Greenland summer blocking characteristics: an evaluation of a high-resolution multi-model ensemble

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1. Objectives

- Investigating spatial patterns of summer blocking over Greenland in reanalysis.
- Evaluating how well the global climate models in the HighResMIP ensemble reproduce those blocking features over Greenland and to what extent the results depend on model resolution.

2. Methods

- Using normalized Greenland Blocking index (GB2, Hanna et al., 2018) and meridional flow reversal index (D12, Davini et al., 2012) to define blocking events over Greenland.
- Using Self Organising Map (SOM) to cluster spatial patterns of blocking days from ERA5 and HighResMIP ensemble.
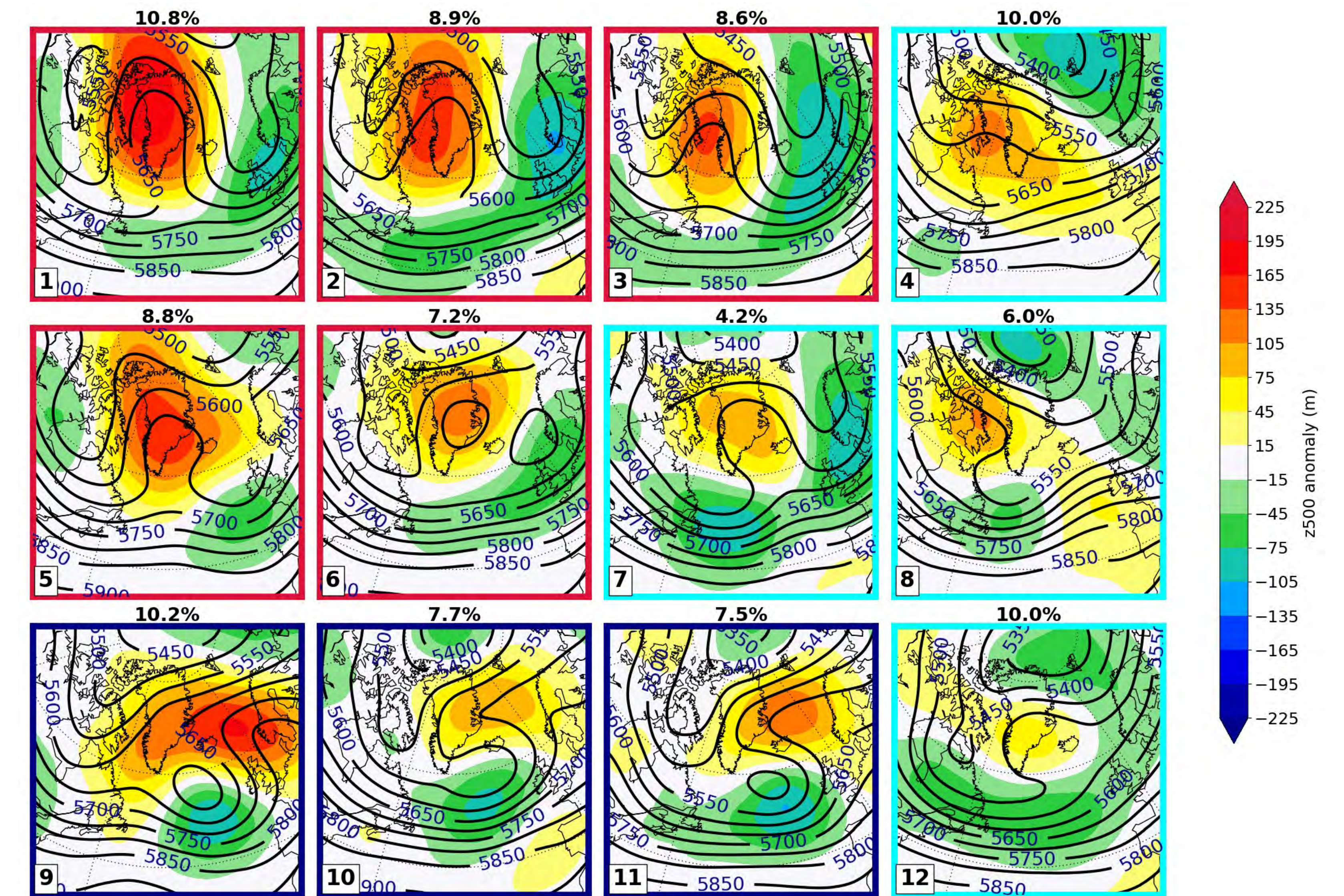
3. Results

- Mean of z500 for all blocking days defined by either GB2 or D12.
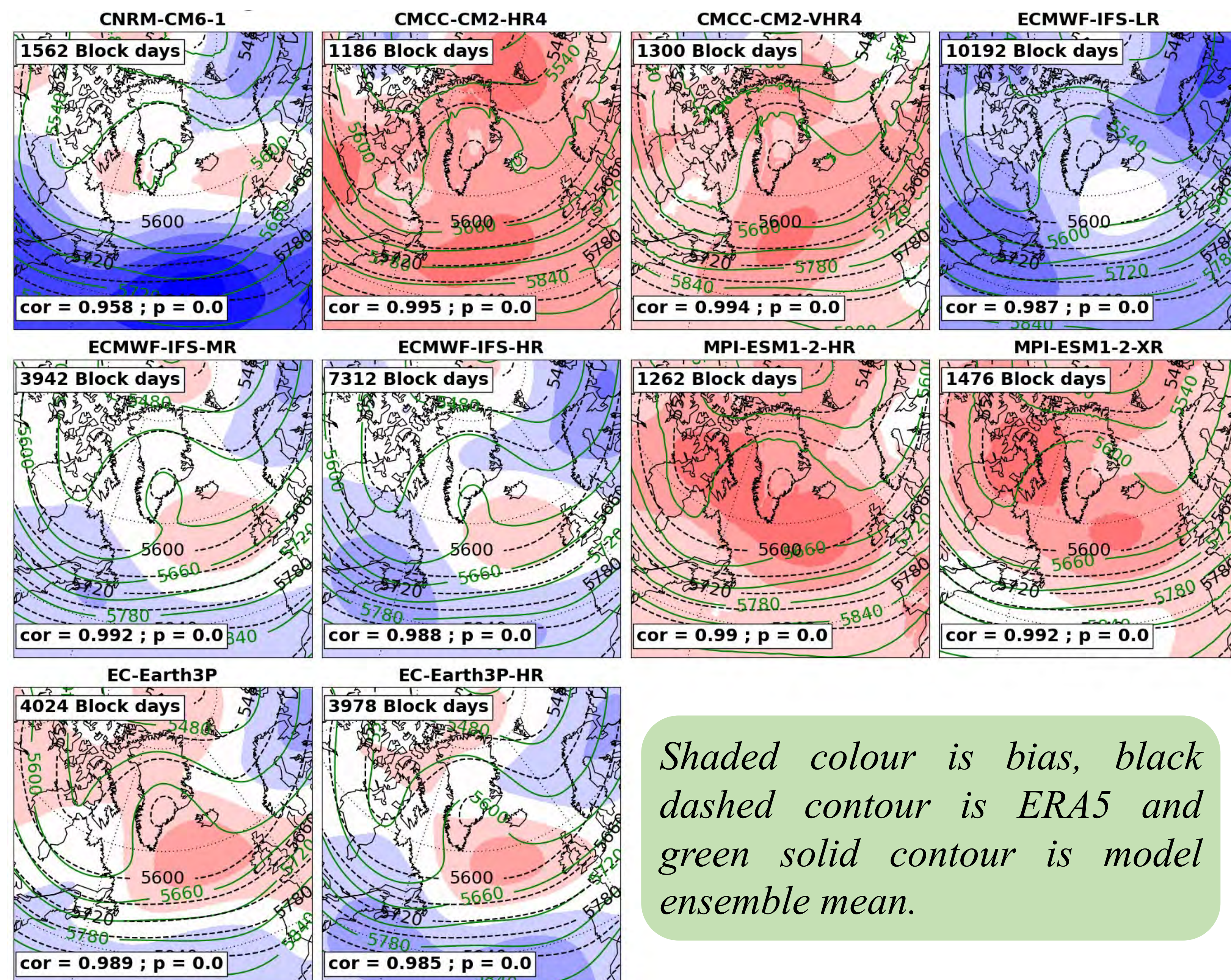
Shaded colour is bias, black dashed contour is ERA5 and green solid contour is model ensemble mean.
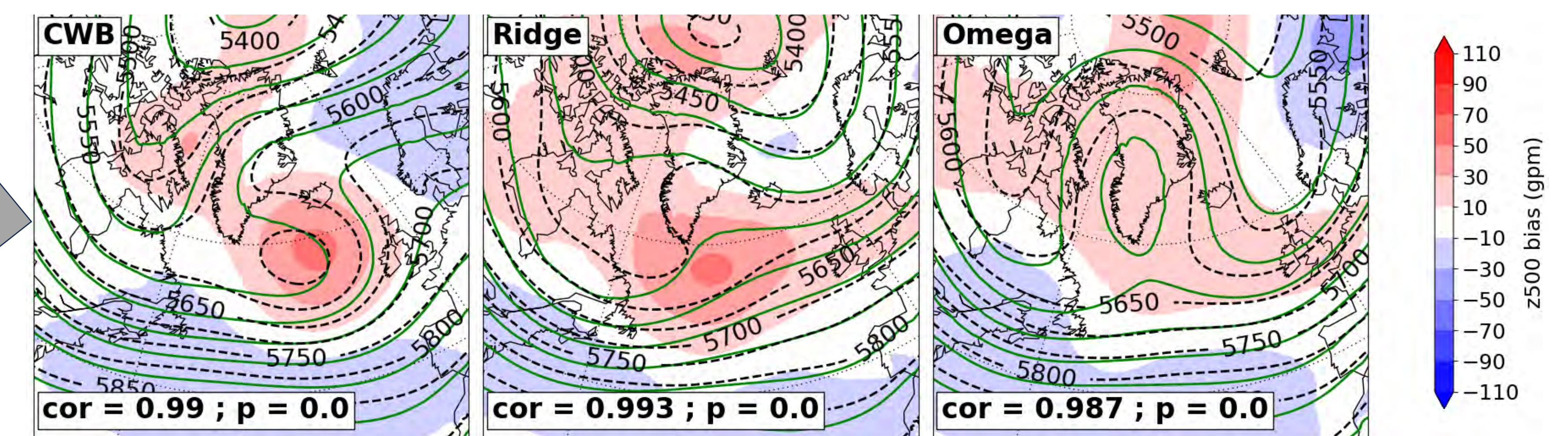
3. Results

- SOM analyses for 3 rows x 4 columns structure for z500 from ERA5

ERA5 Reanalysis

3. Results

- Grouping 12 nodes into 3 main patterns: Cyclonic wave breaking, Atlantic Ridge and Omega. Shaded colour is bias, black dashed contour is ERA5 and green solid contour is model ensemble mean.

Model Ensemble

4. Conclusion

- HighResMIP models can reproduce spatial patterns of Greenland Blocking with systematic biases.
- Higher resolution models do not show significant improvement in representation of blocking.