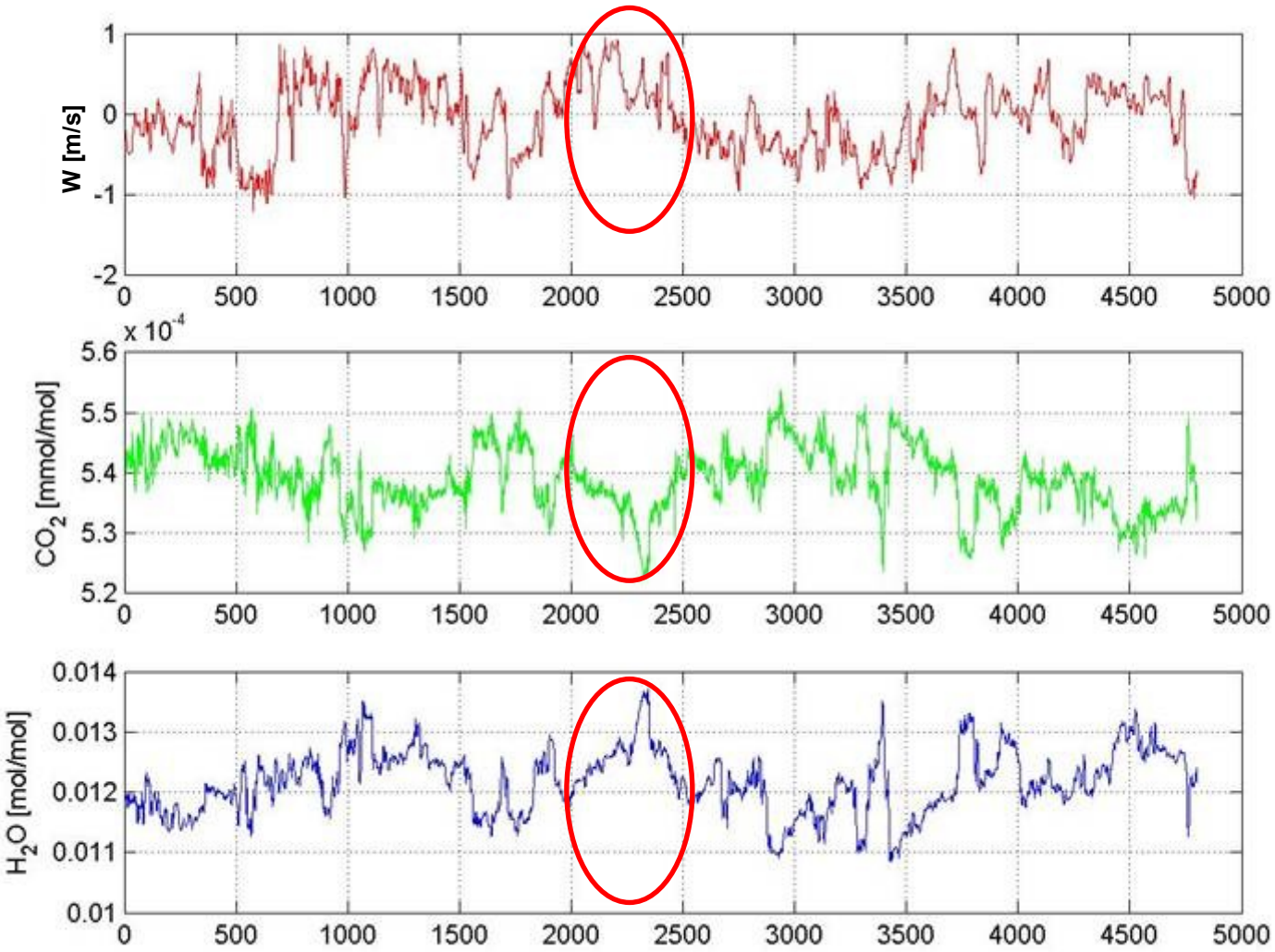
EDDY COVARIANCE

$$F_c = \overline{w' \rho_c'}$$

w' – vertical wind speed component fluctuations

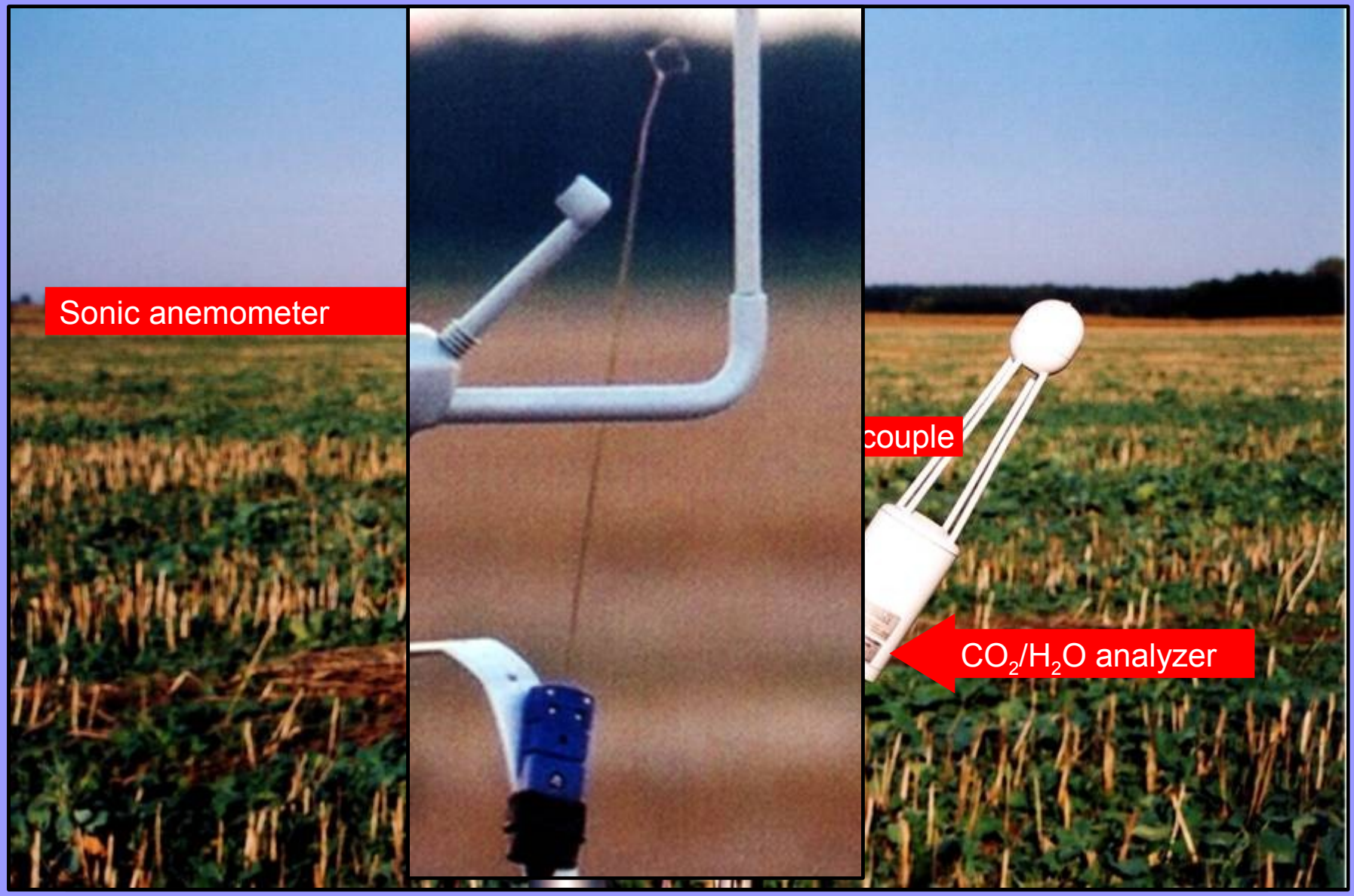
ρ_c' – studied scalar values fluctuations

60 seconds time series of fluctuations of: vertical wind component (w) and concentration of CO_2 and H_2O



High frequency sensors set for measurements of:

w, air temperature and CO_2 and H_2O concentrations.



RADIATION AND SOIL HEAT FLUXES

Net radiometer [Rn]
Net Lite, Kipp&Zonnen

Global radiation [Rs]
CM3, *Keep&Zonen*

Soil heat flux [G]
HFP01, *Hukselux*

MEASURING SYSTEM

12 analogue inputs · 40 Hz = 480 numbers / sek

480 numbers / sek · 60 sek. = 28800 numbers / min.

28800 · 30 min = 864000 numbers / 30 min

8.1 Mb - 30 minutes data file size

389 Mb of data is collected daily.

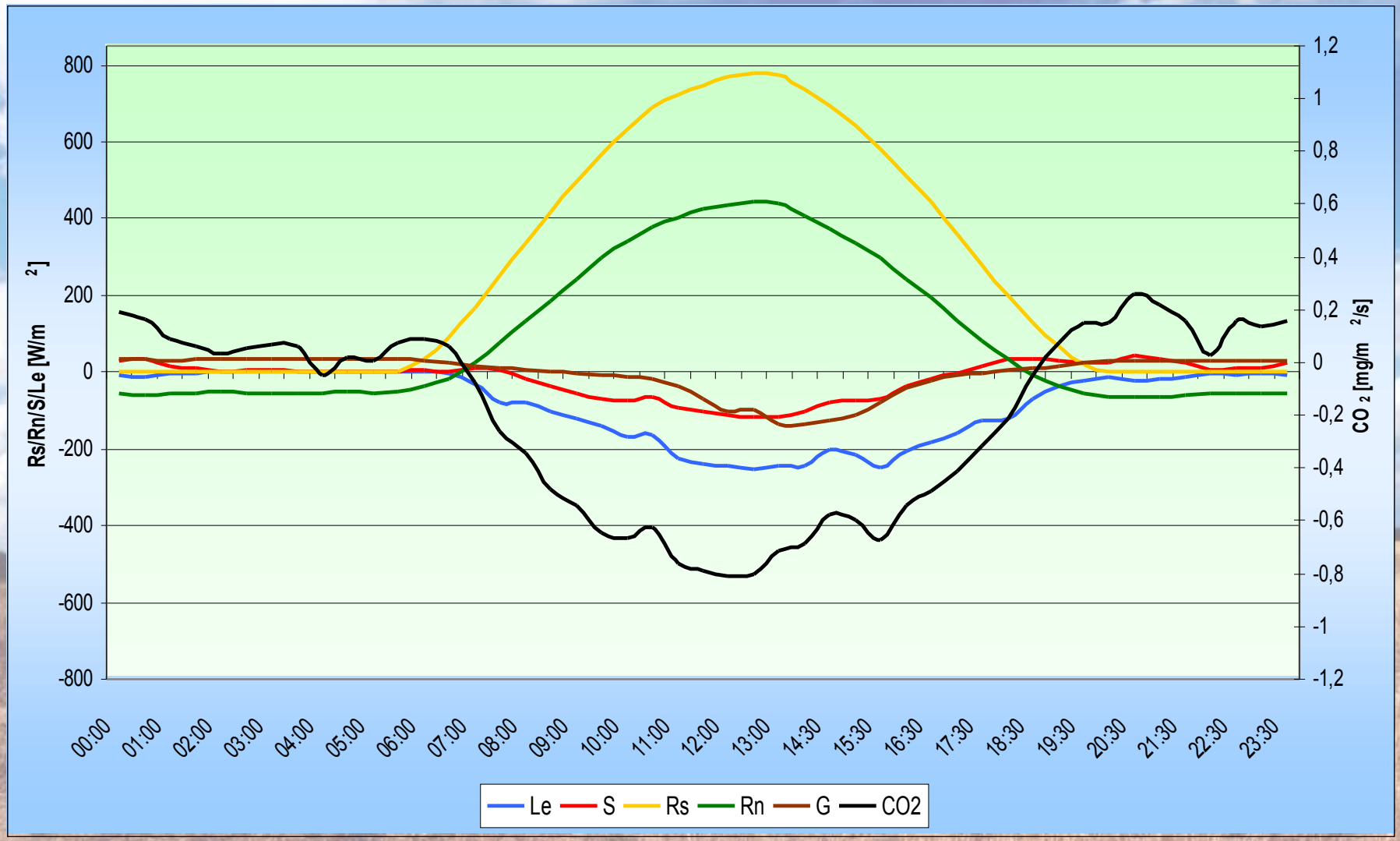
T C

P

Eddy Covariance method adventages

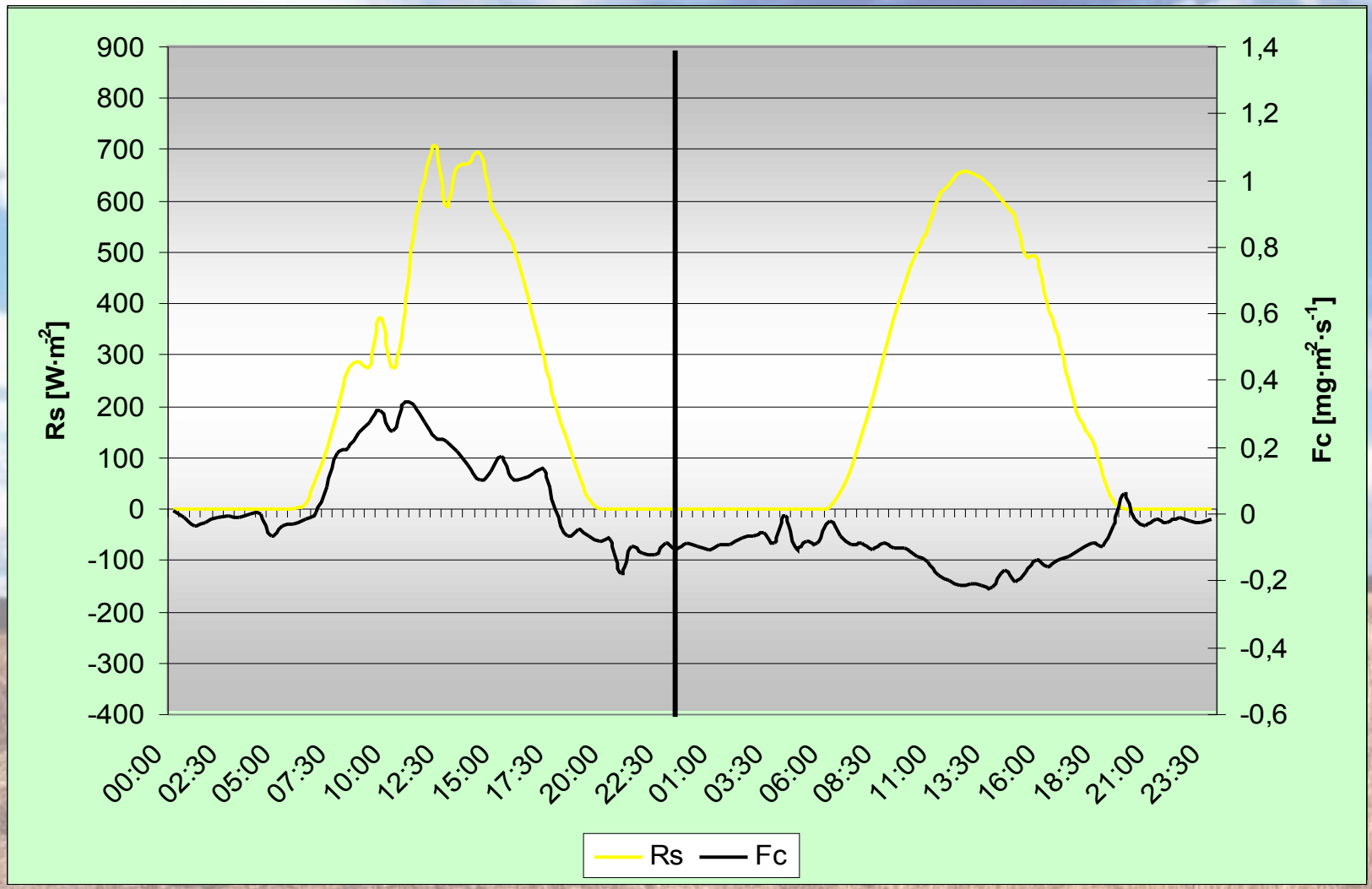
- **Enables a direct measurements of mass and energy fluxes (no empirical coeficients)**
- **Enables relatively large scale study**
- **Enables mass and energy fluxes measurements over rought sufaces (small gradients)**

CORN FIELD 20.08.2002



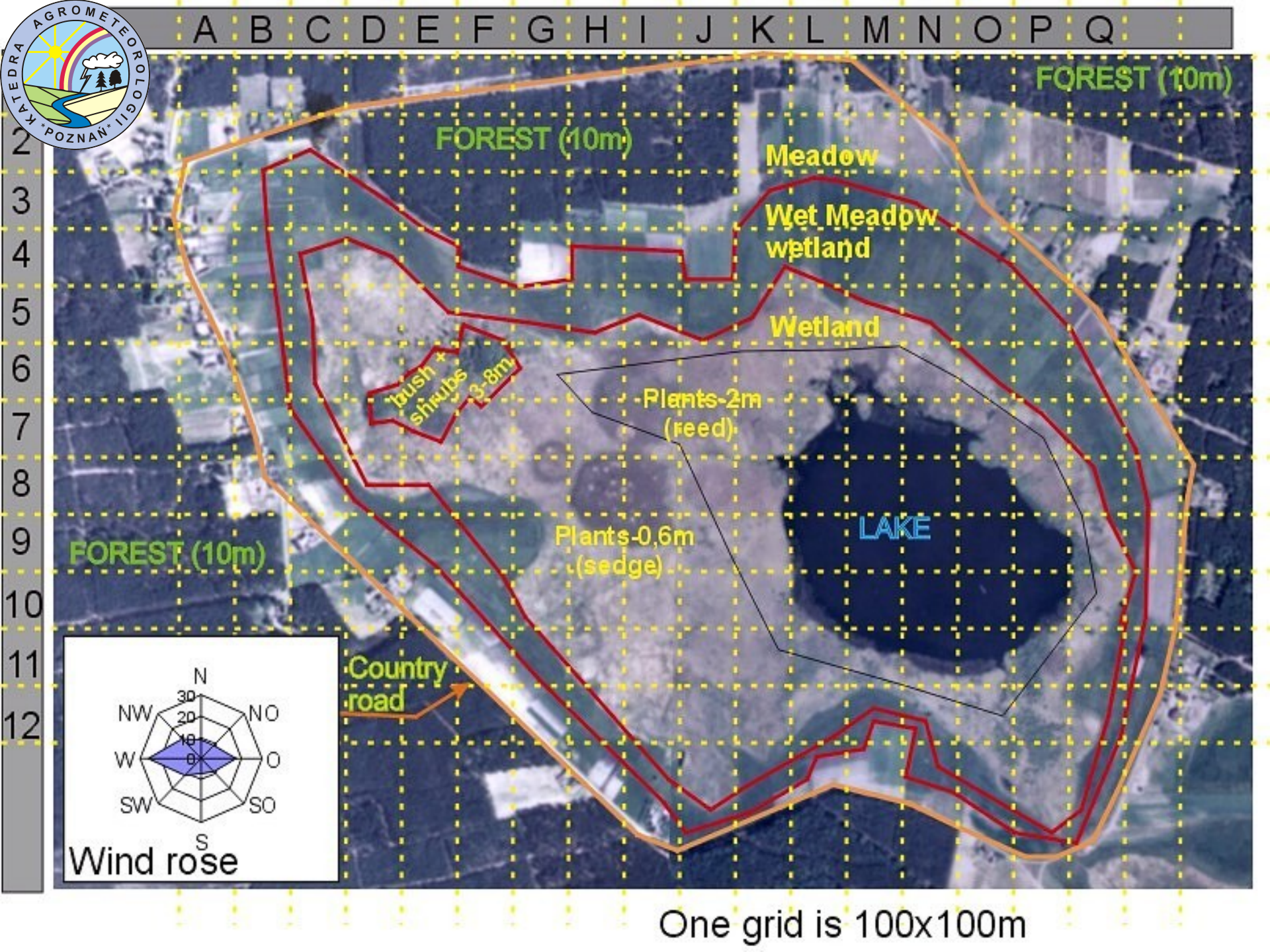
$t_{śr}$ = 21,62°C

Daily run of mass and energy fluxes measured over rape field during September 2002



$t_{śr}$ = 20,3°C

$t_{śr}$ = 24,5°C

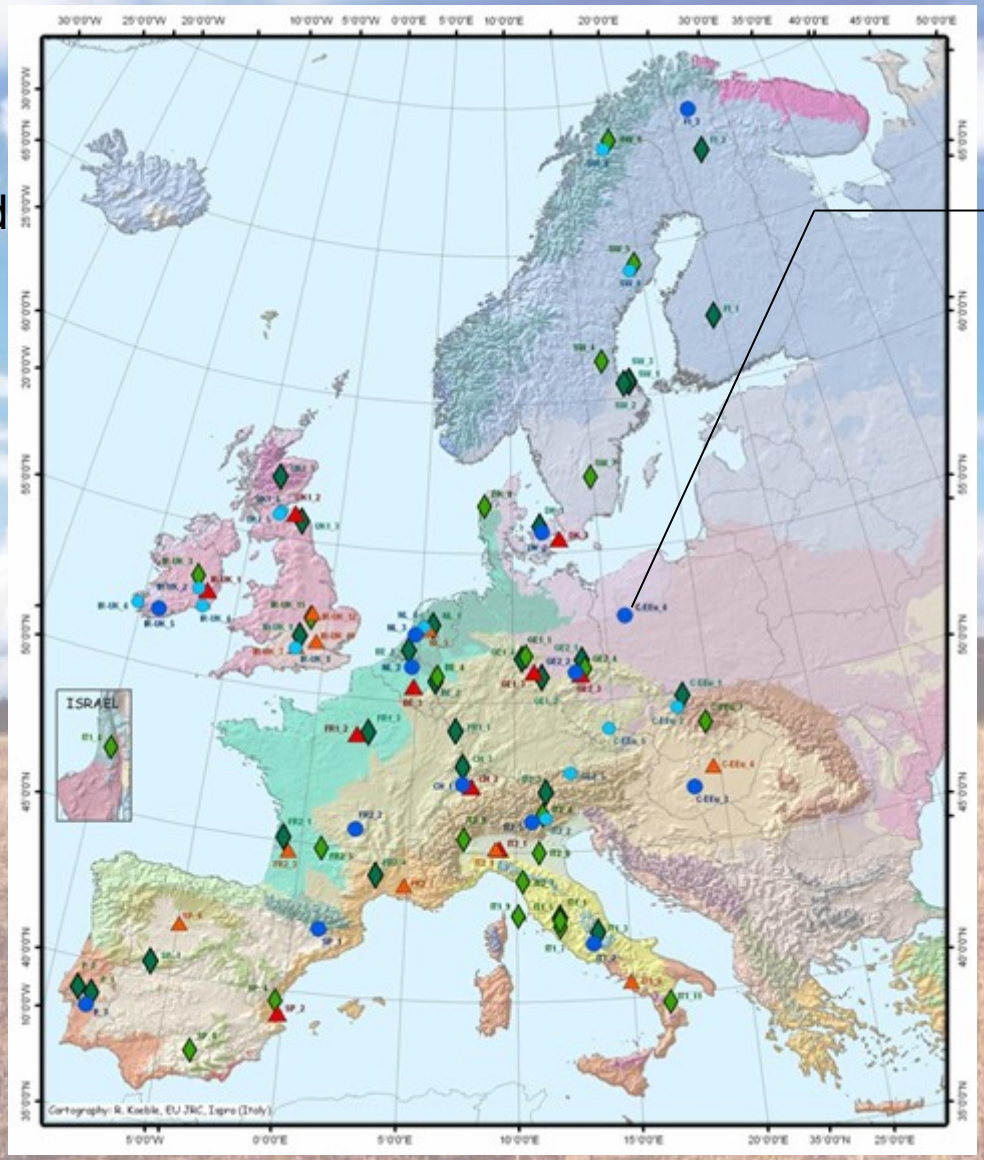

A B C D E F G H I J K L M N O P Q
2 3 4 5 6 7 8 9 10 11 12
KATEDRA AGROMETEOROLOGII
POZNAŃ
FOREST (10m)
FOREST (10m)
Meadow
Wet Meadow
wetland
Wetland
bush + shrubs 3-8m
Plants-2m (reed)
Plants-0,6m (sedge)
LAKE
FOREST (10m)
Country road
N
NO
O
SO
S
SW
W
NW
30
20
10
0
Wind rose
One grid is 100x100m


KATEDRA AGROMETEOROLOGII
POZNAŃ


KATEDRA AGROMETEOROLOGII
POZNAŃ
VENICE (year 452),
ST. PETERSBURG (year 1703),
RZECIN ! (year 2003)

CarboEurope IP

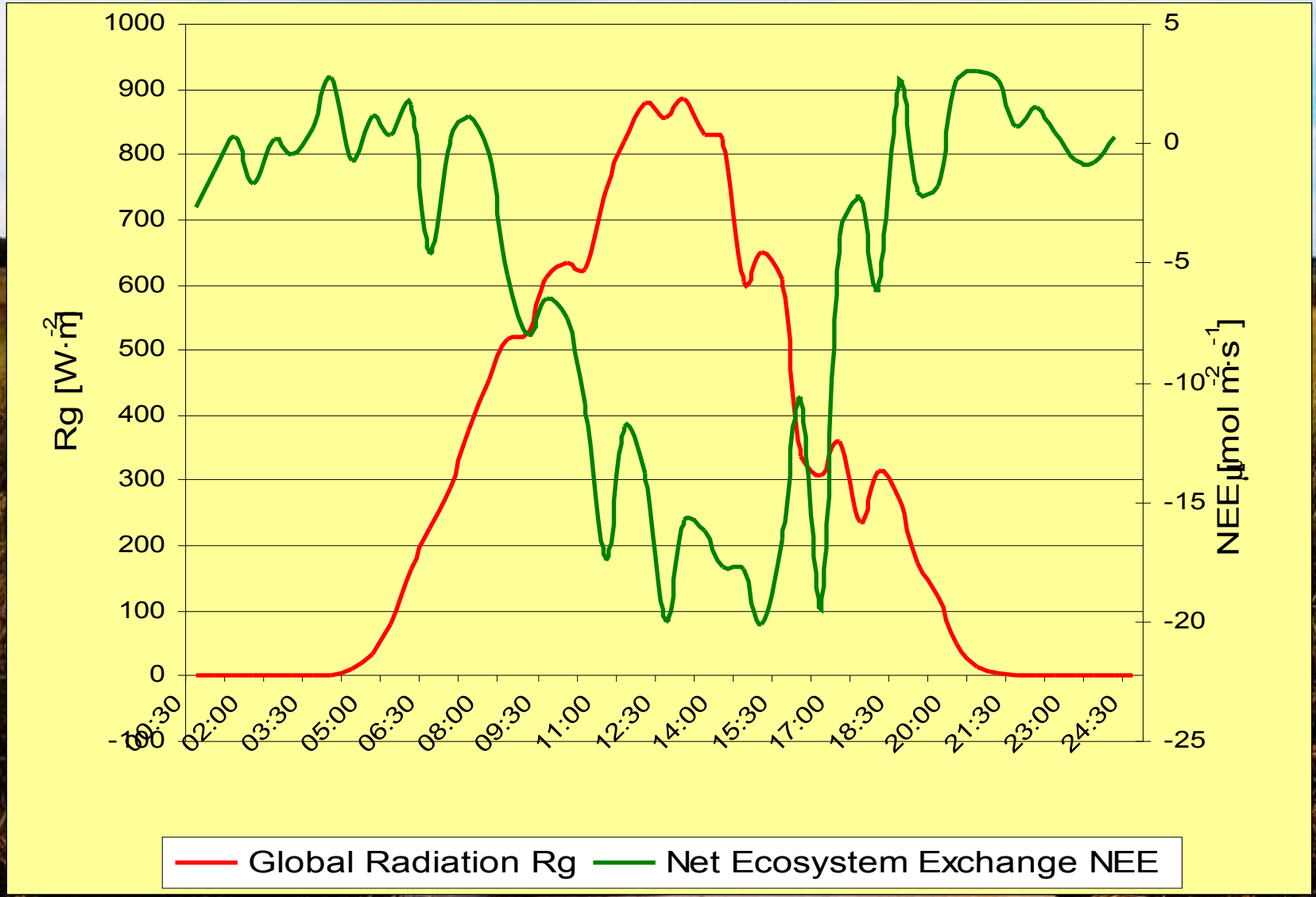
- Wetland/Grassland
- Arable land
- Forest



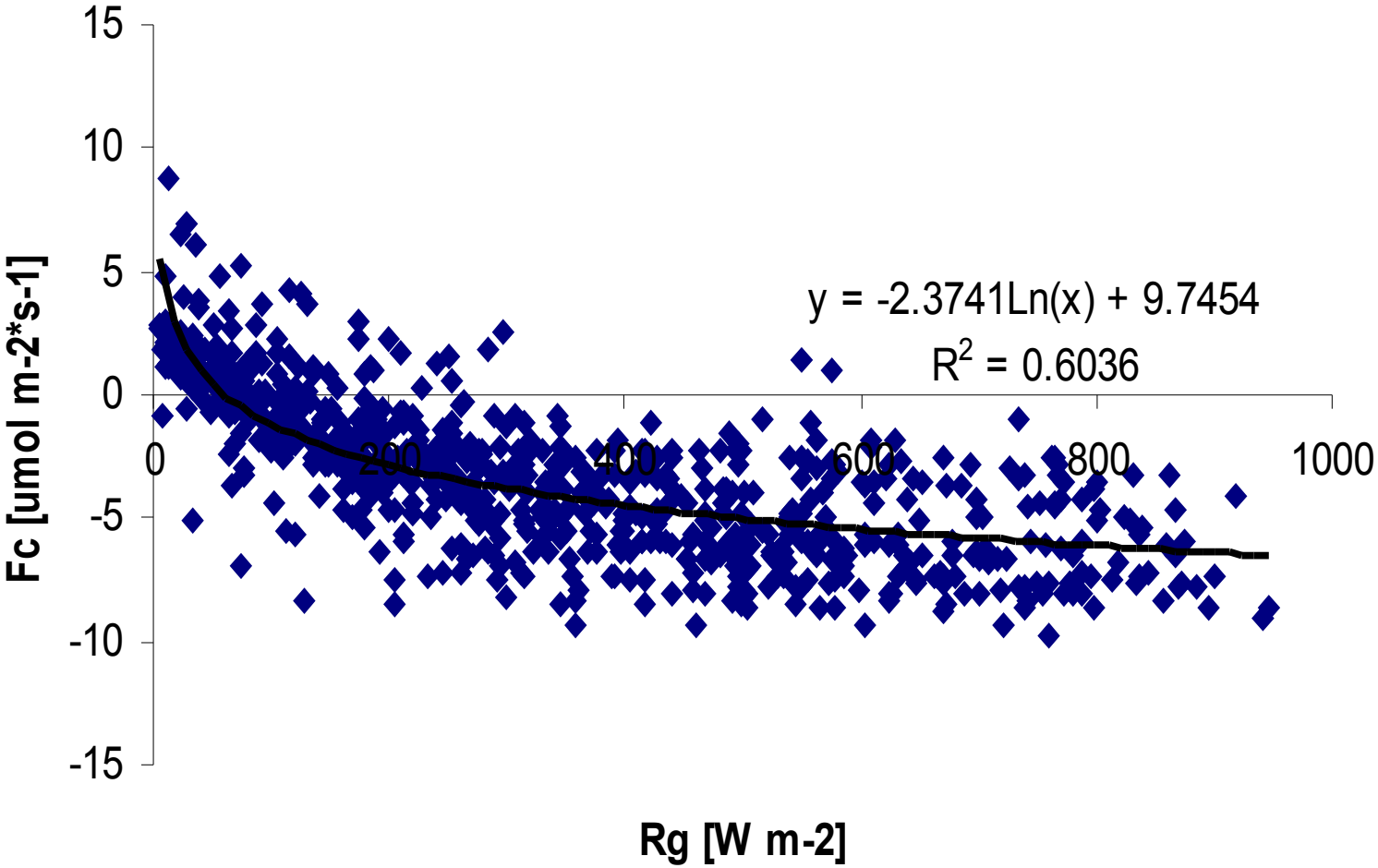
Rzecin site

RZECIN SITE

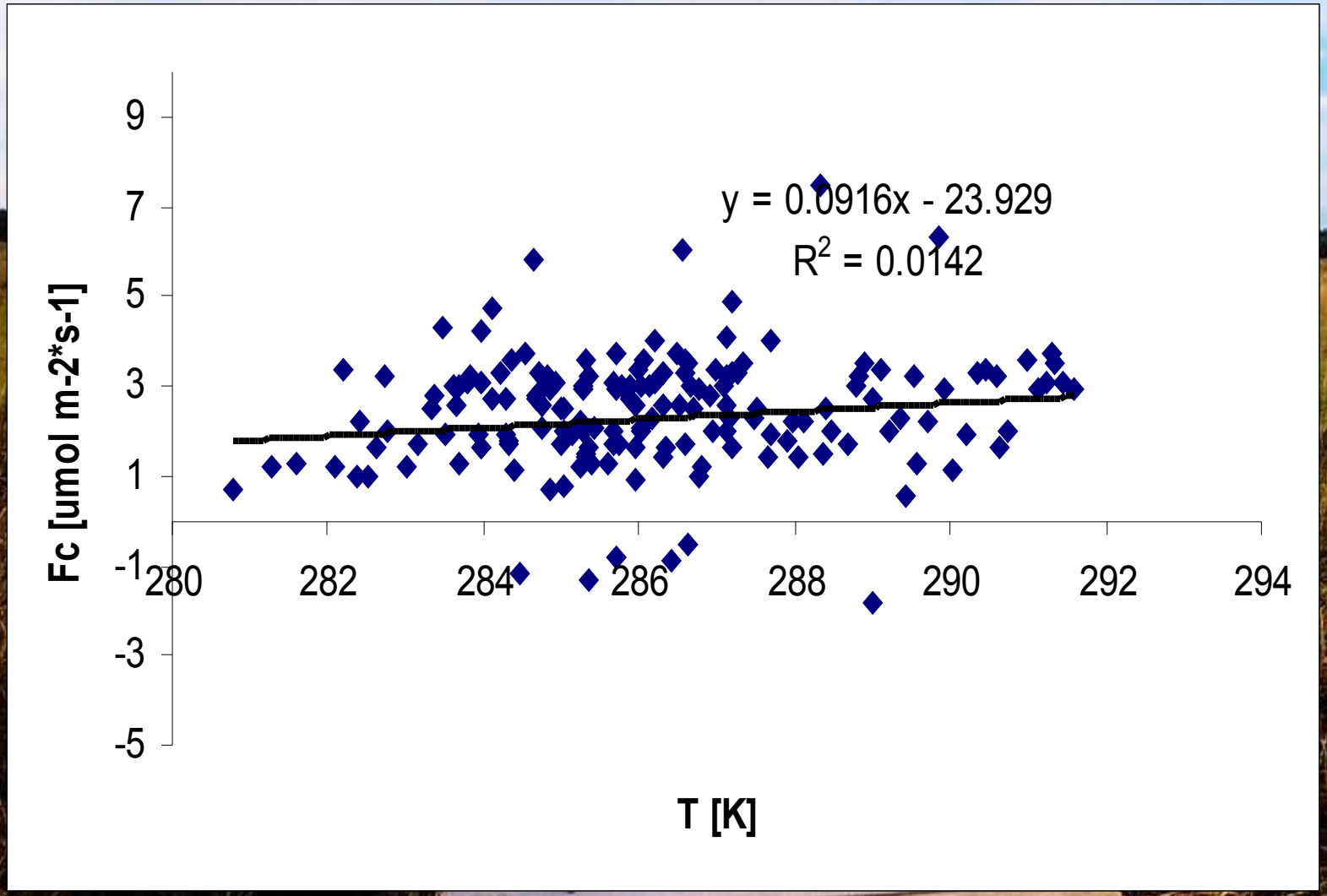
Global radiation and net CO_2 ecosystem exchange



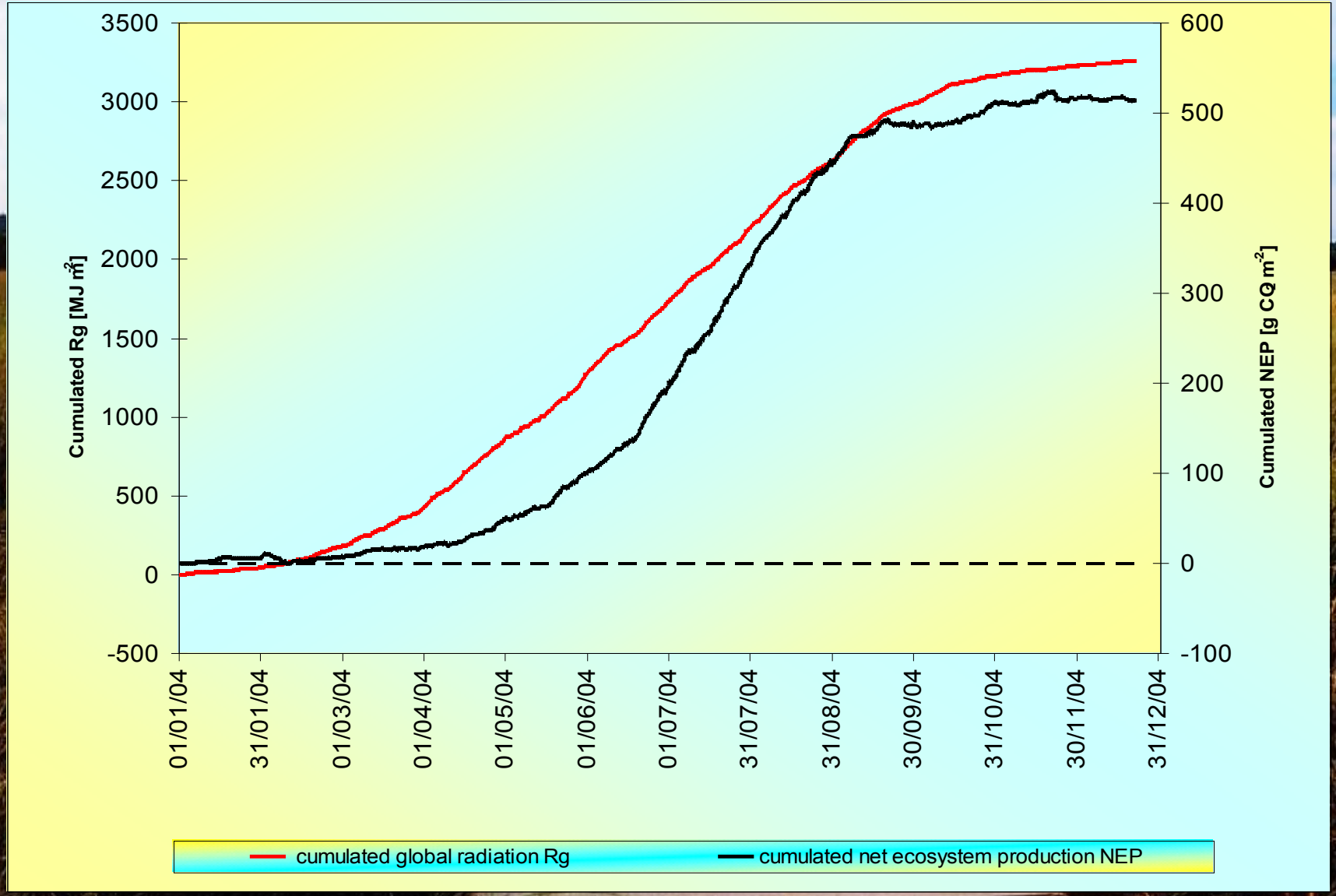
Diurnal Fc vs. Rg relationship - June 2004



Nocturnal Fc vs. T relationship - June 2004

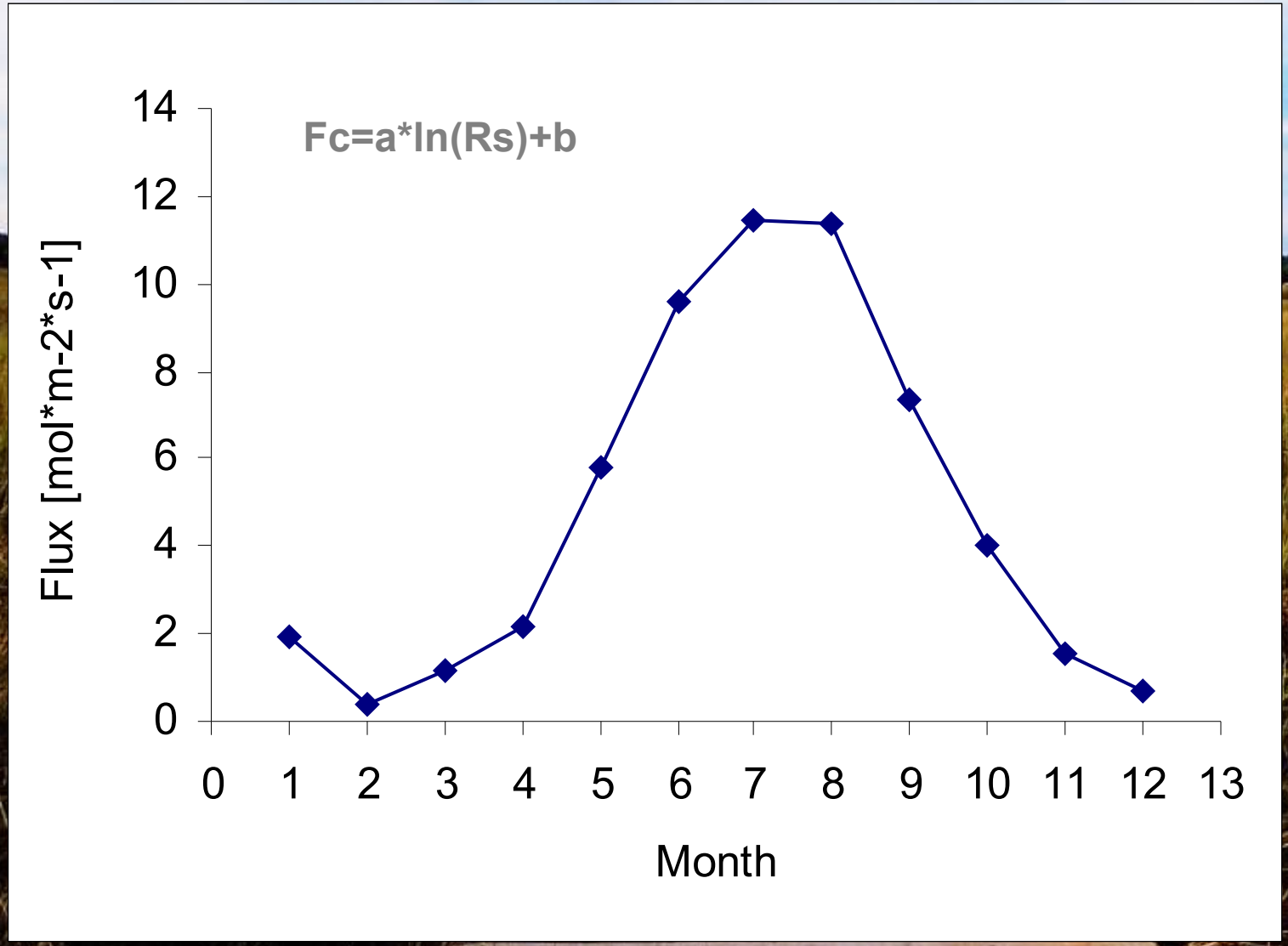


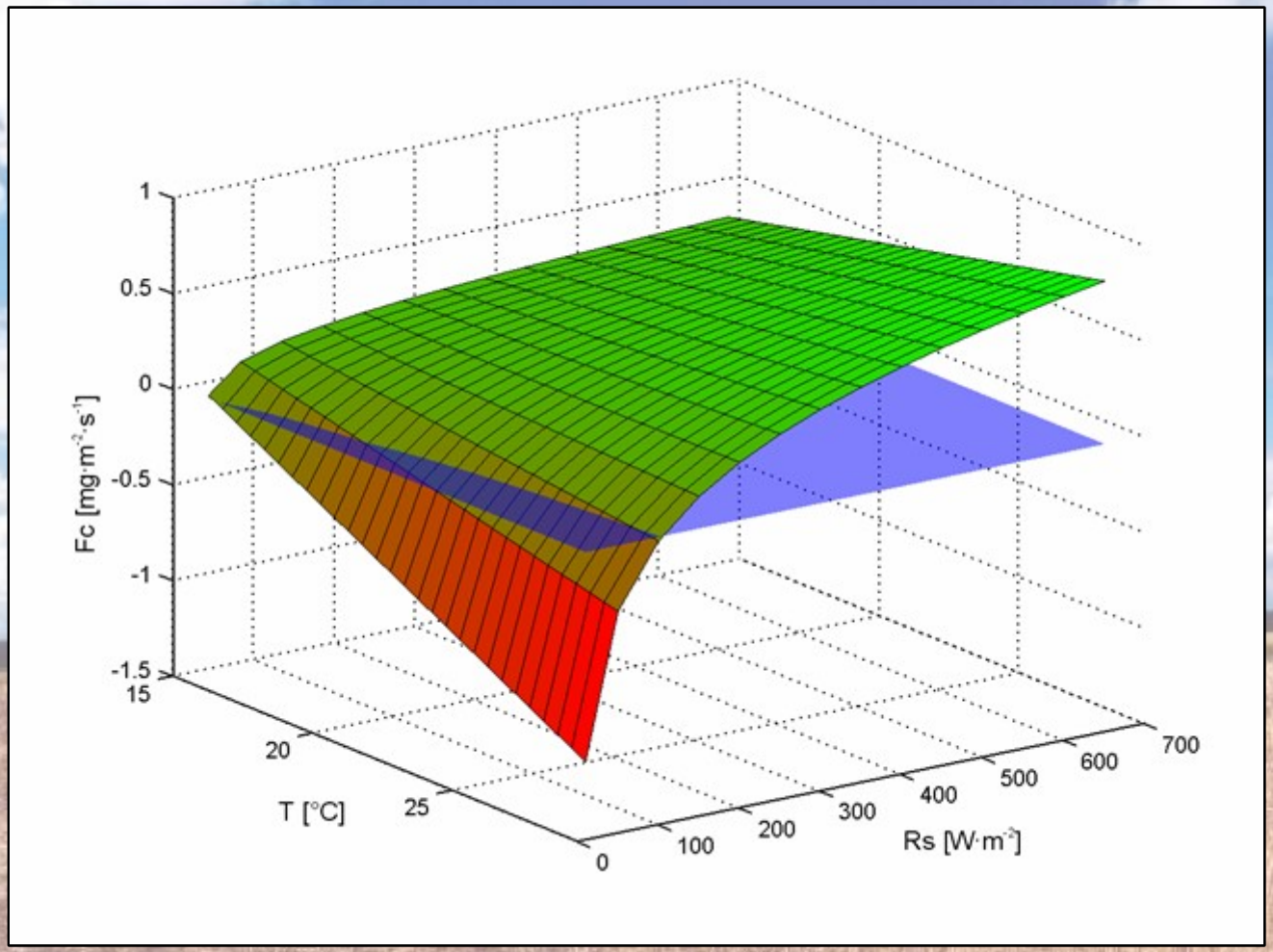
Cumulated values of global radiation and net ecosystem production during 2004




THANK
YOU

Sesonal run of estimated ecosystem respiration values




1
0.5
0
-0.5
-1
-1.5
Fc [mg·m-2·s-1]
15
20
25
T [°C]
0
100
200
300
400
500
600
700
Rs [W·m-2]


THANK YOU