North-Atlantic weather regimes & European temperatures in the IPSL model

Sensitivity to atmospheric resolution

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Motivations & simulations

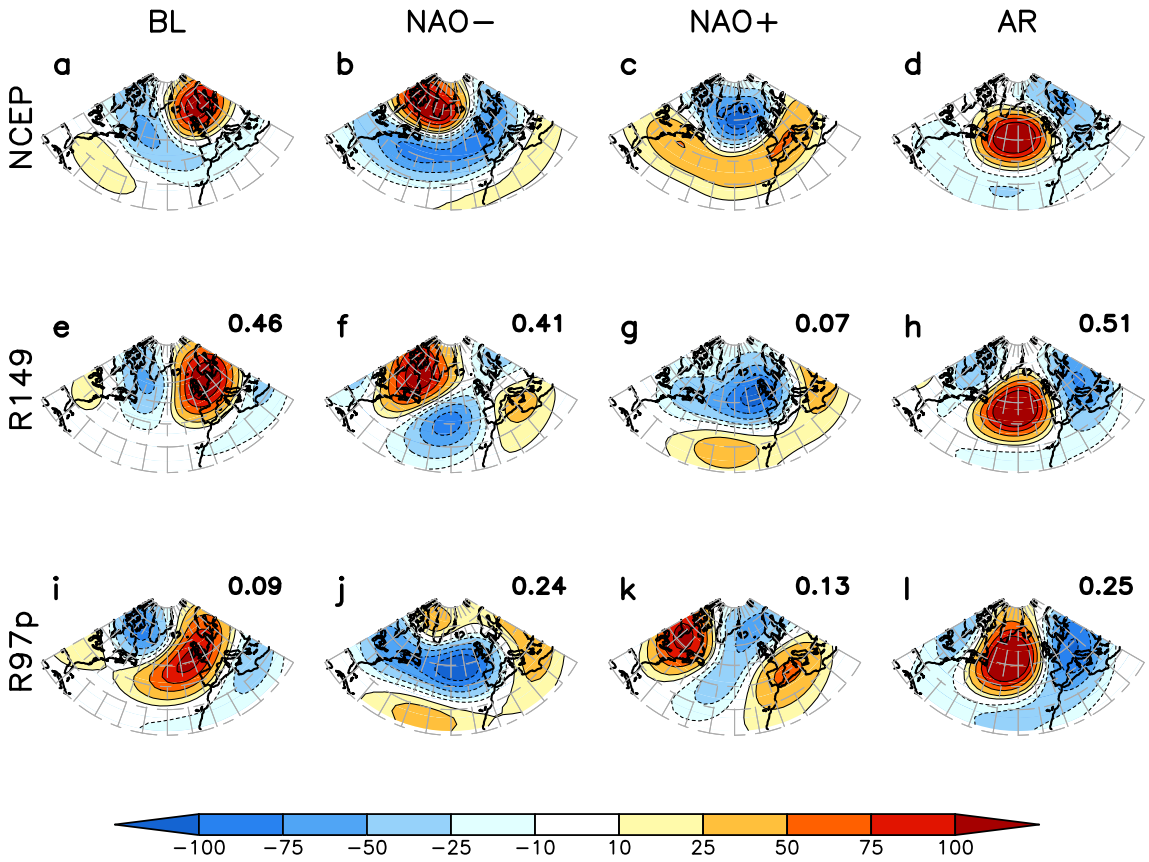
- Towards a better representation of mid-latitude dynamics for regional climate variability...
- WRs $\sim$ 500–1000km & GCMs $\sim$ 100–500km: threshold effects?
- In this study: 50-year control runs from IPSL-CM4v2*

Short name	Atmospheric Horizontal Resolution	p-magic	Vertical Levels	CO2 (ppm)
R97	96×71 ($3.7^\circ \times 2.5^\circ$)	0.02	19	348
R97p	96×71 ($3.7^\circ \times 2.5^\circ$)	0.01	=	=
R99	96×96 ($3.7^\circ \times 1.875^\circ$)	0.02	=	=
R149	144×96 ($2.5^\circ \times 1.875^\circ$)	=	=	=
R1414	144×142 ($2.5^\circ \times 1.25^\circ$)	=	=	=
R1914	192×142 ($1.875^\circ \times 1.25^\circ$)	=	=	=

- Variables: Z500 (ref = NCEP + 20CR) & T2m (ref = E-OBS).

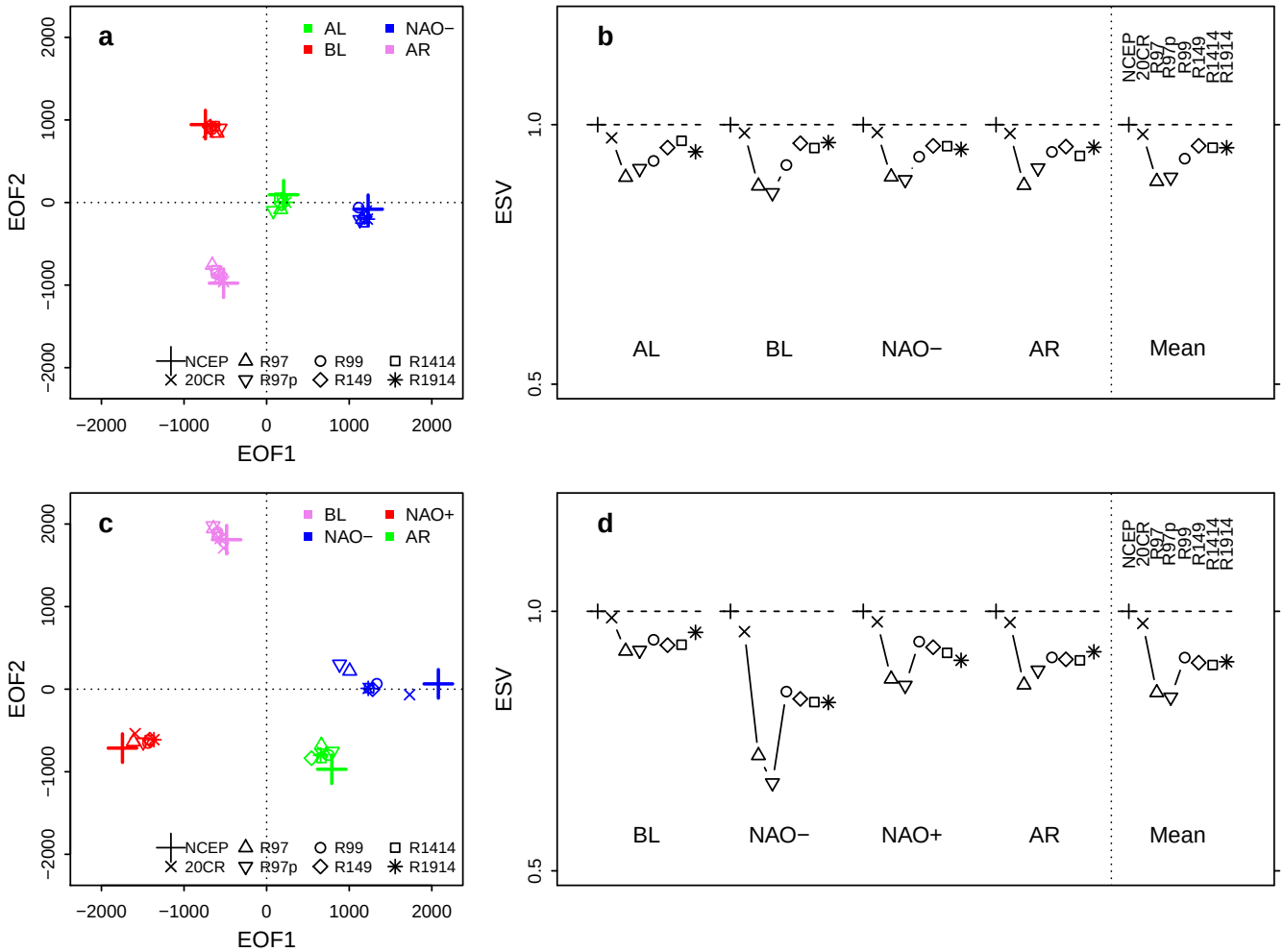
* Thanks a lot to F. Hourdin, M.A. Foujols, I. Musat & S. Denvil...

Weather regimes: centroids
(obtained by clustering Z500 anomalies)



→ WRs can be identified for all experiments (except R97 in summer).

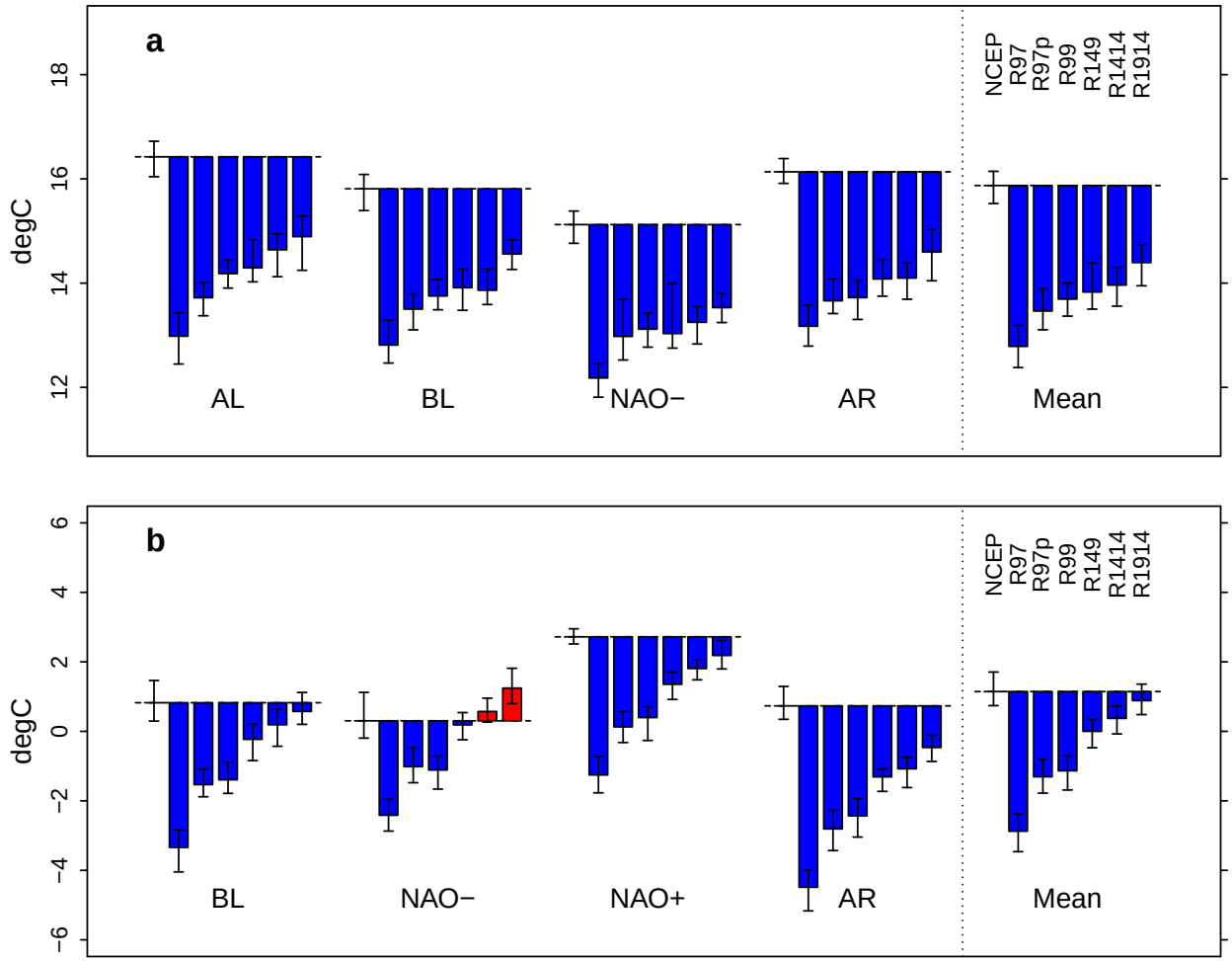
Weather regimes: class centers
(NCEP centroids taken as common reference)



→ Gap between R97 and others, especially in winter NAO−.

European temperatures

Composites (intra-class mean temperature)



→ Reduction of the cold bias with the resolution (R97(p): p-magic).

So?

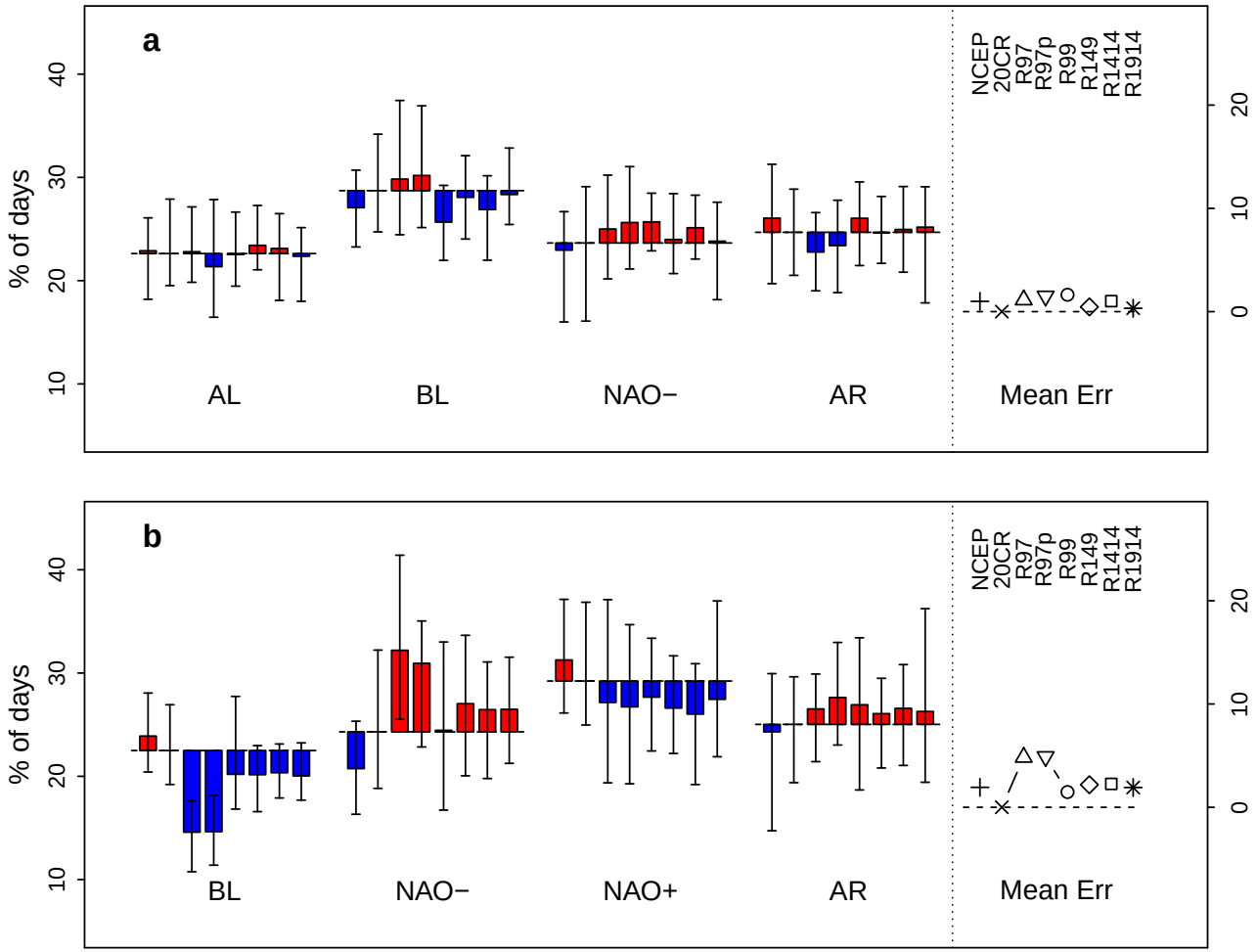
Summary

- WRs well represented, especially for resolutions higher than R97.
- Cold bias reduced by increases in resolution (to be continued...).

And now?

- Temperature analysis (Benjamin & Céline)?
  Heat-waves / cold spells indices?
- Add an IPSL-CM5 control run?
  Only 50-year daily Z500 & T2m required...
- Discuss results with other studies on sensitivity to atmospheric resolution:
  - Global features? (Frédéric et al?)
  - Mid-latitude jet? (Francis et al?)
  - Names of experiments? (R97, R147 etc. = boring!...)
- Submission in August?

Weather regimes: frequencies of occurrence
(NCEP centroids taken as common reference)



Weather regimes: mean persistences
(NCEP centroids taken as common reference)