



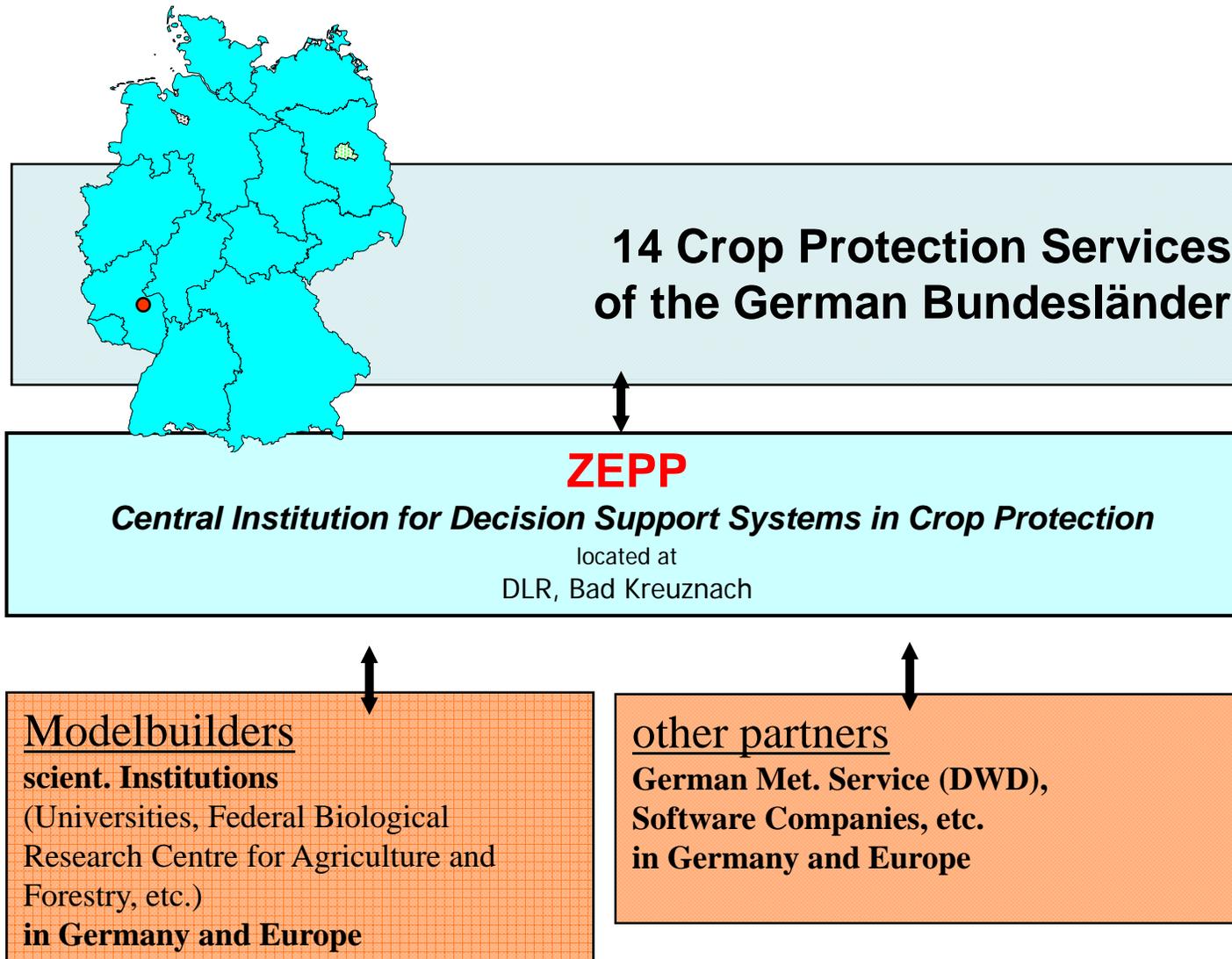
Geographic Information Systems in Crop Protection Warning Service in Germany

ESRI UC 2009
San Diego, June 15th. 2009

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- Introduction
 - About ZEPP
 - Aims
- Met. data interpolation with GIS
- Forecasting models & Risk maps
- summery & conclusion

Introduction - About of ZEPP



Introduction



- **Agriculture** is the targeted production of plant or animal products .
- It serves primarily to food production.



Introduction - Aims



- The development of useful plants and their cultivation have triggered an evolution by pathogens like plant diseases and pest attacks.

world-famous disease was in Ireland (1845-1849)

- four years with bad harvest because of late blight.
- big dearth to the people.
- 500.000 Irishman died and over 1,6 Million migrated to the United States.

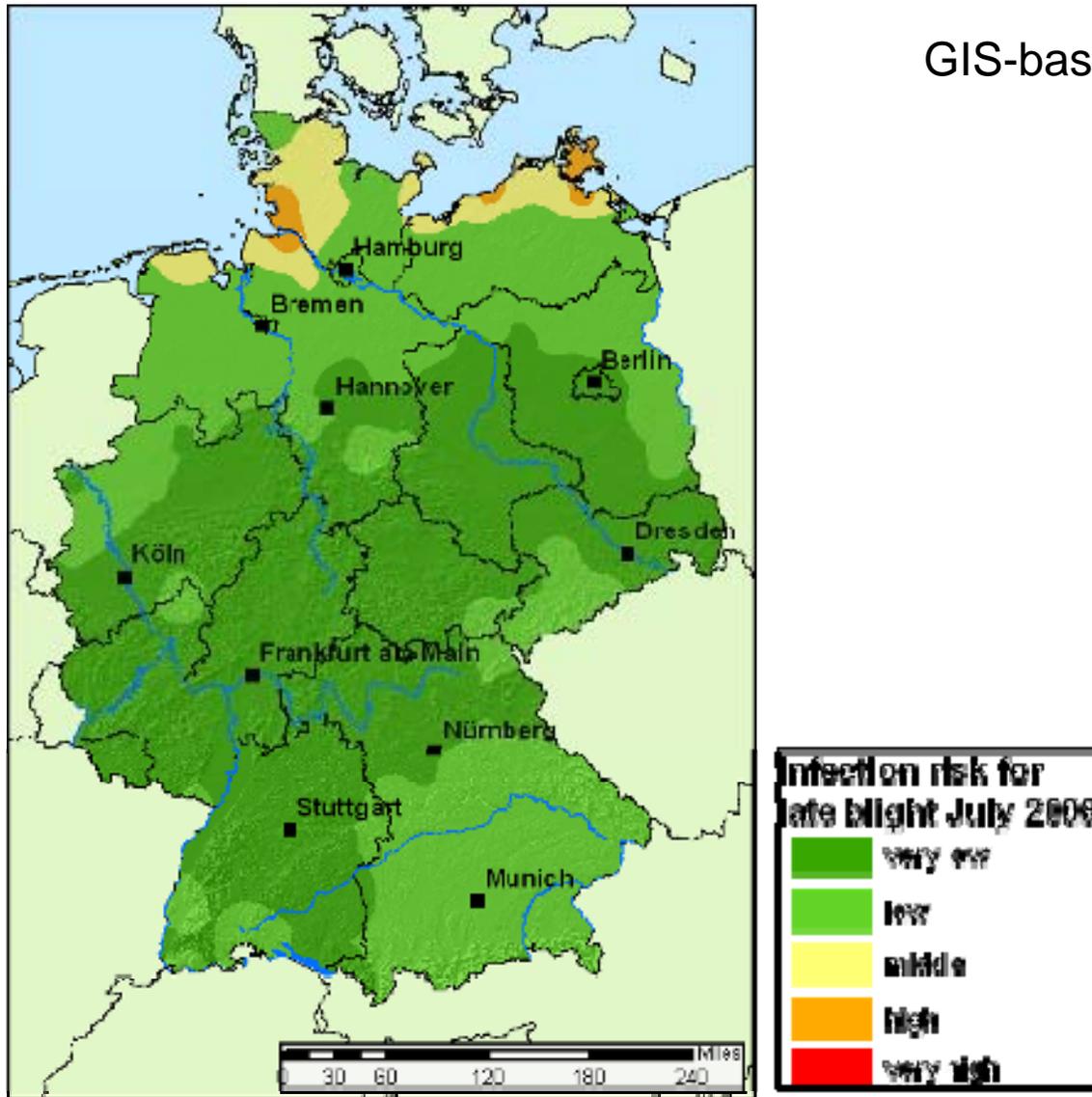


- Spraying helps to avoid plant diseases and pest attacks but the number of treatments are often more than necessary.
- The prediction of the occurrence and the prevention of plant diseases and pest attacks is an important component of integrated pest management.
- Forecasting models and advice by the government are used in the planning of spraying, taking account of economic and ecological aspects.

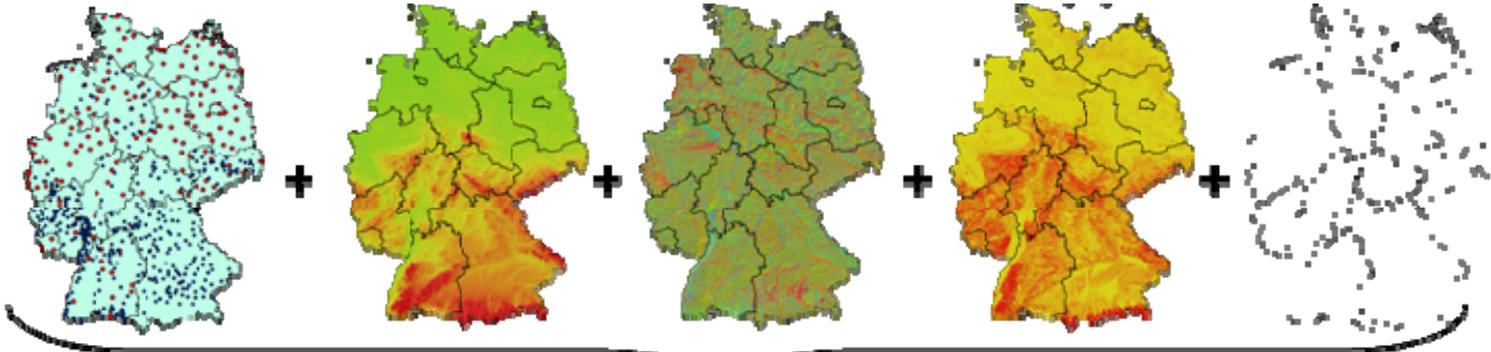
Presentation of model results with GIS



GIS-based forecast



Tactics

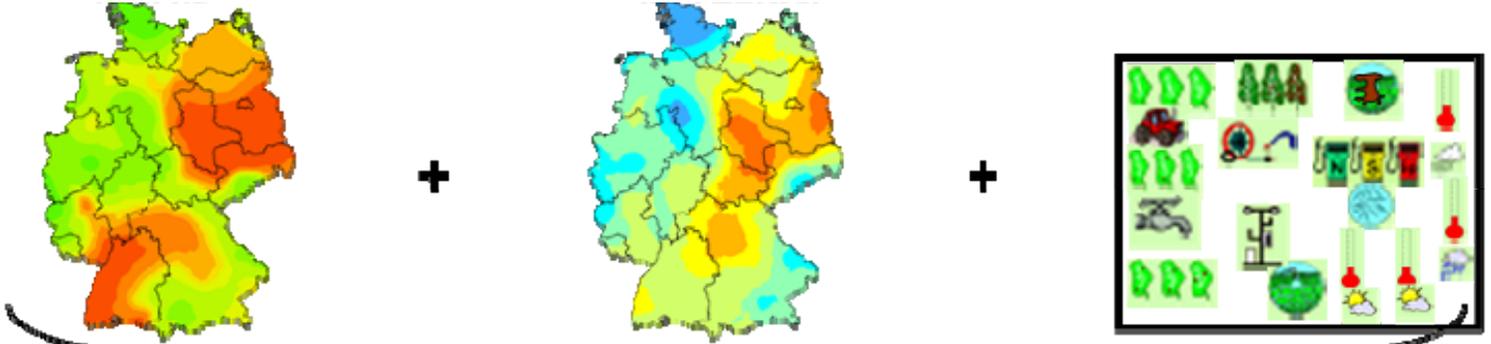


met. data interpolation

temperature

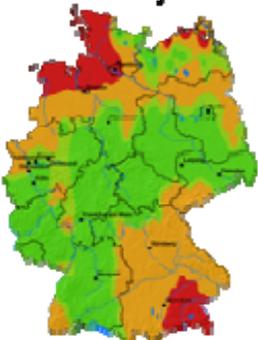
relative humidity

forecasting model



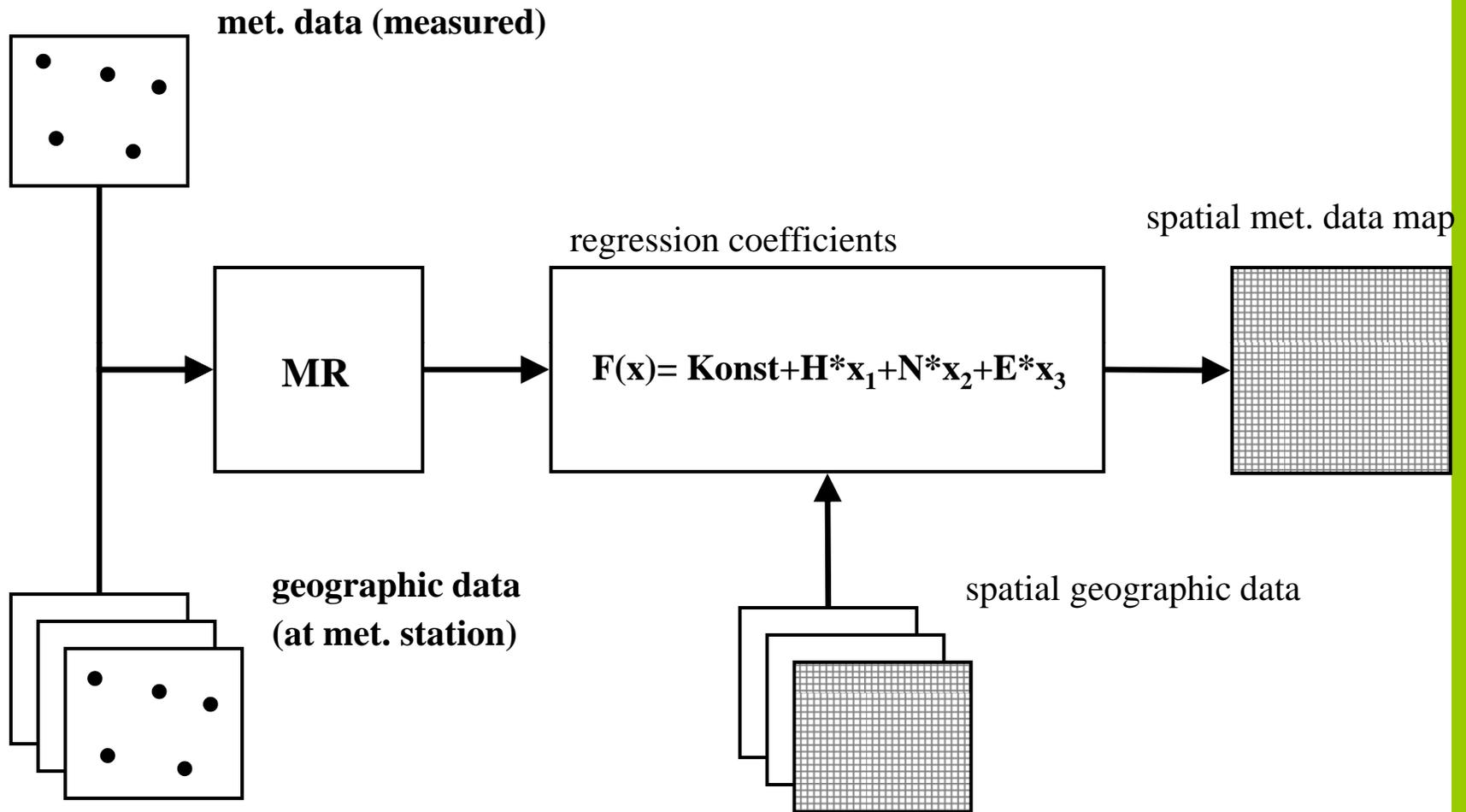
forecasting model run

risk map



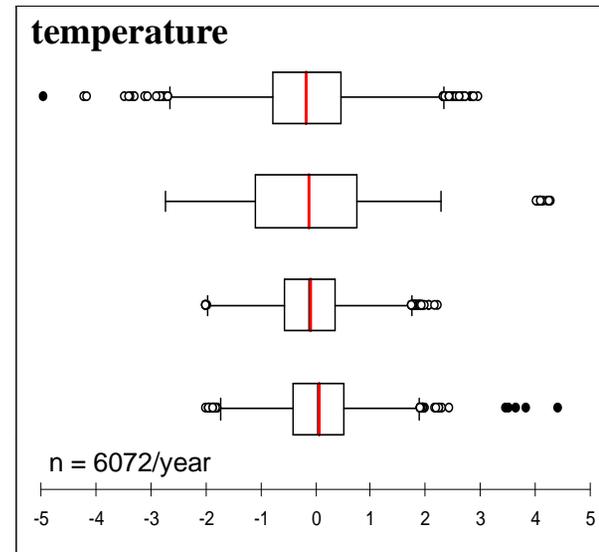
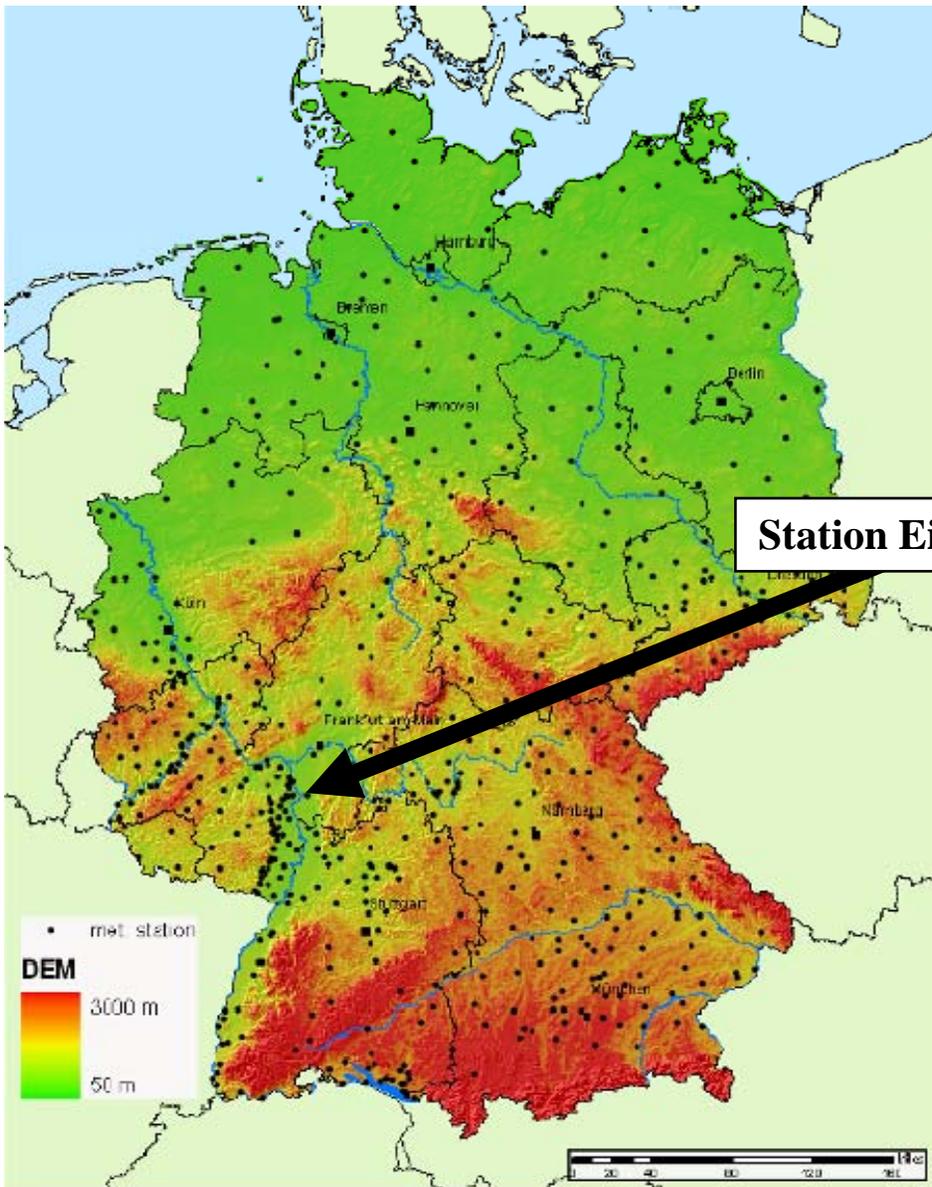
- storage of spatial met. data
 - virtual weather database
 - net of 1x1 km
 - virtual met. stations
 - Germany: 357.050 km²
 - 360.000 virtual met. stations
 - 200.000 virtual met. stations on agriculturally used area

Interpolation with multiple regression (MR)

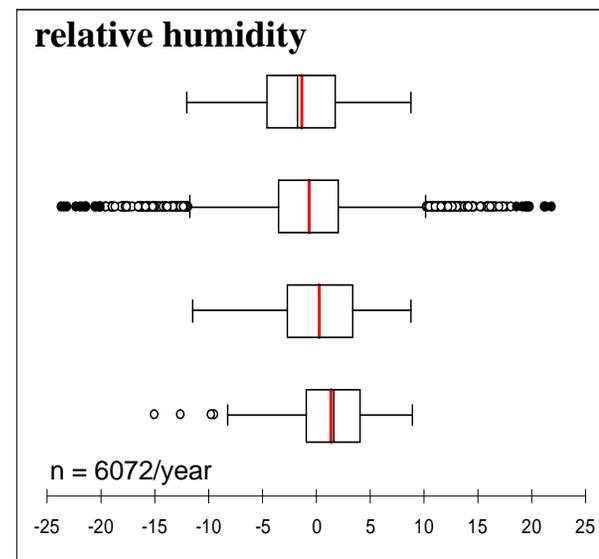


best correlations with altitude longitude and elevation

Difference between measured and calculated met. data



2006
2005
2004
2003

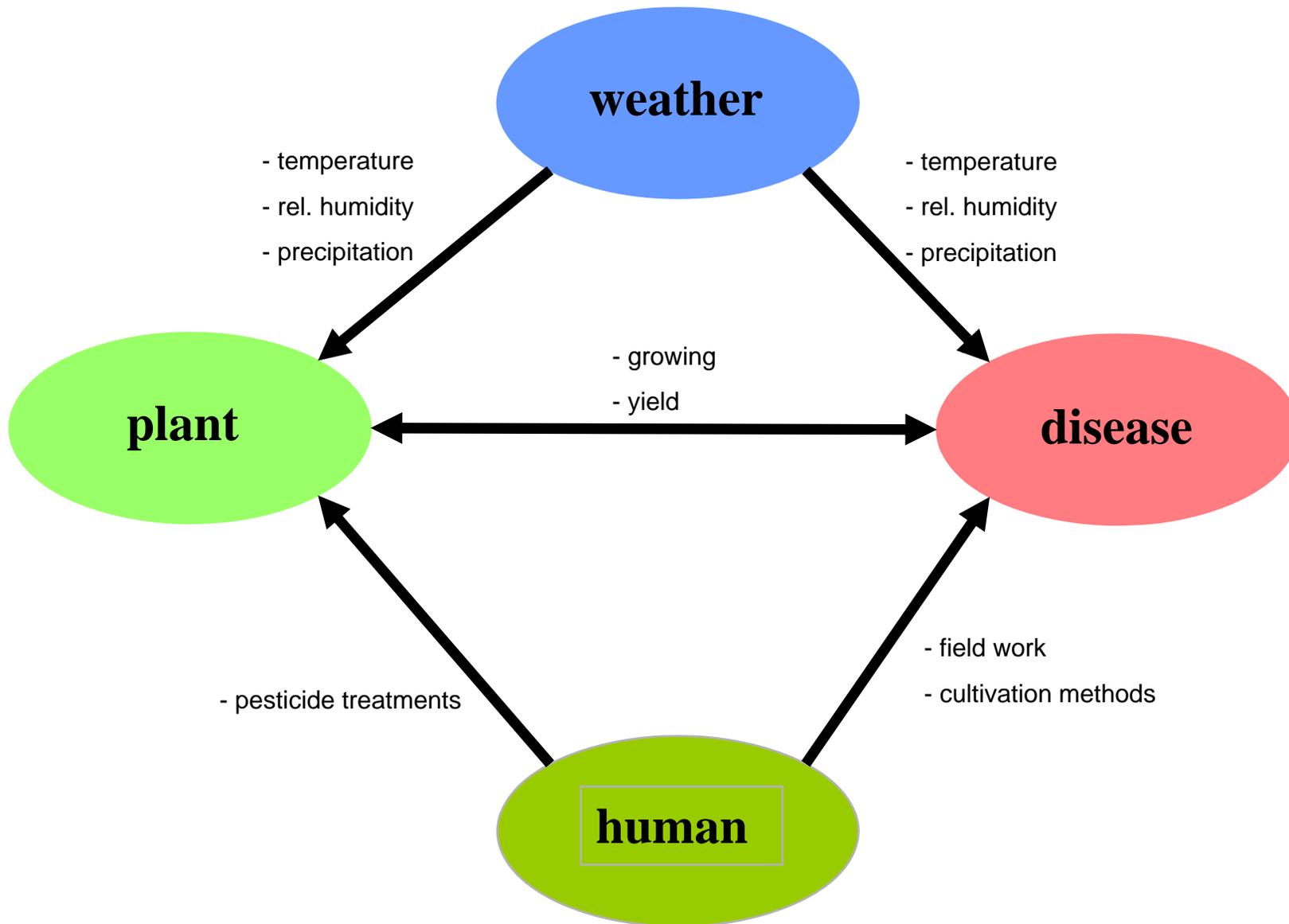


2006
2005
2004
2003

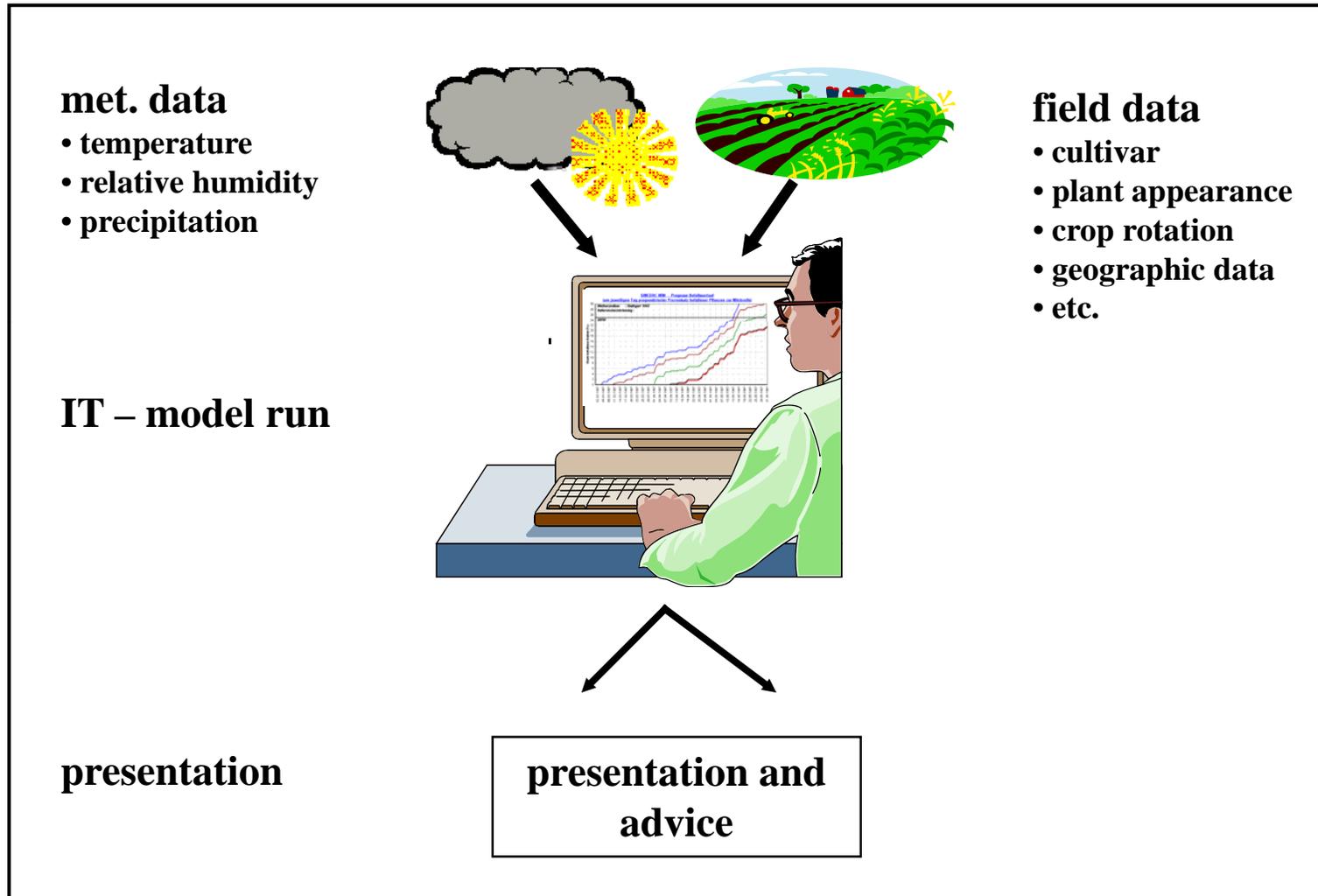
underestimate

overestimate

Relation of Forecasting models



Use of forecasting models

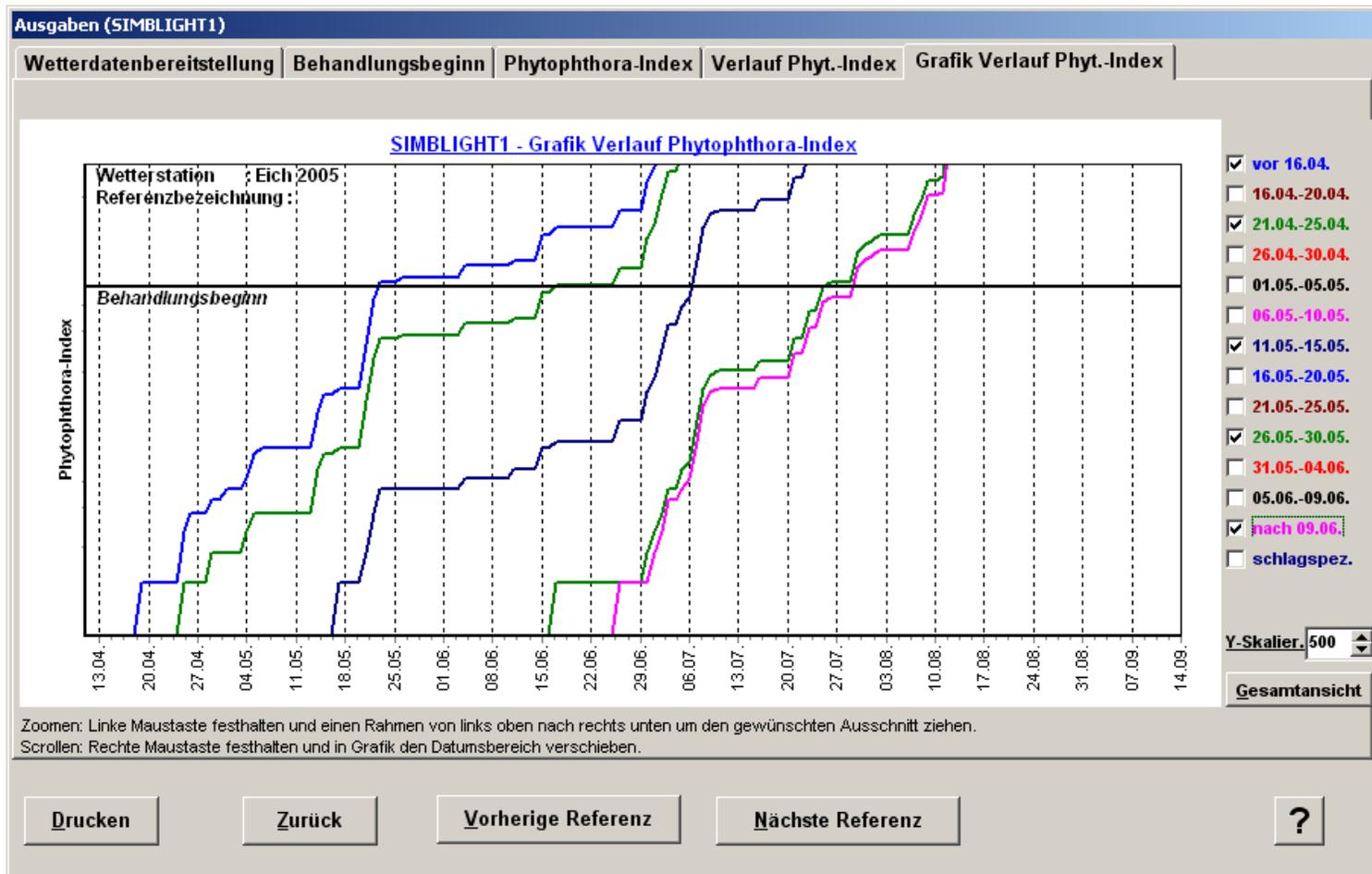


Risk maps with calculated met. data and SIMBLIGHT



SIMBLIGHT calculates best timing for the first application in field.

model inputs: temperature, relative humidity, soil humidity, start plant growing



Late blight for potatoes with SIMBLIGHT1

Forecast of the first appearance of late blight for early growing cultivars in Germany



advice of first treatment:

- yes
- no

Summery and conclusion



- GIS is an useful instrument to optimize the input parameters for forecasting models.
- With ArcGIS plausible results for virtual met. data were produced with MR - interpolation.
- The calculation of forecasting models with virtual met. data was successful.
- Risk maps show hot spots of maximum risk which will make the results of forecasting models easier to understand and to interpret.
- GIS helps to obtain more detailed calculations and results with higher accuracy and validity than before.
- A significant advance in advice to farmers is realized.
- This gets a step closer to the aim of a reduced pesticide use and an economical and environmental friendly crop protection strategy.
- Risk maps can be used at www.isip.de in April 2010.

GIS will make DSS results easier to understand and will lead to a higher acceptance of warning systems by farmers.

Thanks for your attention