Temperature forecasting with expert aggregation

An example in the Chamonix valley

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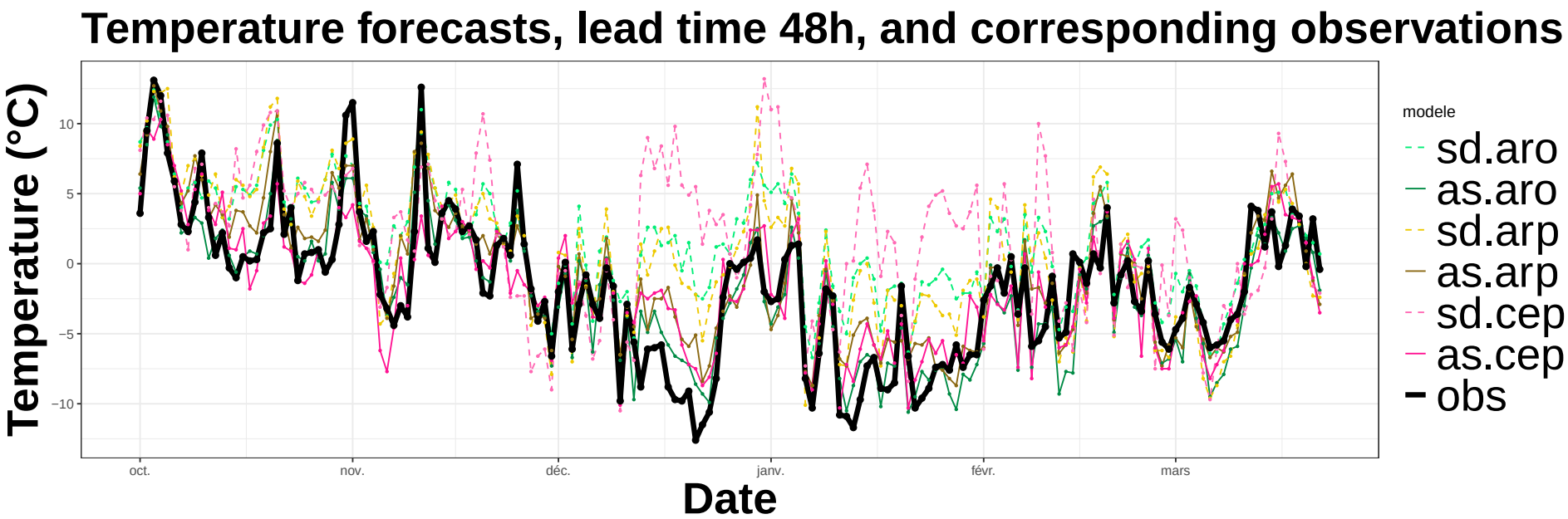
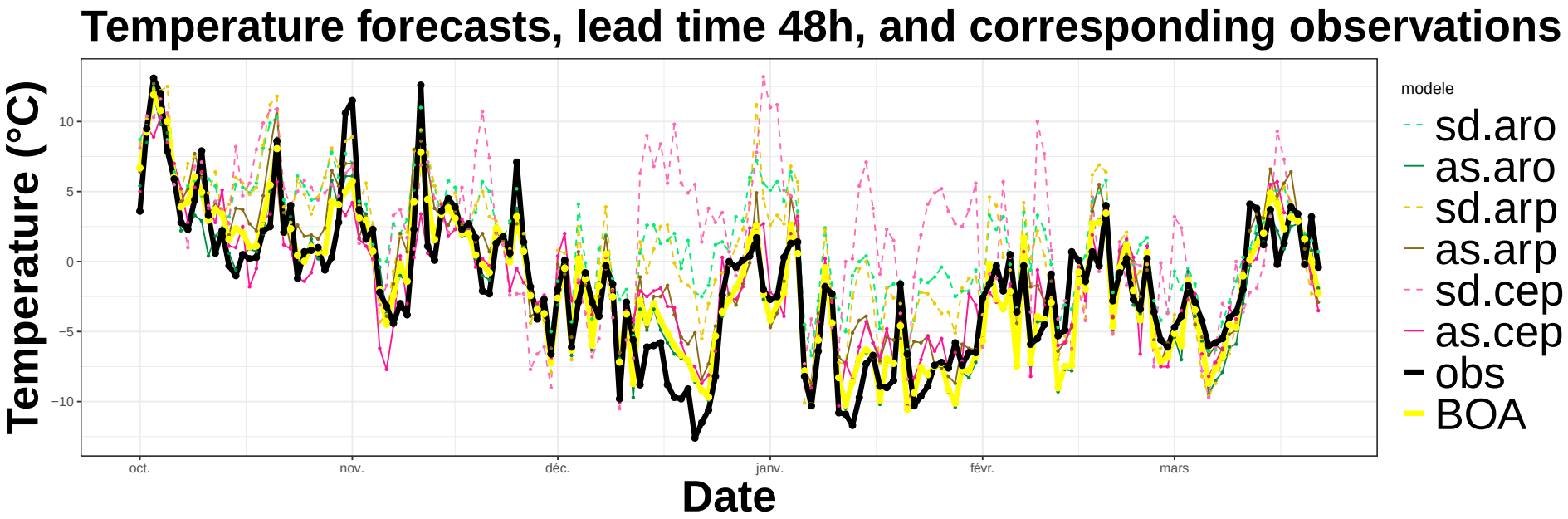


Temperature forecasts (lead time 46H) and corresponding observations in Chamonix (French Alps)

- 6 forecasts : AROME, ARPEGE, IFS and their MOS (Model Output Statistics) versions called in the following "experts"
- Our goal : combine those forecasts in an optimal way



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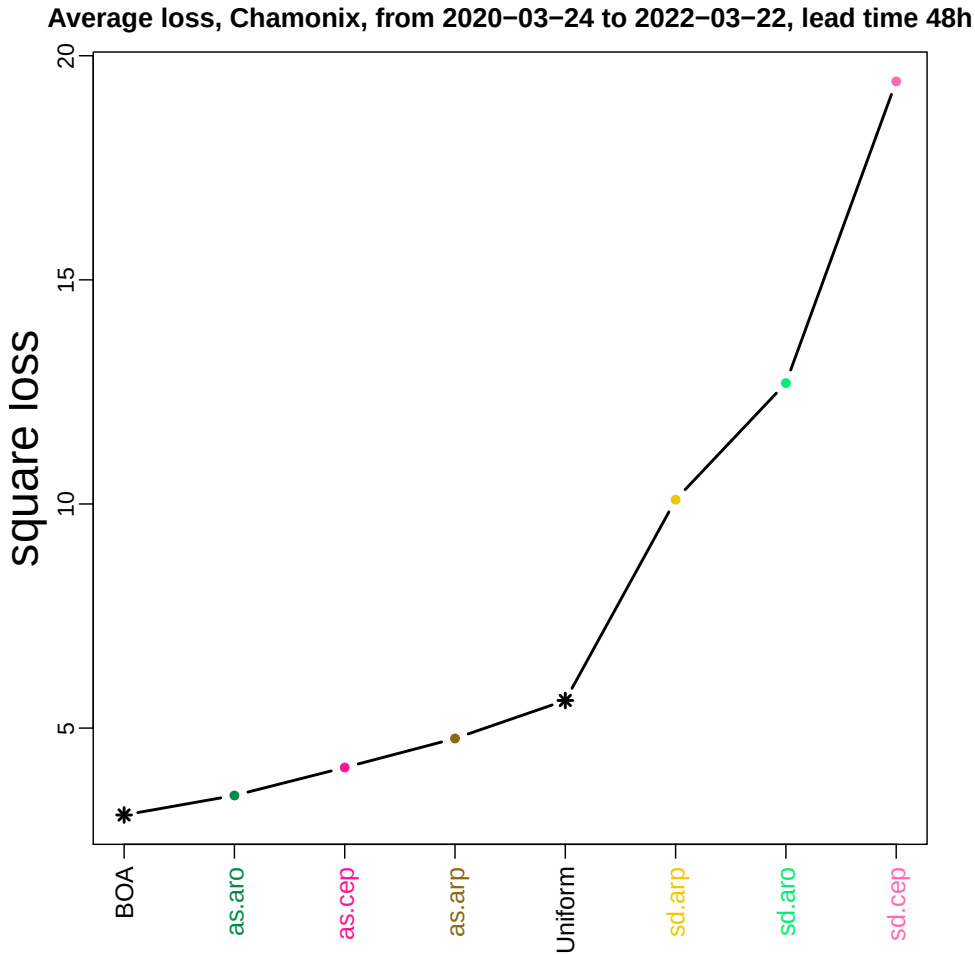
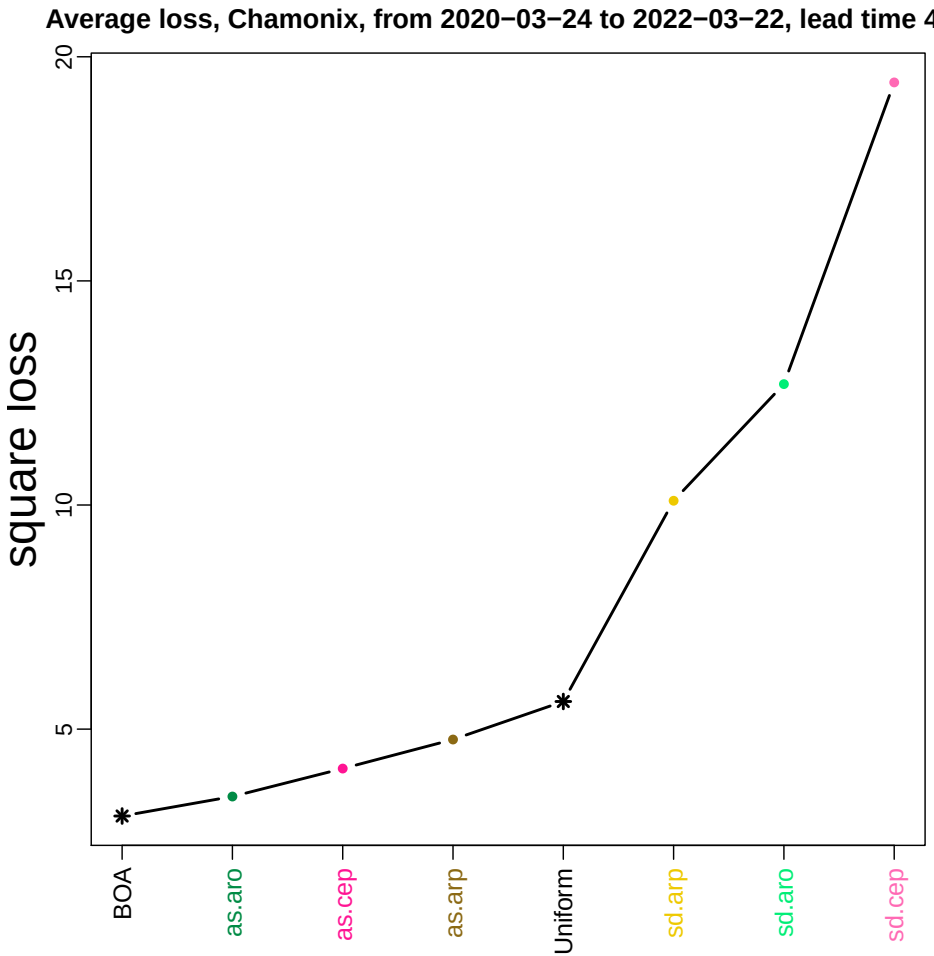
- BOA(Wintenberger [2017])



BOA :

- sequential prediction algorithm
- weighted averaged prediction
- weights, function of the past losses : positive and sum up to one -> convex aggregation
- compete with the best expert in hindsight



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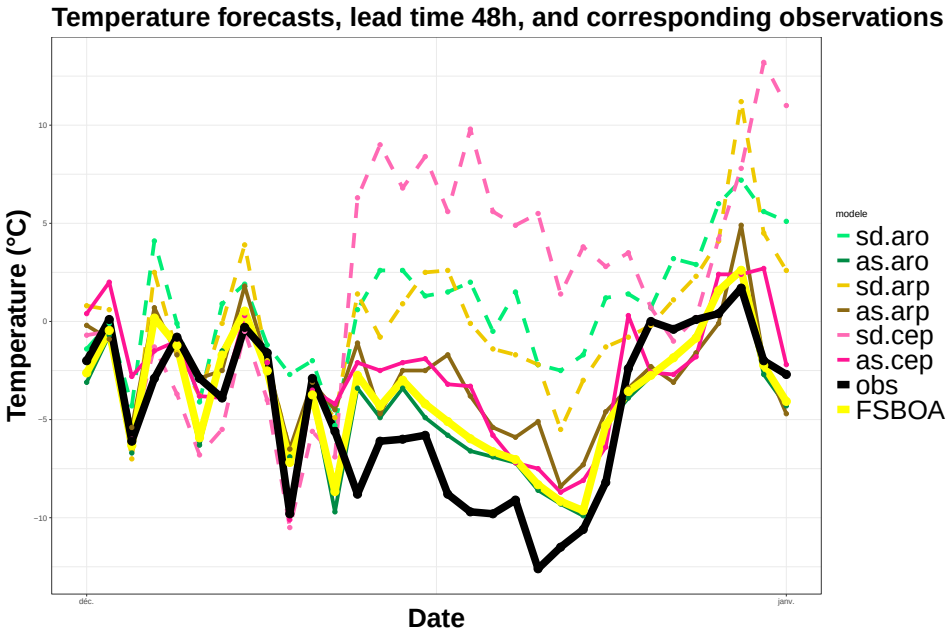
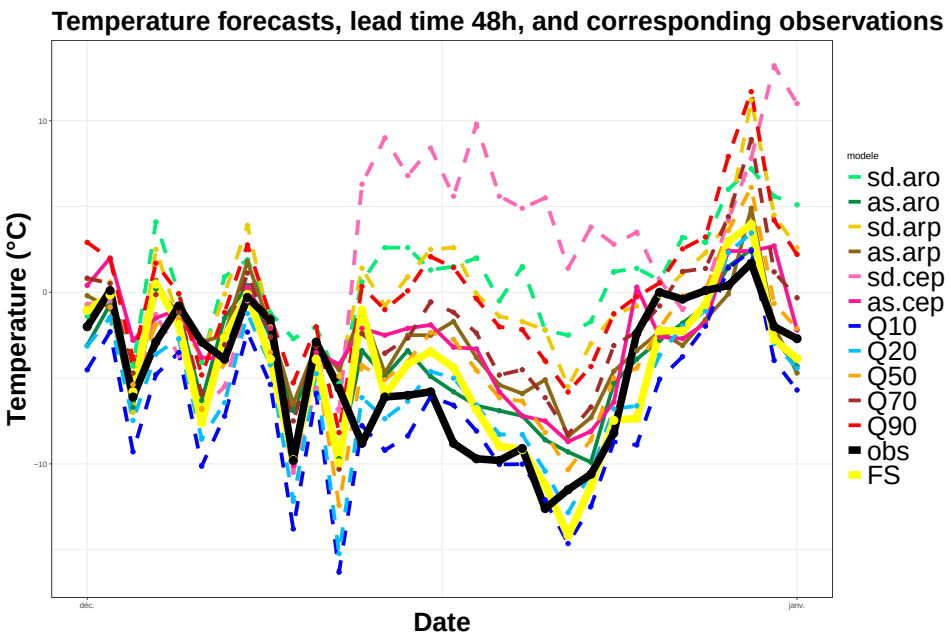
new algorithm : FSBOA, combination of BOA and FS (Fixed Share) (Herbster and Warmuth [1998])
RMSE(BOA) > RMSE(FSBOA)

Improving the aggregation strategy





Our goal : reduce occurrence of large consecutive errors

- use of biased experts : PEARP ensemble forecasts quantiles
- Fixed Share (FS) : more reactive aggregation

- aggregation better than individual best expert on average
- slight improvement on average with the new algorithm FSBOA (ongoing theoretical work)
- use of biased experts and more reactive aggregation strategies to help reduce large consecutive errors
- to be improved since FS adds some noise on everyday forecasts

Mark Herbster and Manfred K. Warmuth. Tracking the Best Expert. *Machine Learning*, 32(2):151–178, August 1998. ISSN 1573-0565. doi: 10.1023/A:1007424614876. URL https://doi.org/10.1023/A:1007424614876.

Olivier Wintenberger. Optimal Learning with Bernstein Online Aggregation. *Machine Learning*, 106(1):119–141, 2017.

Thank You