

Evaluation of Demeter hindcasts for crop yield assessment in Northern Italy

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The Demeter team at Arpa

- Lucio Botarelli: contract negotiation
- Enrico Ceotto: model calibration
- Luca Criscuolo: model implementation
- Giovanna Fontana: model testing
- Stefano Marchesi: data handling
- Vittorio Marletto: supervisor
- Antonella Morgillo: data handling
- Tomaso Tonelli: computer programming
- Margot Van Soetendael: model editing
- Franco Zinoni: model implementation



Demeter at ARPA-SMR

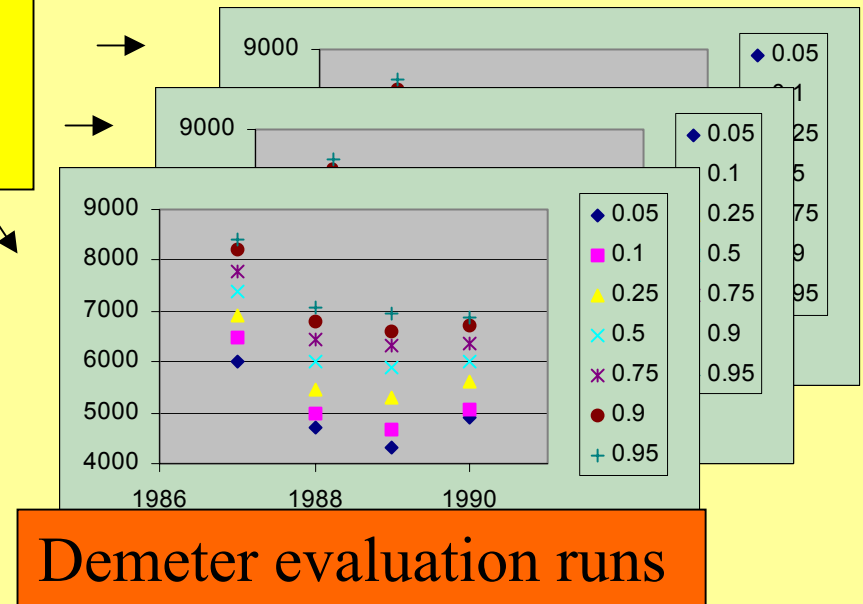
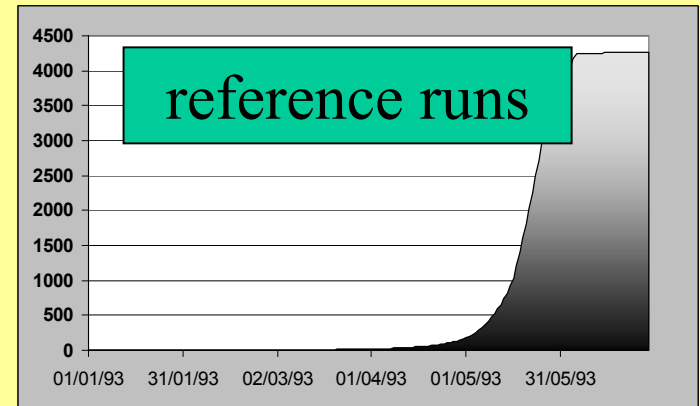
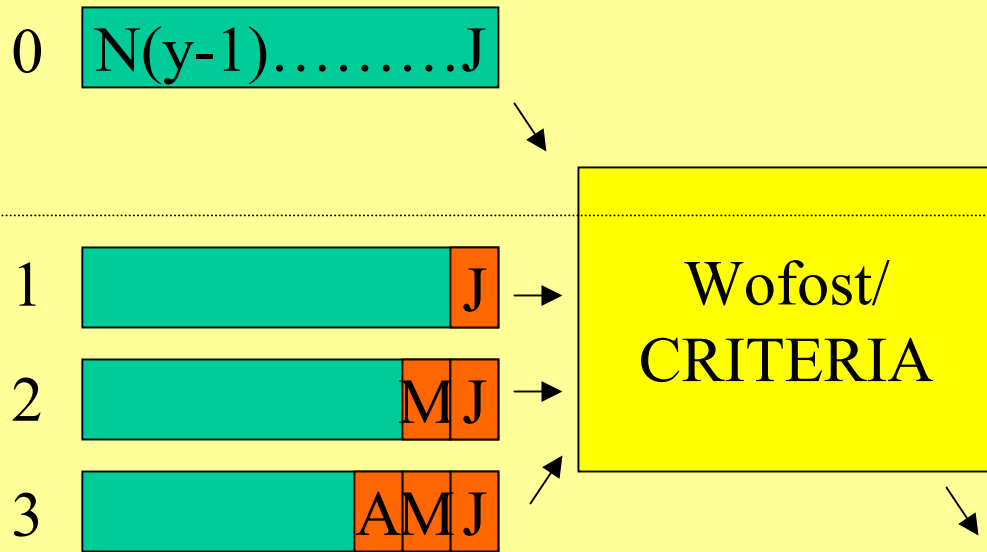
- Implementation and adaptation of a growth model (Wofost 7.1) in the existing CRITERIA soil water and nutrient transport simulation system
- Calibration and testing of Wofost/Criteria with field data provided by ISA-MO (E. Ceotto)
- More code to manage Demeter output downscaled from DMI (U. Andersen) and to feed the model with it
- Evaluation of the agricultural value of simulations done using seasonal forecasts (in progress)



Demeter at ARPA-SMR

- Results presented here refer to the wheat crop, sown in November and harvested end of June
- Results are shown from Demeter output downscaled on
 - Jrc weather dataset
 - Map/Ucea dataset
- Results refer all to one point (Modena) in the middle of the Po plain

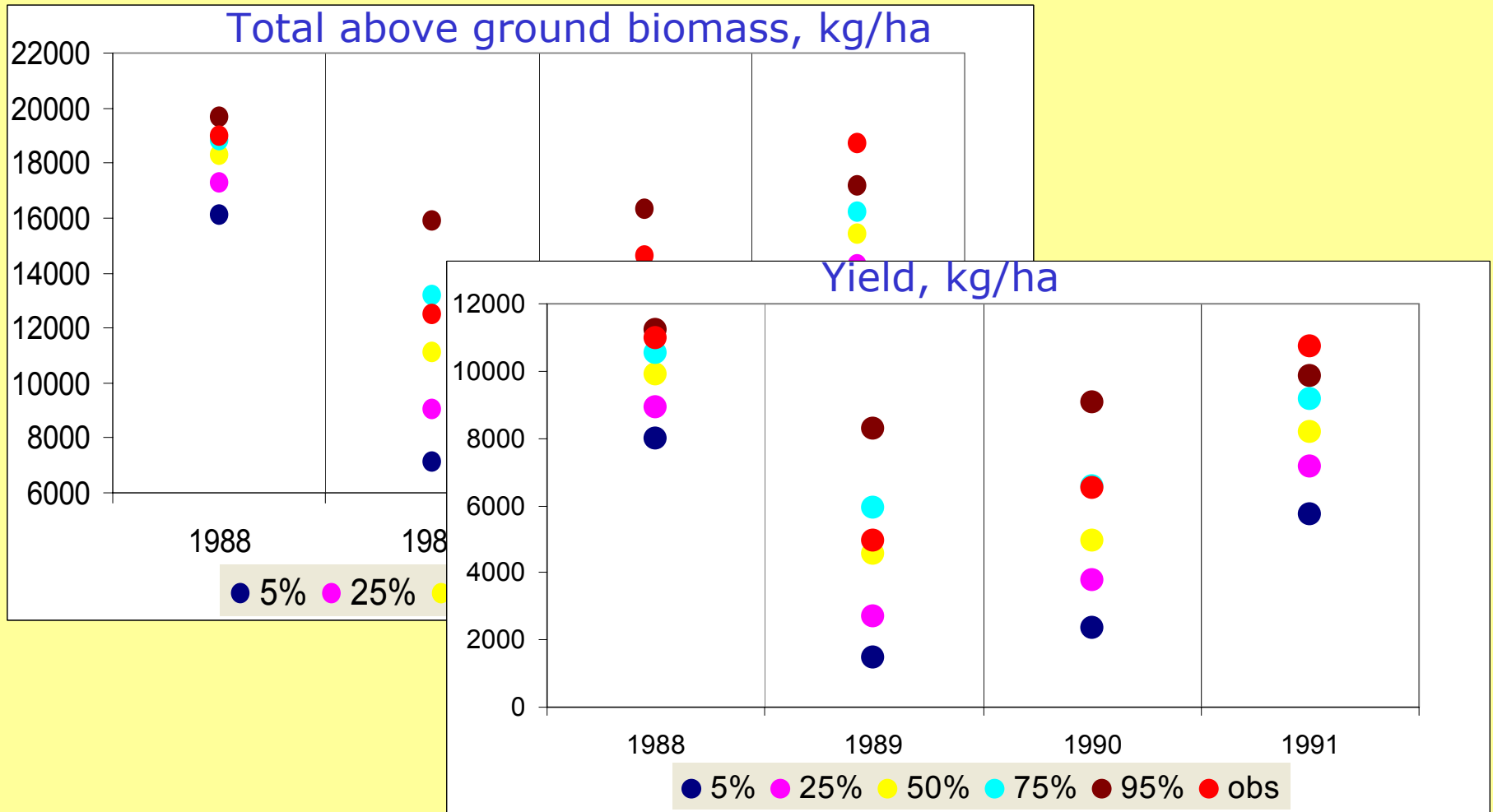
General layout of the hindcast evaluation tests



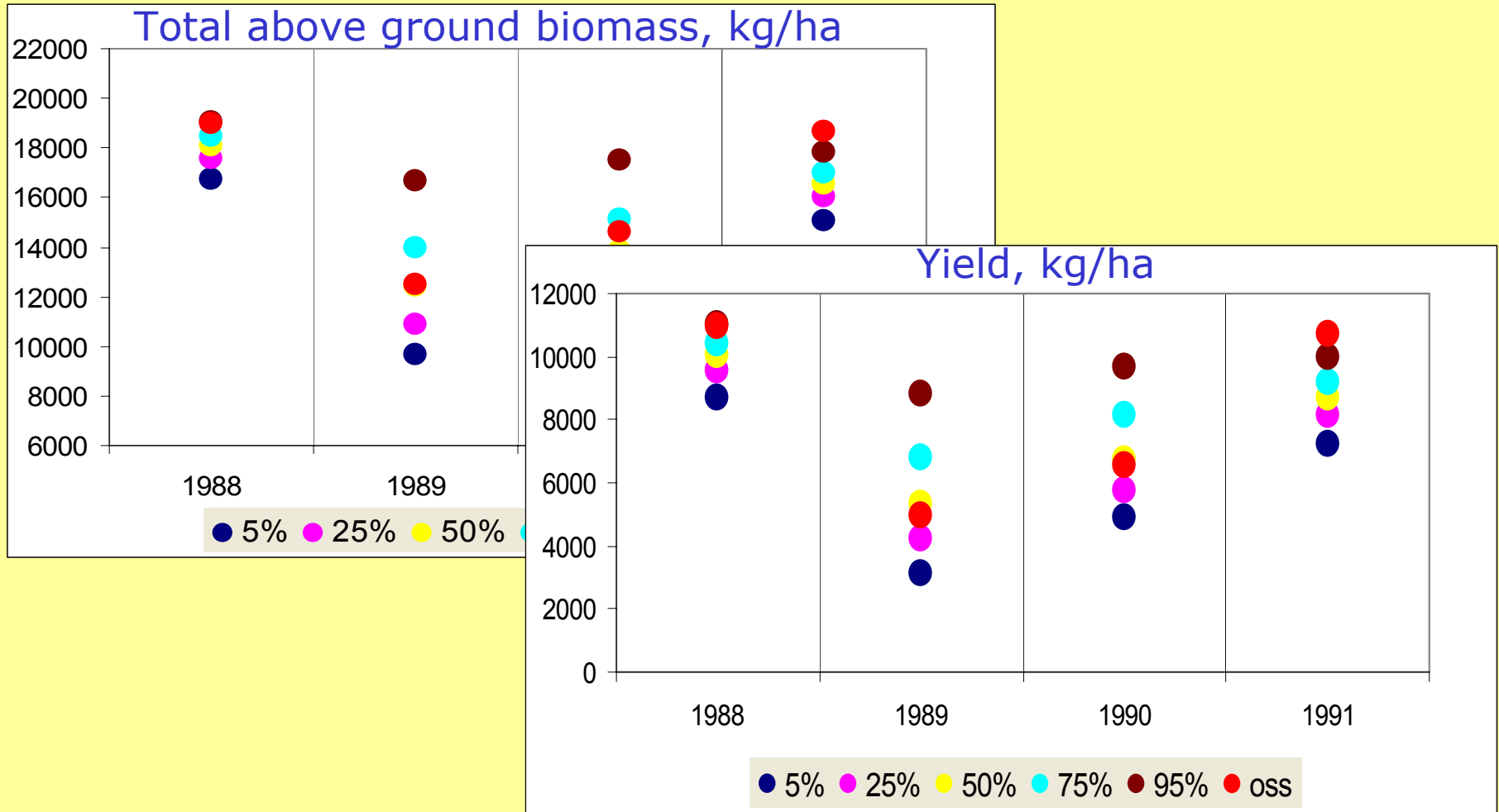
Observations (P, T)

Demeter ds output (P, T)

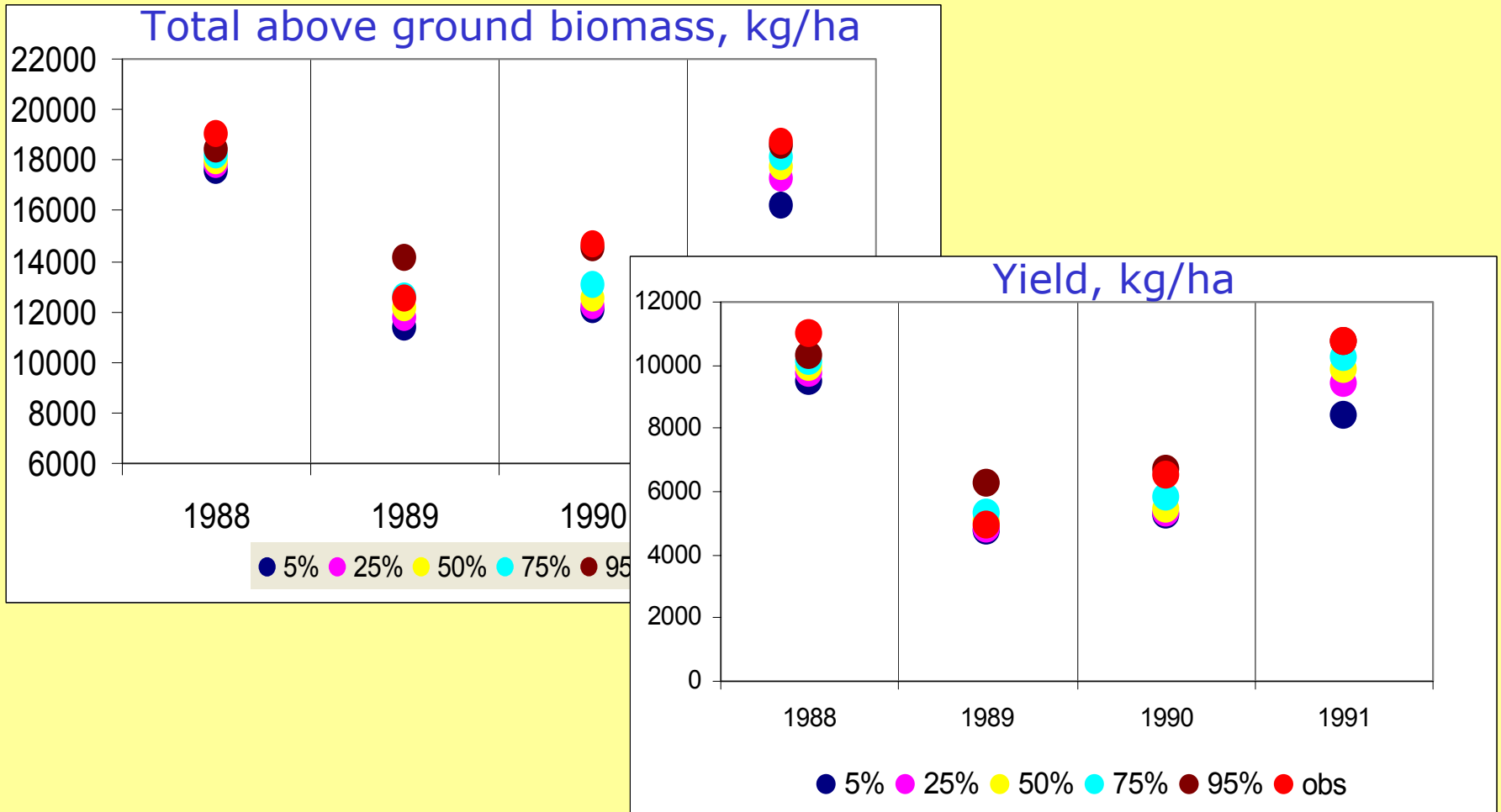
7 models, 9 members, 3 repl (jrc), AMJ



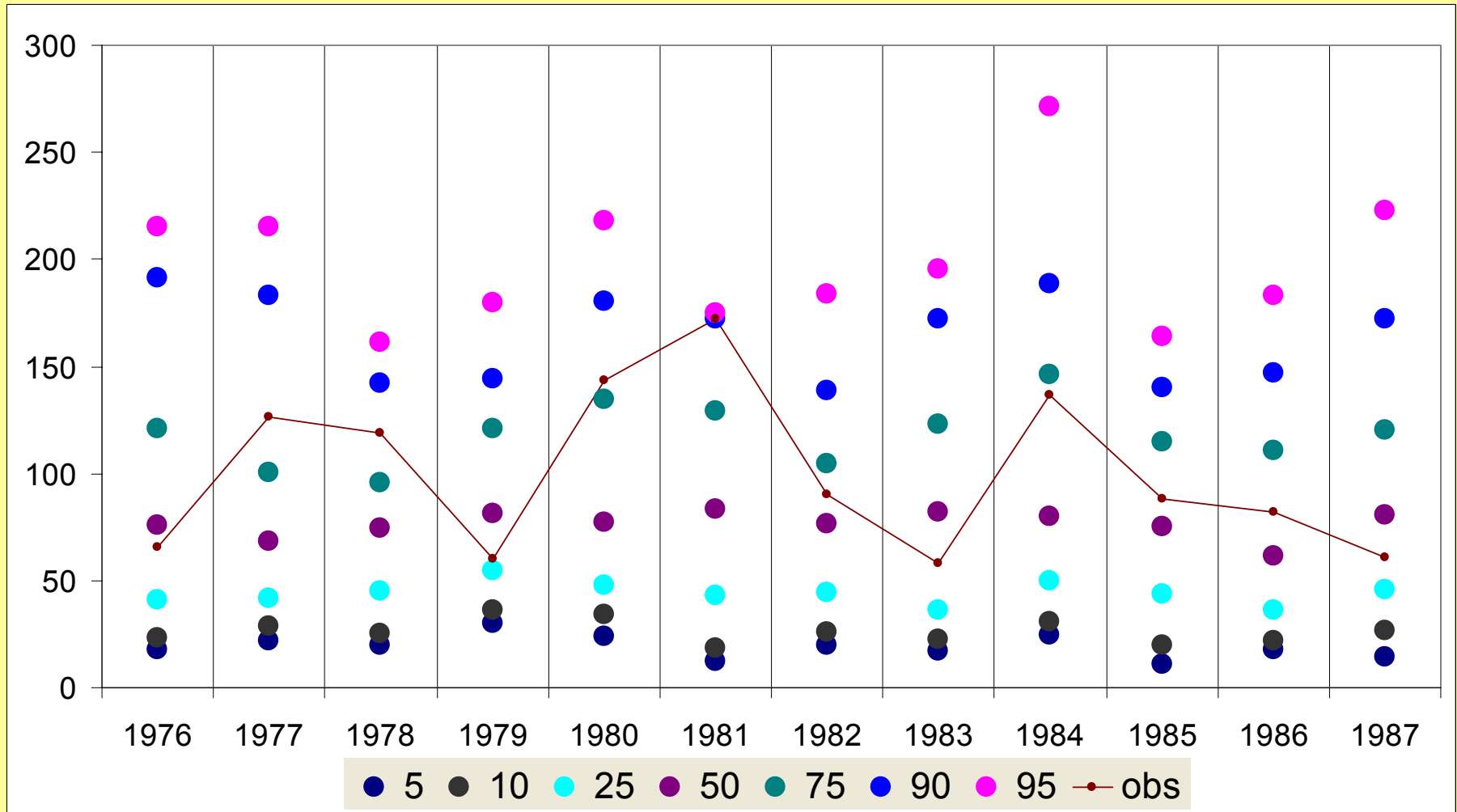
7 models, 9 members, 3 repl (jrc), MJ



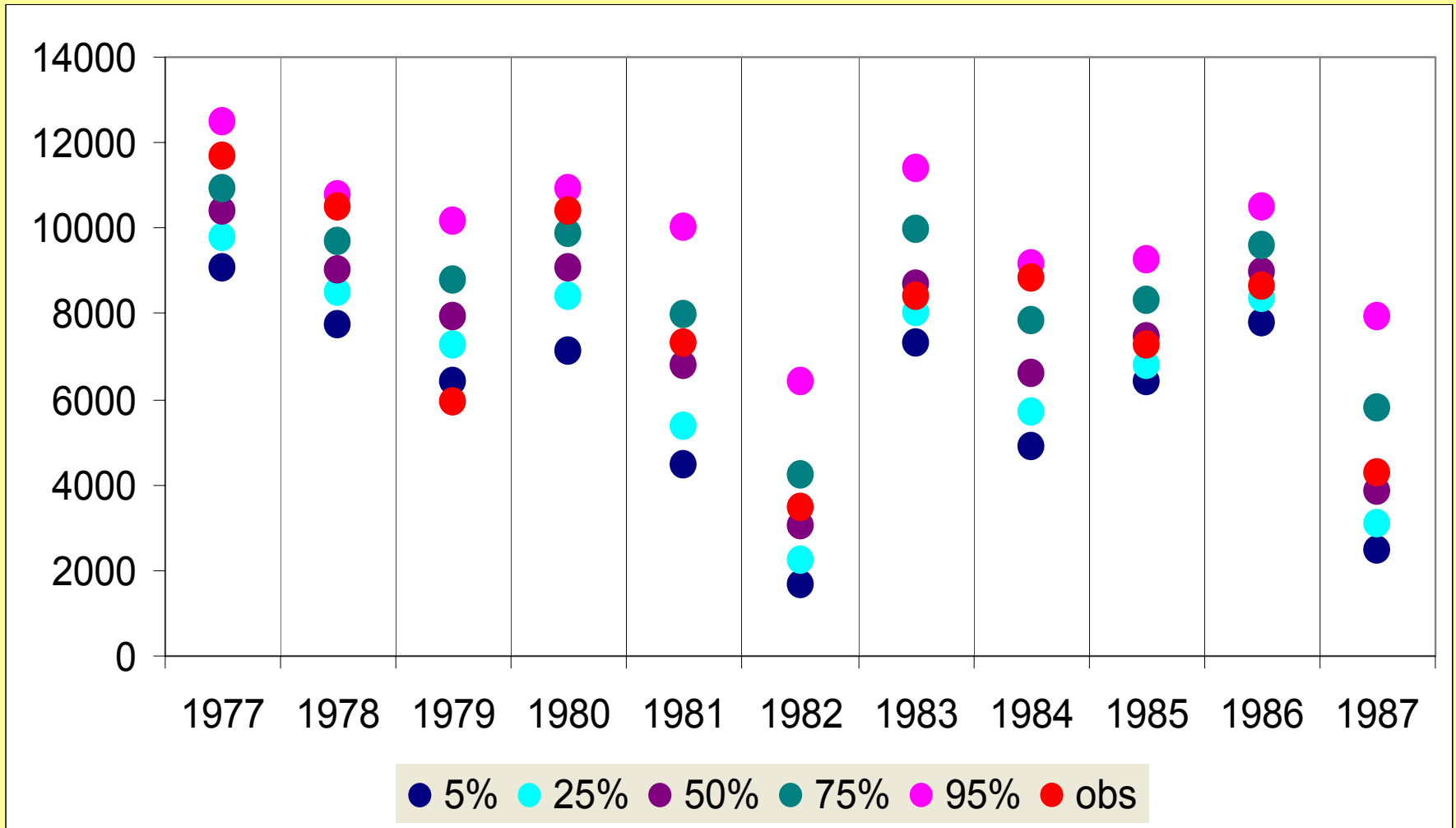
7 models, 9 members, 3 repl (jrc), June



rainfall MJ, 5 mods, 9 mbrs, 2 repl (map/ucea)

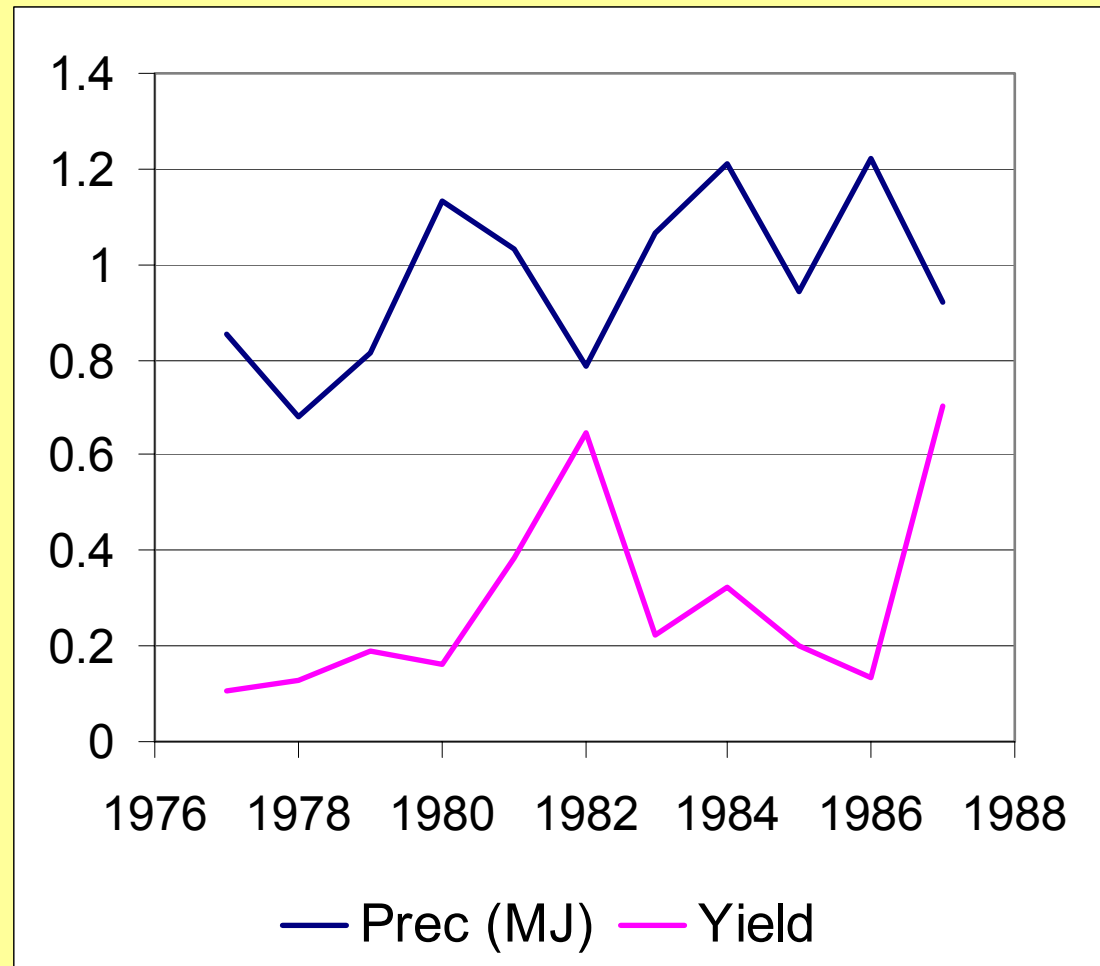


5 mods, 9 mbrs, 2 repl (map/ucea), MJ

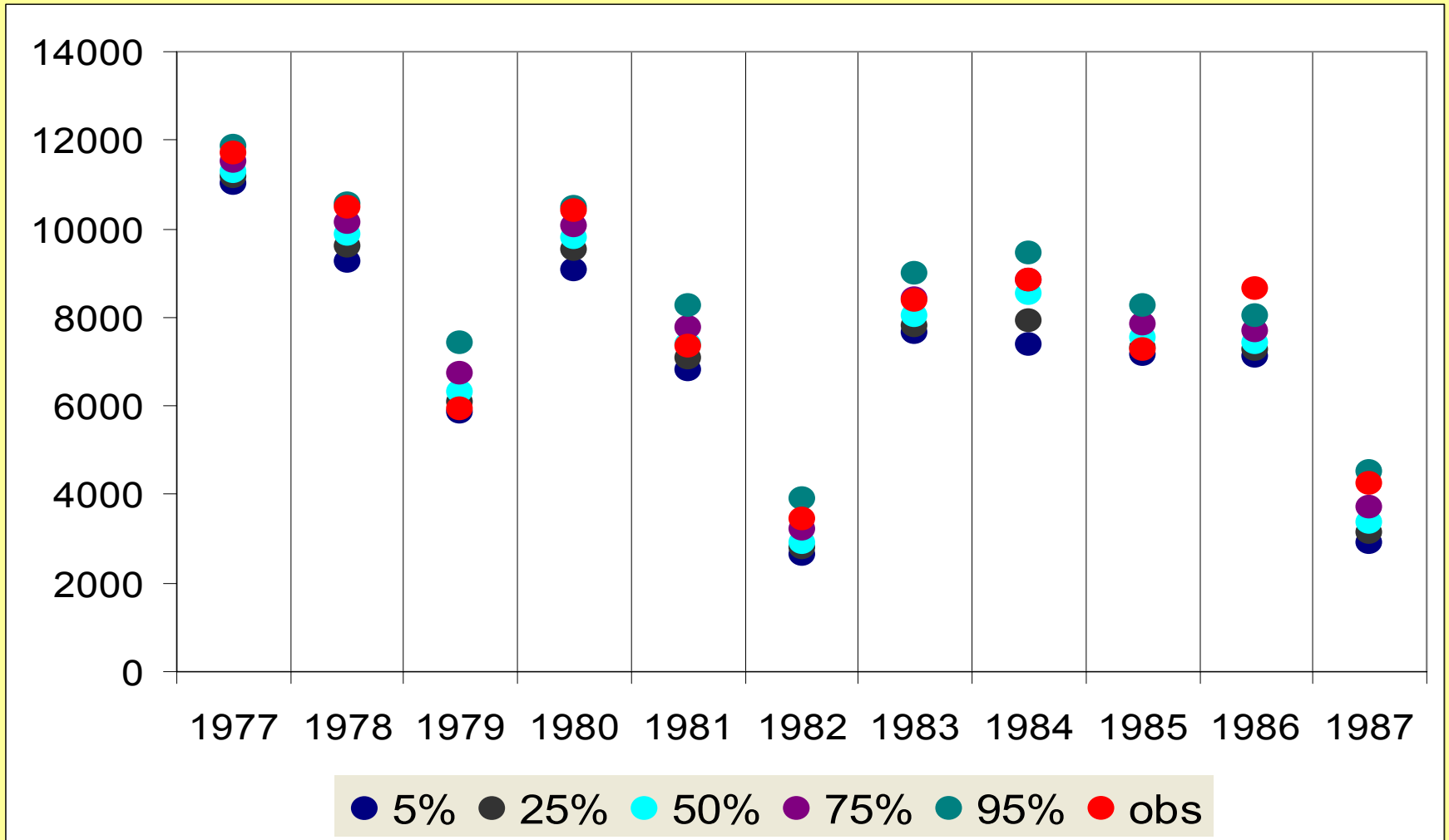


Input dispersion* vs. model output's

*interquartile/median

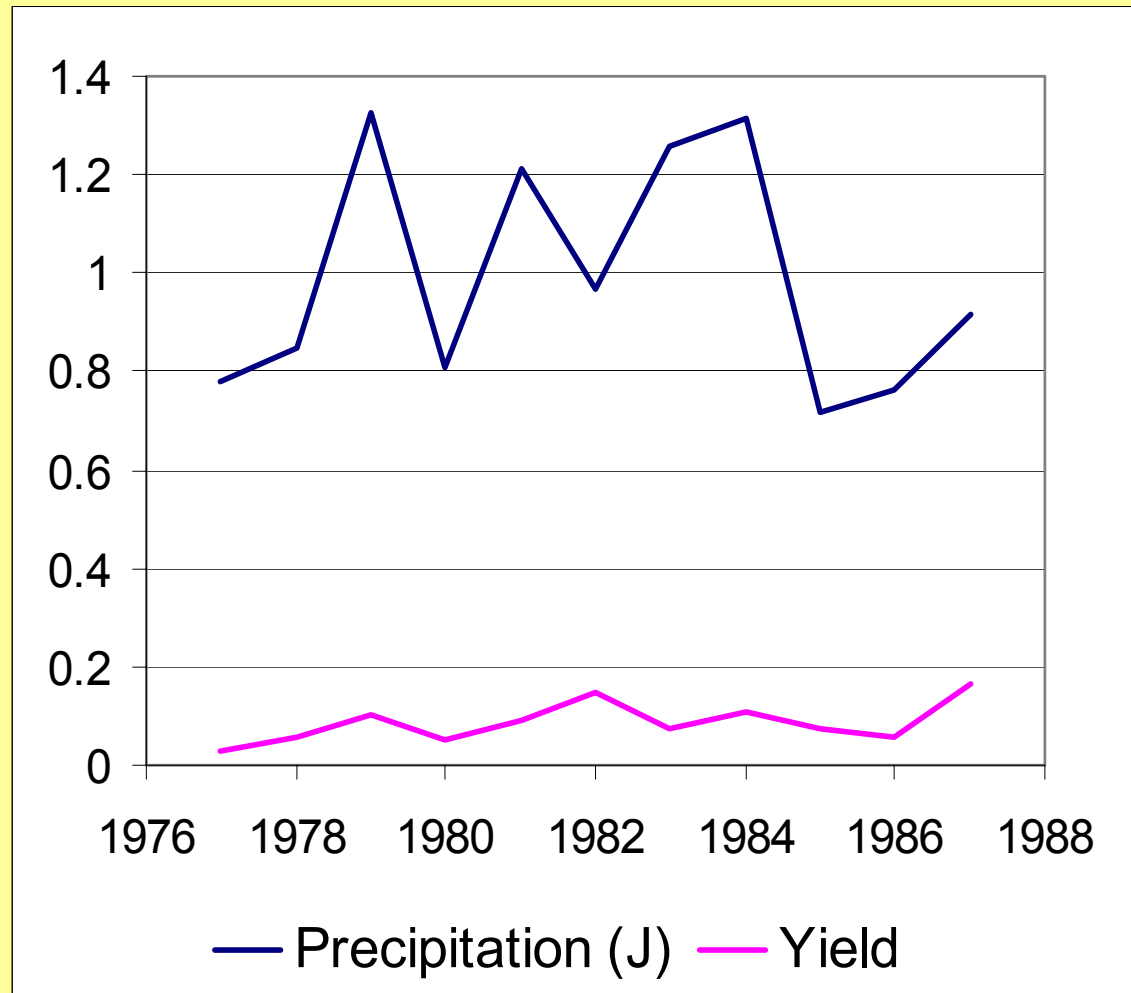


5 models, 9 members, 2 repl (map/ucea), J



Input dispersion* vs. model output's

*interquartile/median



Some conclusions

- Downscaled Demeter hindcasts used in combination with observations show interesting skill in crop yield forecasting (esp. when downscaled on our observational data set)
- The crop model (adapted and calibrated) reduces considerably the dispersion of the ensemble forecasts so that the yield interannual signal appears dominant



What's next

- Testing downscaled hindcasts with the geographical version of the Wofost/Criteria model
- Producing a paper (possibly with U. Andersen and the Jrc people)
- Writing the final report