Introducing GLAMEPSv2

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for the GLAMEPS development team
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Introducing GLAMEPSv2

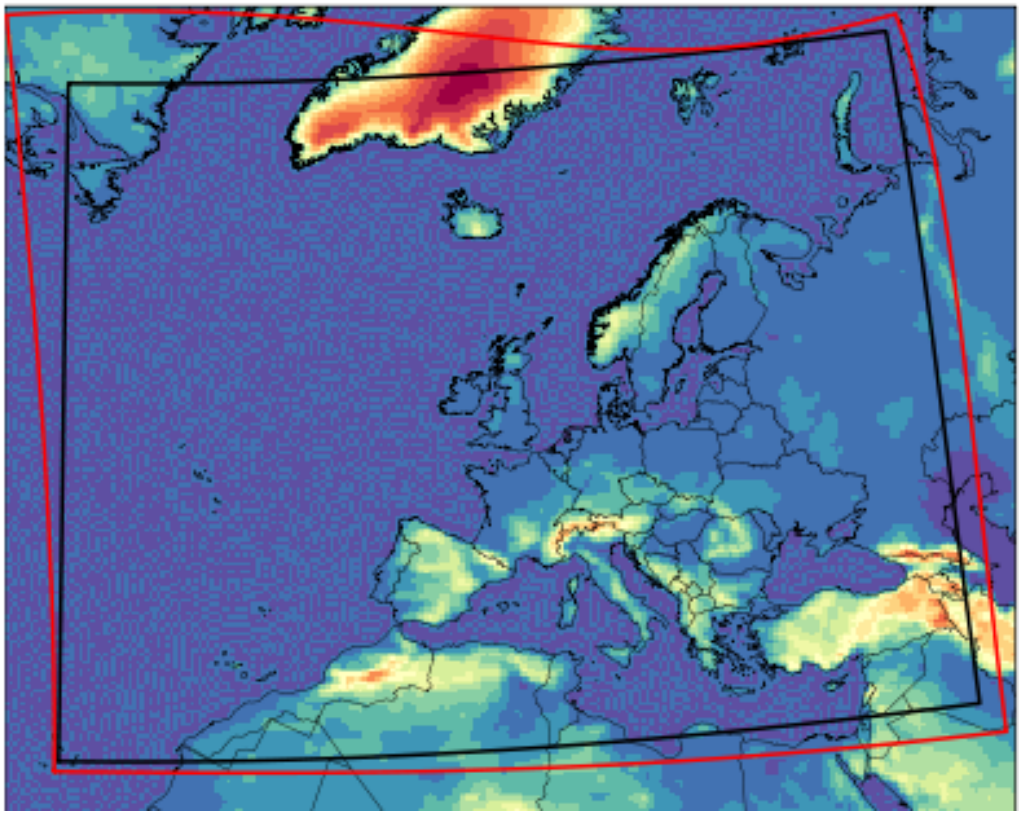
GLAMEPSv2: main changes

GLAMEPSv2 became operational on 25 September. It responds to several requests from users and introduces some major changes compared to v1. Some highlights:

- 4 runs/day.
- Still multi-model, but no more members from global ENS.
- More available output products.
- Increased resolution (domain basically unchanged).

GLAMEPSv2: domain

- Alaro: 853x709, 8.9km, L40
- Hirlam: 870x660, .075^o, L40
- Notice the difference in projection: Lambert vs Rotated Lat/Lon!
- Final products are all on Hirlam domain

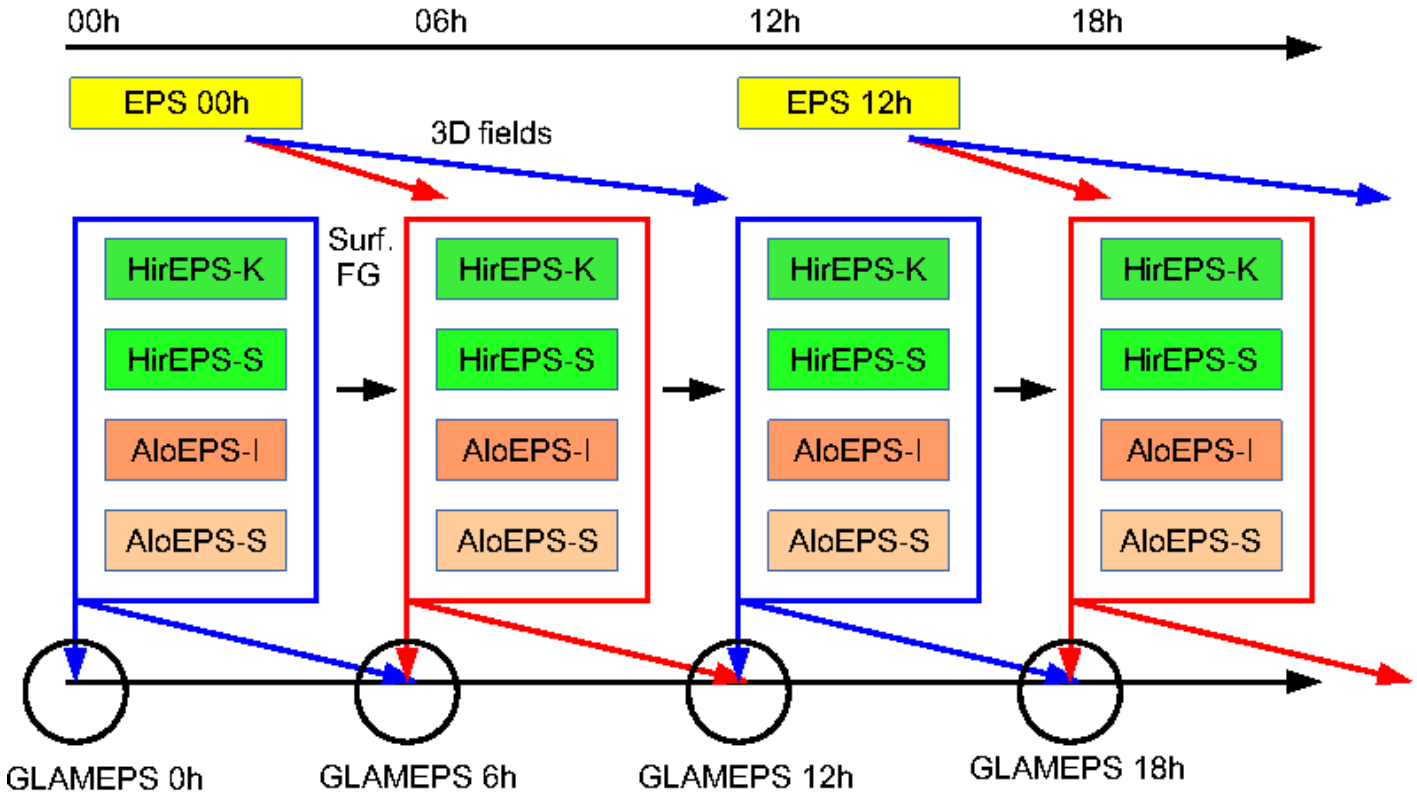


GLAMEPSv2: basics

- Run at 00, 06, 12, 18 to +54h (+60)
- Two versions of Hirlam (Straco, Kain-Fritsch) , two versions of Alaro (Isba, Surfex). Each has 12 perturbed members plus control.
- Half of the members are lagged by 6h. Controls are run every 6h.
- To combine +54h forecasts, we have to run all members to +60.
- (2x6+1) x ALARO_S + (2x6+1) x ALARO_I + (2x6+1) x HIRLAM_K + (2x6+1) x HIRLAM_S = **52**
- LBC's: control and 48 perturbed members from ENS.

v2 cycling/lagging

At every forecast time, you combine the 28+4 new members with the perturbed members calculated 6h earlier. These always correspond to different members from ENS.



Model versions

ALARO:

- Harmonie 37h1.2 (adapted to fit in GLAMEPS SMS suite).
- ISBA and SURFEX schemes.
- Every member has seperate surface assimilation cycle.

HIRLAM:

- Two schemes for cloud parametrisation.
- Stochastic physics.
- Perturbed surface obs.
- Surface assimilation.
- 3d-Var in control members.

Calibration (J.B. Bremnes & T. Nipen)

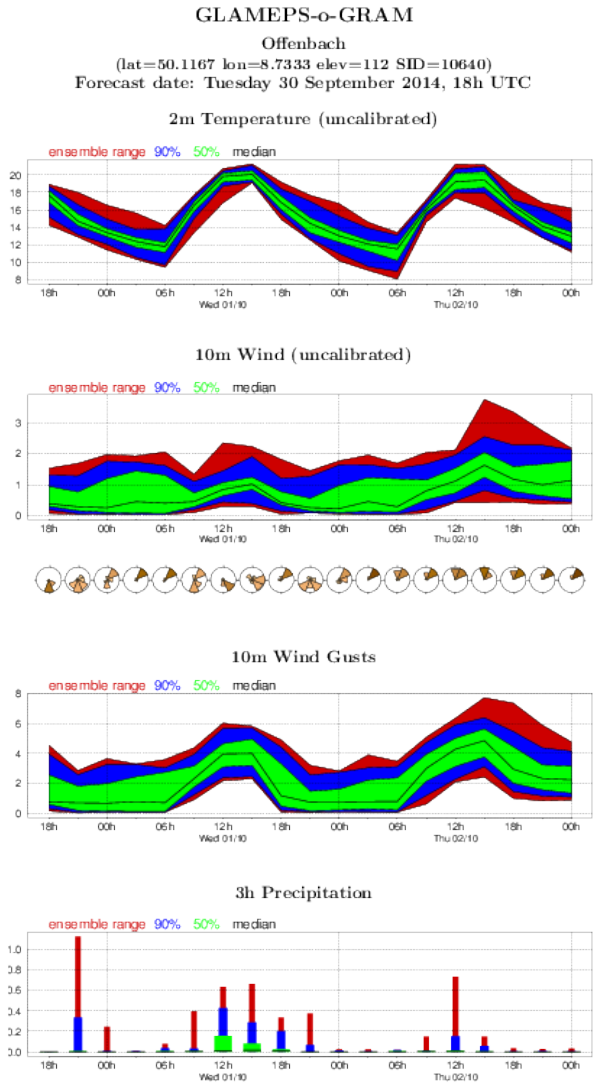
- **Extended Logistic Regression**

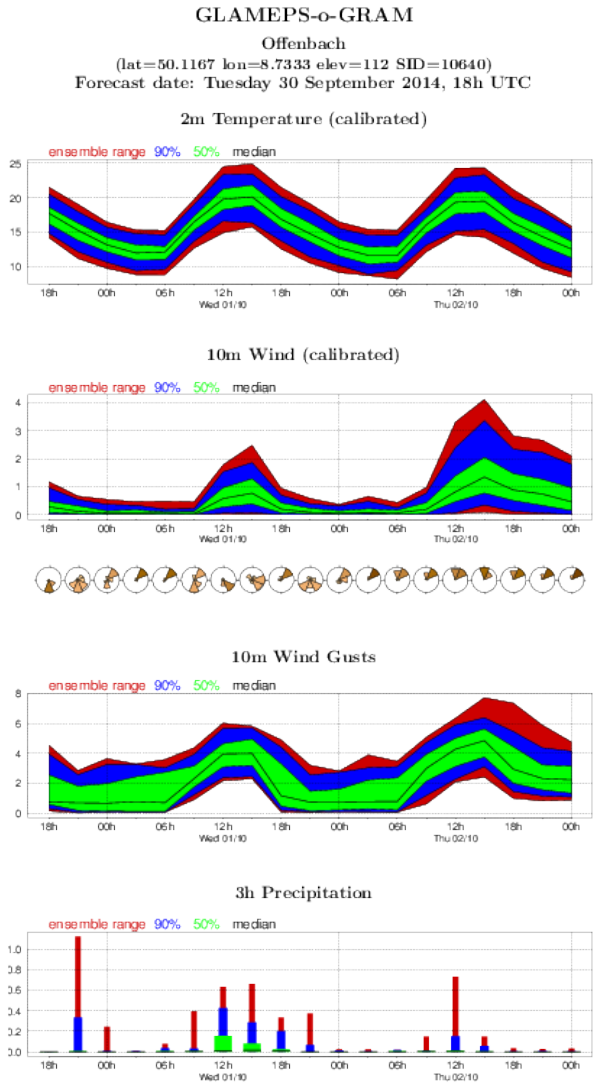
$$P(y < q_j|x) = \Lambda\left(\frac{g(q_j) - \beta x/\alpha}{1/\alpha}\right),$$

$$\Lambda(x) = \frac{e^x}{1 + e^x}$$

- Predictors: (square root of) ensemble mean and grid point elevation.
- Currently only T2m and S10m, trained over the whole domain (but separate per forecast time).
- A calibrated ensemble is sampled (pointwise) from the resulting probability distribution function for the fixed quantiles 1. . . N/(N+1).
- In the future, it is planned to add other spatial dependencies.

Illustration: GLAMEPS-o-grams

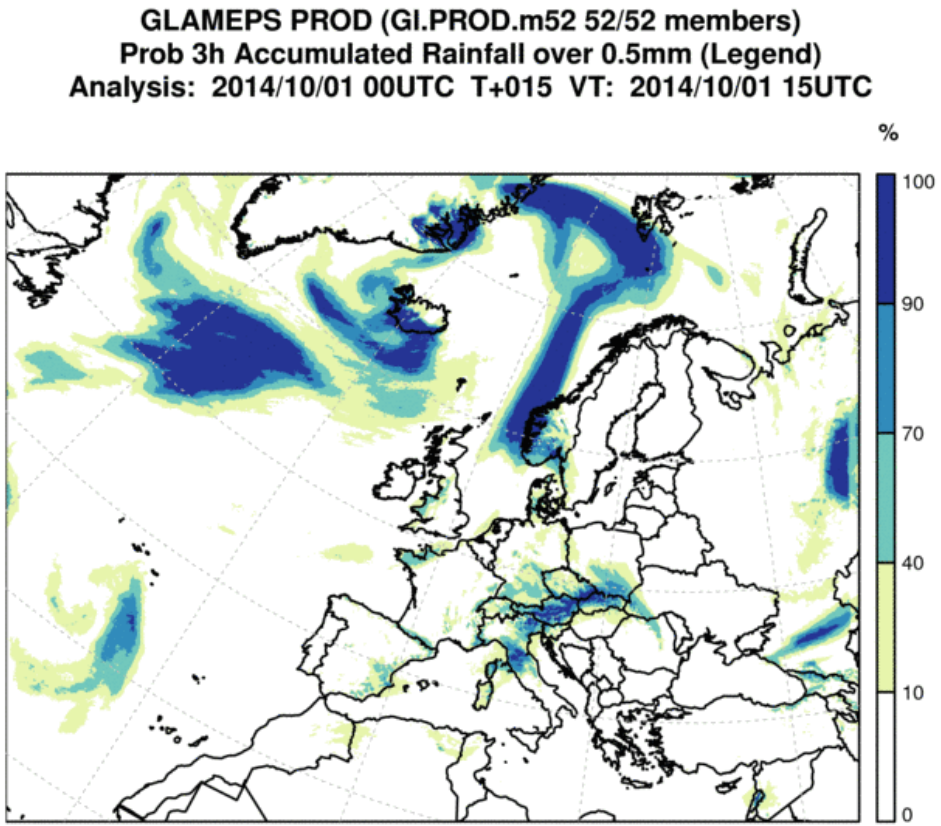




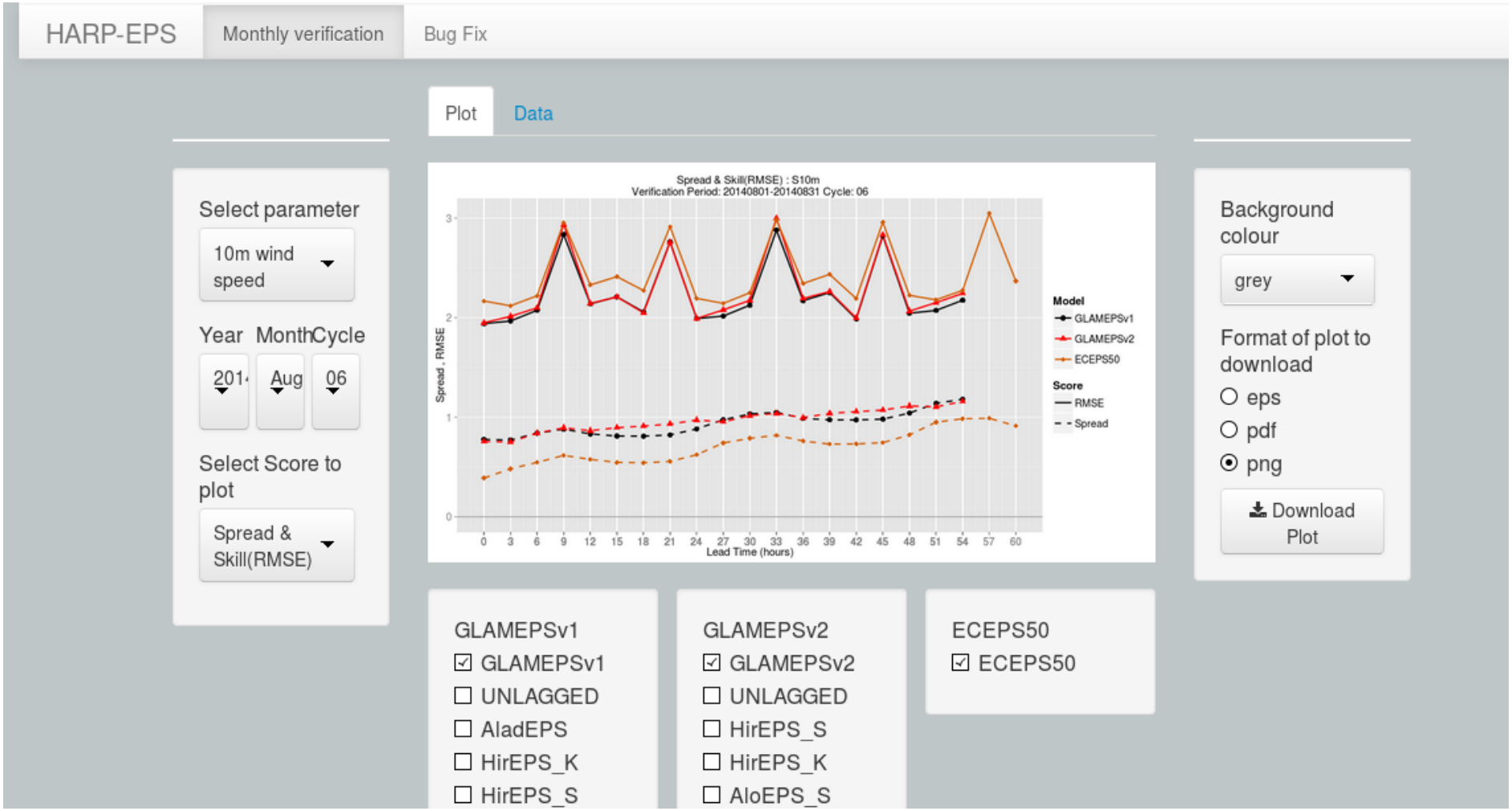
Output & Products

1. **Graphical products** (on website):
   - Probability maps
   - Ensemble Spread
   - GLAMEPS-o-Grams
2. **GRIB files** (on ecgate):
   - Member forecasts
   - Ensemble forecasts (probability maps)
   - Primary (archived): T2m, Td2m, Q2m, 10m wind, precipitation, pressure level data
   - Secondary (not archived): levels P700,P1000,100m wind; Tmin/max, 0^o isotherm, cloudiness ...
3. **SQLite tables**
   - Monthly tables of main variables, interpolated to station locations
   - Mainly meant for calibration, verification, meteograms

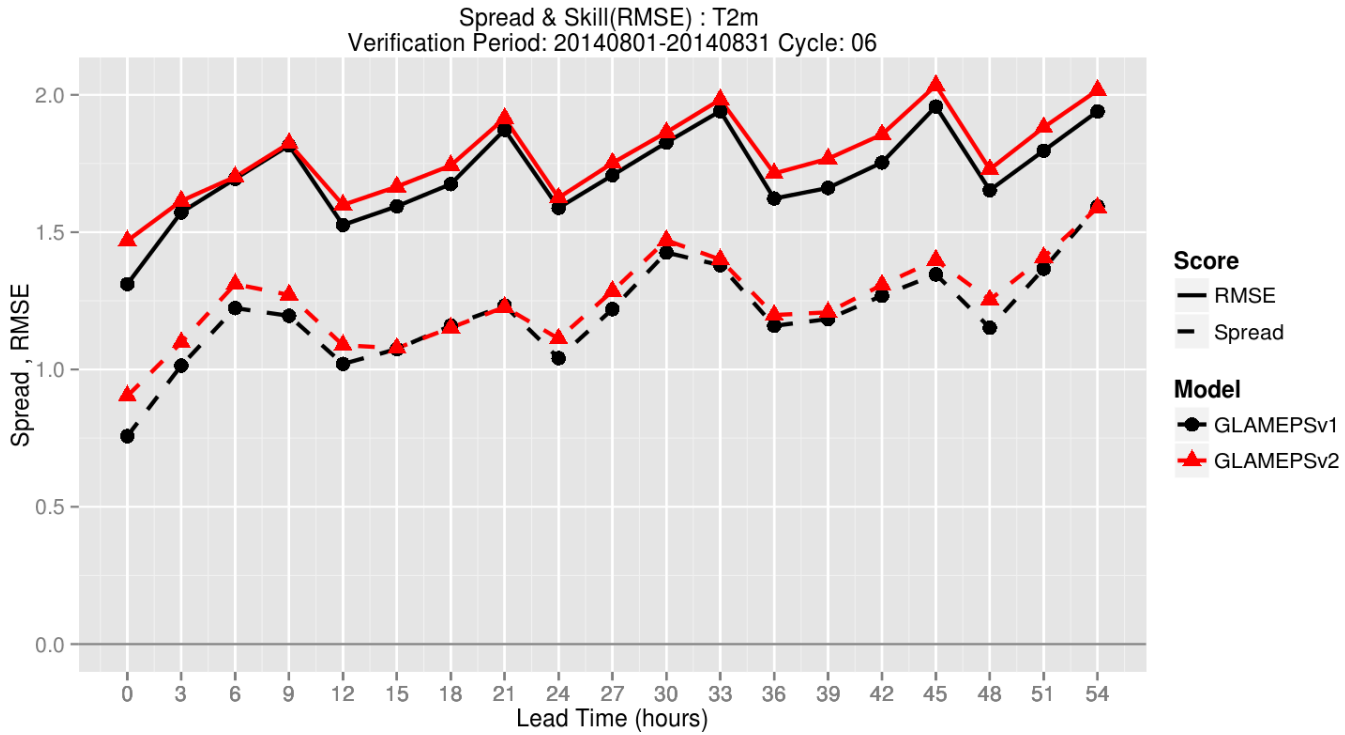
Example: 3h precip



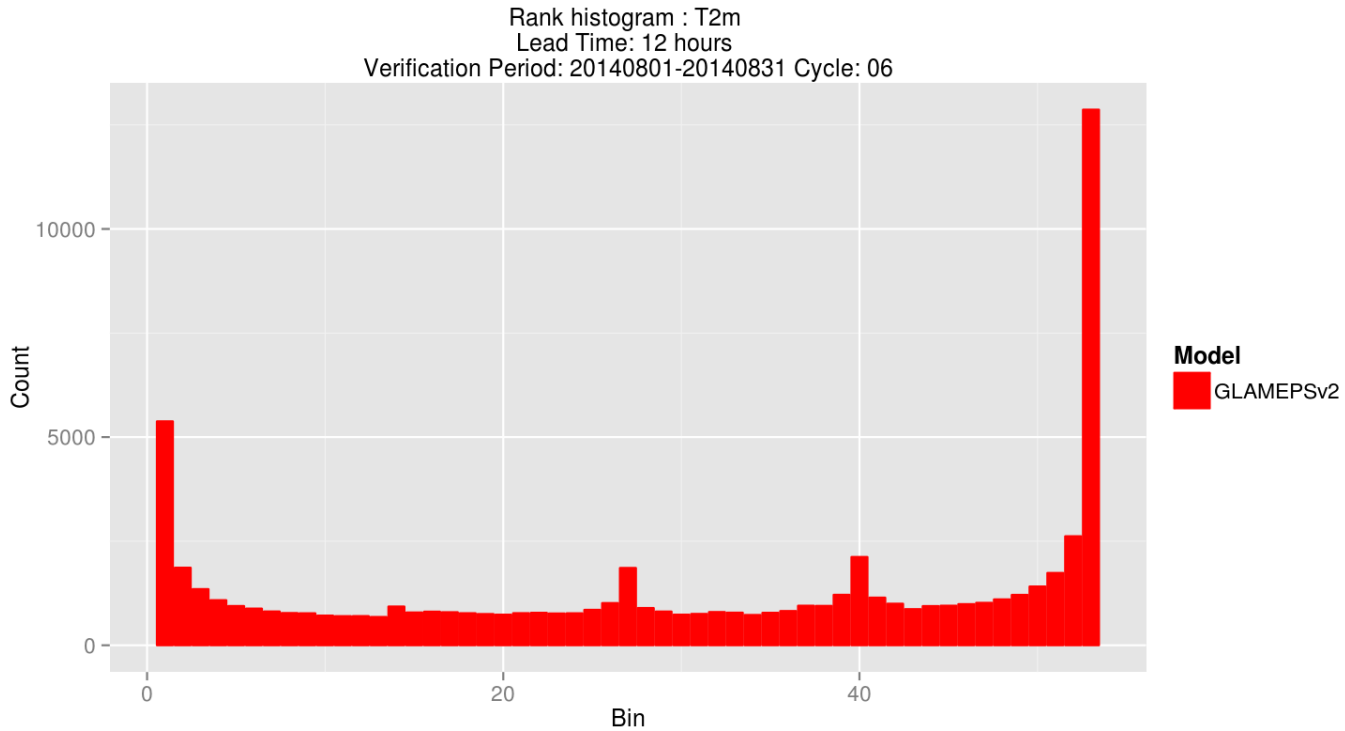
Scores


HARP-EPS
Monthly verification
Bug Fix
Plot
Data
Select parameter
10m wind speed
Year
Month
Cycle
201
Aug
06
Select Score to plot
Spread & Skill(RMSE)
Spread & Skill(RMSE) : S10m
Verification Period: 20140801-20140831 Cycle: 06
Spread , RMSE
Lead Time (hours)
Model
GLAMEPSv1
GLAMEPSv2
ECEPS50
Score
RMSE
Spread
Background colour
grey
Format of plot to download
eps
pdf
png
Download Plot
GLAMEPSv1
GLAMEPSv1
UNLAGGED
AladEPS
HirEPS_K
HirEPS_S
GLAMEPSv2
GLAMEPSv2
UNLAGGED
HirEPS_S
HirEPS_K
AloEPS_S
ECEPS50
ECEPS50

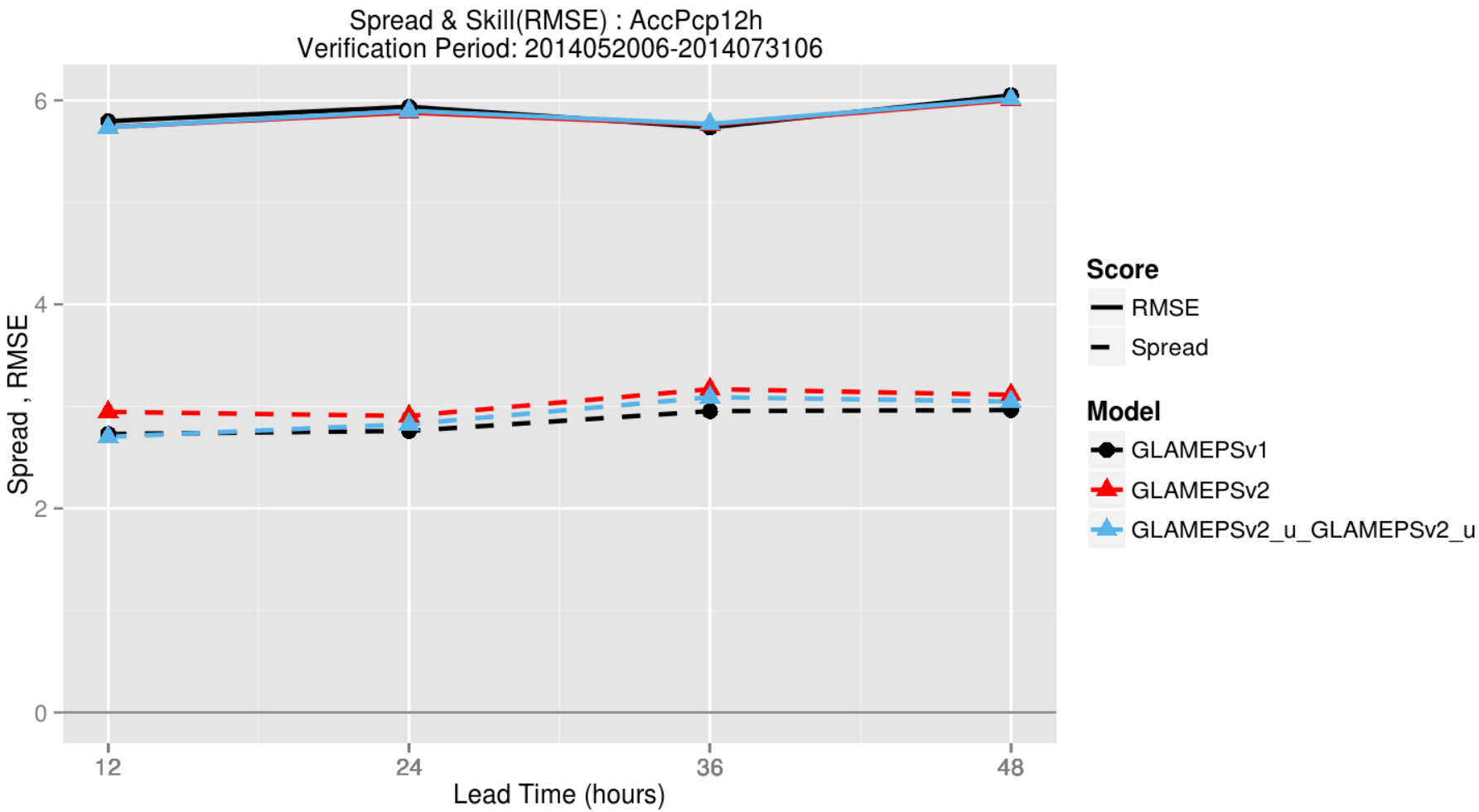
v2 vs v1


Spread & Skill(RMSE) : T2m
Verification Period: 20140801-20140831 Cycle: 06
Spread , RMSE
2.0
1.5
1.0
0.5
0.0
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
45
48
51
54
Lead Time (hours)
Score
RMSE
Spread
Model
GLAMEPSv1
GLAMEPSv2

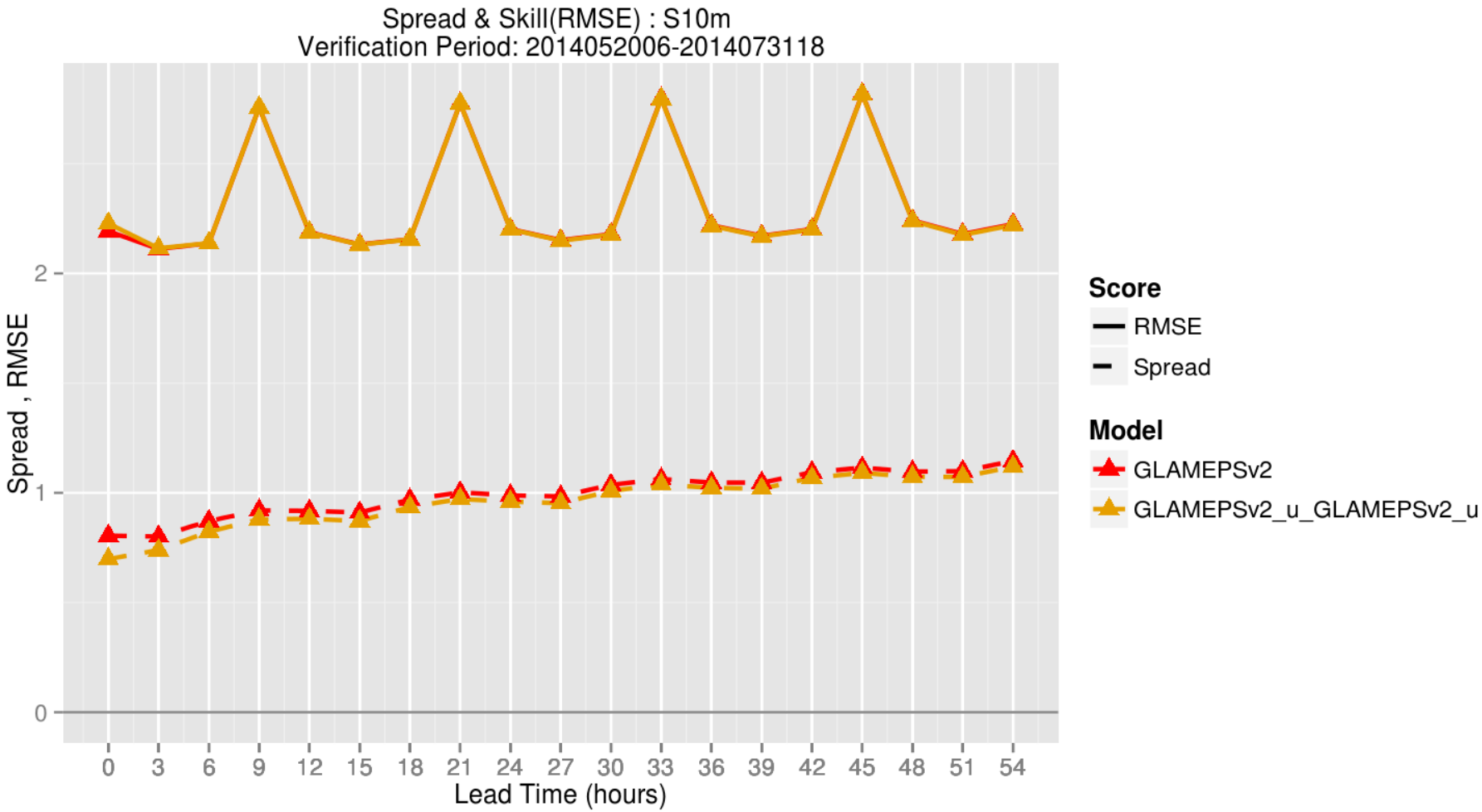
Multi-model spread



Impact of lagged members



Impact of lagged members



Conclusions

- GLAMEPSv2 became operational with the switch to CRAY.
- The main contribution to spread appears to be coming from the multi-model setup.
- The lagged members do improve the spread, but for many variables the effect is mainly at the beginning of the run.
- v1 and v2 scores are comparable $\rightarrow$ room for improvement.
- Spread of the ALARO subensembles is somewhat less (no extra perurbations)
- **FUTURE**
  - Additional perturbations (& 3d-Var) for Alaro members
  - New perturbation methods (e.g. CAPE singular vectors)
  - Further development of calibration

THANK YOU!