POLJOPRIVREDNI FAKULTET UNIVERZITET U NOVOM SADU
PFNS
DEPARTMAN ZA RATARSTVO I POVRTARSTVO

UNIVERSITÀ DEGLI STUDI FIRENZE
DISPAA
DIPARTIMENTO DI SCIENZE DELLE PRODUZIONI AGROALIMENTARI E DELL'AMBIENTE

UNIVERSITÄT FÜR BODENKULTUR WIEN
BOKU
DEPARTMENT FÜR WASSER-ATMOSPHÄRE-UMWELT

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European Commission

Agrometeorological measurements

Introduction

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$A_gM_{net}^+$ INTERNATIONAL SUMMER SCHOOL IN AGROMETEOROLOGY AND CROP MODELLING 2017

How to plan measurements ?

- **What is my research question or problem ?**

What to measure ?

- To measure conditions in the environment (i.e. Temperature, Air humidity, wetness)
- To measure mass- or energy flows/transport (i.E. Heat, radiation, evaporation)

How to measure?

- Spatial scale? (vertical, horicontal, point)
- Temporal scale? (i.e. daily, hourly, seconds)

The Solution

- **Defined method, defined technology**

(accuracity needed, economic questions, …)

Potential problems which can occur during measuements

Sources of uncertainy in measured data:

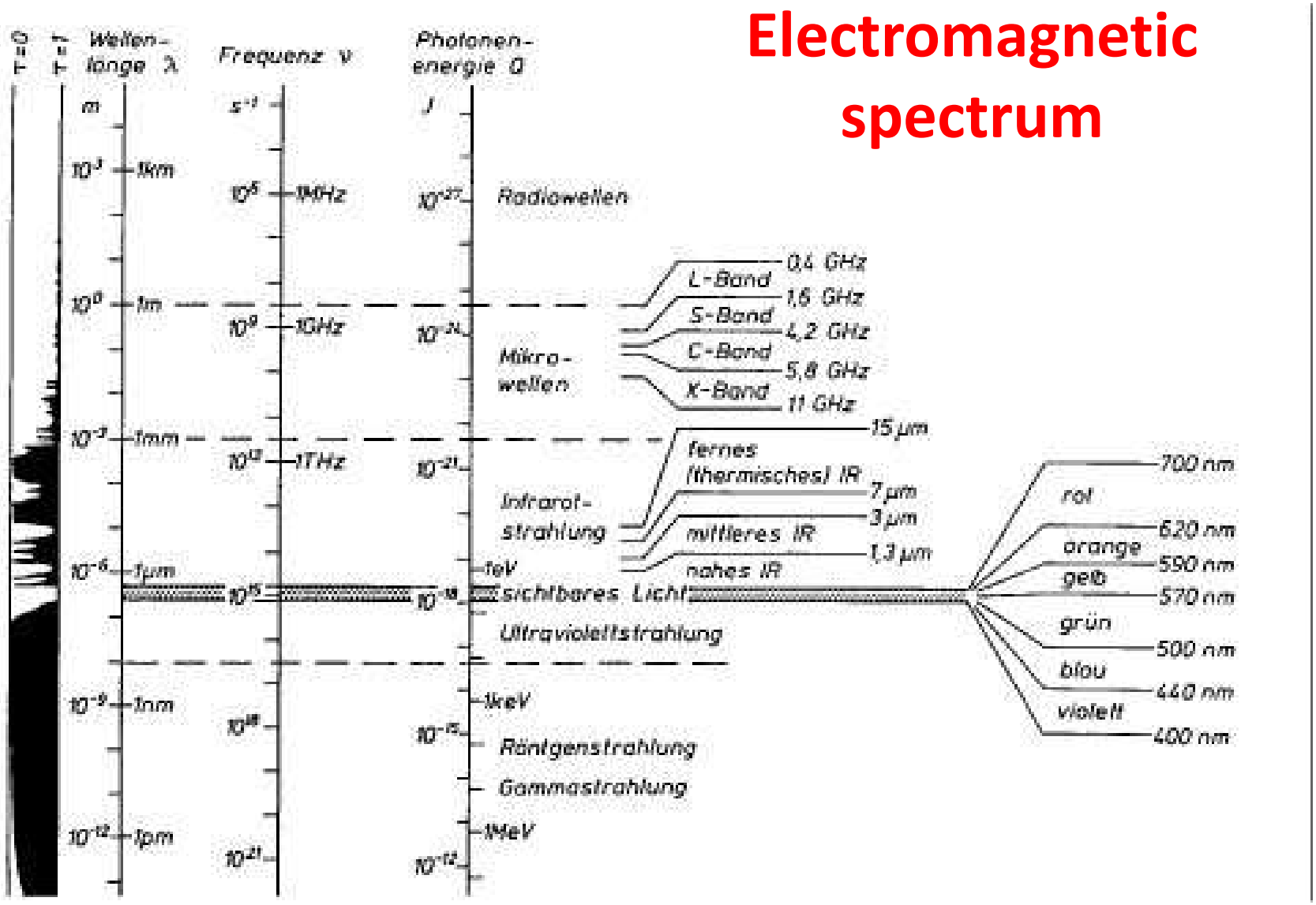
- **Homogenity of time series (climate data !)**

-**Accuracity of measured data (technique)**

- **Representation of data for application**

Impacting factors:
Soil conditions
Topography
Vegetation
(many on them can also change over time!!)

Electromagnetic spectrum



Short wave radiation

- **Global radiation**
  (0.3 ... 3.0µm, Maximum at 0.5µm)
  Unit: W/m²
  Radiation source is the sun with 6000 °K surface temperature

- **Ultraviolett radiation (UV)**
  (UVC: 0,01-0,28 µm, UVB: 0,28-0,31 µm, UVA: 0,31-0,38 µm)

- **Visible radiation**
  0,38-0,75 µm used for photosynthesis
  PAR (Photosyntetic Active Radiation, 30-40% of global radiation)

- **Near Infrared radiation**
  >3,0 µm

Thermal or long wave radiation

(3.0 ... 100µm, Maximum at 10µm):
Main radiation source is the Earth
with app. 287 °K surface temperature

Unit: W/m²

(irradiance)

- **Solar constant**

Radiation intensity at the upper atmophere

1369 W/m²

$0 = Rn - G - H - L.E (- \Delta S)$

Rn = Net radiation
G = Soil heat flux
H = Sensitive heat flux
L.E = Latent heat flux (evaporation)
L = latent heat ($2{,}45*10^6$ J/kg)
E = Amount of water
ΔS = energy stored in biomass
Units : $MJ.m^{-2}\ d^{-1}$ or $W.m^{-2}$

Energy balance

$0 = P - L.E - R - \Delta Sw + K - D$

P = Precipitation
LE = evapotranspiration
R = Runoff
ΔS_W = Soil storage change
K = Capillary rise, D = Drainage

Water balance

Serbia for Excell

Daily course of radiation energy balance components

$G = R_s + R_d$ (global radiation)

$R = a\,(R_s + R_d)$ (reflection)

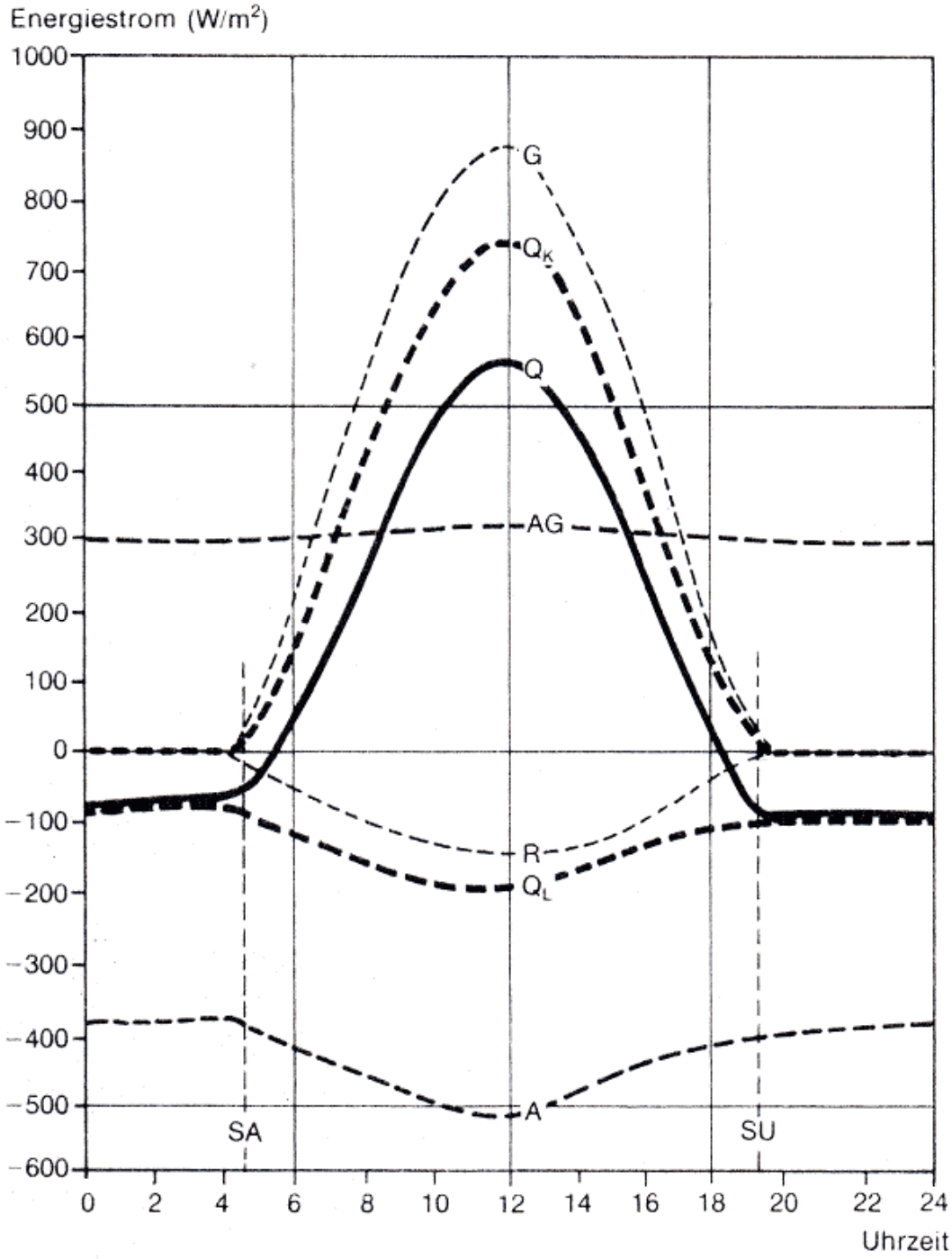
$Q_k = R_k$ (net global radiation)

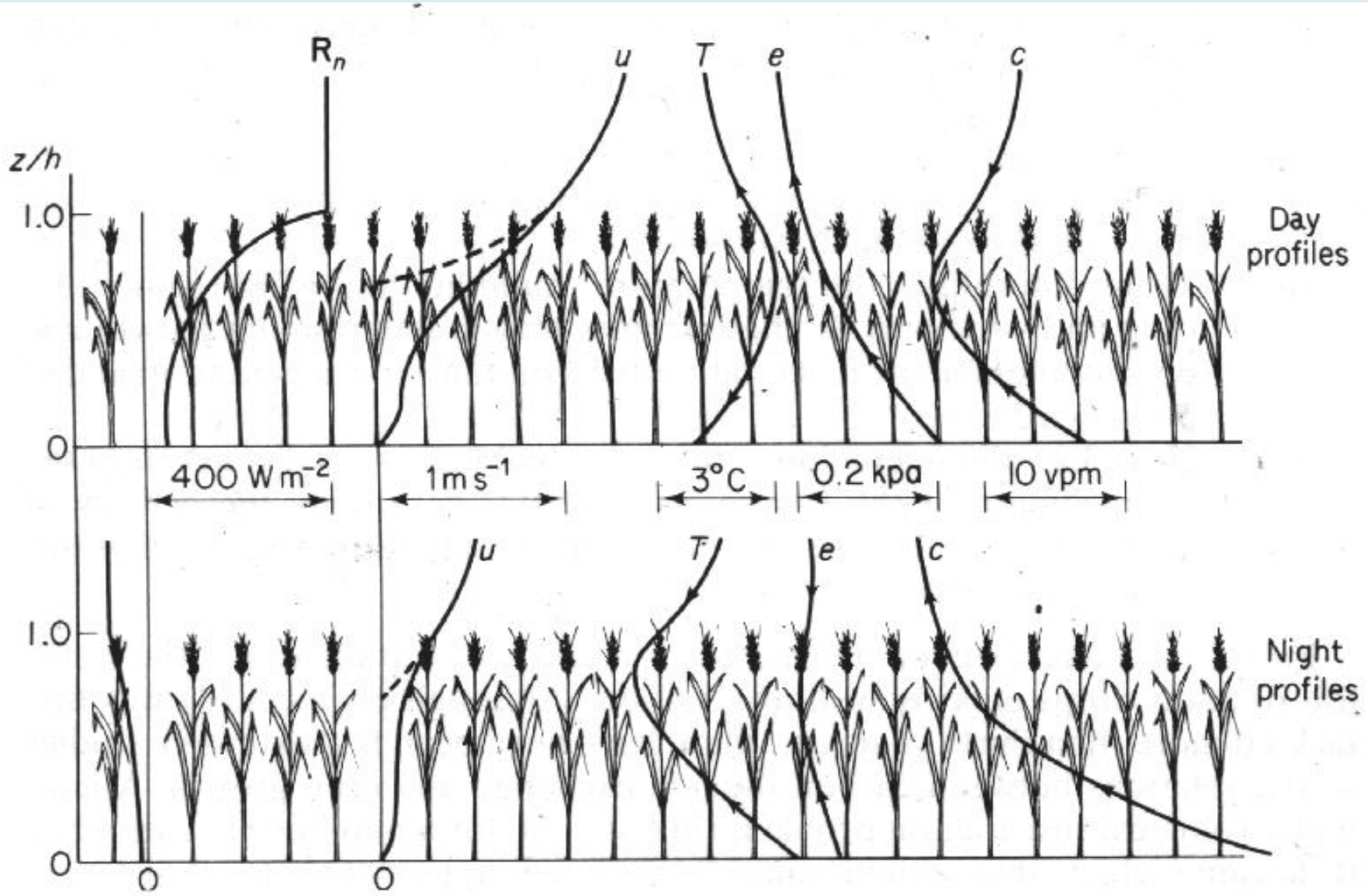
$A = R_E$ (thermal emission)

$A_G = R_A$ (thermal atmospheric)

$Q_L = R_L$ (thermal balance)

$Q = R$ (total net radiation)



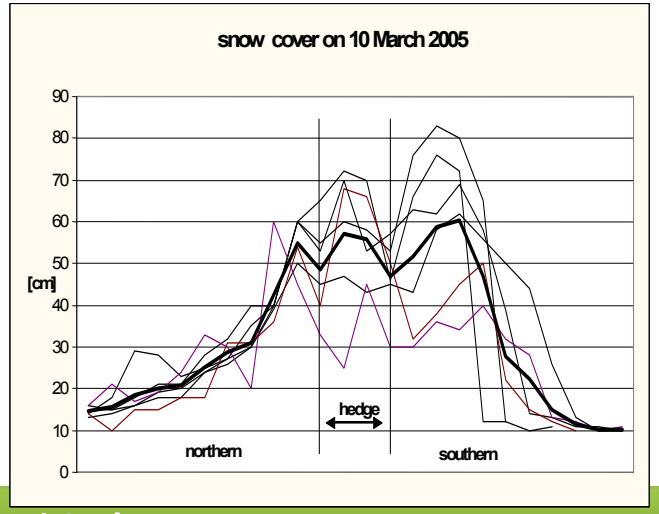


Typical microclimatic diurnal conditions within canopies
(n. Monteith and Unsworth, 1999)

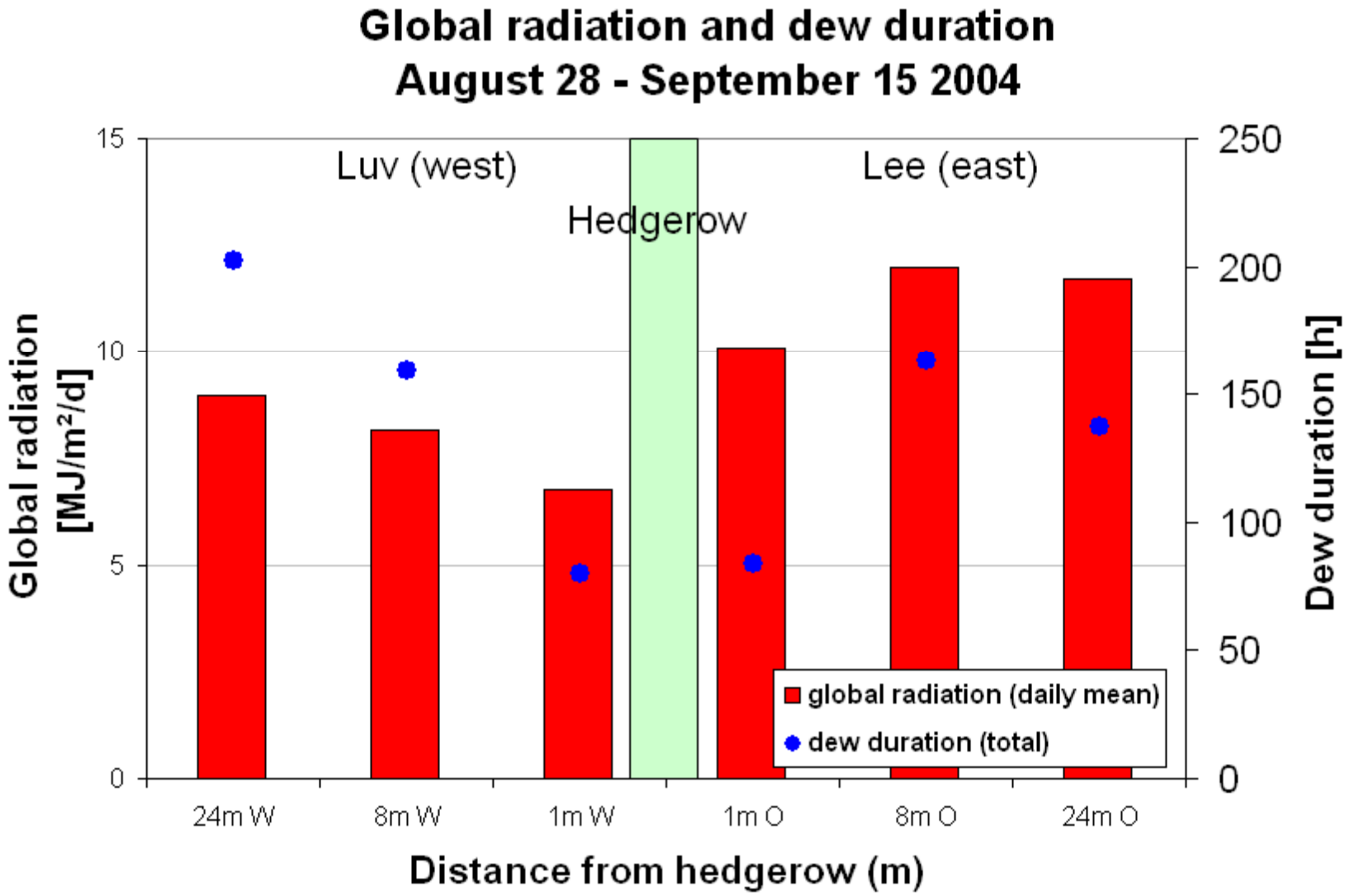
Measuring local (micro)climates

Influence of hedgerows on microclimate and yield effects (Transect measurements and simulation)

Snow Accumulation Effects

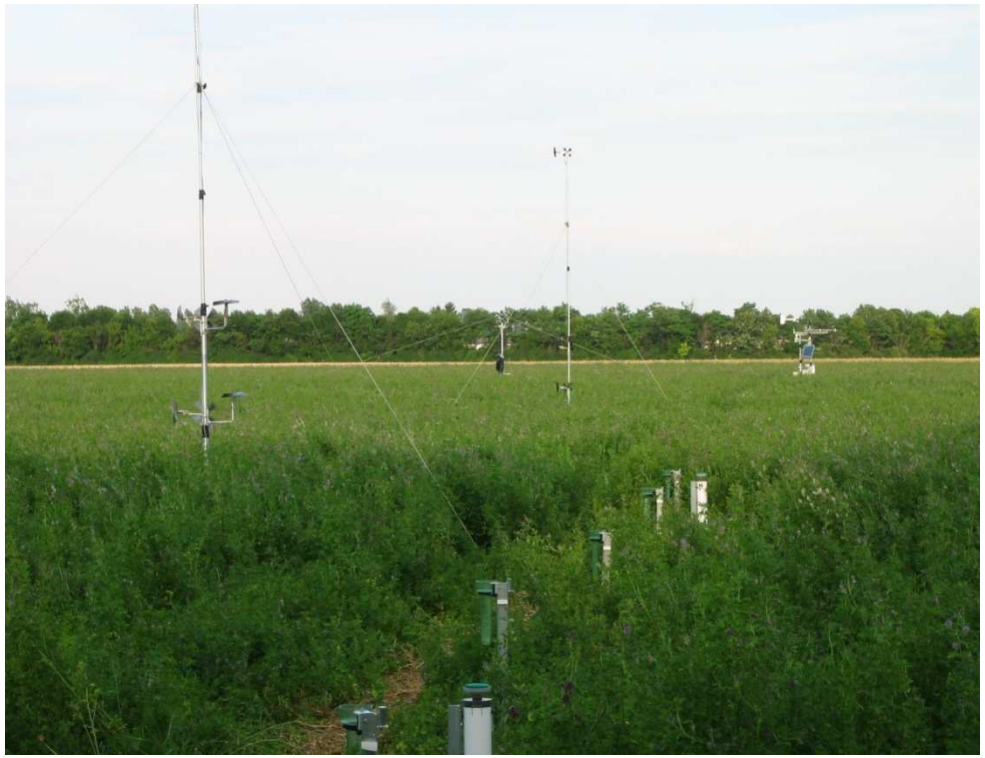


Hedgerow effects on small scale radiation and dew duration

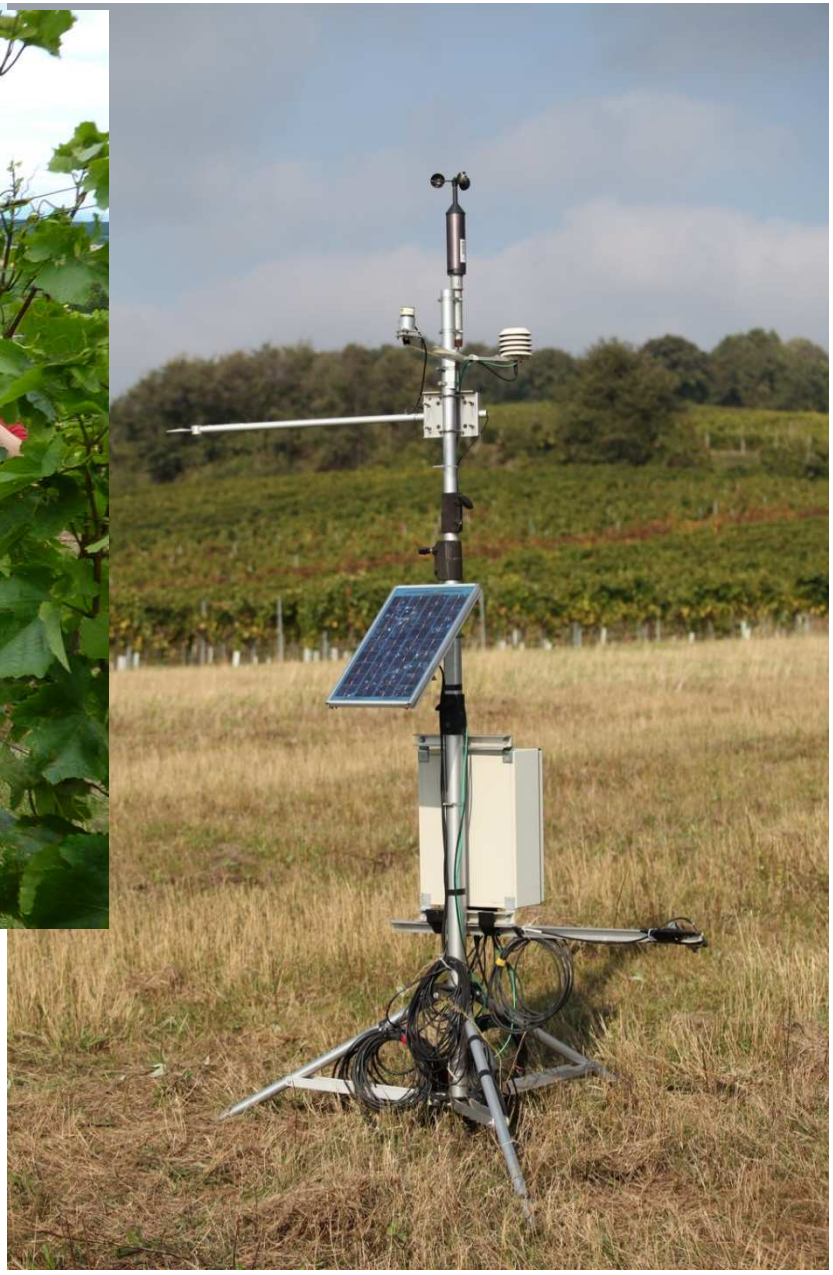


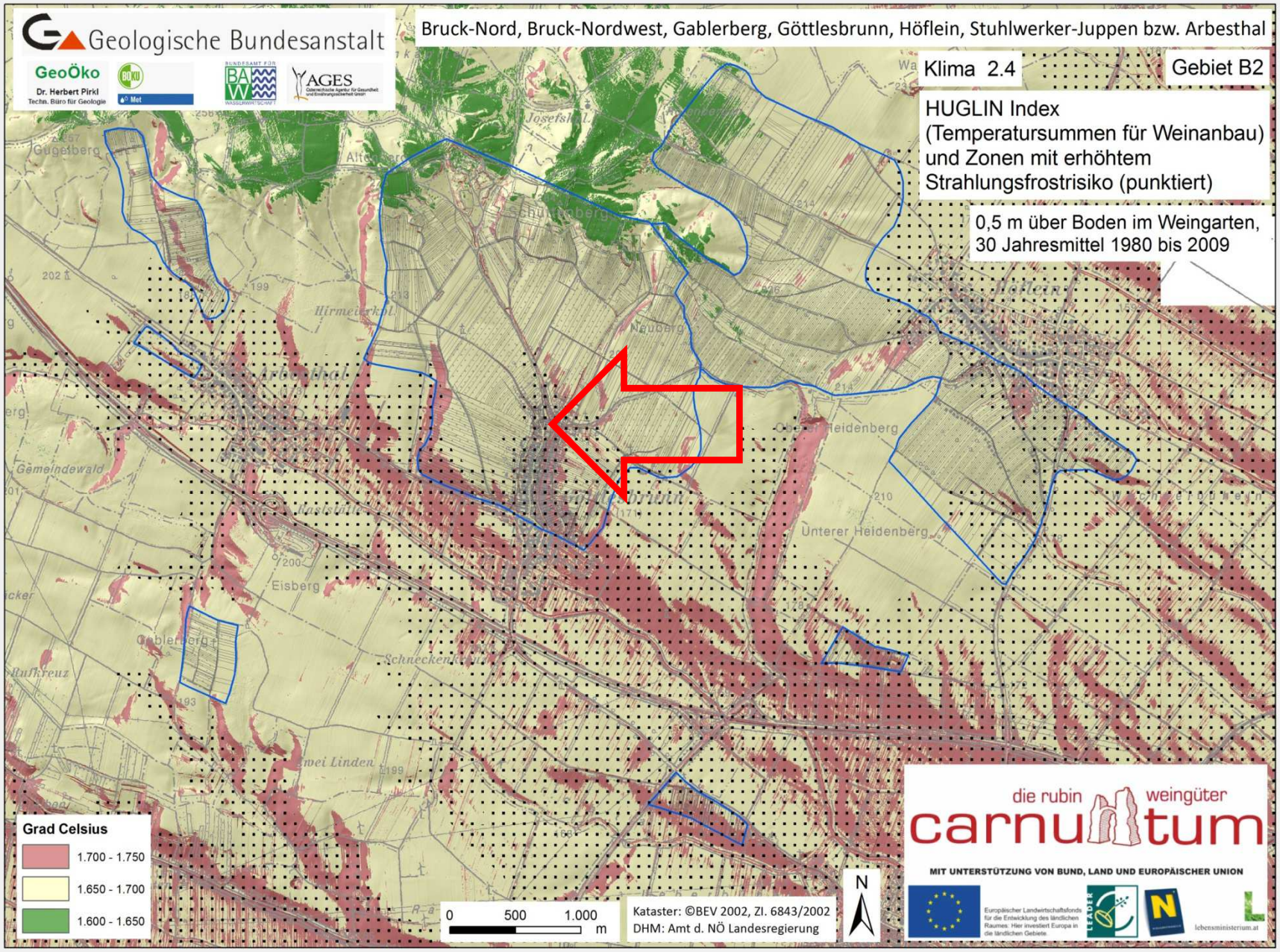
Evaporimeter measurements in hedgerow transects

- To detect multiple microclimatic effects of hedgerows



Site: Marchfeld, Austria. MUBIL project




Geologische Bundesanstalt
GeoÖko
Dr. Herbert Pirkl
Techn. Büro für Geologie
Bruck-Nord, Bruck-Nordwest, Gablerberg, Göttlesbrunn, Höflein, Stuhlwerker-Juppen bzw. Arbesthal
Klima 2.4
Gebiet B2
HUGLIN Index
(Temperatursummen für Weinanbau)
und Zonen mit erhöhtem
Strahlungsfrostrisiko (punktiert)
0,5 m über Boden im Weingarten,
30 Jahresmittel 1980 bis 2009
Grad Celsius
1.700 - 1.750
1.650 - 1.700
1.600 - 1.650
0
500
1.000
m
Kataster: ©BEV 2002, Zl. 6843/2002
DHM: Amt d. NÖ Landesregierung
N
die rubin weingüter
carnuntum
MIT UNTERSTÜTZUNG VON BUND, LAND UND EUROPÄISCHER UNION
Europäischer Landwirtschaftsfonds für die Entwicklung des ländlichen Raumes. Hier investiert Europa in die ländlichen Gebiete.
lebensministerium.at

Radiation frost – May 2012 (Göttlesbrunn)

Thank you !