

WP 5 Users Application
EC-JRC Agriculture Contribution

Test of the JRC Crop Model with DEMETER downscaled hindcasts

European countries 1995 to 1998

pierre.cantelaube@jrc.it

jean-michel.terres@jrc.it

Final DEMETER meeting IfM-Kiel 7-8 July 2003

The JRC Crop Yield System

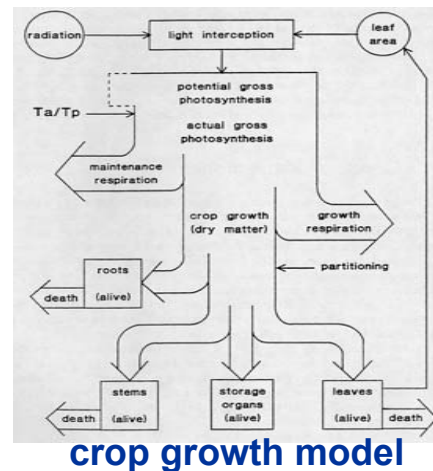
Yield Forecast

Regression:

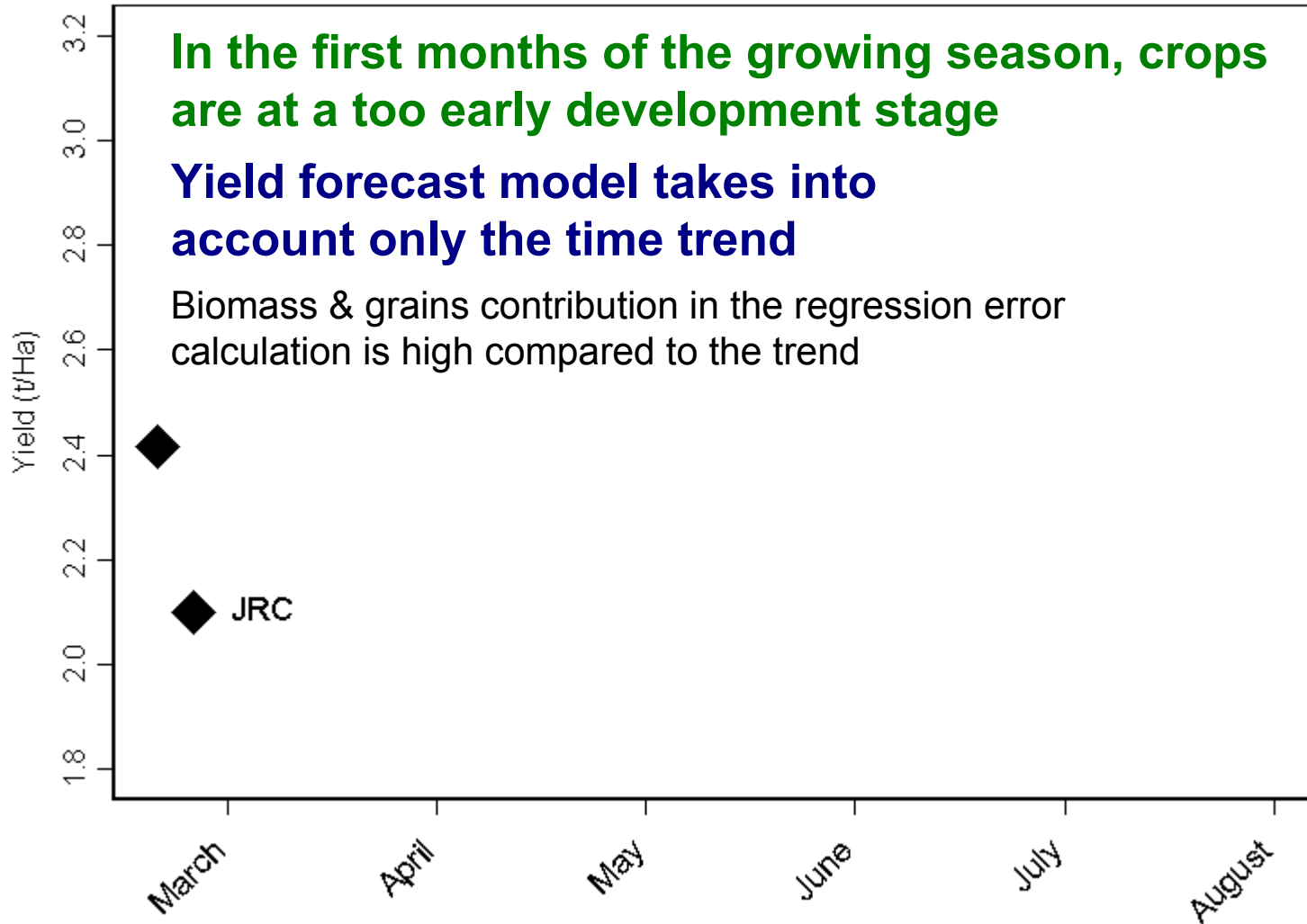
Yield $\sim f(t, \text{Crop indicators})$

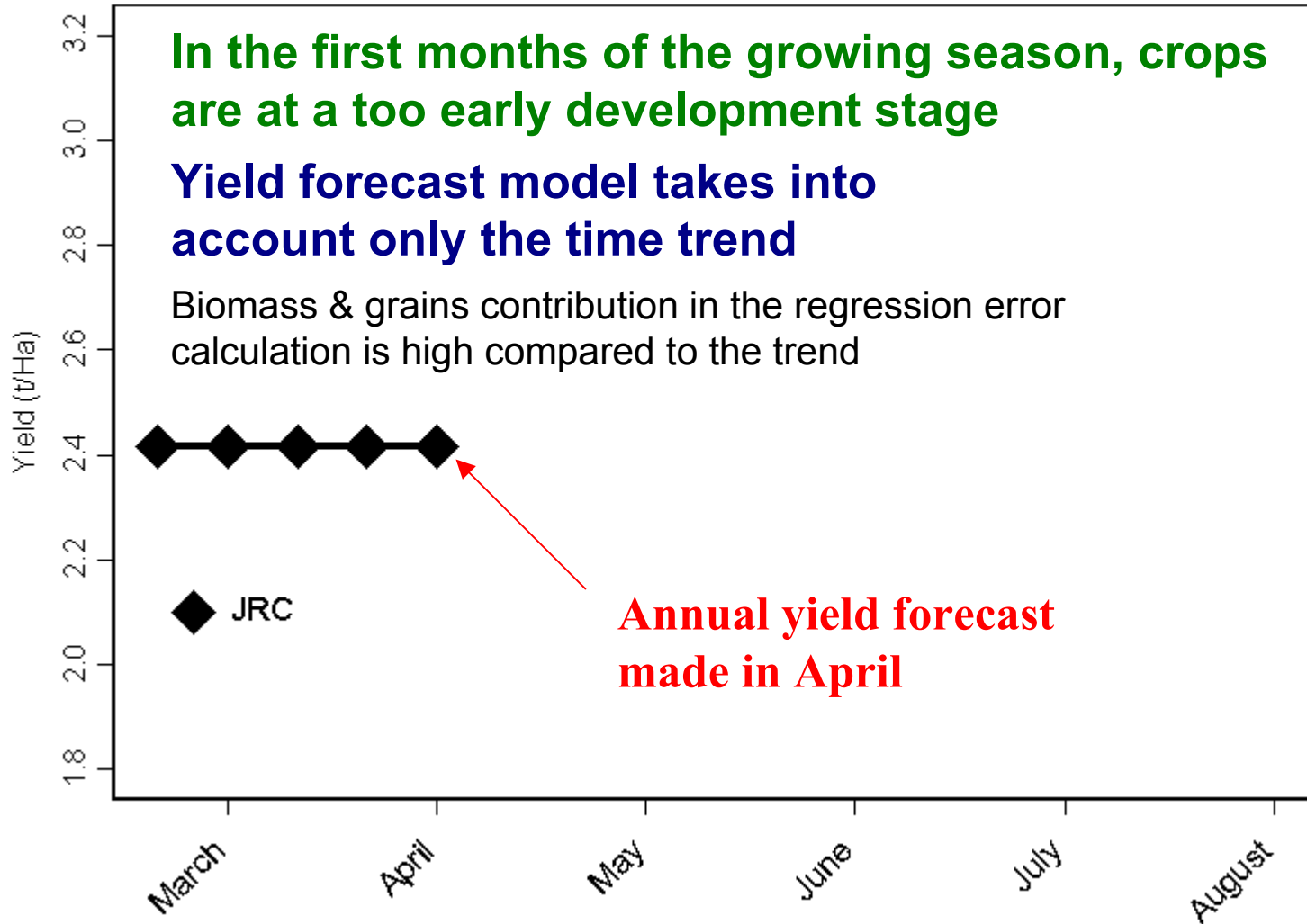
8 years of archive/EUROSTAT

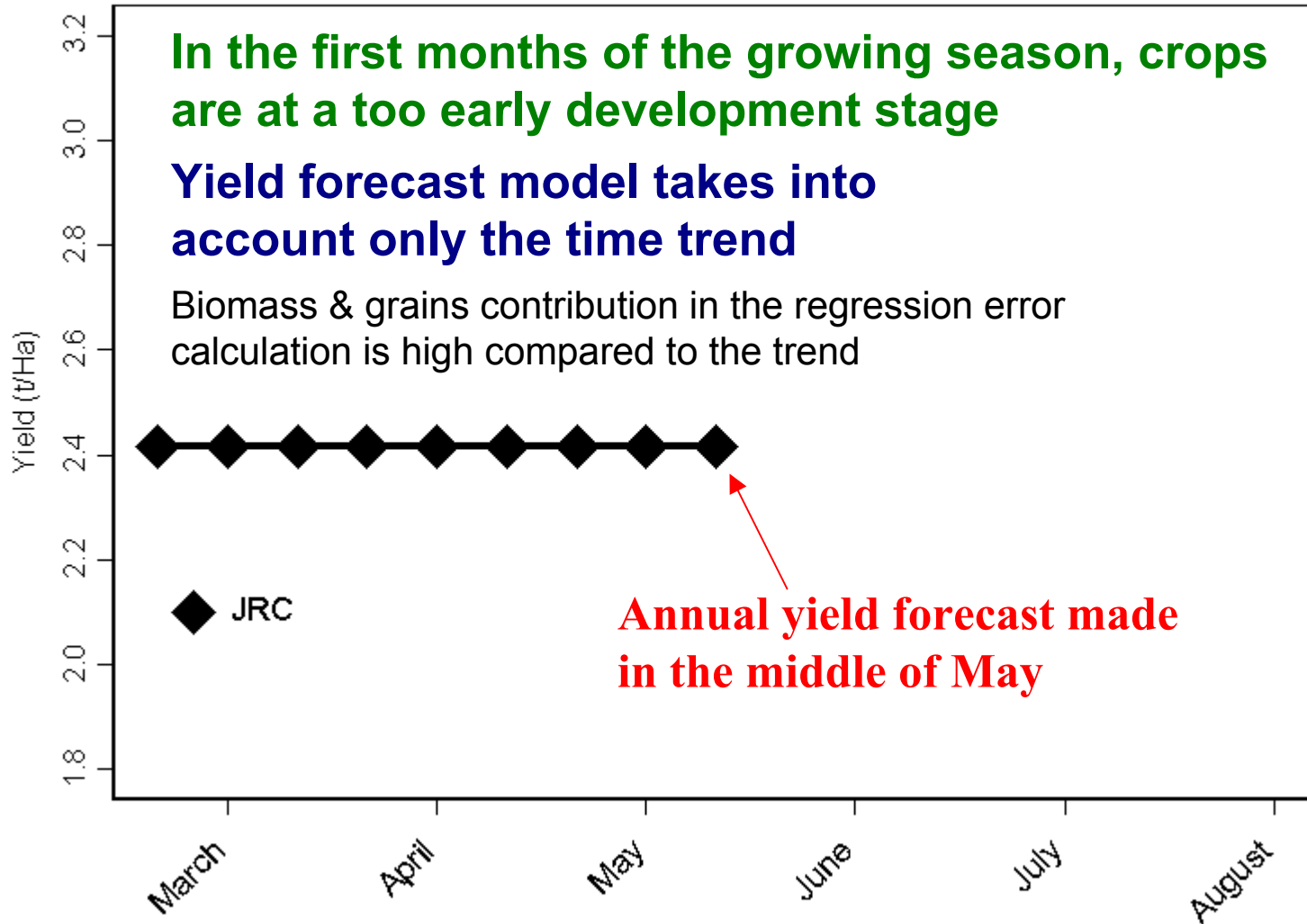
Crop Indicators
simulation of biomass,
dry matter, storage
organs... all along the
growing season

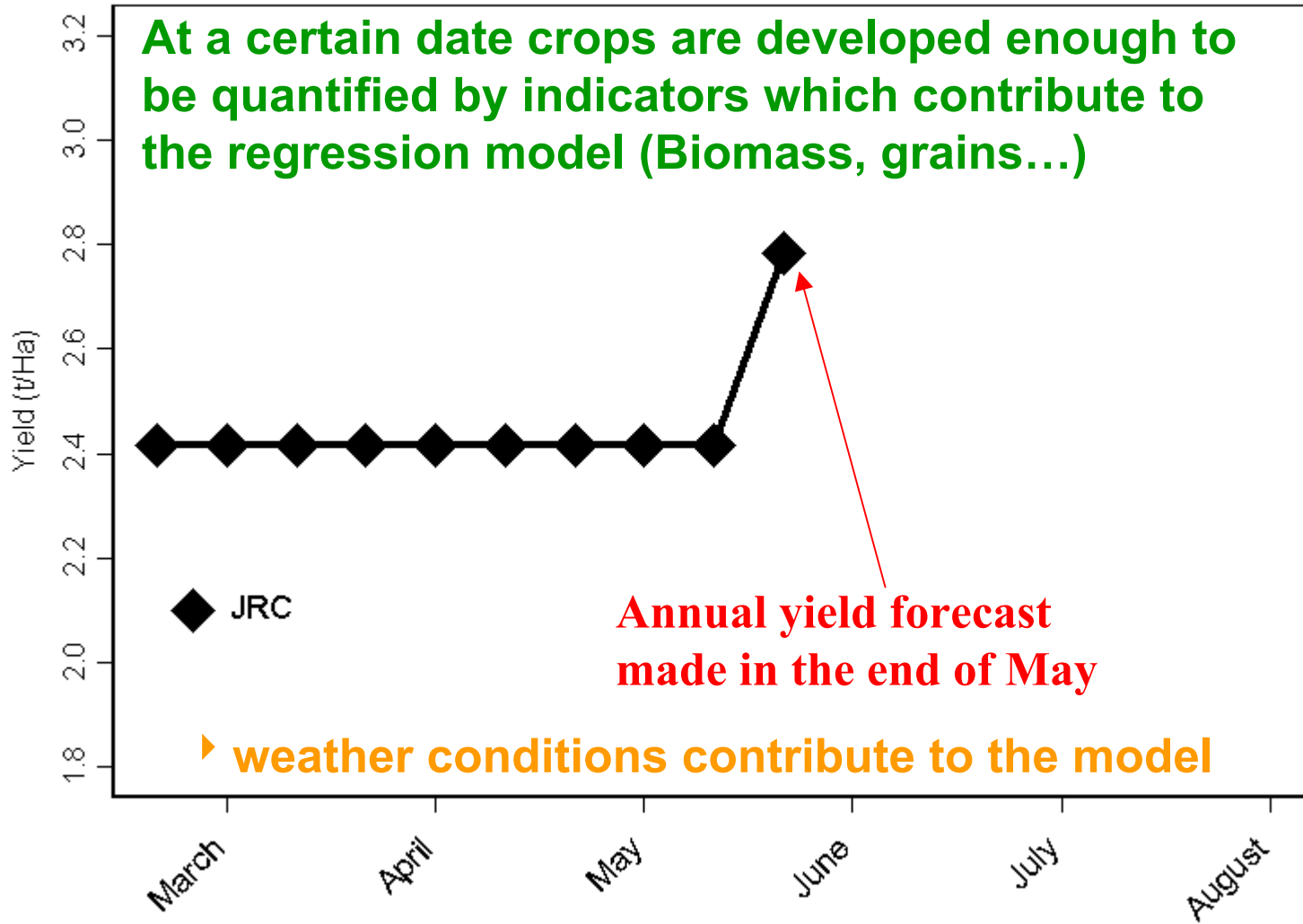


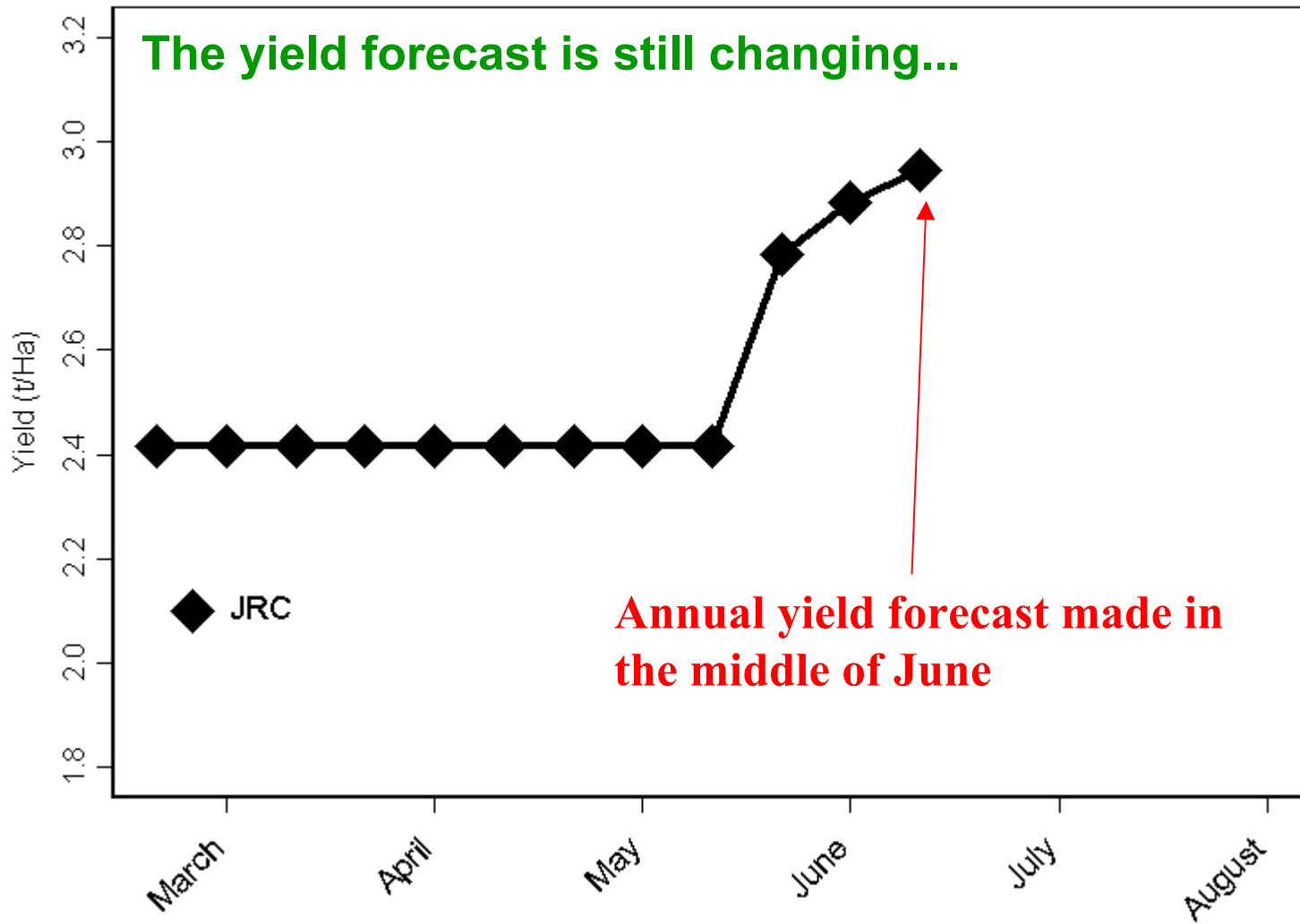
-
- **Soil Data**
- **Crop Data**

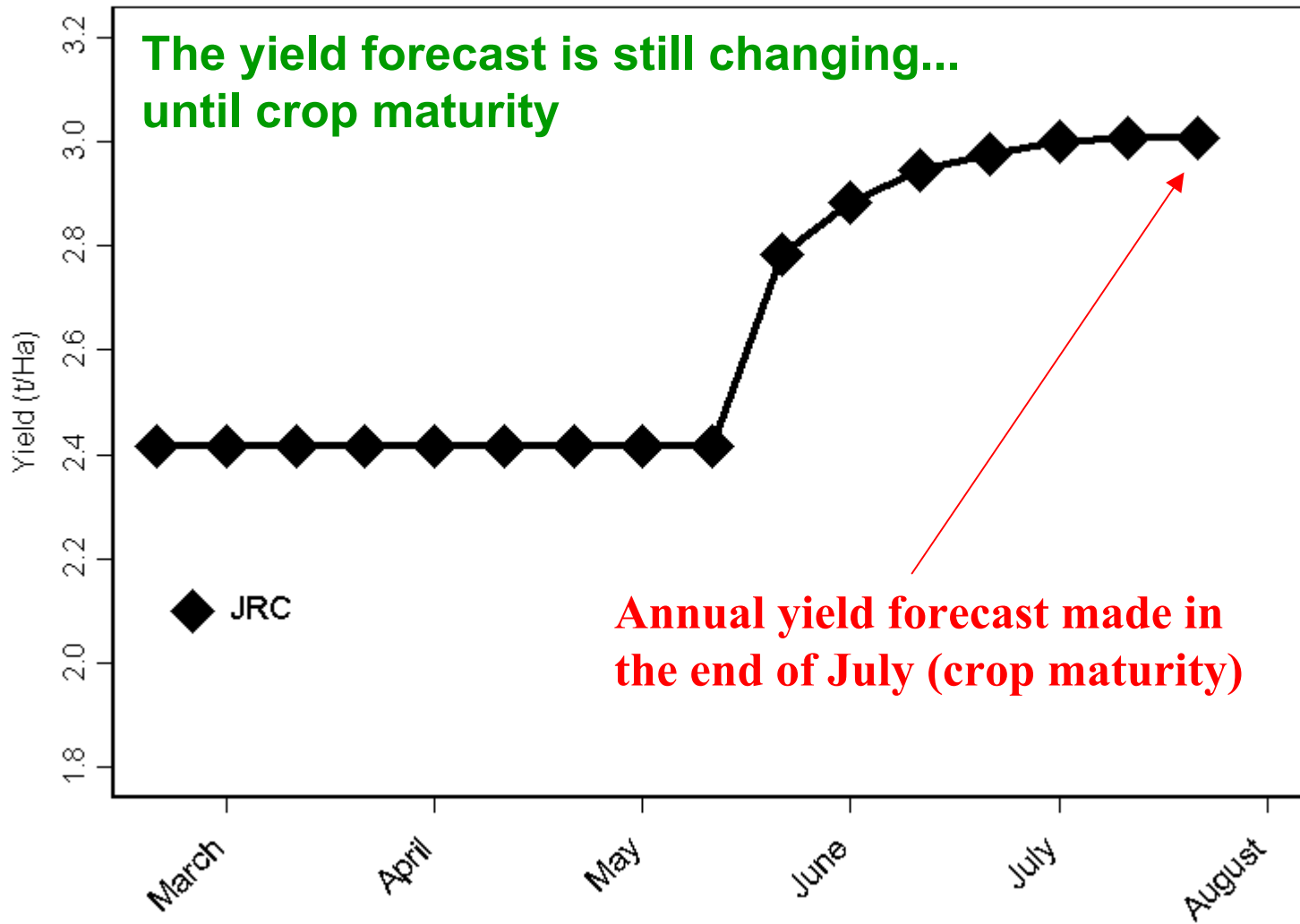


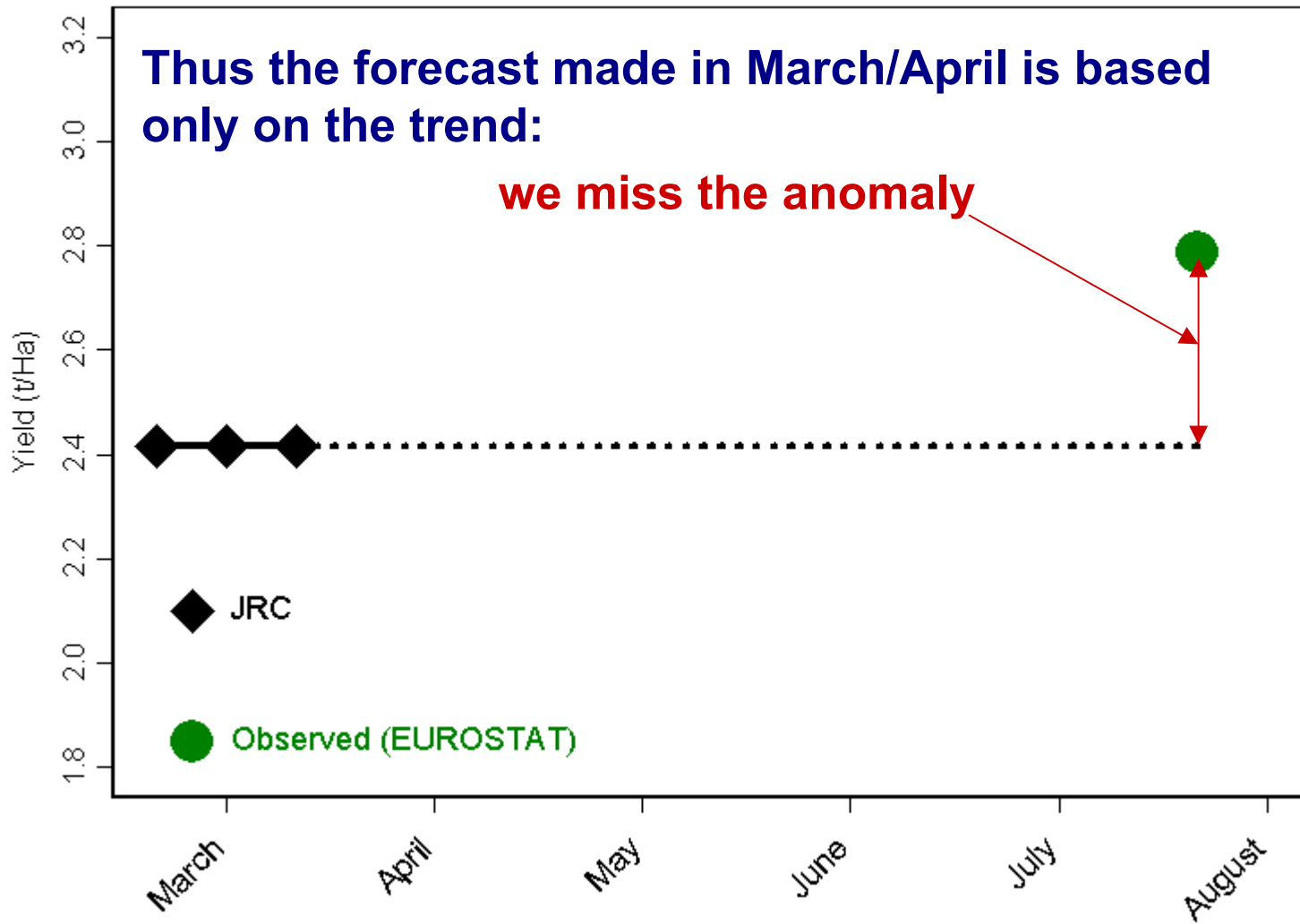




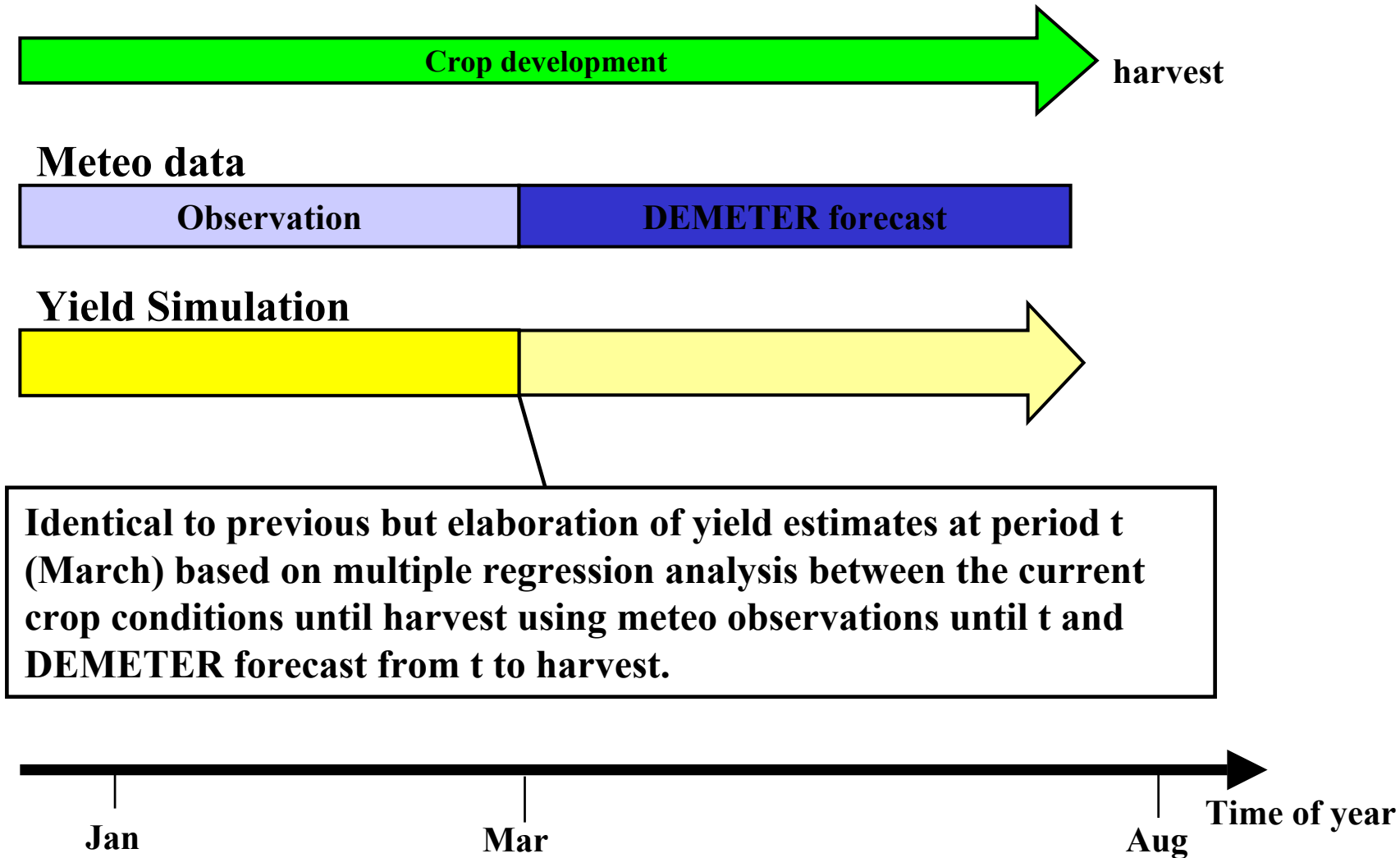




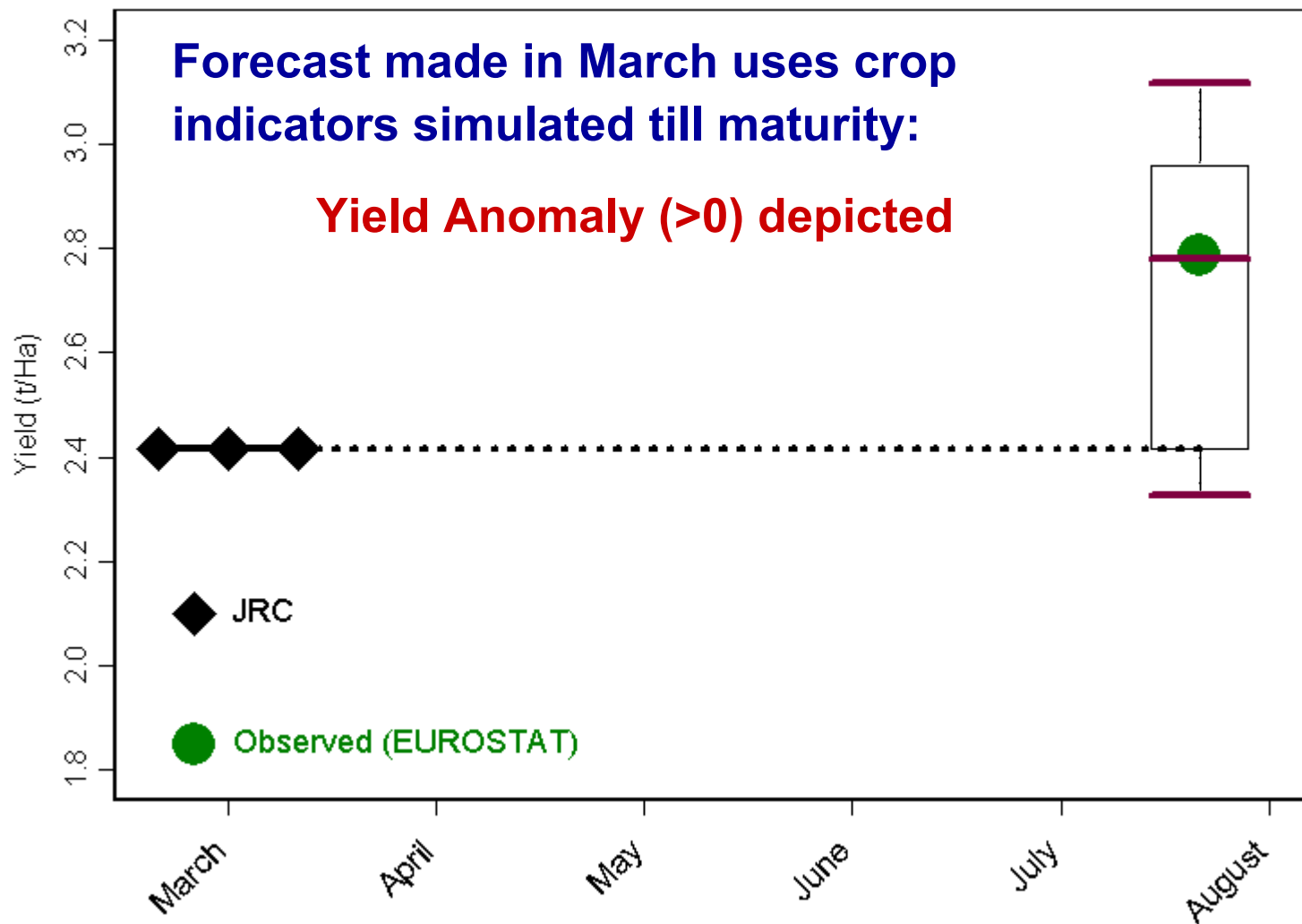




Use of (downscaled) seasonal forecast within the JRC Crop Model



Using Seasonal forecast/DEMETER

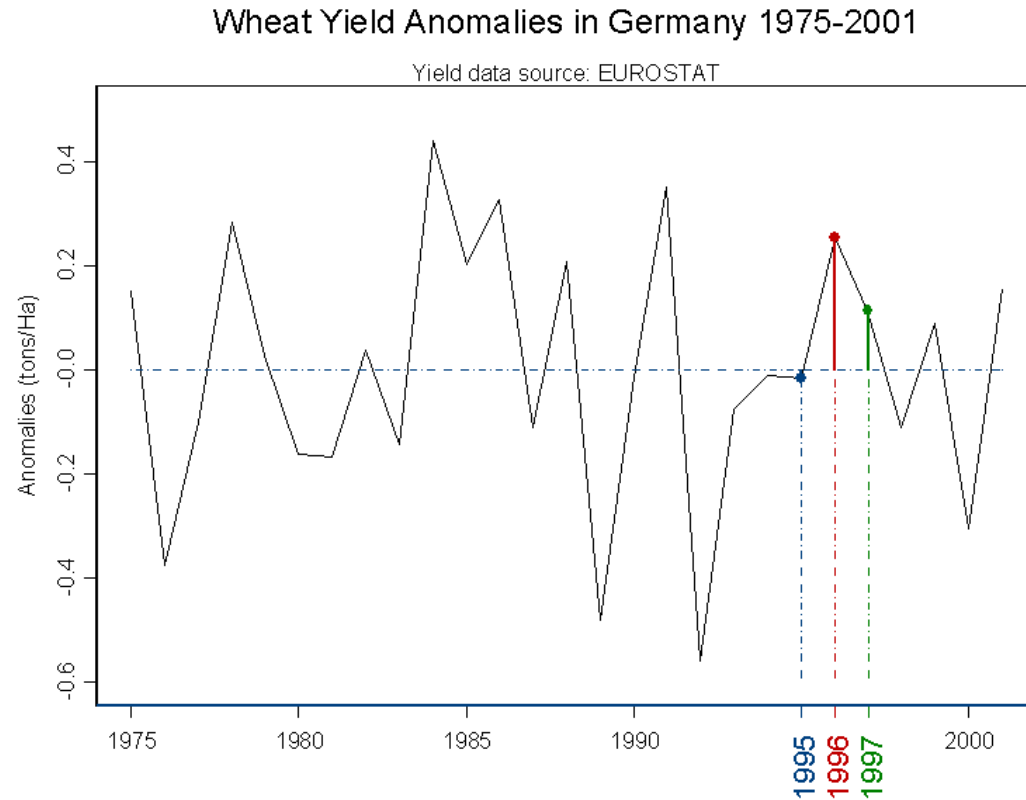


Example: Winter Wheat forecasts in Germany 1995, 96, 97.

Actual Situation:

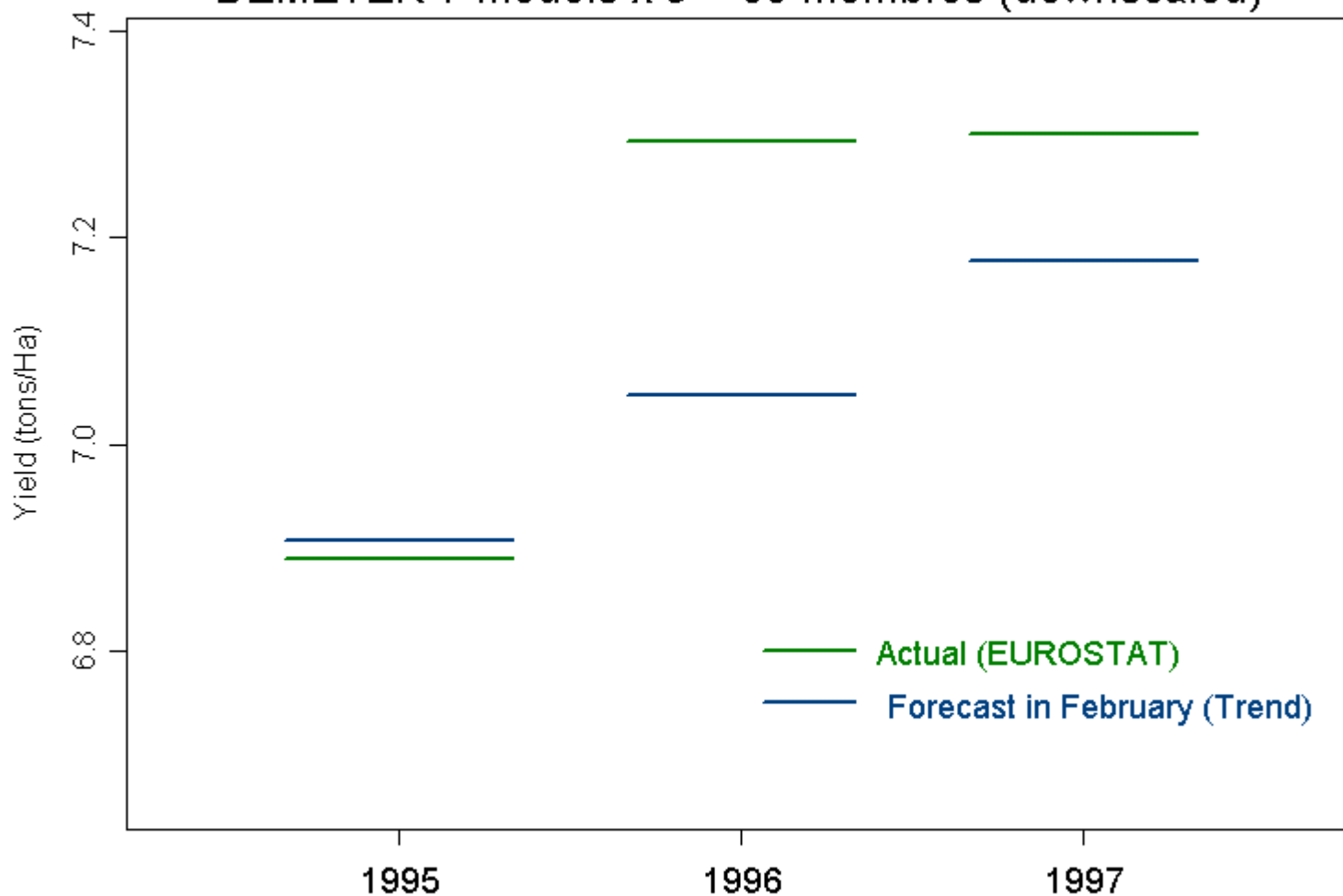
95: Slight negative anomaly

96 & 97: Positive anomalies



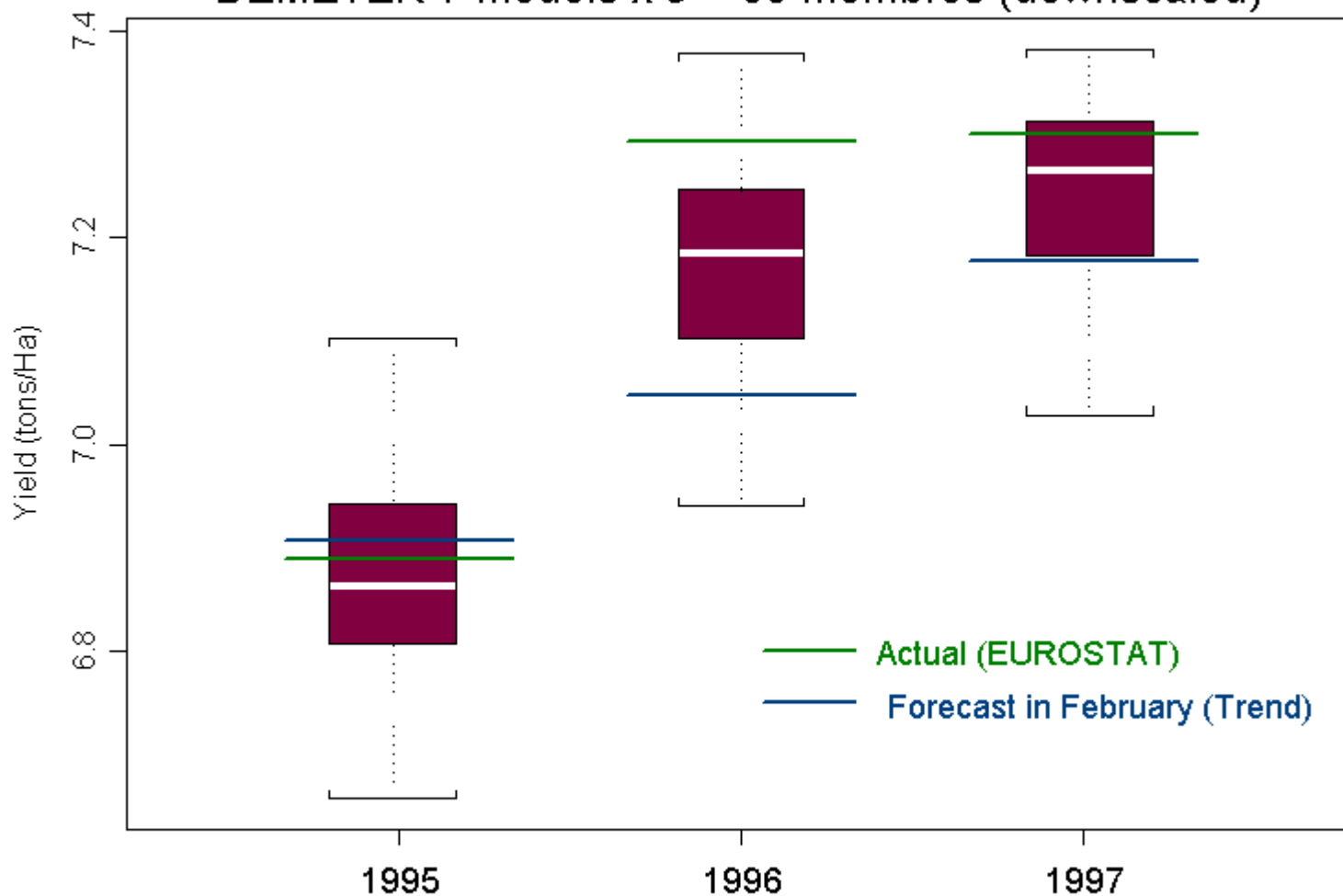
Forecasted Yield 1995,96,97 - GERMANY

DEMETER 7 models x 9 = 63 membres (downscaled)

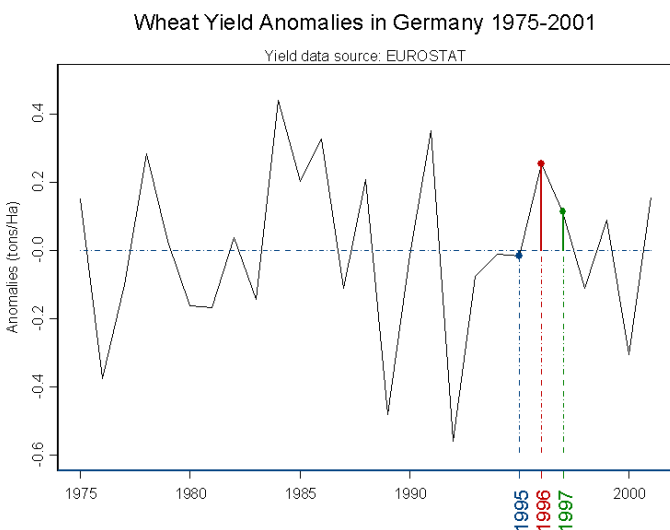
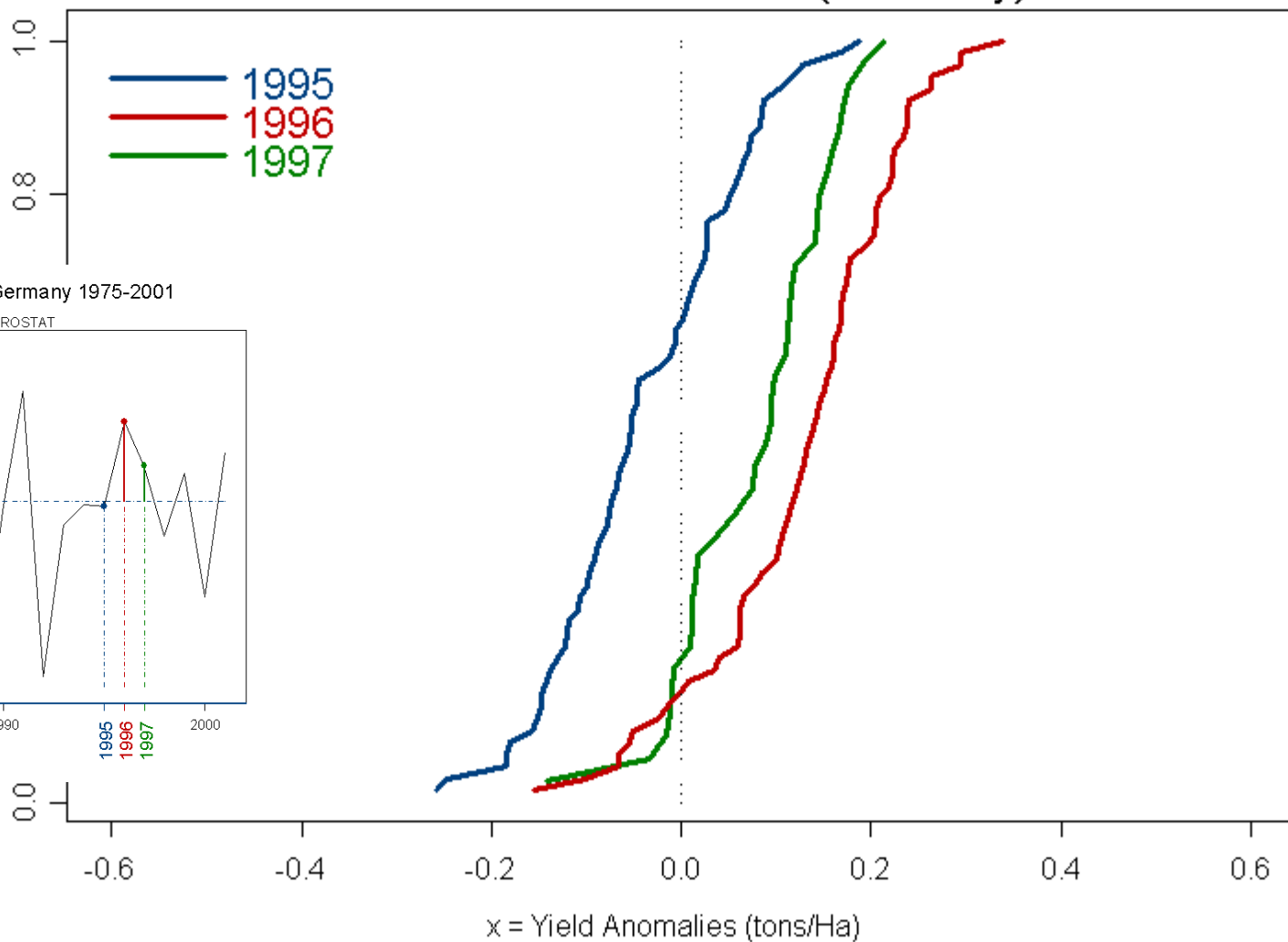


Forecasted Yield 1995,96,97 - GERMANY

DEMETER 7 models x 9 = 63 membres (downscaled)



Cumulative Distribution Function - DEMETER Ensembles Wheat Yield Anomalies (Germany)



Wheat Yield Forecasting in Germany

RMSE

Percentage error of forecast

1995

March	April	May	June	July	Final
0.08	0.08	0.08	0.08	0.05	0.05

DEMETER average **0.29**

DEMETER weighted average **0.33**

March	April	May	June	July	Final
1.4	1.4	1.4	1.4	1.4	1.2

DEMETER **4.2**

DEMETER weighted average **4.9**

1996

March	April	May	June	July	Final
0.28	0.28	0.28	0.28	0.28	0.28

DEMETER average **0.26**

DEMETER weighted average **0.24**

March	April	May	June	July	Final
4	4	4	4	4	4

DEMETER **3.6**

DEMETER weighted average **3.3**

1997

March	April	May	June	July	Final
0.12	0.12	0.12	0.09	0.07	0.07

DEMETER average **0.05**

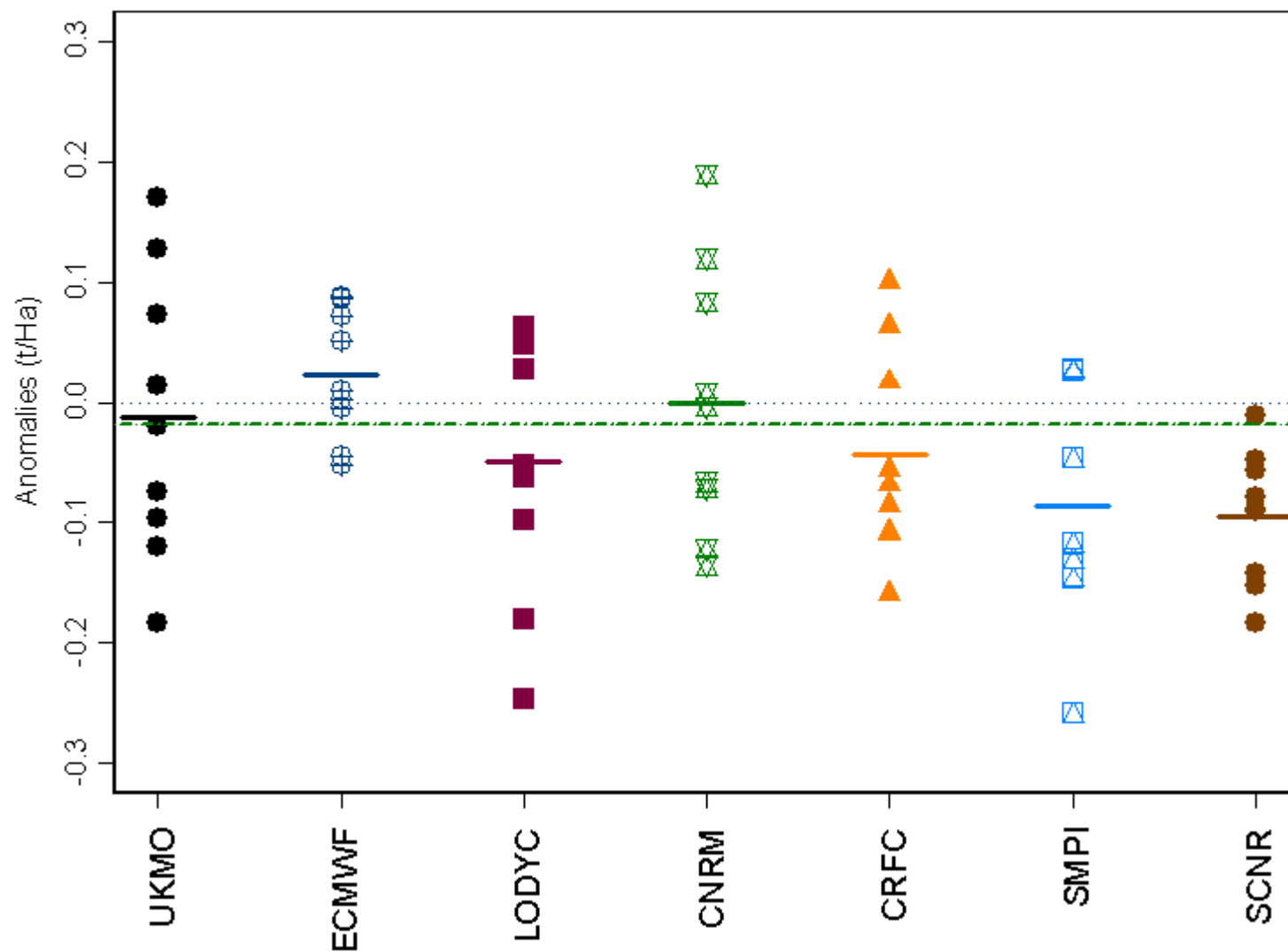
DEMETER weighted average **0.04**

March	April	May	June	July	Final
1.68	1.68	1.68	1.56	1.02	1.01

DEMETER **0.58**

DEMETER weighted average **0.6**

Forecasted Yield Anomaly for wheat (1995) in Germany DEMETER Ensemble (Downscaled)



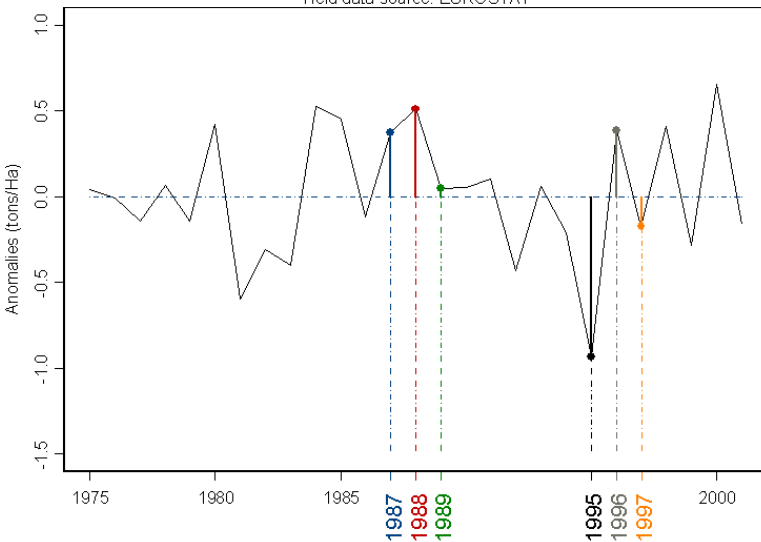
Example: Spain 1987 to 89, 1995 to 97

Globally good results for 1987,88,89

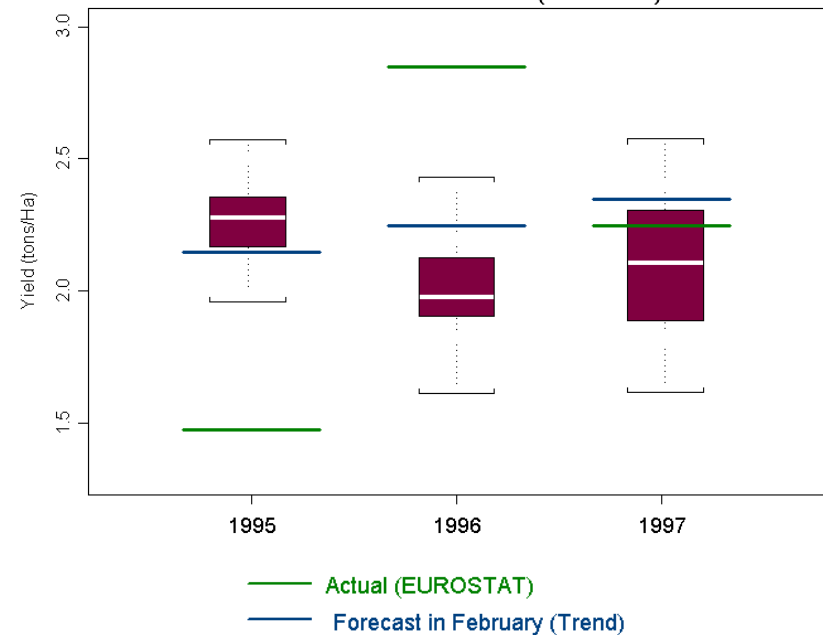
Bad results for 1995 and 1996, good skill in 1997

Wheat Yield Anomalies in Spain 1975-2001

Yield data source: EUROSTAT



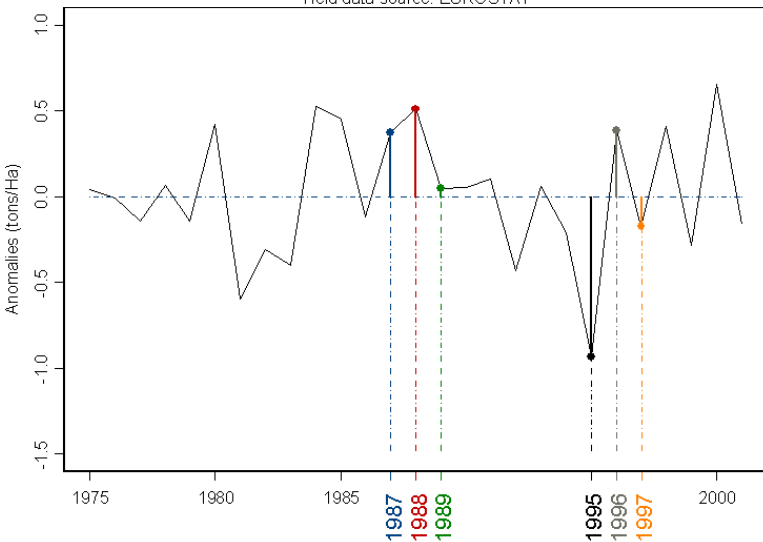
Forecasted Yield in Spain 1995,96,97
DEMETER 63 members (7 models)



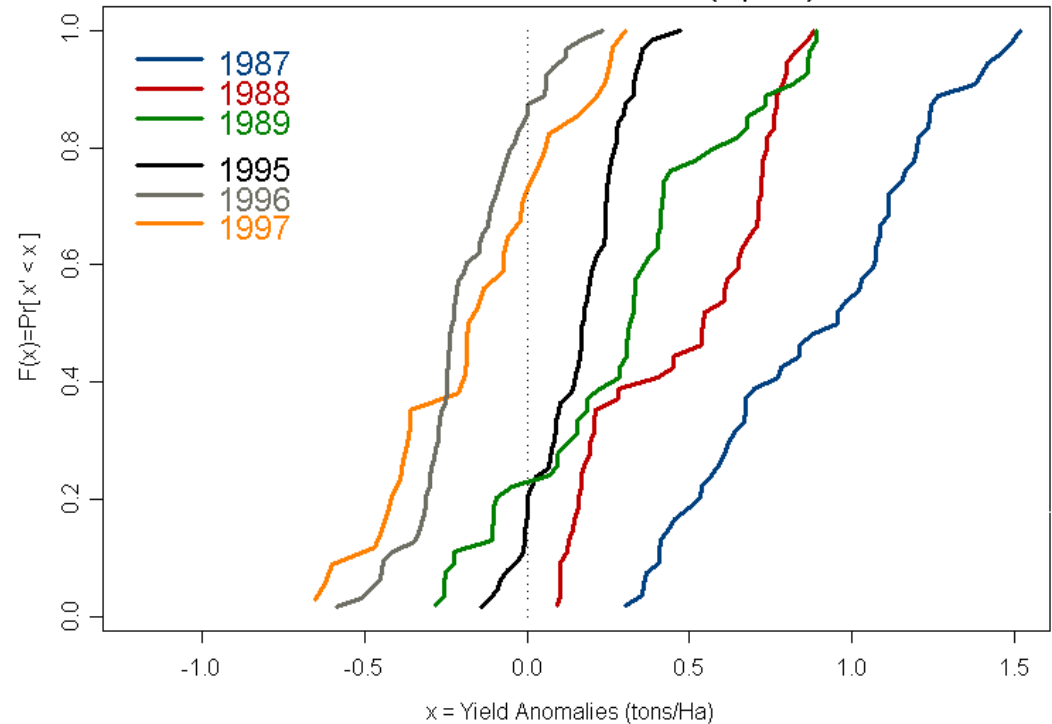
Example: Spain 1987 to 89, 1995 to 97

Wheat Yield Anomalies in Spain 1975-2001

Yield data source: EUROSTAT



Cumulative Distribution Function - DEMETER Ensembles
Wheat Yield Anomalies (Spain)



Wheat Yield Forecasting in Spain

RMSE

1988

March	April	May	June	July	Final
0.37	0.37	0.35	0.32	0.30	0.29

DEMETER average **0.07**

DEMETER weighted average **0.07**

1995

March	April	May	June	July	Final
0.62	0.62	0.62	0.60	0.59	0.58

DEMETER average **0.75**

DEMETER weighted average **0.77**

1997

March	April	May	June	July	Final
0.12	0.12	0.12	0.12	0.11	0.11

DEMETER average **0.13**

DEMETER weighted average **0.12**

Percentage error of forecast

March	April	May	June	July	Final
13	13	12	6	5	5

DEMETER **2.5**

DEMETER weighted average **2.5**

March	April	May	June	July	Final
43	43	43	36	33	29

DEMETER **53**

DEMETER weighted average **54**

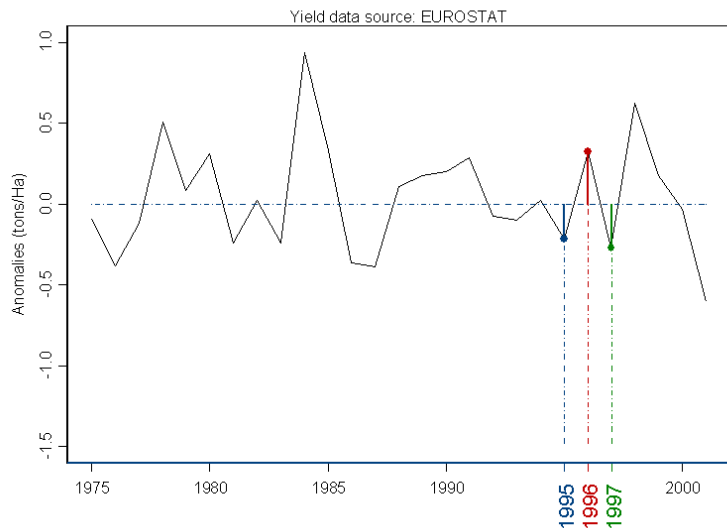
March	April	May	June	July	Final
6	6	5	5	4	4

DEMETER **6**

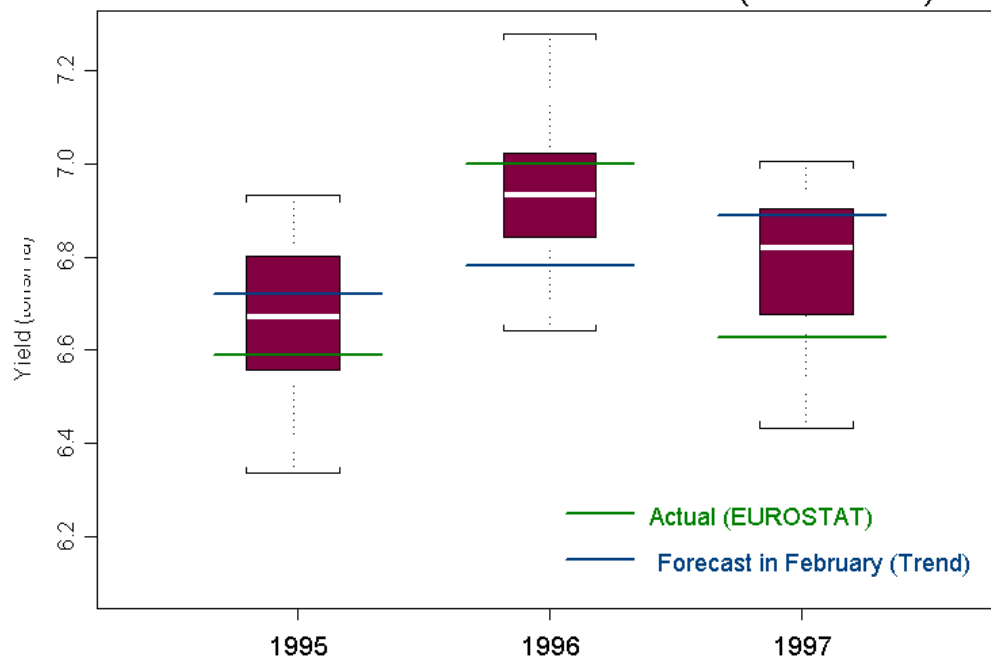
DEMETER weighted average **6**

Example: France 1995, 96, 97

Wheat Yield Anomalies in France 1975-2001

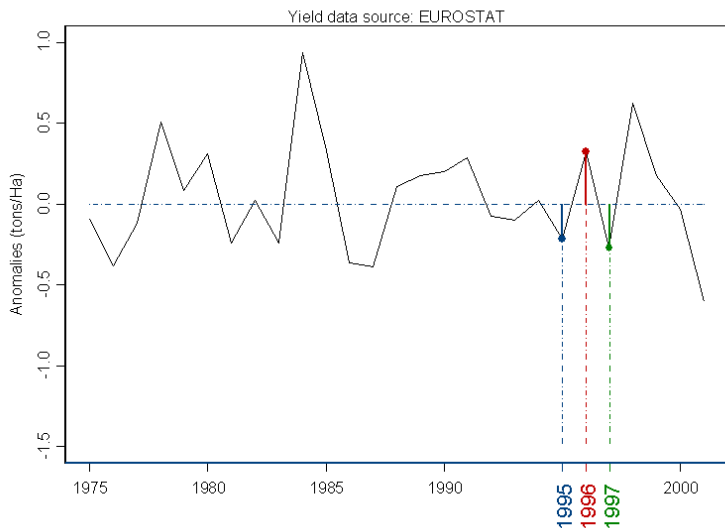


Forecasted Yield 1995,96,97 - FRANCE
DEMETER 7 models x 9 = 63 membres (downscaled)

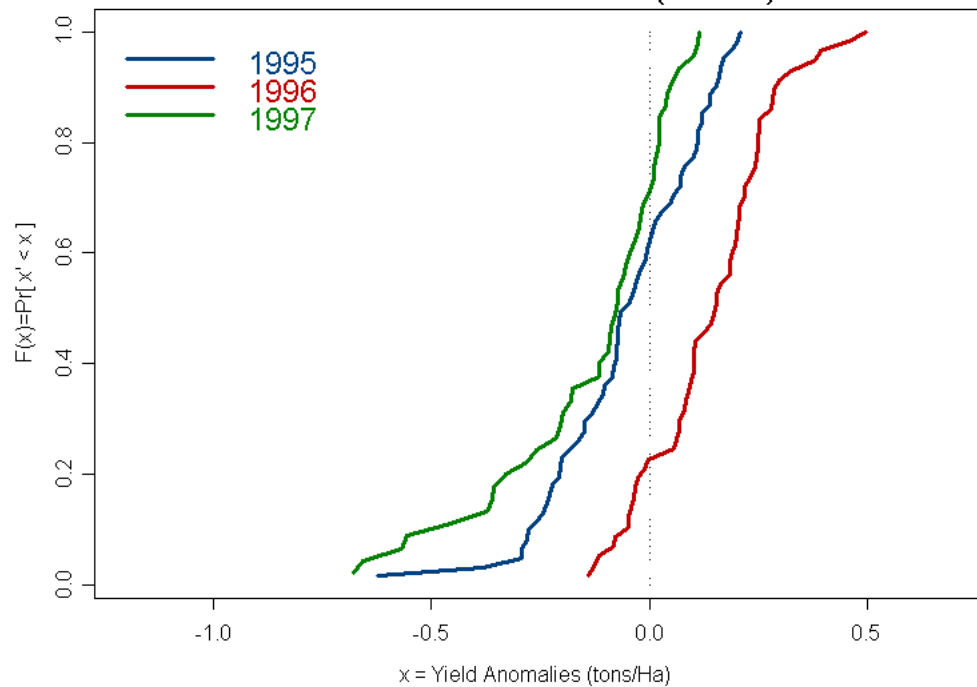


Example: France 1995, 96, 97

Wheat Yield Anomalies in France 1975-2001



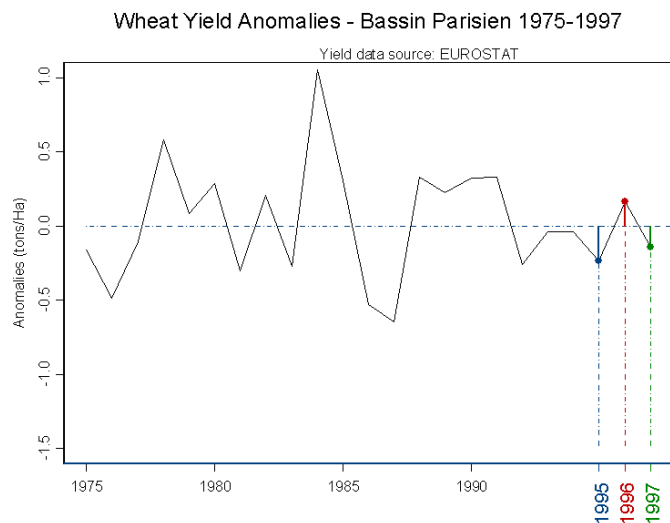
Cumulative Distribution Function - DEMETER Ensembles
Wheat Yield Anomalies (France)



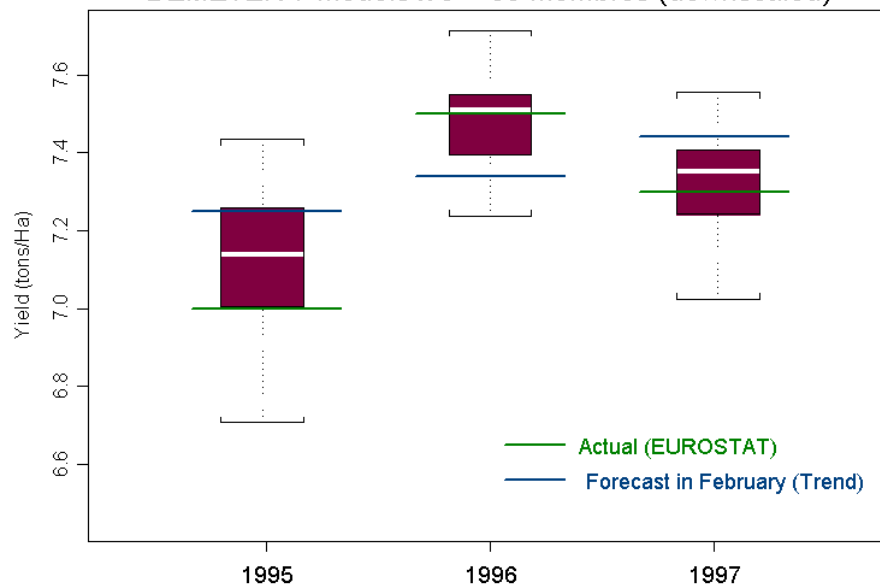
Forecasting at a regional level



Example: ***Bassin Parisien***, most important agricultural French region (for wheat)



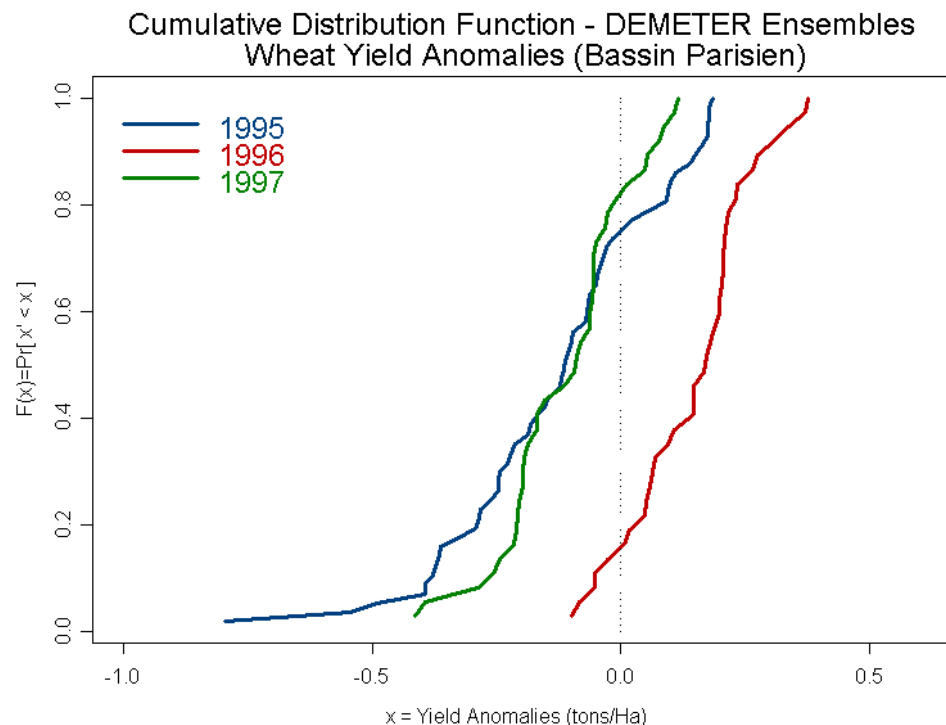
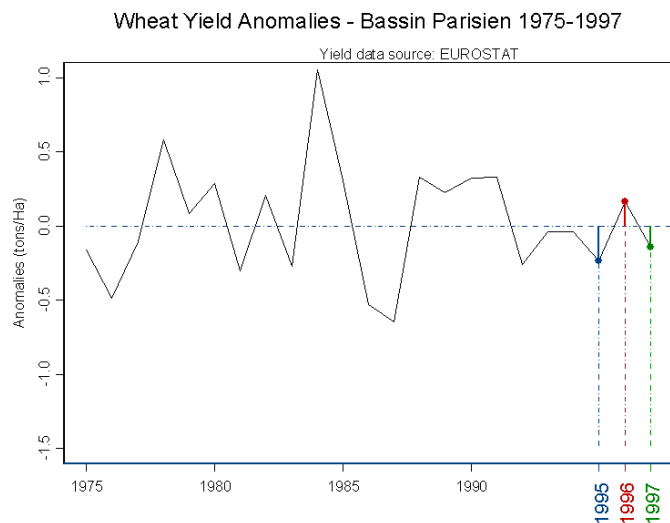
Forecasted Yield 1995,96,97 - Bassin Parisien
DEMETER 7 models x 9 = 63 membres (downscaled)



Forecasting at a regional level

vs forecast at a national level ?

Comparable skill !



Downscaled DEMETER hindcast 1995-1998

1995 to 1997 done

1998: to import into the JRC database, to be used as input of the Crop Model

Analysis of all these data (crop model behavior, quantile samples from the ensemble, etc...)

Task 4 (Assessing potential economic benefits) to be carried out.

Are DEMETER forecast useful for crop modeling?

Yes!