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

EUROPEAN COMMISSION
Horizon 2020
EUROPEAN UNION FUNDING FOR RESEARCH & INNOVATION

Summer School 2017

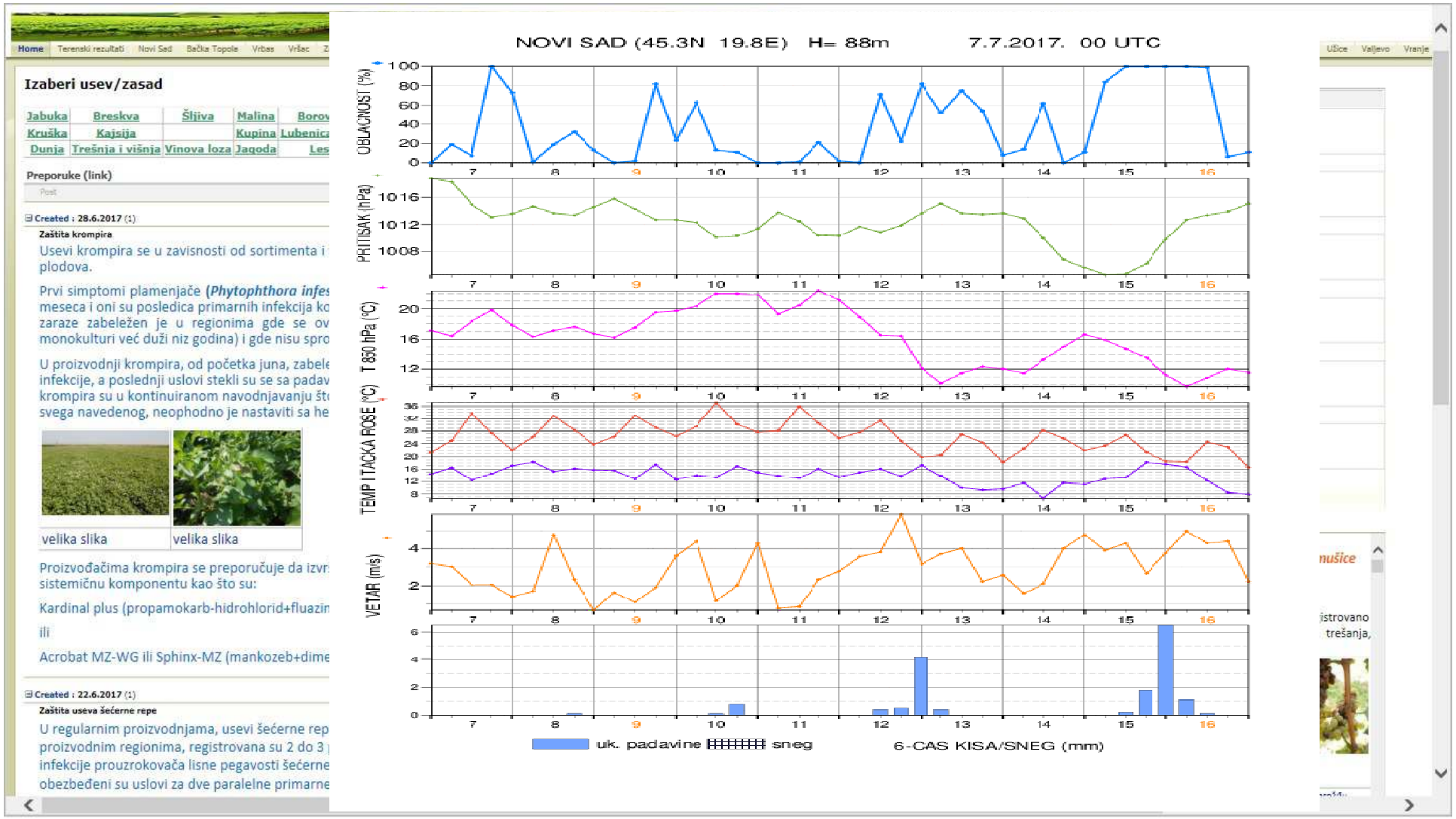
$A_gM_{net}^+$ INTERNATIONAL SUMMER SCHOOL IN AGROMETEOROLOGY AND CROP MODELLING 2017

Monthly and Seasonal Forecast Application in Agriculture: Possibilities & Limitations

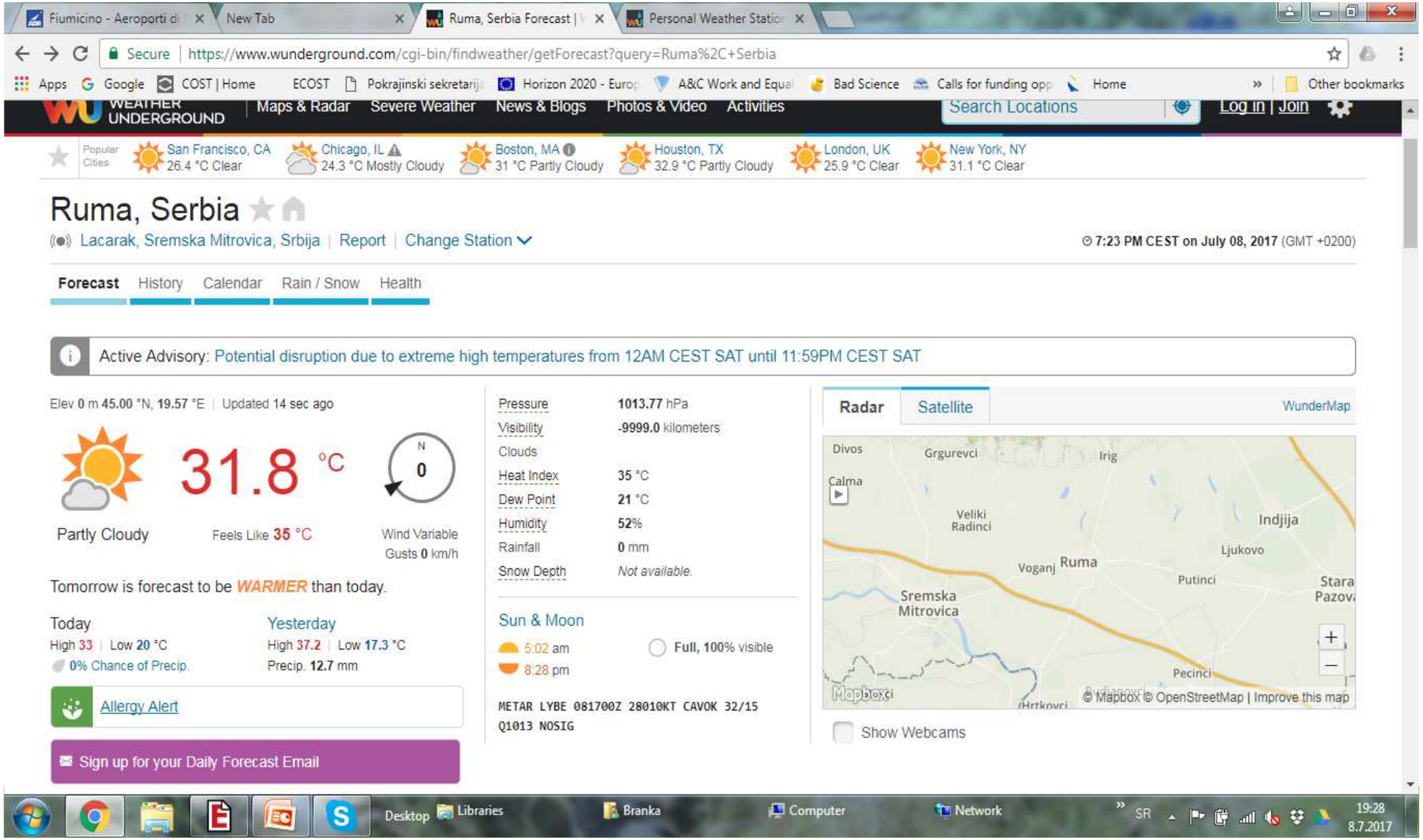
Branislava Lalić

Faculty of Agriculture, Novi Sad, Serbia

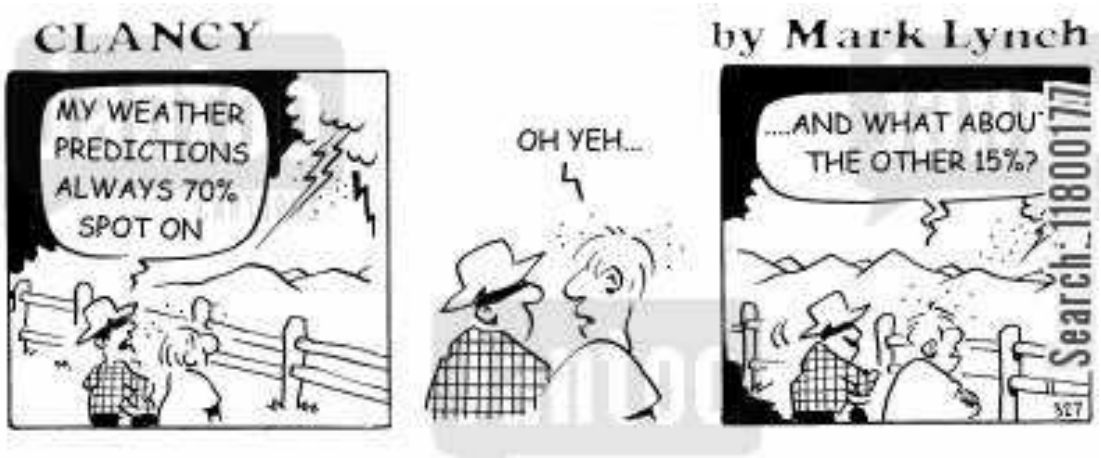
WE ARE ALL INTERESTED IN WEATHER …



WHEATHER DATA – AVAILABLE MORE THAN EVER



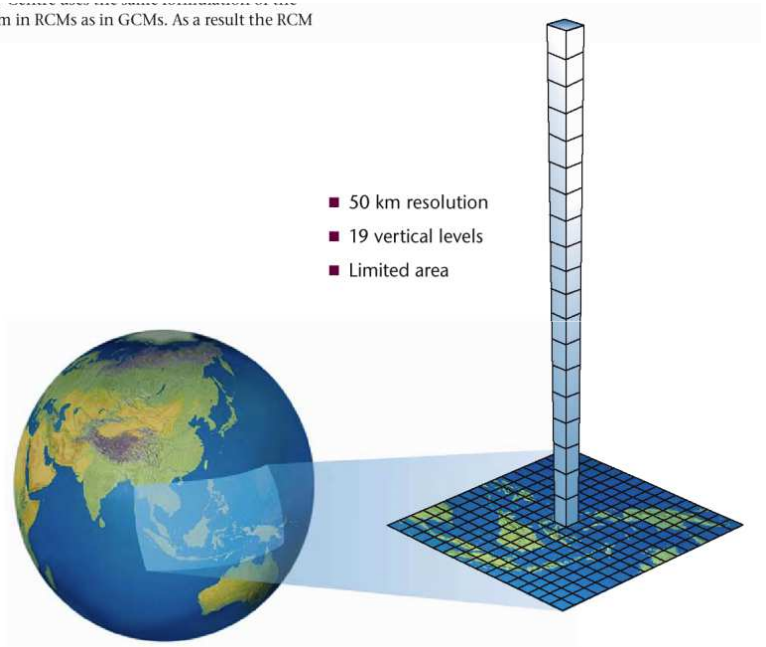
WEATHER FORECAST ACCURACY ...

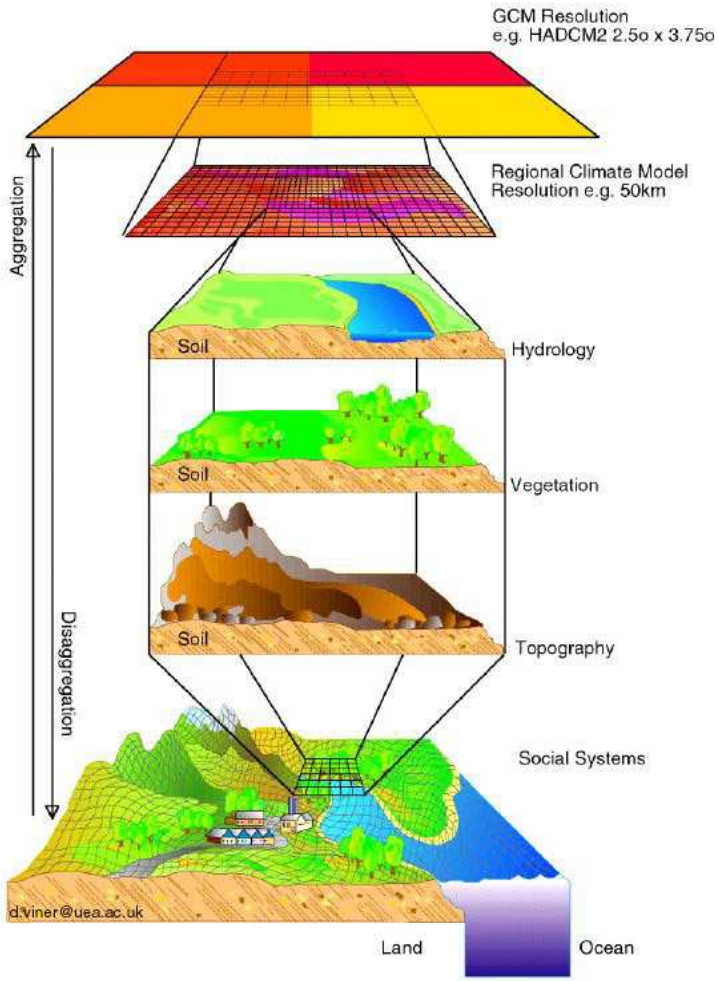


WEATHER FORECAST ACCURACY – EARTH FROM NWP MODEL "PERSPECTIVE"

...

climate system in RCMs as in GCMs. As a result the RCM





SIMPLIFICATION, APPROXIMATION, PARAMETERIZATION

PLANT MODELLING ACCURACY ...

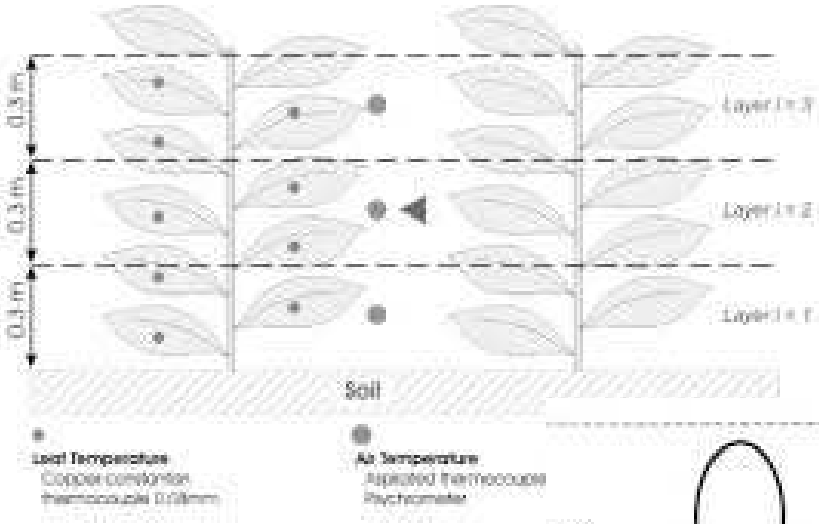


Figure 1 - Schematic representation of position

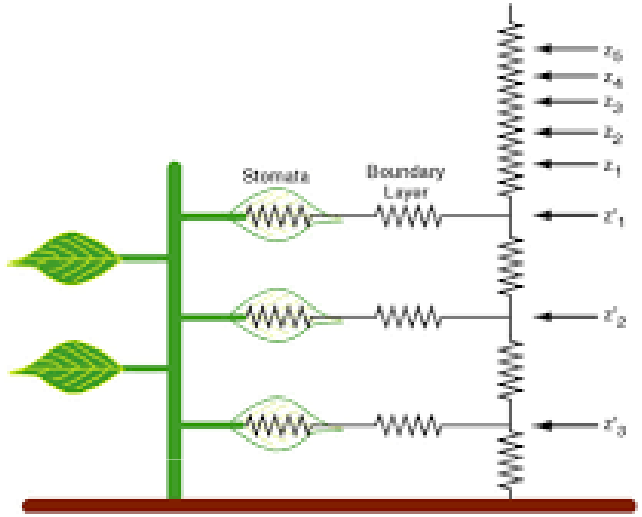
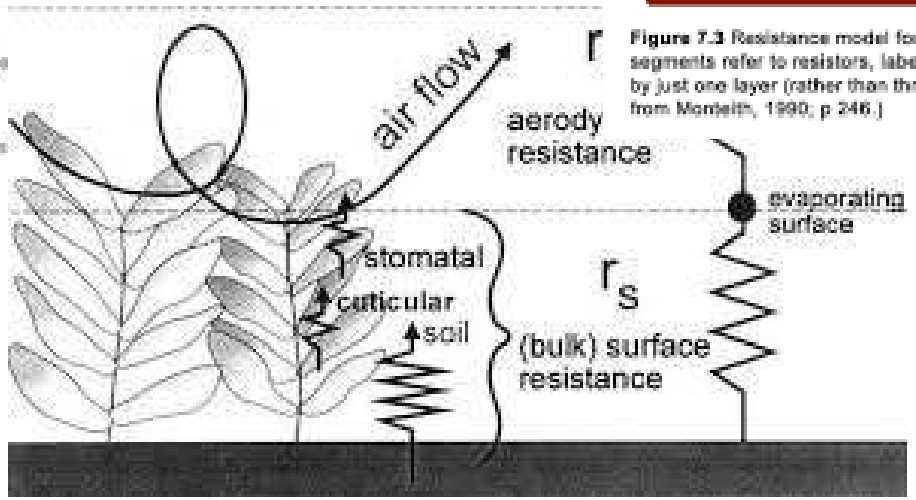


Figure 7.3 Resistance model for a plant in a stand of vegetation. Serrated segments refer to resistors, labeled accordingly. Our model is represented by just one layer (rather than three layers) of vegetation. (Freely adapted from Monteith, 1990; p 246.)



SIMPLIFICATION, APPROXIMATION, PARAMETERIZATION

FROM DETERMINISTIC TO ENSEMBLE MODELLING: ATMOSPHERE

IDEAL CASE: WE KNOW INITIAL CONDITIONS, WE KNOW MATH,

SIMPLIFICATIONS, APPROXIMATIONS & PARAMETERIZATIONS

ARE CLOSE TO REALITY

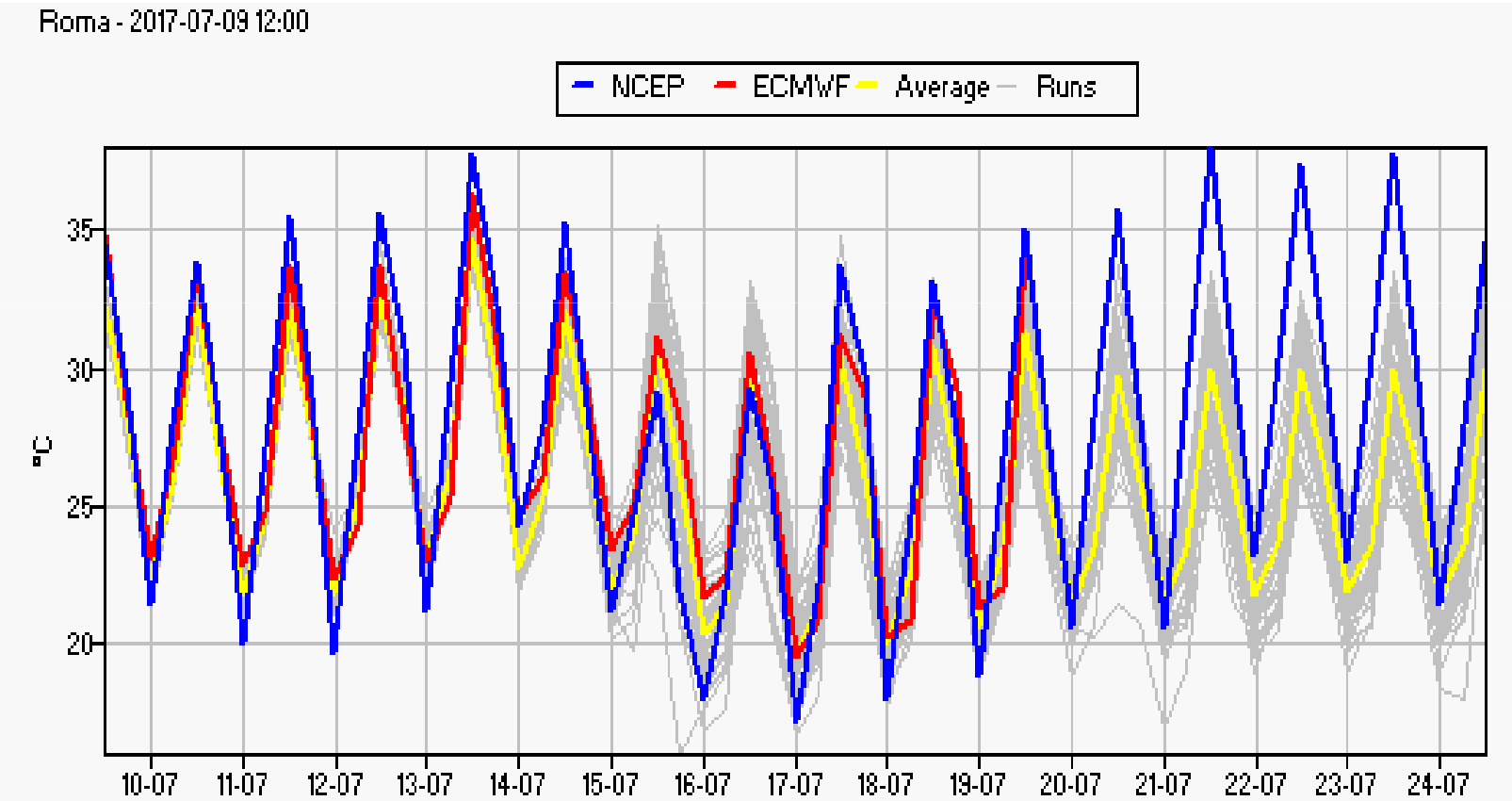
DYNAMICAL AND NON LINEAR – ATMOSPHERE AND PLANT

IN CASE OF ATMOSPHERE AND PLANTS, **EXACT VALUES OF INITIAL CONDITIONS ARE UNKNOWN**

The atmosphere and plants are nonlinear dynamical systems.

Important feature of such systems is that **even small perturbations of initial conditions can produce significantly different system evolution** (Lorenz, 1963).

FROM DETERMINISTIC TO ENSEMBLE MODELLING: ATMOSPHERE & PLANTS



FROM DETERMINISTIC TO ENSEMBLE MODELLING: PLANTS

Input data

Daily meteo data

Management

Cultivar

Soil

Model

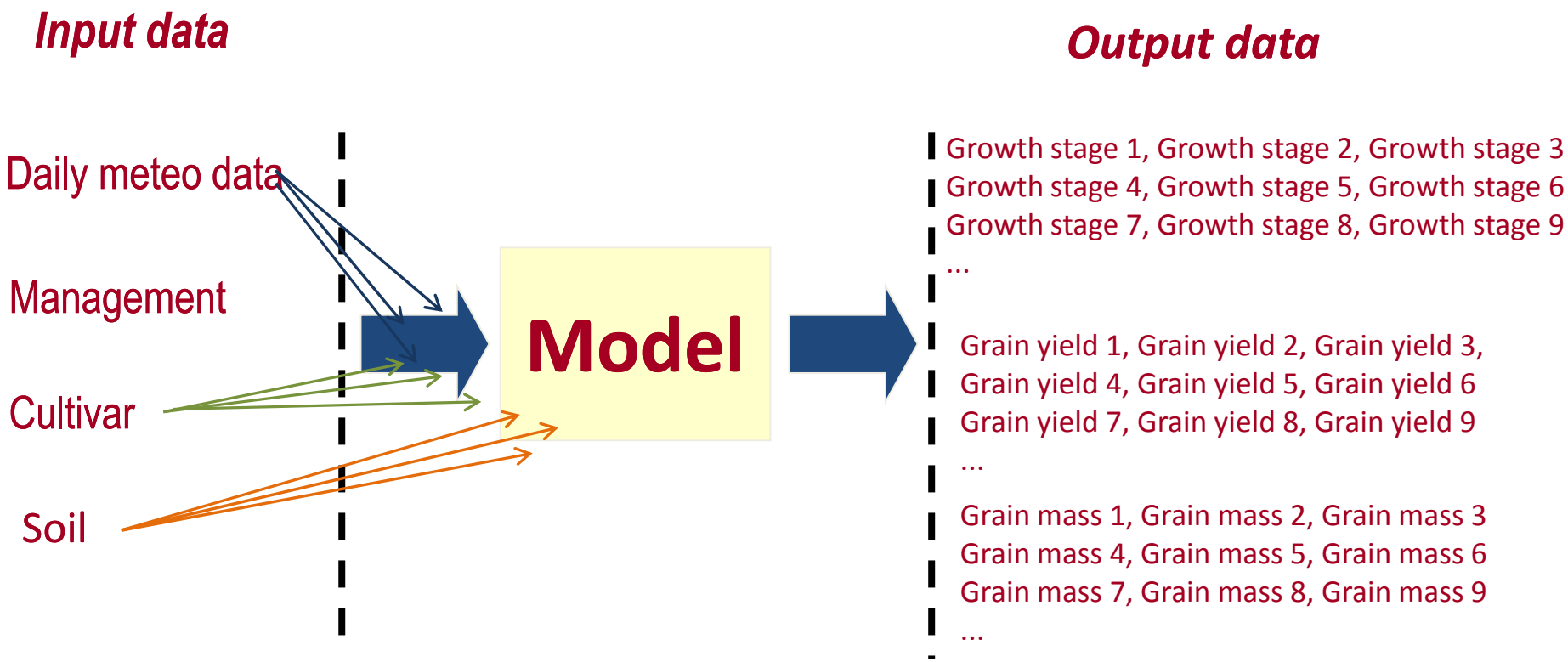
Output data

Growth stage 1
Growth stage 2
Growth stage 3
...

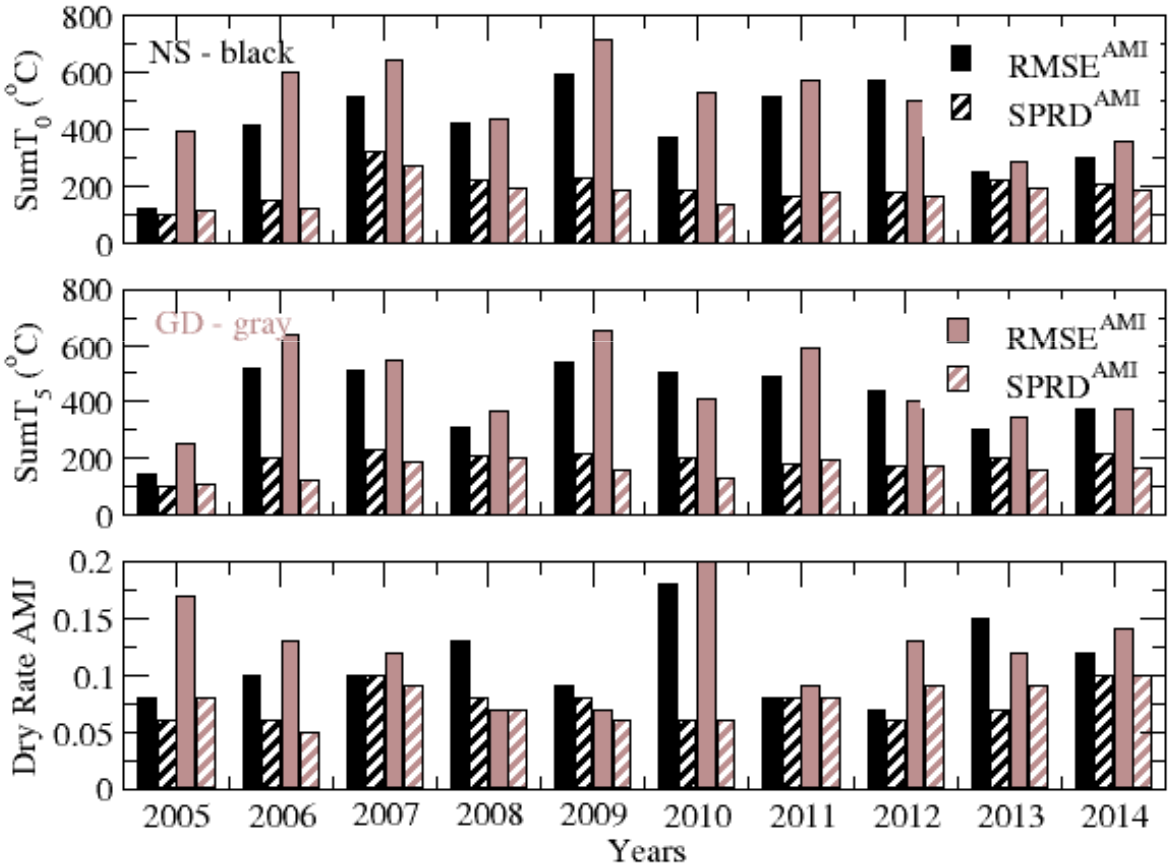
Grain yield 1
Grain yield 2
Grain yield 3
...

Grain mass 1
Grain mass 2
Grain mass 3
...

FROM DETERMINISTIC TO ENSEMBLE MODELLING: PLANTS

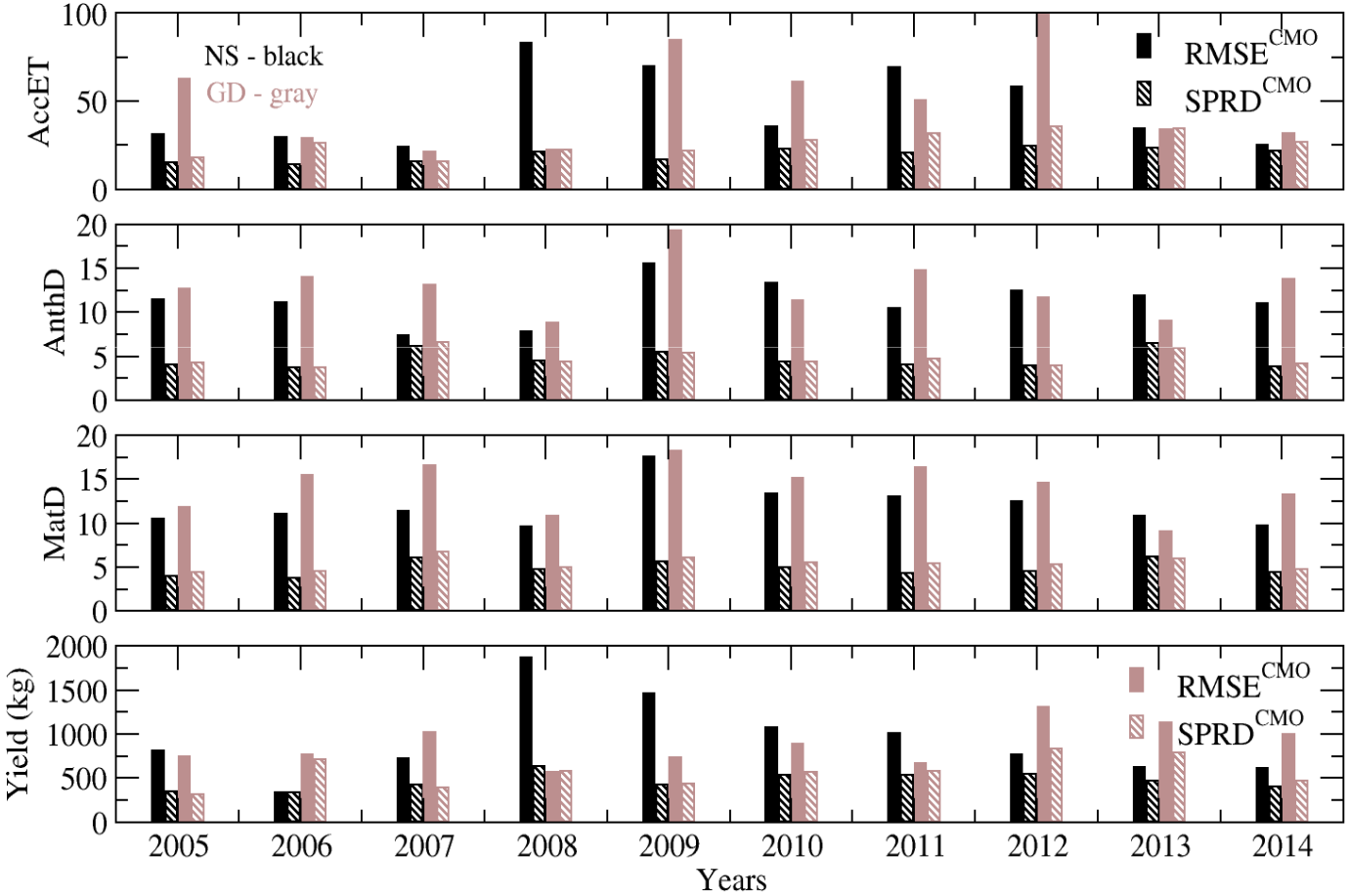


ENSEMBLE PLANT FORECASTING – PART I



AMI: $RMSE^{AMI}$ and $SPRD^{AMI}$ for $SumT_0$, $SumT_5$ and Dry rae AMJ calculated for 2005-2014.

ENSEMBLE PLANT FORECASTING – PART I



CMO: $RMSE^{CMO}$ and $SPRD^{CO}$ for Yield, MatD, AnthD and AccET calculated for 2005-2014.