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

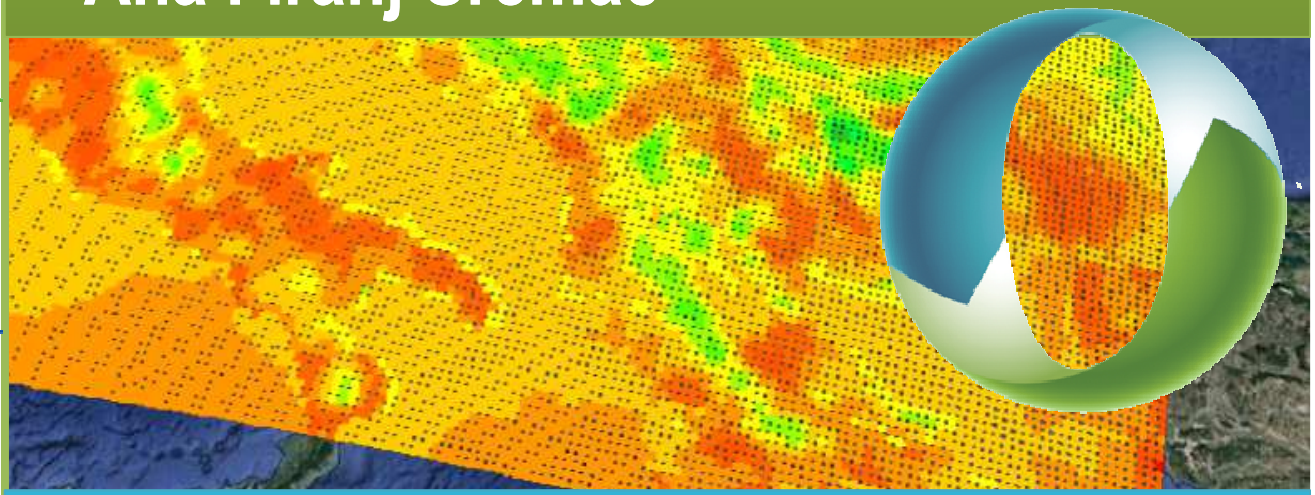
UNIVERSITÄT FÜR BODENKULTUR WIEN
BOKU
DEPARTMENT FÜR WASSER-ATMOSPHÄRE-UMWELT

EUROPEAN COMMISSION
Horizon 2020
EUROPEAN UNION FUNDING FOR RESEARCH & INNOVATION

Workshop 2018

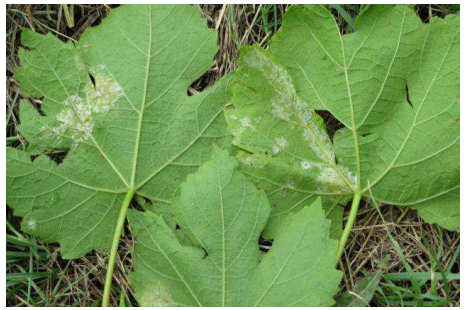
Use of different timescale weather forecast in the field of plant disease prediction

Ana Firanj Sremac



Department of field and vegetable crops,
Faculty of Agriculture,
University of Novi Sad

Source:
Forecasting and Warning Service of Serbia in plant protection



Outline

- **Idea for research:** Introduction of different time scale weather forecasting into prediction of meteorological conditions for plant disease appearance.

- **Operational warning system.**

- **Levels**:
  - *Seasonal* - season with high/low plant disease risk,
  - *Monthly* – month with/low high plant disease risk,
  - *Short term (4-day)* - plant disease appearance risk and calculation of infection intensity.

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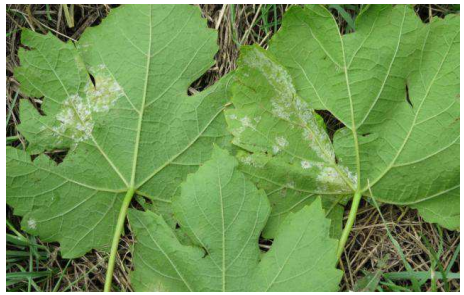
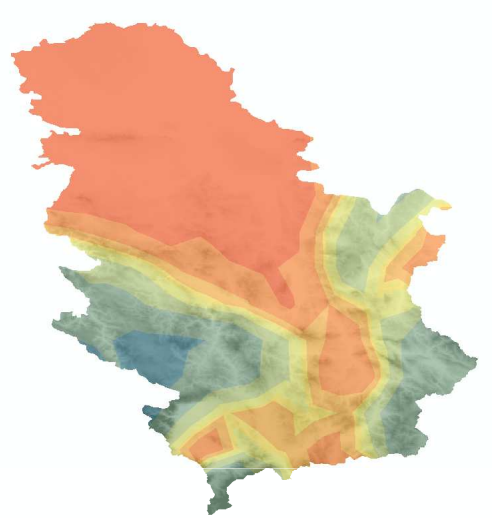


Outline

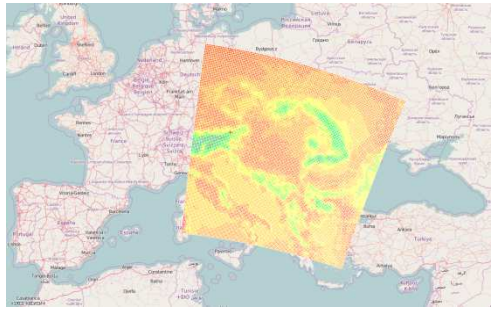
- **Implementation**

- **Data:** Field observations
  - Disease appetence
  - Plants phenological stage
  - Meteorology
- **Models:**
  - Empirical plan disease model
  - NWP model outputs

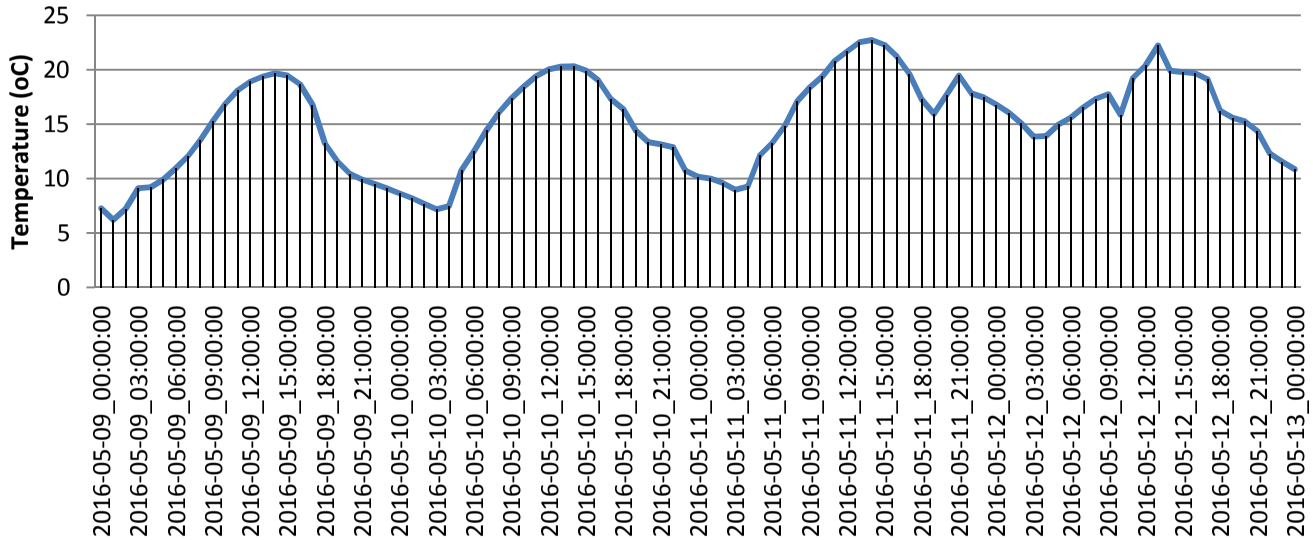
Short-term WP

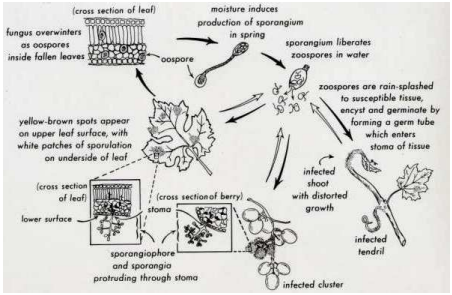


WRF ARW



- The WRF ARW model is a fully compressible, nonhydrostatic model (with a hydrostatic option). Its vertical coordinate is a terrain-following hydrostatic pressure coordinate. The grid staggering is the Arakawa C-grid. The model uses higher-order numeric.
- Run with 0.25° GFS input data on 3h
- 10km resolution, 1h output
- For the time of interest it was run on 4 days





BAHUS

- biometeorological model
- designed to provide information about the occurrence and severity of plant diseases

Observed
Forecasted

input module,

providing meteorological and biological

modelling module,

consisting of empirical relationships and conditions related to disease occurrence and infection severity

output module,

information about the risk of infection, the duration of the incubation period (IP), the time of the first symptoms and the intensity of the infection

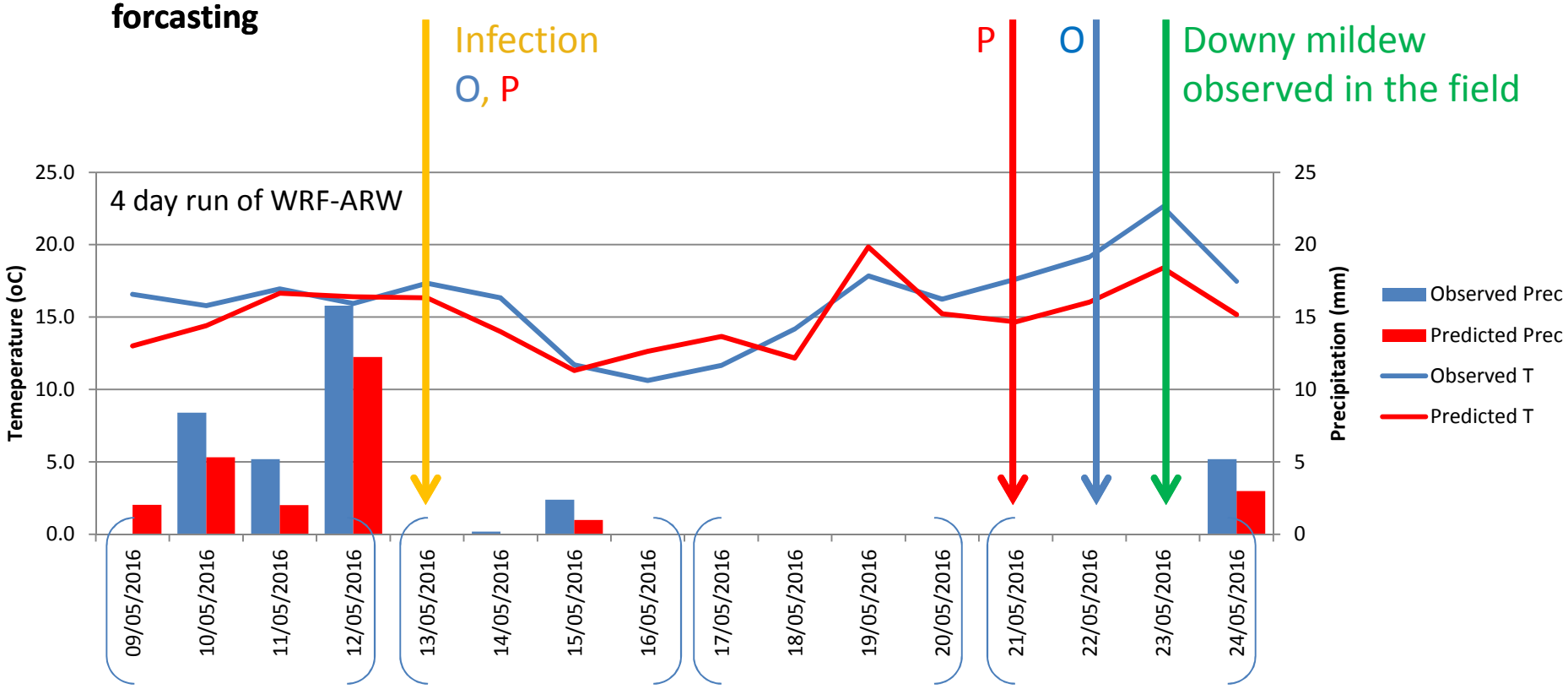
Plasmopara viticola
Downy mildew of wine grape

Results

End of incubation period calculated with Müller's method in BAHUS for observed and predicted meteorological elements.

Čerević – Lat 45.1916, Lon 19.669, 09/05/2016

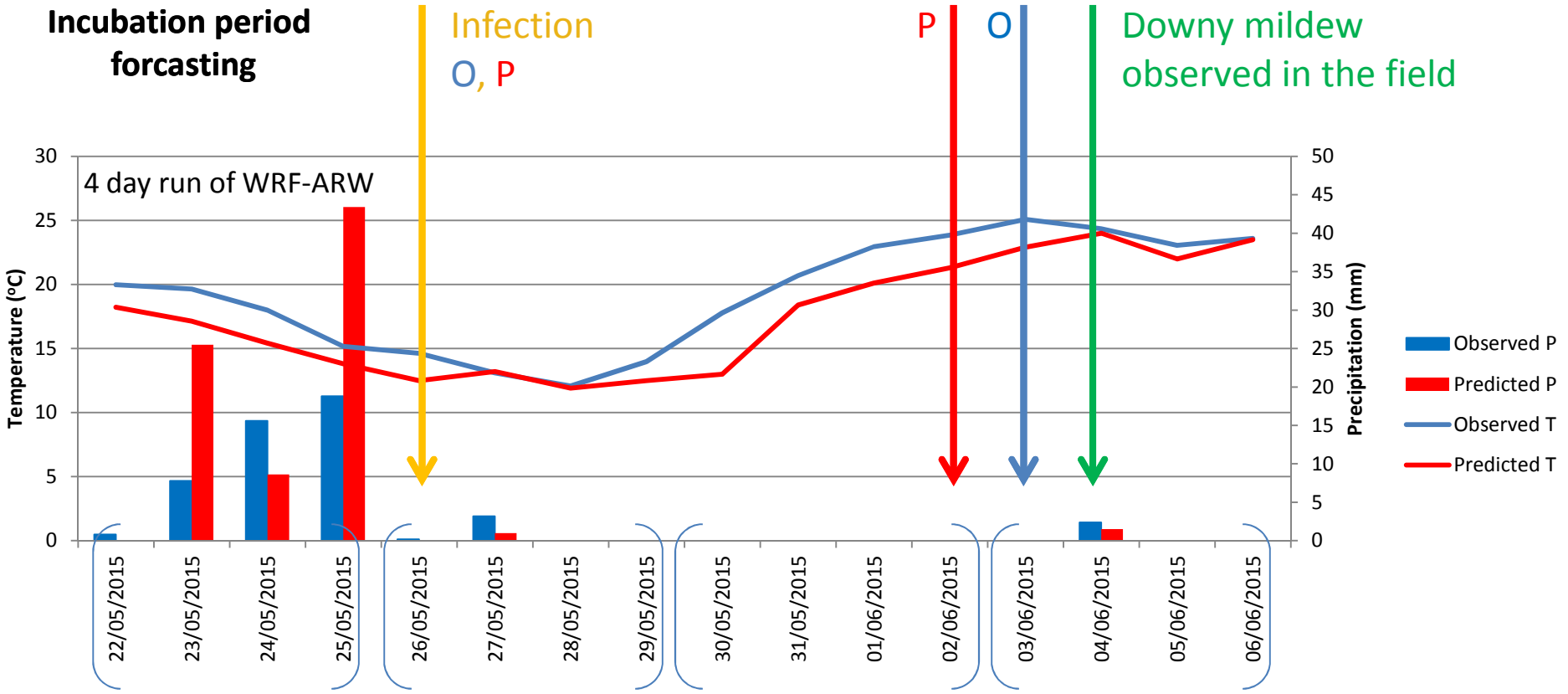
Incubation period forcasting

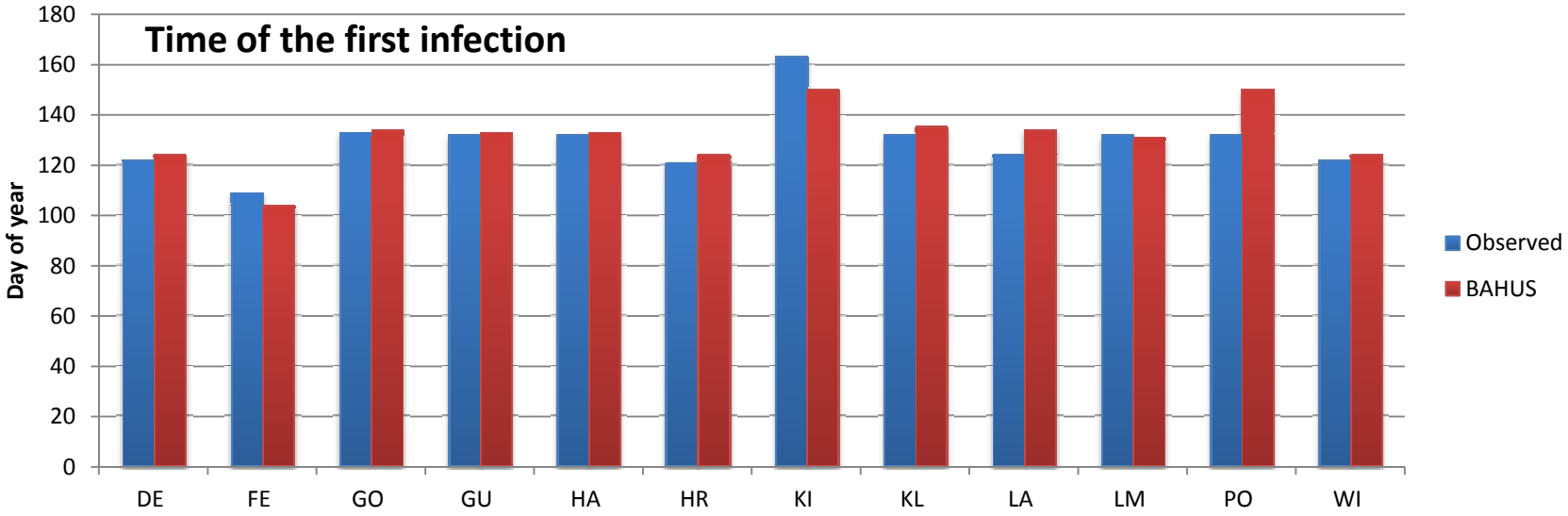


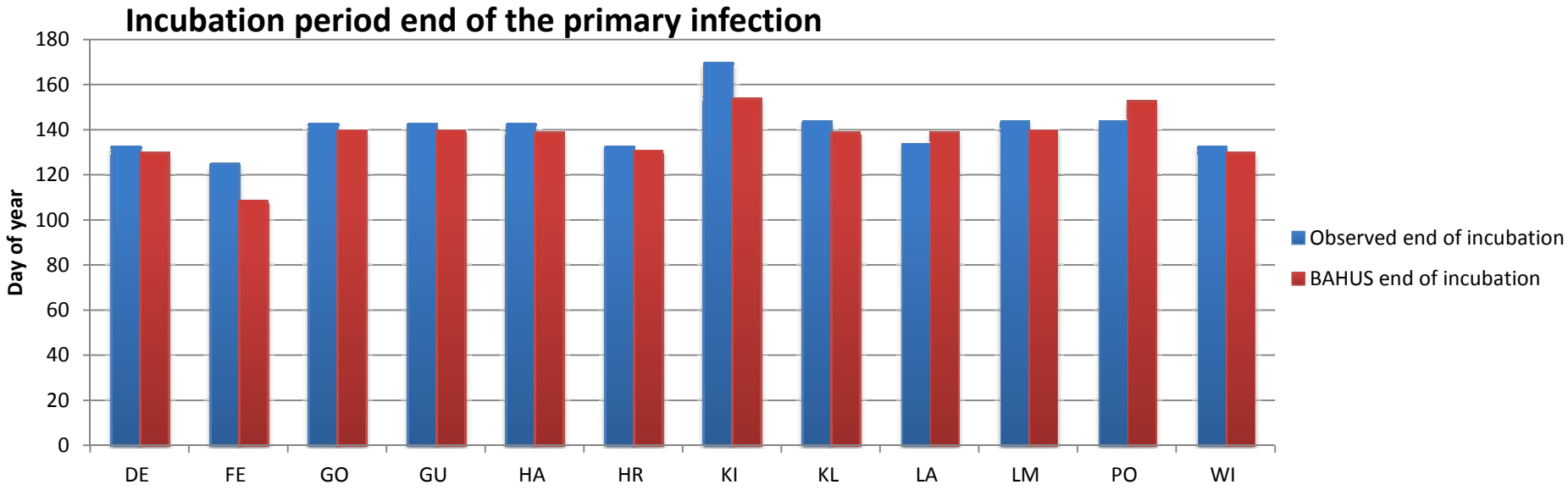
Results

End of incubation period calculated with Müller's method in BAHUS for observed and predicted meteorological elements.

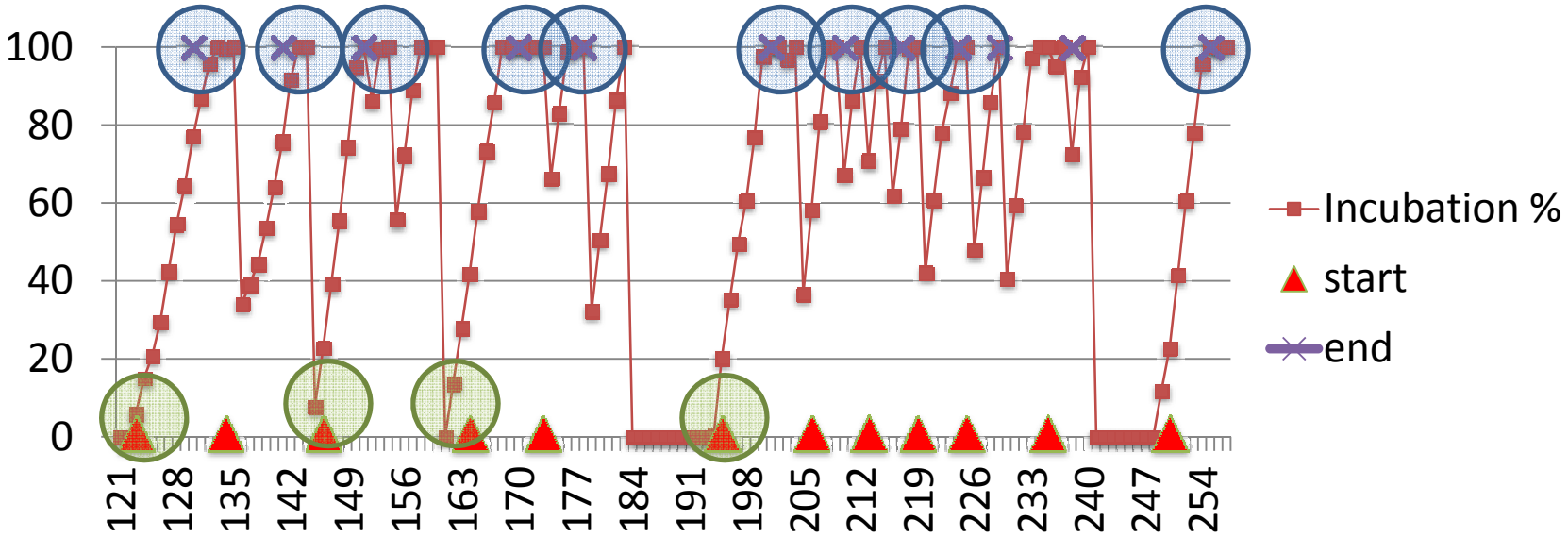
Vršac – Lat 45.1227, Lon 21.3002, 22/05/2015



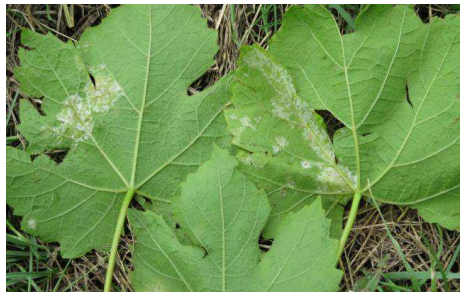

Time of the first infection
Day of year
180
160
140
120
100
80
60
40
20
0
DE
FE
GO
GU
HA
HR
KI
KL
LA
LM
PO
WI
Observed
BAHUS


Incubation period end of the primary infection
Day of year
180
160
140
120
100
80
60
40
20
0
DE
FE
GO
GU
HA
HR
KI
KL
LA
LM
PO
WI
Observed end of incubation
BAHUS end of incubation

- DE - Austria

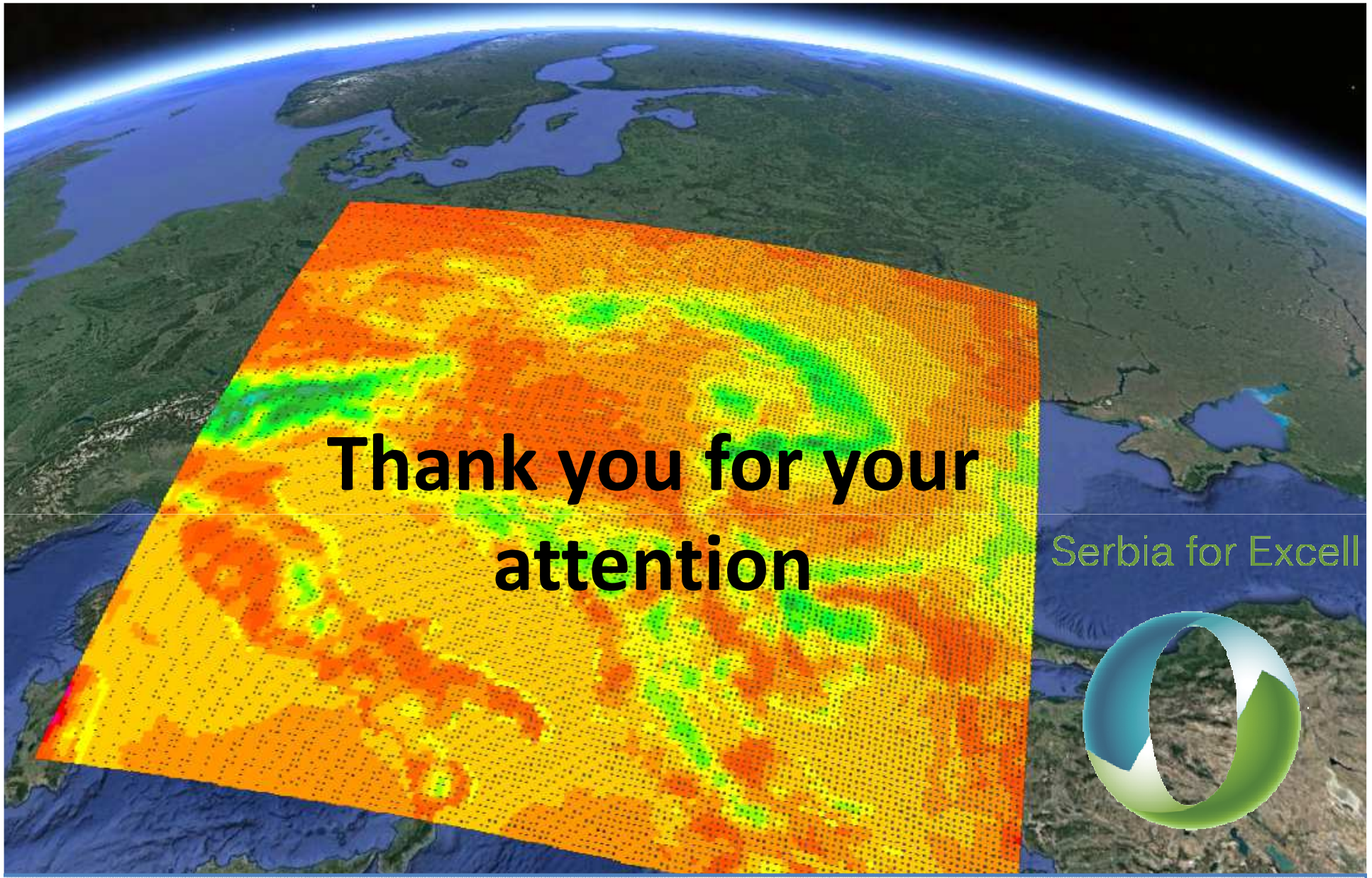

100
80
60
40
20
0
121
128
135
142
149
156
163
170
177
184
191
198
205
212
219
226
233
240
247
254
Incubation %
start
end

Source:
Forecasting and Warning Service of Serbia in plant protection



Future plans

- **Use of full BAHUS (2 additional disease)**
- **Use of monthly and seasonal weather forecast**
- **Operational use**
- **Introduction of other important disease or pest algorithms**



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