

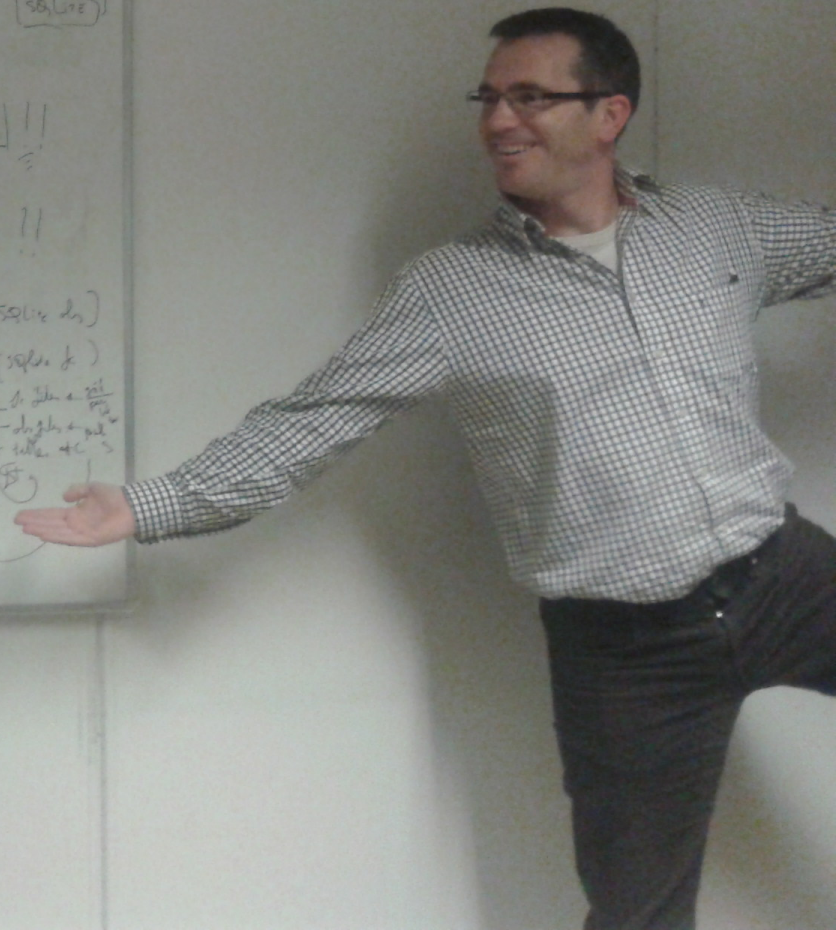
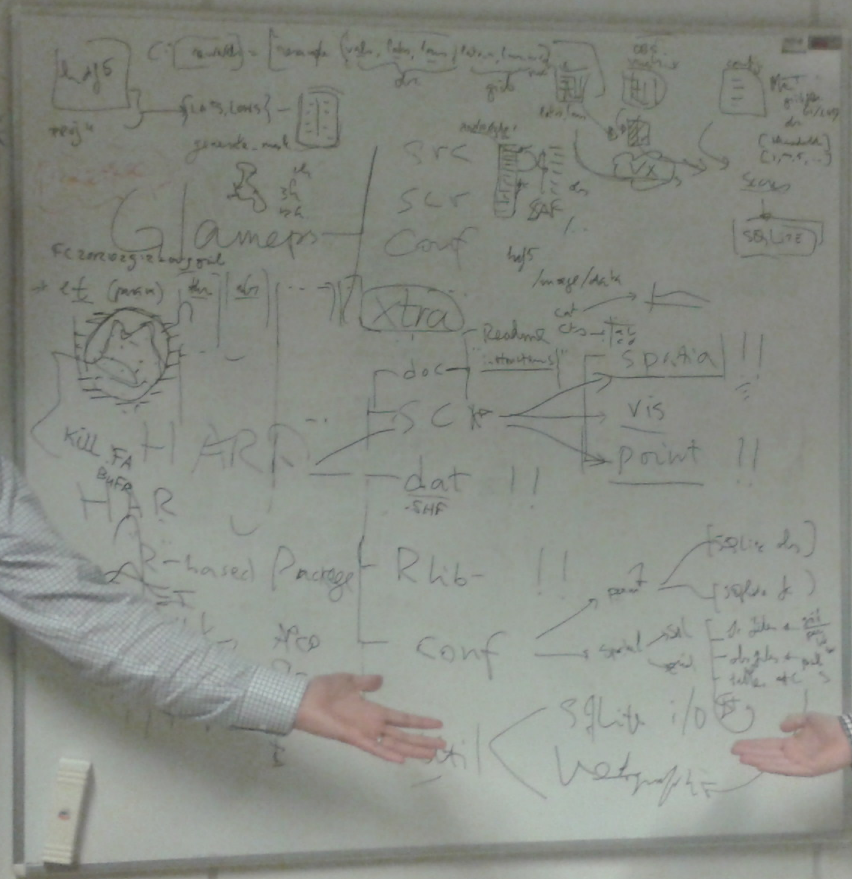
HARP

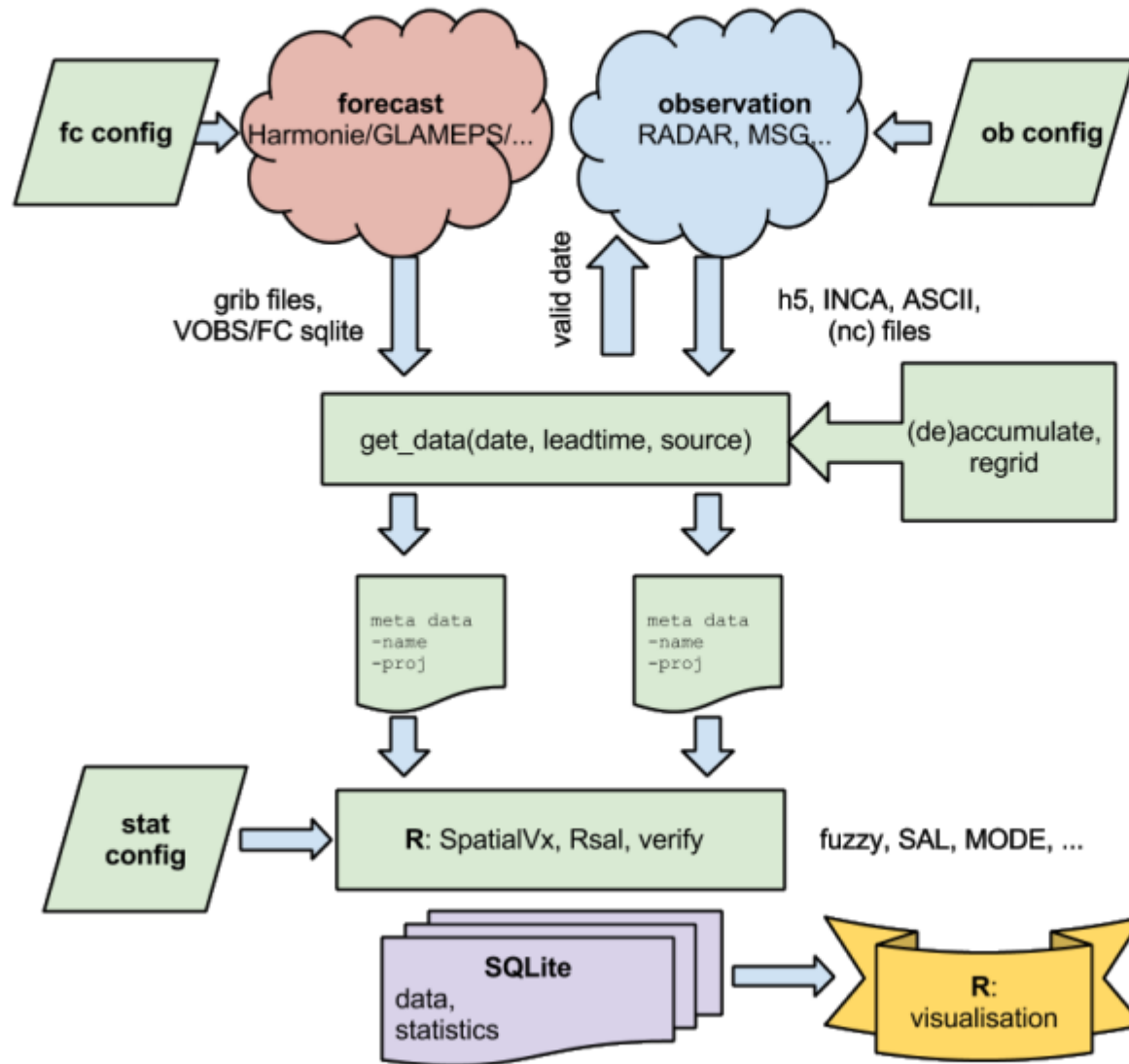
a common framework for verification

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Outline

- Development of HARP
- Preparation of data for HARP digestion
 - The SQLite idea
- Verification routines
- Results
 - SQLite tables and plots
- Outlook





see Emiel's poster

HARP structure

As can be found on the common repository: git@hirlam.org:Harp

HARP



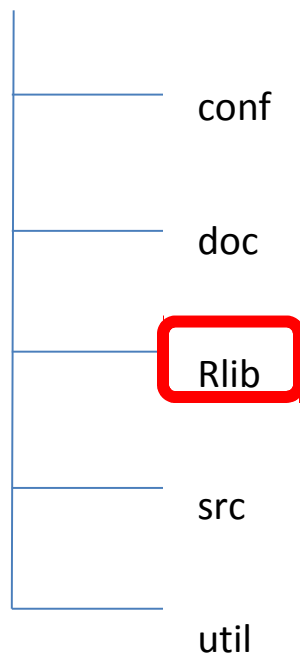
The main routines: **src**

R-scripts doing the actual verification and visualization:

- EPS verification
- Spatial verification (SAL, FSS, ...)
- Visualization of spatial and EPS verification results

HARP structure

HARP



R library files: **Rlib**

Specific R-libraries for verification:

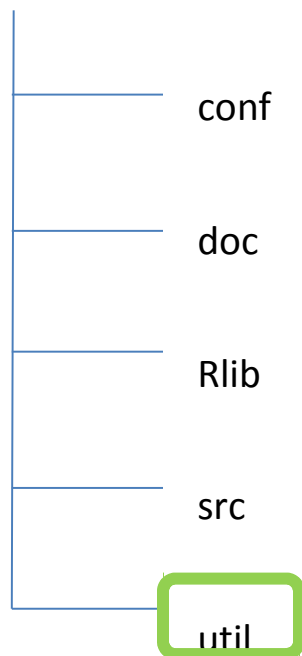
- mapNew
- geogrid
- Rfa
- Rgrib2
- ...

+ requiring some other R-libraries

- RSQLite
- h5r
- spatialVx
- verification
- ggplot2
- ...

HARP structure

HARP



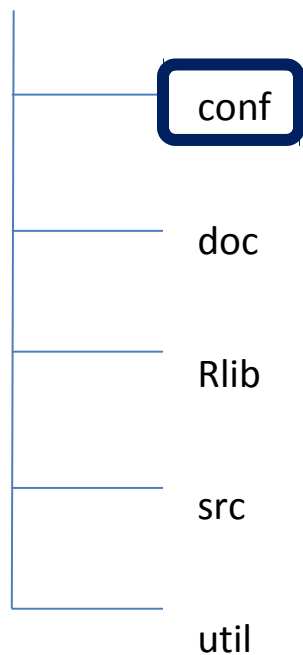
Preparing data: **util**

Utility files to prepare data for input to R-(verification)scripts (src)

- Interpolating model data to station position
- Preparing observation data (like VOBS)
- Interpolation methods for model fields (spatial verification)

HARP structure

HARP



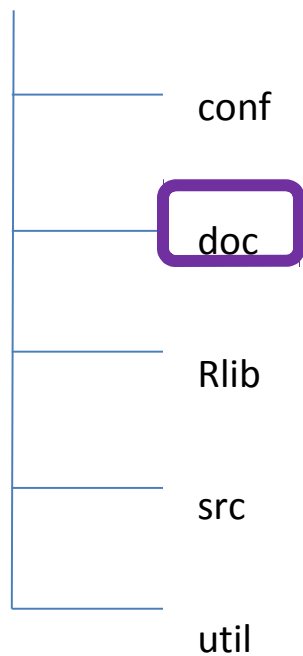
Preparing the verification chain: **conf**

Definition of models, directories, parameters, ...

- model domains
- model runs, lead times, ...
- structure of the local environment (directories)
- definition of thresholds, scores, ...

HARP structure

HARP

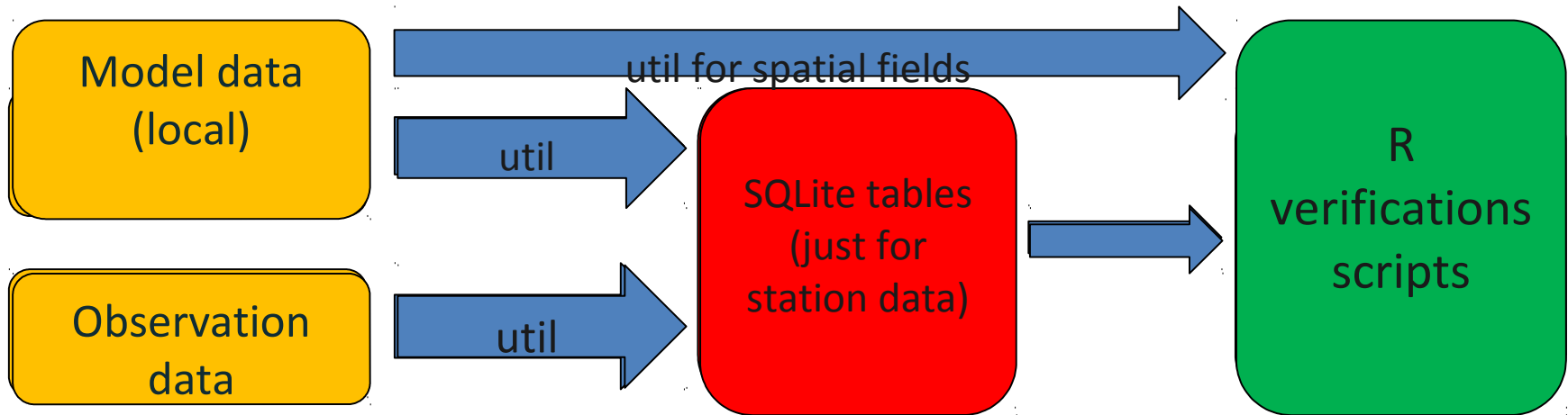


Documentation: **doc**

- Readme
- Howto's
- Documentation of utilities
- Documentation of (our own) R-libraries

util

To extract data from local environment and plug them to the interface
(remember Marrakech)



Status:

- Interpolation of model data to station position -> SQLite table
- Extraction of observations from VOBS -> SQLite table
- parsing of VFLD files -> SQLite table
- reading and plugging of several spatial fields (Grib, FA, hdf5 ascii, bin)

- not restricted to SQLite – any other SQL – database can be used with small changes in the setup

Interface: SQLite tables

Station table:

Information about observation stations used in the process of verification.

Station id	Lat	Lon	Elevation	Land type
sid (int)	lat (float)	lon (float)	elev (float,m)	ltype (int?)

Forecast data tables:

Data table for each parameter / monthly

Point forecast data extracted from the model concatenated in monthly SQLite files.

-> interpolated to station position as from station tables as a view

id	fc.date	Verif.date	Lead time	System time update time	lat	lon	Member 1	Member 2
sid (int)	fcdate (int)	validdate (int)	leadtime (int)	lastmod (int)	lat (float)	lon (float)	m1name (char)	m2name (char)

Interface: SQLite tables

SYNOP

Holds information from SYNOP or other surface station (by month)

-> extracted from VOBS files (at the moment)

Station id	Verif.date	T2m	Wind direction	...
sid (int)	validdate (int)	t2m (float)	dd (float)	...

Interface: SQLite SNYOP (firefox)

validdate	SID	lon	lat	elev	CCtot	D10m	S10m	T2m	RH2m	Pmsl	AccPcp...	Q2m	vis	Td2m	Tmax	T
1364774400	1001	-8.67	70.92	9	6	340	11	261.9	76.4	1013.4		0.001214	2500	258.6		
1364774400	1002	16.25	80.05	8		160	5	261.2		1001.3						
1364774400	1003	15.5	77	11	3					1000.5			12000			
1364774400	1006	22.82	78.25	14		230	5	254.8	84.2	1002.5		0.000750...		252.8		
1364774400	1008	15.47	78.25	26	1	120	5	257.6	74.4	1001.7		0.000842...	55000	254.1		
1364774400	1009	25	80.65	5				259.3	83.3	1003.2		0.001082		257.1		
1364774400	1010	16.12	69.3	13	6	310	11	272.3	80	1007.1		0.00284	50000	269.3		
1364774400	1011	31.5	80.07	10		60	16	264		1001.7						
1364774400	1015	17.83	69.6	14		190	11	272.2	83.7					269.8		
1364774400	1016	28.88	78.92	14		100	7	265.2	93.9	999.4		0.001964		264.4		
1364774400	1017	14.78	77.68	6		60	5	253.7		1001.9						
1364774400	1020	16.53	76.47	10		60	10	259.3		1000.8						
1364774400	1023	18.53	69.05	76		250	1	267.9	94.8	1007.3		0.002441	1800	267.2		
1364774400	1025	18.9	69.67	8		190	6	270.2	92.1	1005.8		0.0028	7000	269.1		
1364774400	1026	18.93	69.65	114	8	200	4	269.7	94.2	1006.1		0.002794	15000	268.9		
1364774400	1027	18.9	69.65	20				270.6	93.5					269.7		
1364774400	1028	19	74.52	16	2	150	3	261.1	83.6	1002.9		0.001258	30000	258.9		
1364774400	1033	19.5	70.23	24		230	4	271	86.1	1004.7		0.002787		269		
1364774400	1037	20.25	69.38	4		90	2	266.1	92.5	1005.8		0.002059		265.1		
1364774400	1043	22.82	70.4	10		260	4	271.1								
1364774400	1044	22.13	70.48	6		240	7	271.4	92.2	1003.3		0.00307		270.3		
1364774400	1046	20.95	69.78	4		290	2	269.2	74.8	1005.2		0.00211		265.4		
1364774400	1049	23.35	69.97	2		120	3	264	81.3	1004.3		0.001538		261.4		
1364774400	1052	23.67	70.67	79		230	6	270.3	96.3	1002		0.002988		269.8		
1364774400	1055	23.97	71.08	14		250	13	273	64.8	1000.1		0.002439		267.2		
1364774400	1058	23.53	69.57	381		130	2	255.5	83.5	1007.4		0.000826...		253.4		
1364774400	1059	23.53	70.57	7		150	1	267.5	78	1003.7		0.001288		264.4		

src: R-tools

To day

EPS

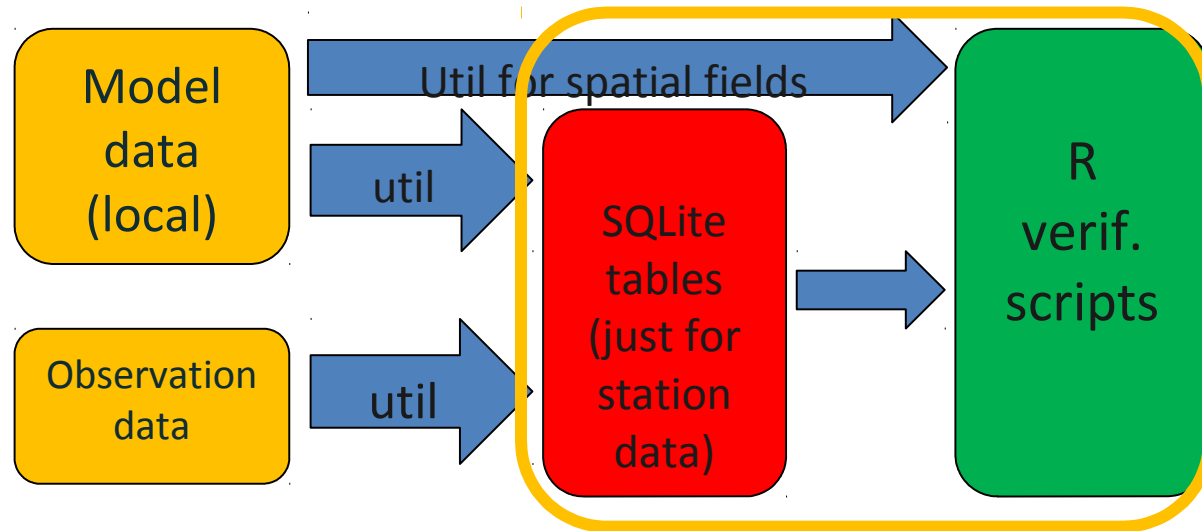
- Prototype version providing basic scores
- Plotting routines
- Reading but not yet writing to SQLite

Spatial

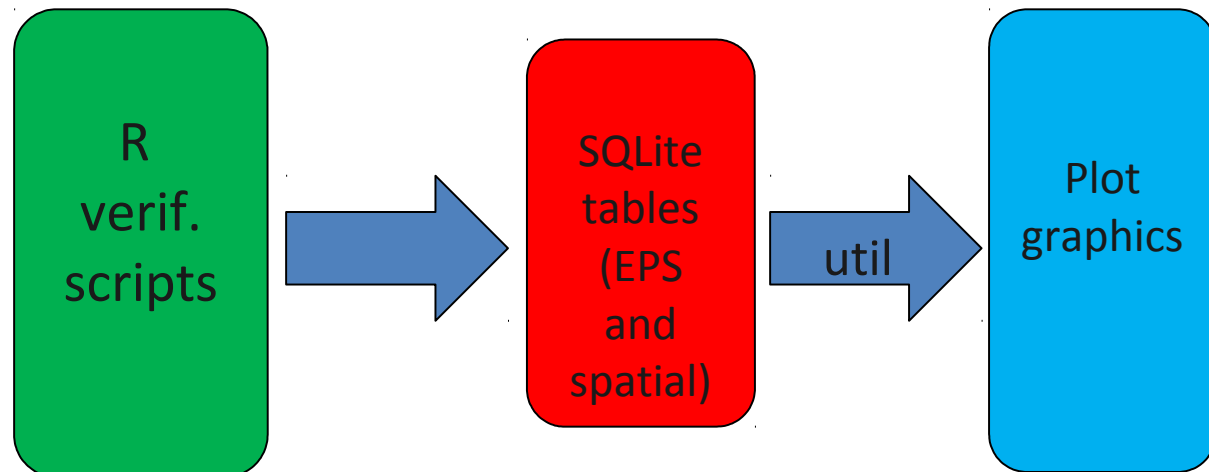
- Development version for FSS and SAL
- Development version for plotting routines
- SQLite output exist for FSS

src: R-tools

- Read from SQLite data files or from spatial fields
- Calculate scores
- Write to SQLite results files



- Read from SQLite results files
- Plot



Results: SQLite

Aggregated results

- Overall scores for each model and region (one table per sub-domain). Different tables for scores with different dimensions.

Ensemble / Model	Lead time	Score 1	Score2
mname (character)	Leadtime(int)	(float)	(float)		
...					

Disaggregated results

- For each scores are calculated per validation time and lead time. It is for some scores possible to aggregate overall scores from this tables.
- Enable calculation of scores for changing regions, domains, lead-times, periods ...
- Scores can be calculated directly via query for selected stations, lead times ...

Station id	Ensemble / Model	fc.date	Lead.time	Score 1	Score 2
sid (int)	mname (character)	fcdate (integer)	leadtime (integer)	(float)	(float)

Results: SQLite spatial (firefox)

SELECT * FROM stats

SQL ausführen

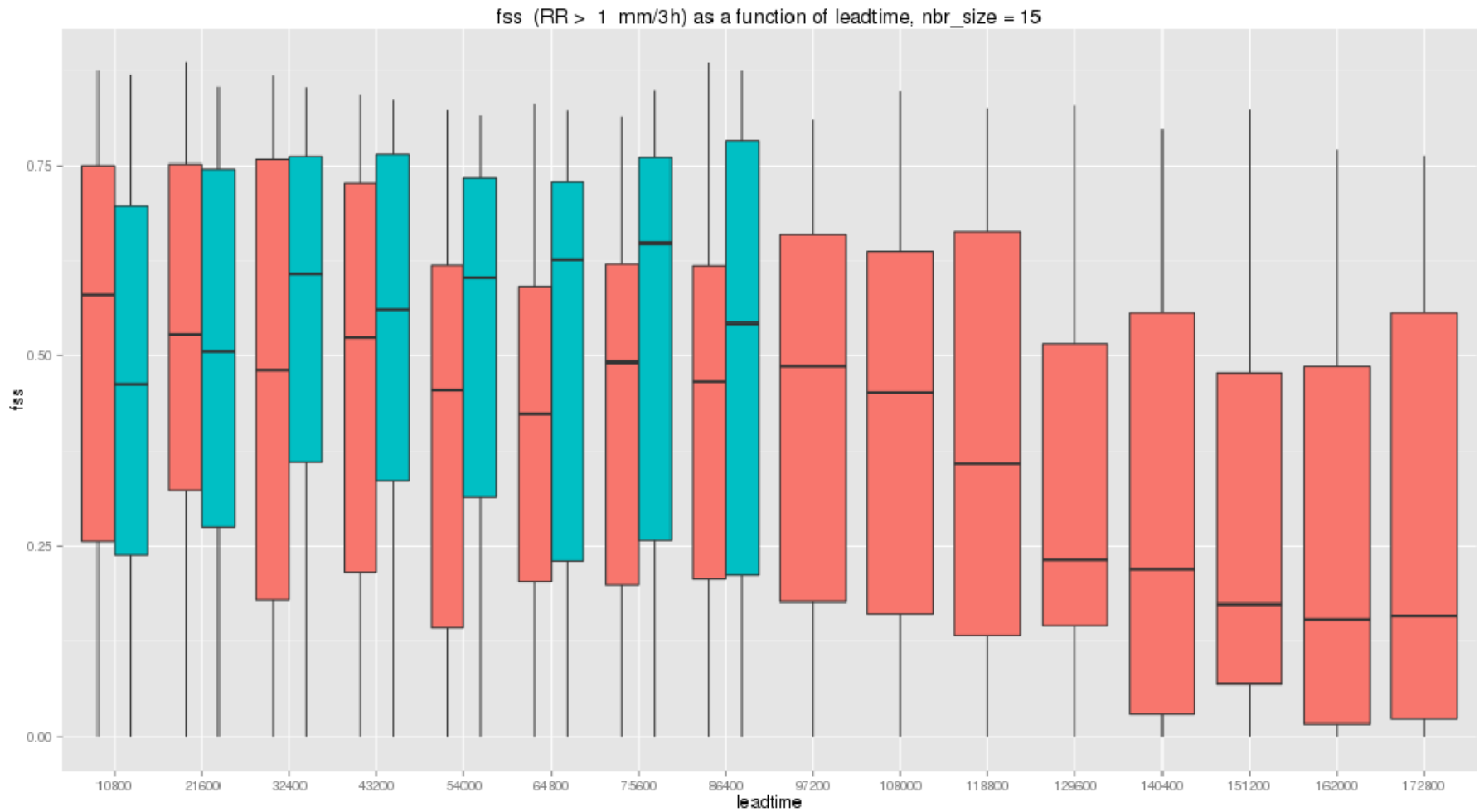
Aktionen ▾

Letzter Fehler:

not an error

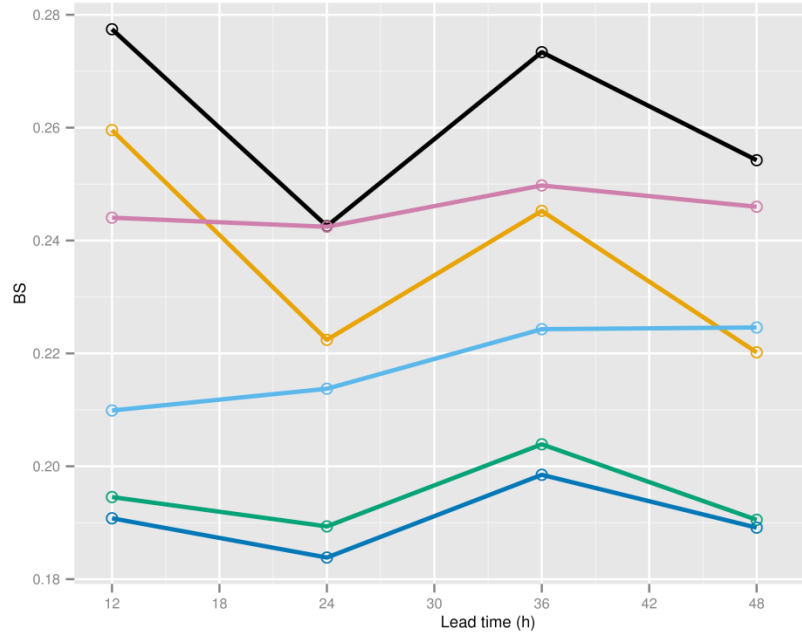
date	leadtime	threshold	nbpts	baserate	bias	mse	ets	hk	fss
1359687600	3	0.1	1	0	0.353755555555...	68106604.91330...	-0.023911938248...	0	0.270578438280
1359687600	3	0.3	1	0	0.353755555555...	68106604.91330...	-0.014775234334...	0	0.212940651494
1359687600	3	1	1	0	0.353755555555...	68106604.91330...	-0.000036047075...	0	0.054626028760
1359687600	3	3	1	0	0.353755555555...	68106604.91330...	0.000042915672...	0	0.011700053182
1359687600	3	0.1	3	0	0.353755555555...	68106604.91330...	-0.022594020707...	0	0.302009742117
1359687600	3	0.3	3	0	0.353755555555...	68106604.91330...	-0.015235583898...	0	0.240330675946
1359687600	3	1	3	0	0.353755555555...	68106604.91330...	0.000415387331...	0	0.062704143351
1359687600	3	3	3	0	0.353755555555...	68106604.91330...	0.000552570178...	0	0.011337717059
1359687600	3	0.1	15	0	0.353755555555...	68106604.91330...	0.016668765676...	0	0.384897665169
1359687600	3	0.3	15	0	0.353755555555...	68106604.91330...	0.019608897972...	0	0.319181716818
1359687600	3	1	15	0	0.353755555555...	68106604.91330...	0.029103585754...	0	0.111844038780
1359687600	3	3	15	0	0.353755555555...	68106604.91330...	0.009354066884...	0	0.011379605227
1359687600	3	0.1	49	0	0.353755555555...	68106604.91330...	0.068793494005...	0	0.500830525043
1359687600	3	0.3	49	0	0.353755555555...	68106604.91330...	0.074501185120...	0	0.452073514141
1359687600	3	1	49	0	0.353755555555...	68106604.91330...	0.078996886154...	0	0.226470424844
1359687600	3	3	49	0	0.353755555555...	68106604.91330...	0.042014584666...	0	0.014063126024
1359687600	3	0.1	225	0	0.353755555555...	68106604.91330...	0.111040061223...	0	0.766232840350
1359687600	3	0.3	225	0	0.353755555555...	68106604.91330...	0.097623249380...	0	0.772002174414
1359687600	3	1	225	0	0.353755555555...	68106604.91330...	0.091339020558...	0	0.701200059533
1359687600	3	3	225	0	0.353755555555...	68106604.91330...	0.110636712777...	0	0.116465620451
1359698400	6	0.1	1	0	0.515333333333...	68107318.64632...	-0.137276808472...	0	0.605442549847
1359698400	6	0.3	1	0	0.515333333333...	68107318.64632...	-0.122692190793...	0	0.611260053619
1359698400	6	1	1	0	0.515333333333...	68107318.64632...	-0.037991482582...	0	0.374994345682
1359698400	6	3	1	0	0.515333333333...	68107318.64632...	0.000187509404...	0	0.017862549197
1359698400	6	0.1	3	0	0.515333333333...	68107318.64632...	-0.116006077444...	0	0.648591387783
1359698400	6	0.3	3	0	0.515333333333...	68107318.64632...	-0.108707937711...	0	0.661047043609

Results: plots

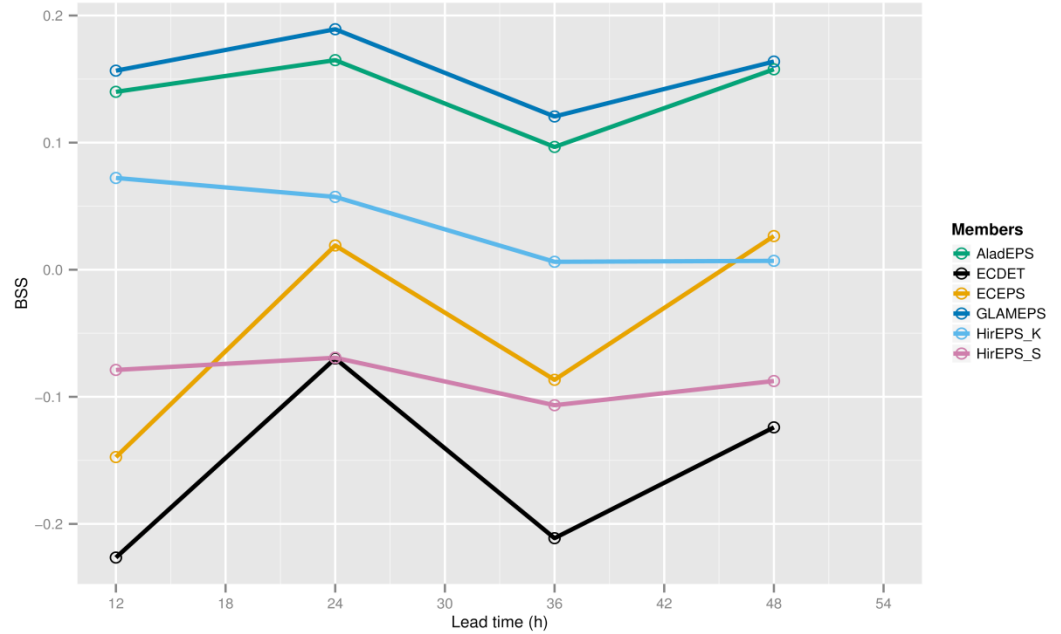


Results: plots

AccPcp12h: BS Threshold 0.1
2013-01-01 06:00:00 – 2013-03-31 06:00:00

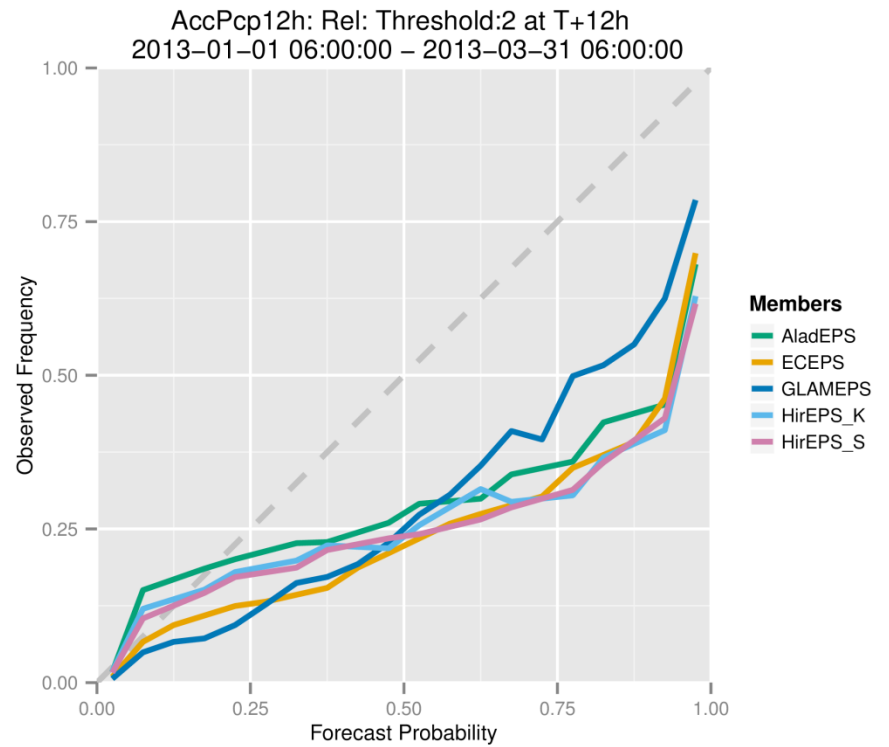
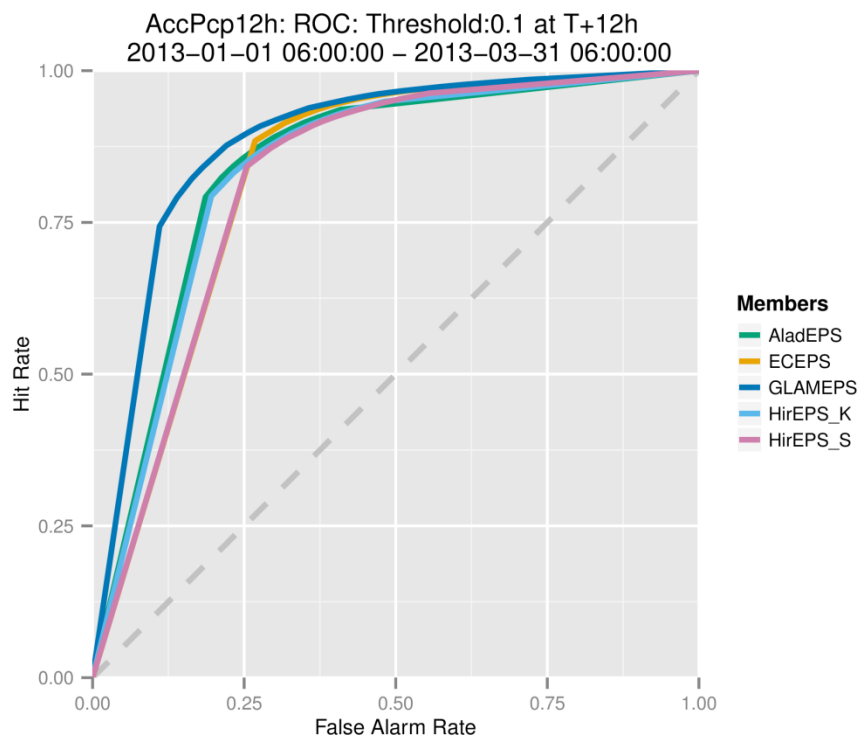


AccPcp12h: BSS Threshold 0.1
2013-01-01 06:00:00 – 2013-03-31 06:00:00

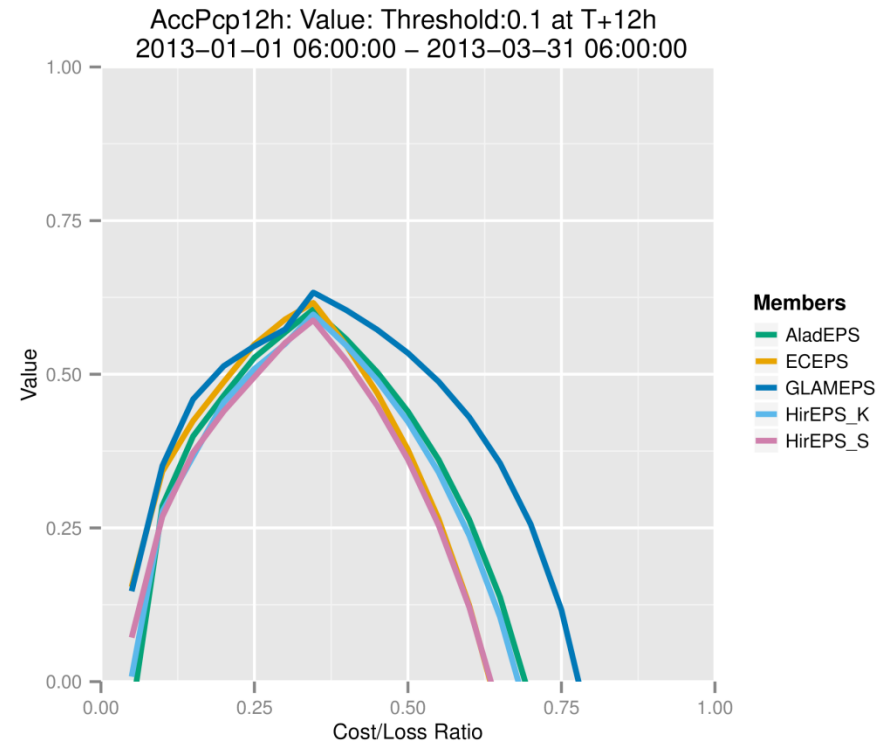
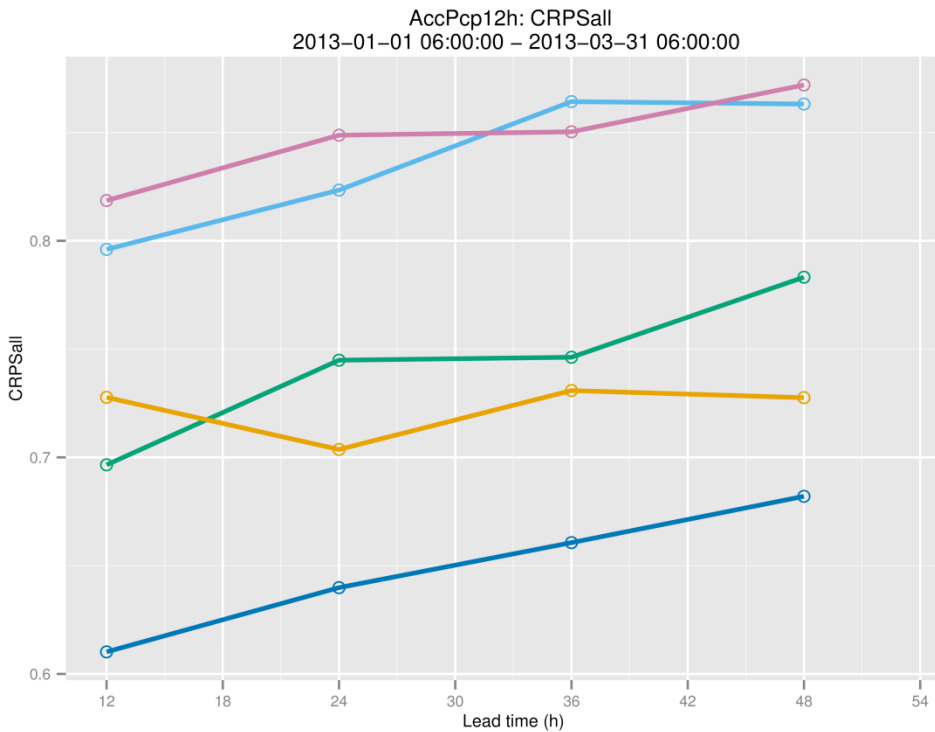


- Members**
- AladEPS
 - ECEDET
 - ECEPS
 - GLAMEPS
 - HirEPS_K
 - HirEPS_S

Results: plots



Results: plots



Results

- Structure of framework was settled
 - Git repository for Harp and Harp_sample (example data)
- General database structure for input and output data
- Prototype version for EPS verification
 - System is easy to implement locally (experience at met.no)
- Possibility to run spatial verification FSS (not yet prototype)
- Production of graphics is externalized

Outlook

- Fixing the prototype version for EPS
 - Implementing reading and writing from SQLite files
 - Cosmetics to the plotting tools
- Getting prototype for spatial verification
 - Util's for different input data types
 - Develop output format for verification results
 - Plotting routines
- Documentation
 - Description of the utilities and R scripts
 - Howto's for local implementations of methods
 - Example data (Harp_sample)
- Visualisation
 - Results to web-platform

THANKS

A. Deckmyn

E. van der Plas

A. Singleton

X. Yang


J. B. Bremnes

K. Sattler

U. Andrae

O. Vignes

S. Tascu



HARF