

Simulation of crop growth in Northern Italy using downscaled reanalysis and hindcasts

*Vittorio Marletto, Stefano Marchesi,
Giovanna Fontana (Arpa Bologna)
Enrico Ceotto (Isa Modena)*

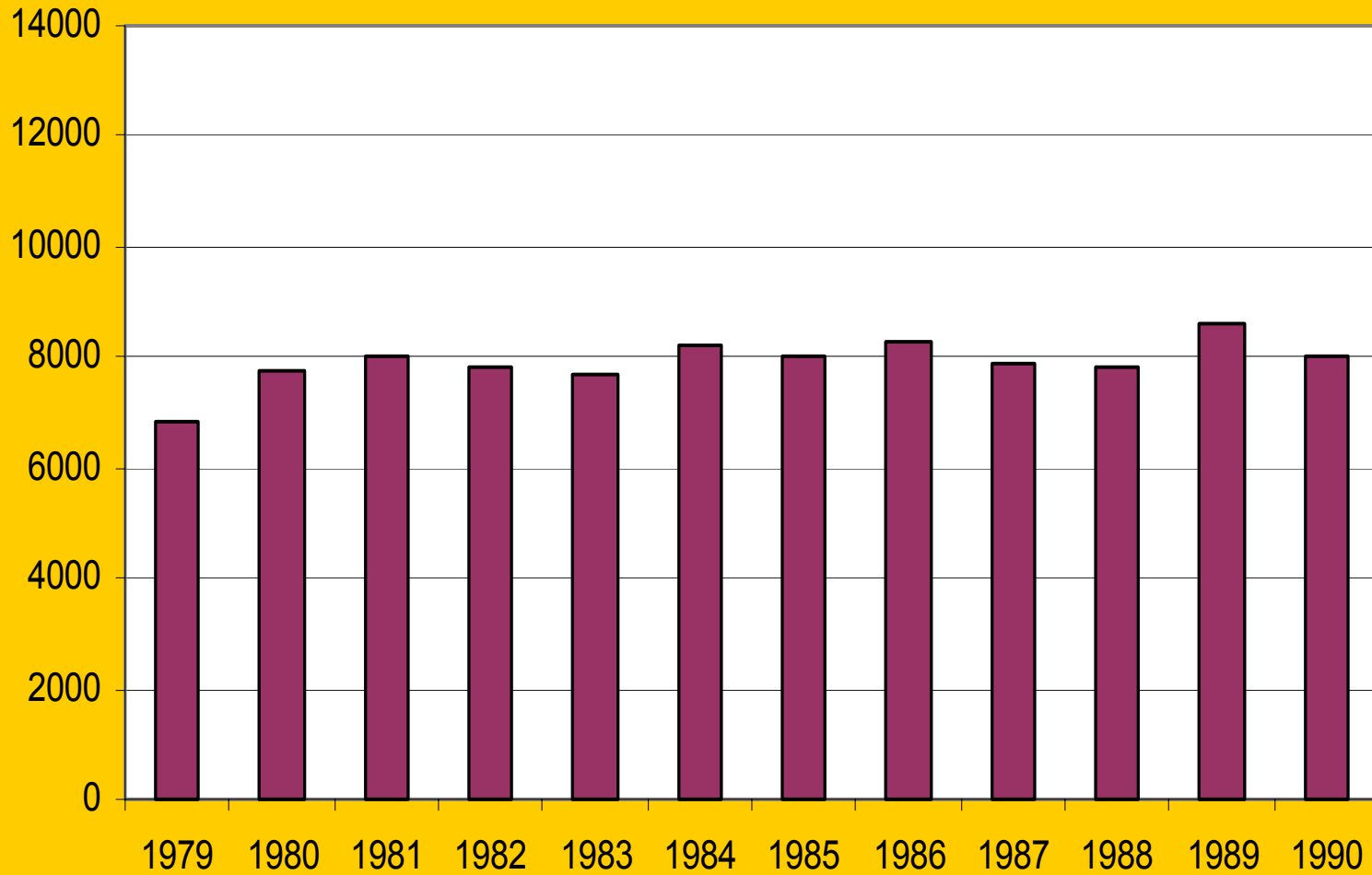
Previous work

- Implementation of the Wofost 7.1 crop growth model in the Criteria soil water simulation system
- Build-up of an observational data set over the Po Plain (northern Italy)
- Comparisons between ERA15 and observations
- Exploratory analysis of yield/climate relationships

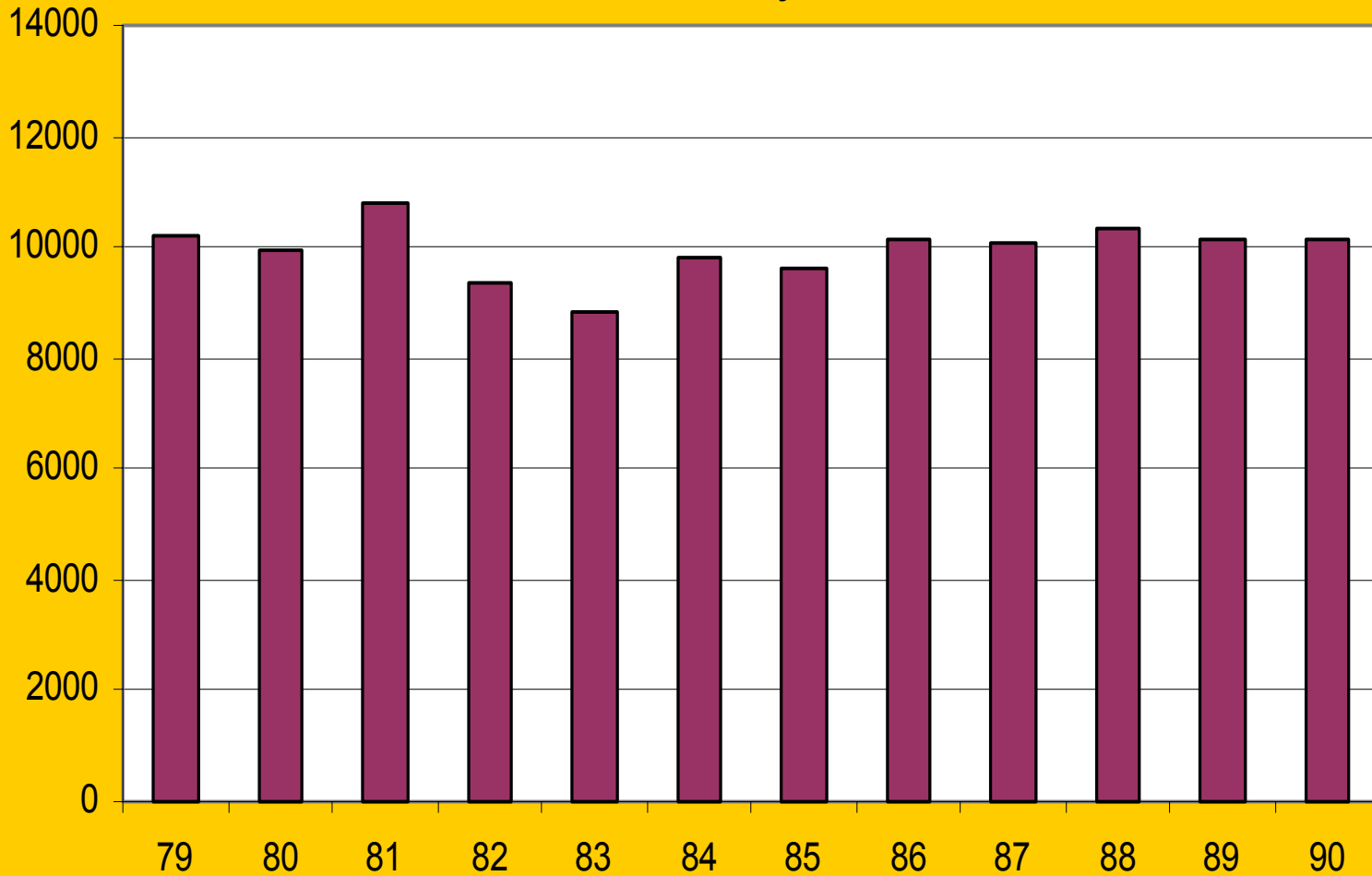
Work in progress...

- Testing sensitivity of our model(s) to climatic variability induced by:
 - climatology (observations for 15 years, Map prec. & Ucea temp.)
 - downscaled ERA15/weather generator (one year, 30 runs)
 - Demeter hindcasts (one point, two models, 18 members, May run, six months)

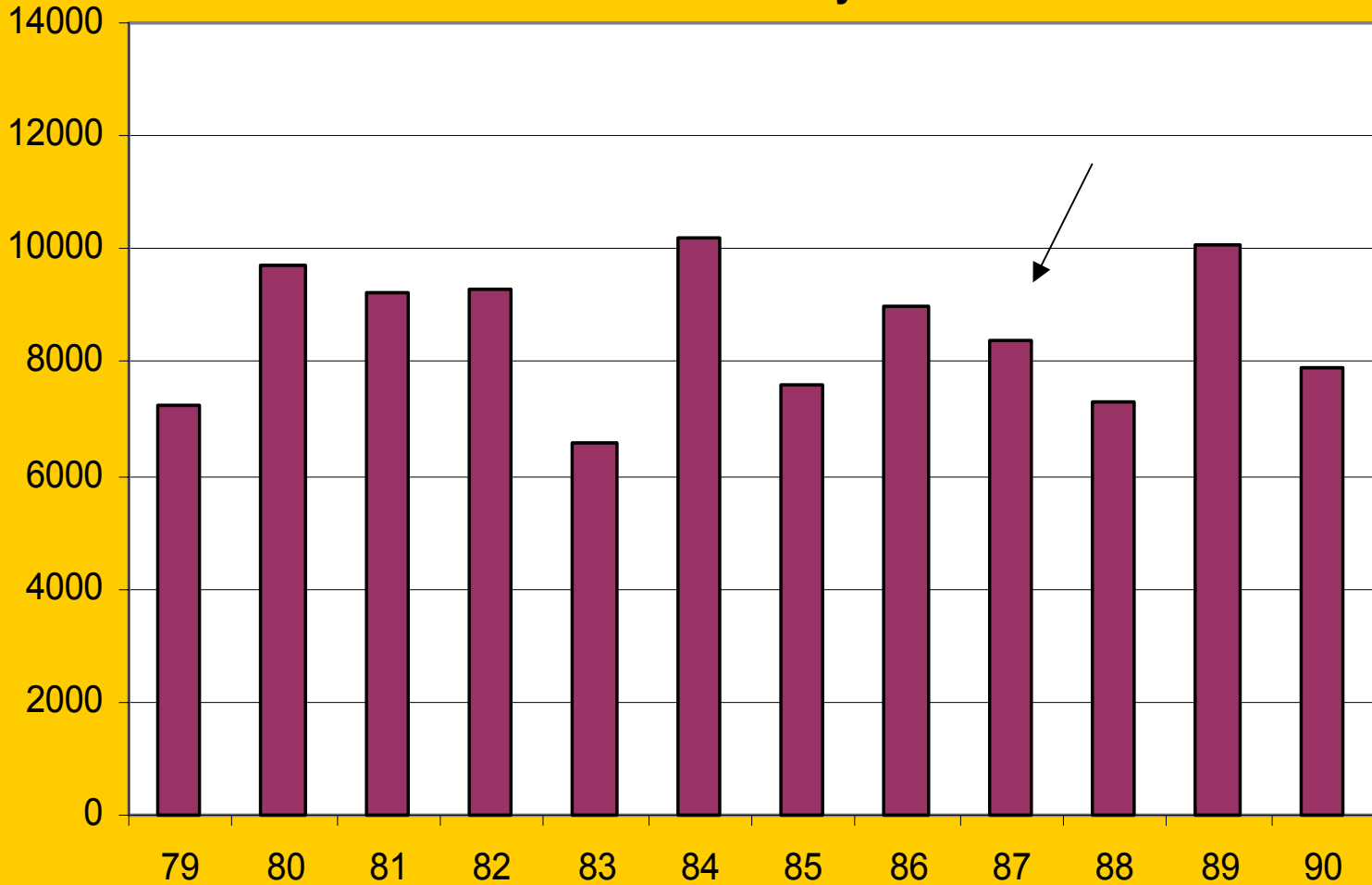
**Maize yield (kg/ha dry matter) from national statistics - Central Po Valley -
cv = 0.05**



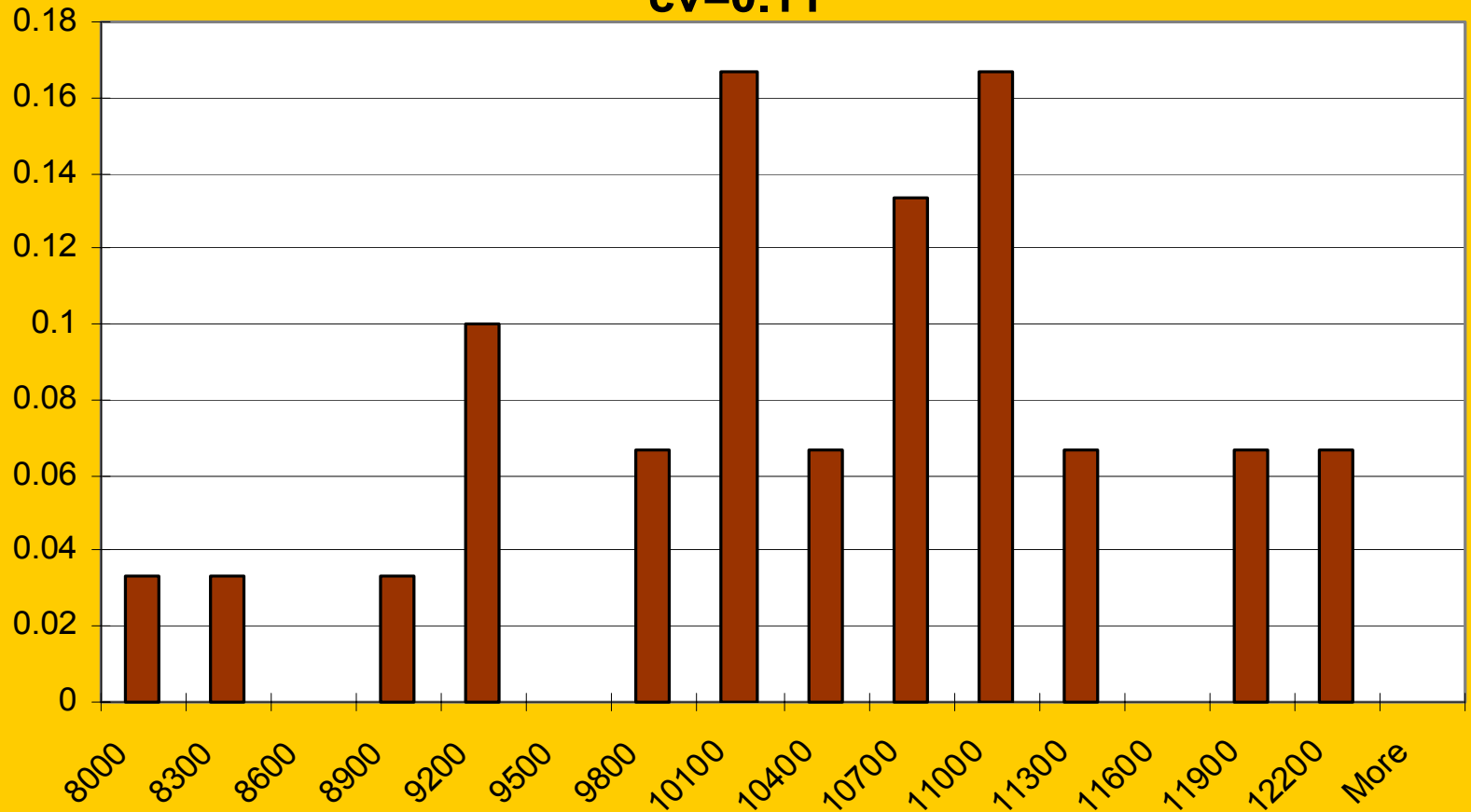
Potential maize yield (kg/ha dry matter) simulated with weather data -
Central Po Valley - cv = 0.05



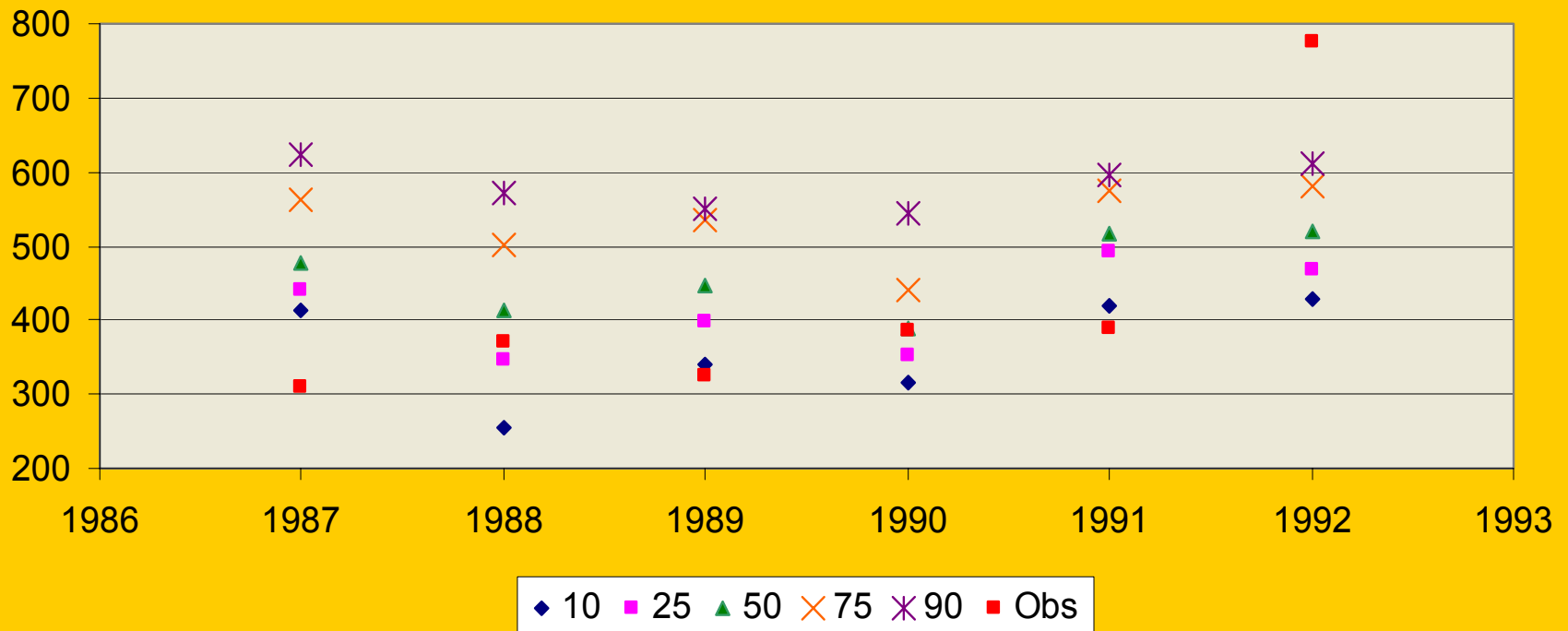
Irrigated maize yield (kg/ha dry matter) simulated with weather data - Central Po Valley - cv = 0.14



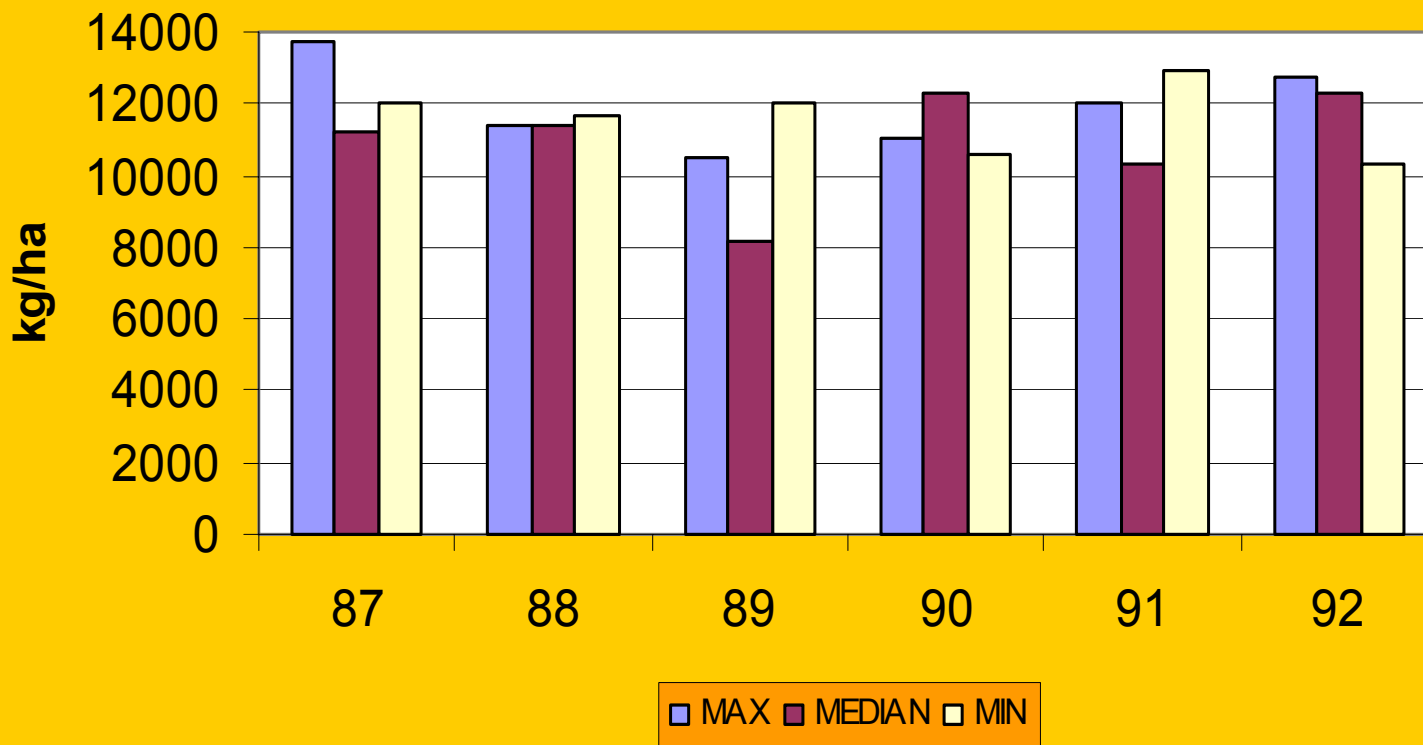
Frequency distribution of dry weight of storage organs (kg/ha) - Central Po Valley - Irrigated maize - 1987 ds ERA 15 data replicated by WG (Andersen) - $cv=0.11$



"Summer" precipitation (MJJASO) Demeter hindcasts - 18 members Ecmwf, MetOffice Northern Italy



Irrigated maize yield simulated with Demeter hindcasts (Ecmwf, MetOffice) - Central Po Valley



...some remarks...

- At local scale there seems to be a need to downscale using local data (more stations, properly located)
- Preliminary crop simulations with Demeter hindcasts show reasonable results in terms of variability (though systematically higher yields)

Work in progress...

- extending the test to the whole Po Valley over all the Demeter period (with two downscaling methods?)
- extending the test to two crops
 - wheat: computing the impact of Feb/ May seasonal forecasts on crop yields
 - maize: computing the impact of May/ Aug seasonal forecasts on crop yields and irrigation (number and amount)



that's all, thank you