



Status of EPS verification modules development Results after the first testing period

Angela Celozzi
Chiara Marsigli



VERSUS EPS- PP PLAN Phase 5

Task 3: Implementation of Probabilistic Scores

This task is ongoing from the COSMO year 2012 - task4 phase 4. During this year, the PL team will finish the calculation and visualisation of the ensemble and probabilistic scores in VERSUS using as a reference the EPS documents edited by F.Gofa (Task 5.a phase 3). and A. Boundel (Pre-task phase 4).

In the Patch08 (release scheduled for December 2012),VERSUS will be able to calculate the Following Statistical Indexes:

- ✓ Brier Score and its decomposition
- ✓ Brier Skill Score
- ✓ Ranked Probability Score and Skill Score

And of the following plots:

- ✓ Rank Histogram
- ✓ ROC Curve (and ROC area)
- ✓ Reliability Diagram (with Sharpness Histogram)
- ✓ Cost/Loss Ratio

in the Standard Verification for continuous parameters and precipitation.



VERSUS EPS- Crucial Point

Now after the loader of EPS grib and bufr, the system organizes the data, calculates the Probability and calculates the statistical index using R software.

- ✓ It was necessary to update R software with the last version available. This is the reason of the introduction of the Task 1.a Only with the last R version we can use the code suggested from Anastasia in her document. Unfortunately the new R code doesn't compatible with the old one and some changes are necessary in the R scripts
- ✓ A particularly extensive test phase is necessary because the R behaviour, during the multi-user sessions, isn't clear.
- ✓ VERSUS allows the execution of the EPS score only for the precipitation as cumulated parameter. For any other cumulated parameter is necessary to extend the VERSUS system.



VERSUS EPS- PP PLAN Phase 5

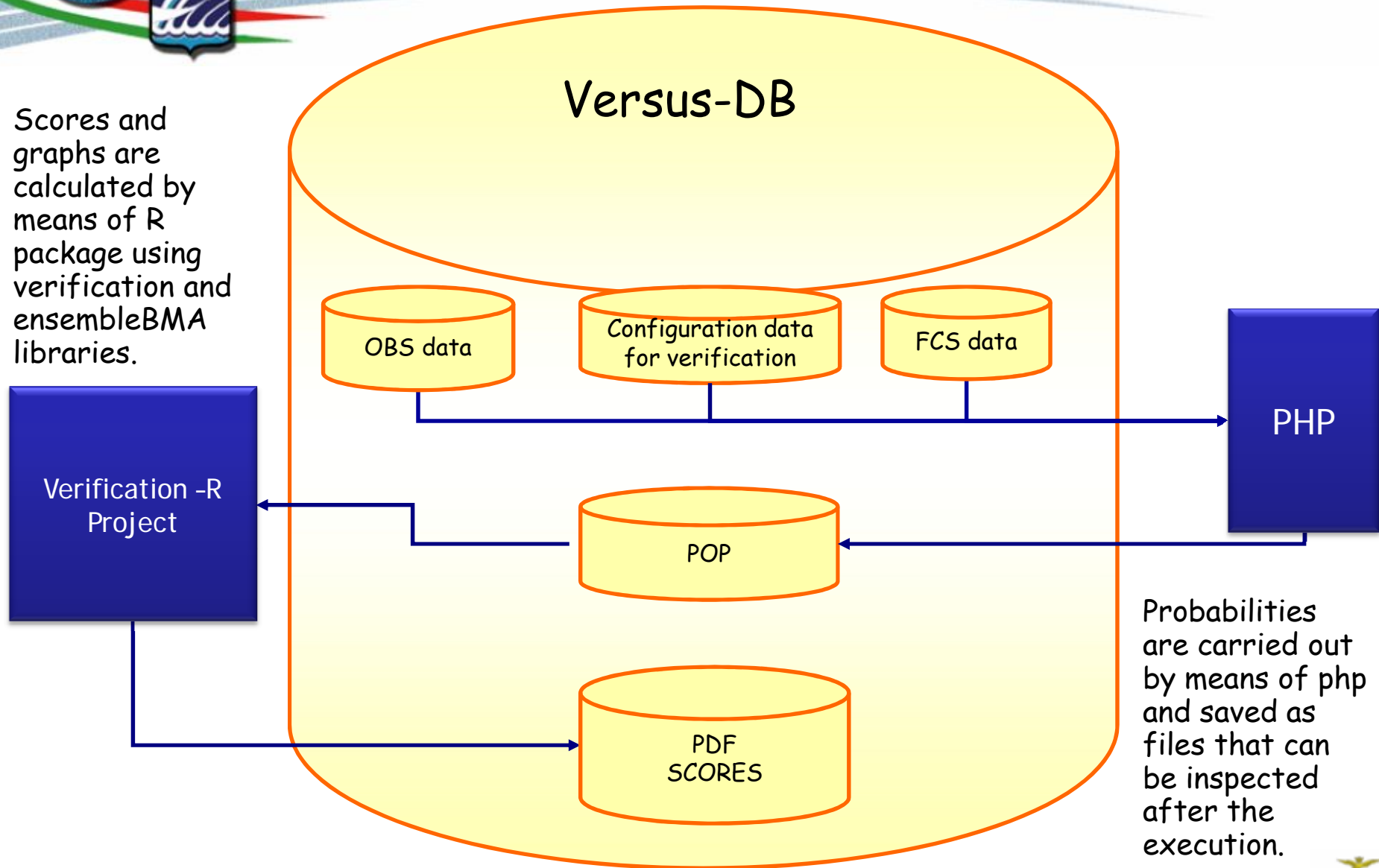
Decisions have to be made regarding the possibility to implement them also for the WDV, Conditional Verification, for the Verification with the Analysis fields, and for the upper air verification from WG.

The deterministic approach was implemented in the past also for Ensemble models.



VERSUS EPS- Architectural Design

Scores and graphs are calculated by means of R package using verification and ensembleBMA libraries.



Probabilities are carried out by means of php and saved as files that can be inspected after the execution.





EPS: Registration

Standard (EPS)

Registration

Description: EPS monthly (MECE)

Stratification: Pratica di Mare

Date: Monthly

Frequency: Frequency

Step: Start 24 End 120 Interval 24

Observation

Parameter: PRECIPITATION - KG/M**2 - 13021

Forecast

Model: COSMO-LEPS-131-80-2

Run 0

Members

- Member 1
- Member 2
- Member 3
- Member 4
- Member 5
- Member 6

Grid: Lat1: -16.125; Lon1: -15.75; Lat2: 9.75; Lon2: 16.125

Parameter: Precipitation - mm - 2

Method: 06) Mean of points Circle R=15 km (mean_radius param.=)

Threshold

Selected Thresholds: [0, 1], [1, 10], [10, 20], [20, 25], [25, 9999]

Insert Thresholds: From-To

From: To:

Delete Add

Scores: BRIER, BRIER SKILL, BRIER DECOMPOSITION, RPS, RPSS, RPS.dim

Diagrams: ROC, Reliability, Cost-Loss, Rank

Save

It's possible to choose the members for the Verification

Scores and Diagrams are fixed





EPS: Report

**The verification has been created.
To create a new verification click on 'Continue'**

Standard Verification Report[EPS]

Id	2695
Name	EPS monthly (MECE)
Criteria Type	Surface
Dichotomic	No
Run	0
Frequency	Monthly
Period Based	Forecast
Steps	START: 24 END: 120 INTERVAL: 24
Stratification	Pratica di Mare
Geographical Distribution	No
OBS	
Parameter	TOTAL PRECIPITATION - KG/M**2 - 13021
Suspect Value	No
FCS	
Model	COSMO-LEPS
Grid	Lat first:-16.125; Lon first:-15.75; Lat last:9.75; Lon last:16.125
Parameter	Precipitation - mm - 2
EPS Diagramm	ROC, Reliability, Cost-Loss, Rank
Scores	BRIER BRIER-SD BRIER-SKILL RPS RPSS RPS.clim
Thresholds	[0 , 1] [1 , 10] [10 , 20]

Diagrams: ROC, Reliability, CostLoss, Rank

Scores : BRIER, BRIER-SD, BRIER-SKILL, RPS, RPSS, RPS.clim



EPS: Searching configured verification

Searching for Report

Verification ID	<input type="text"/>	Active ID Criteria	
Description	<input type="text"/>		
Verification	<input type="radio"/> Standard	<input type="radio"/> Conditional	<input type="radio"/> Weather Type
	<input type="radio"/> Time Series	<input type="radio"/> Daily Cycle	<input type="radio"/> Scatter Plot
	<input type="radio"/> COSI	<input type="radio"/> Cross	<input type="radio"/> Monthly
	<input checked="" type="radio"/> Standard (EPS)		
Criteria	Surface		
Stratification	<input type="text"/>		
Date	Start 2012-04-01	Stop 2012-04-30	
Frequency	Monthly		
Model	<input type="text"/>		
Run	Run 0		
Method	<input type="text"/>		
OBS Parameter	<input type="text"/>		

Search Reset

- Configuration
- Verification
- Report
- Data Availability
- Verification Archive
- On-site Analysis
- Verification Removal





EPS: Results of searching

EPS Diagrams							
Periodical Monthly-Surface							
From: 2012-04-01 To: 2012-04-30							
Run: 0							
Description	Date	Data Avail.	Susp. OBS	Numeric Results	Graphic		
					Modify	Show	Down. Delete
EPS monthly (MECE) [TOTAL PRECIPITATION]	April 2012	 Yes					
<< 1 >>							
							Results: 1
<input type="button" value="Back"/>							

Running a verification on EPS means to calculate the Probability of distribution, the scores and the graphs. Probabilities are carried out by means of php and saved as files that can be inspected after the execution. Scores and graphs are calculated by means of R package using verification and ensembleBMA libraries.



EPS: Execution

EPS Diagrams									
Periodical Monthly-Surface									
From: 2012-04-01 To: 2012-04-30									
Run: 0									
Description	Date	Data Avail.	Susp. OBS	Numeric Results	Graphic				
					Modify	Show	Down.	Delete	
EPS Pratica di Mare (non MECE)	April 2012	Yes					PDF		
[TOTAL PRECIPITATION]									
EPS Pratica di Mare (MECE)	April 2012	Yes					PDF		
[TOTAL PRECIPITATION]									

<< 1 >>

Results: 2

Back

After the execution of a verification, the system give the capability to:

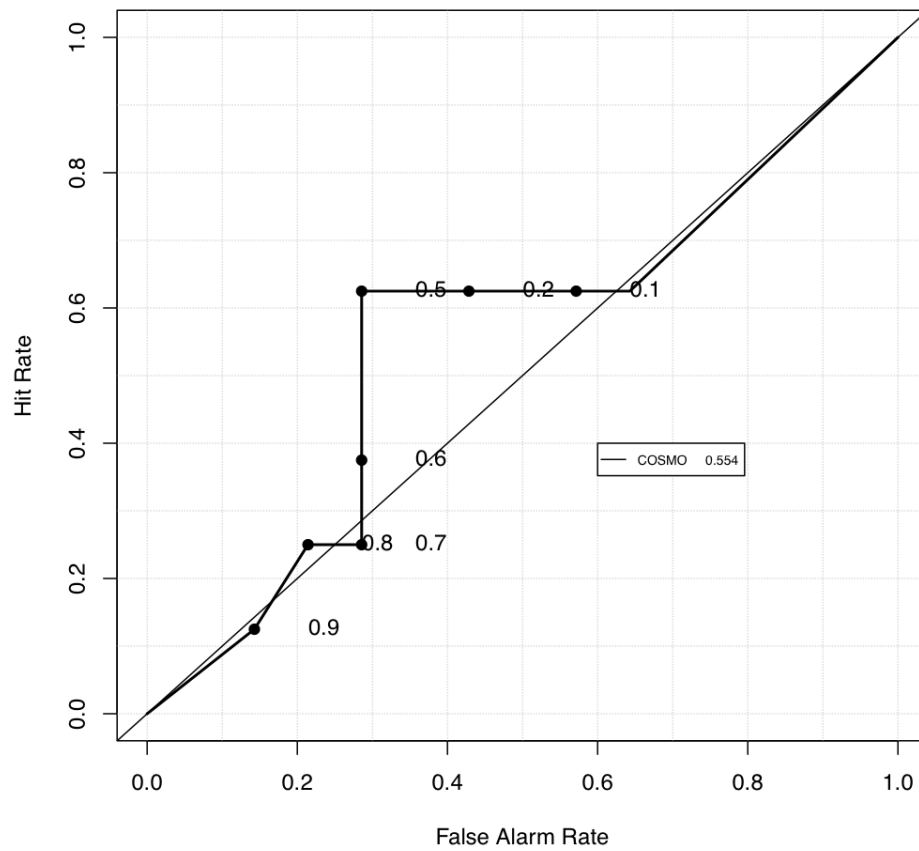
- Get the scores value
- Get the probabilities value (new icon)
- Run graphics for numerical scores
- Download pdf graphs



EPS Graphic: Some Examples

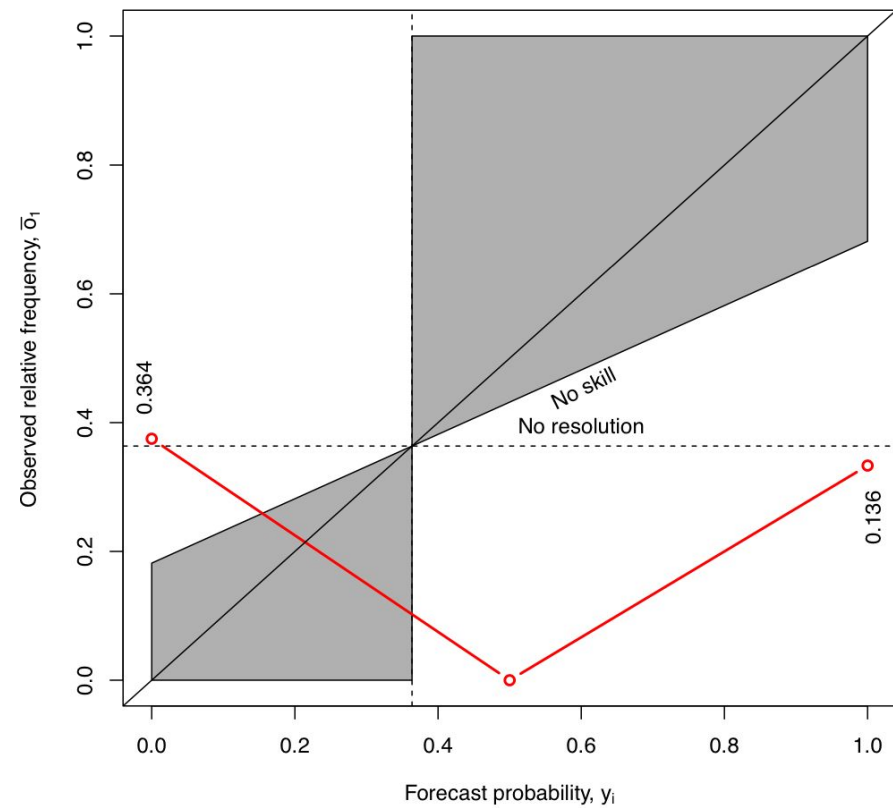
ROC

From: 2012-04-01 To: 2012-04-30 Step: 24 Th: 1 -9999



Reliability

From: 2012-04-01 To: 2012-04-30 Step: 24 Th: 1 -9999





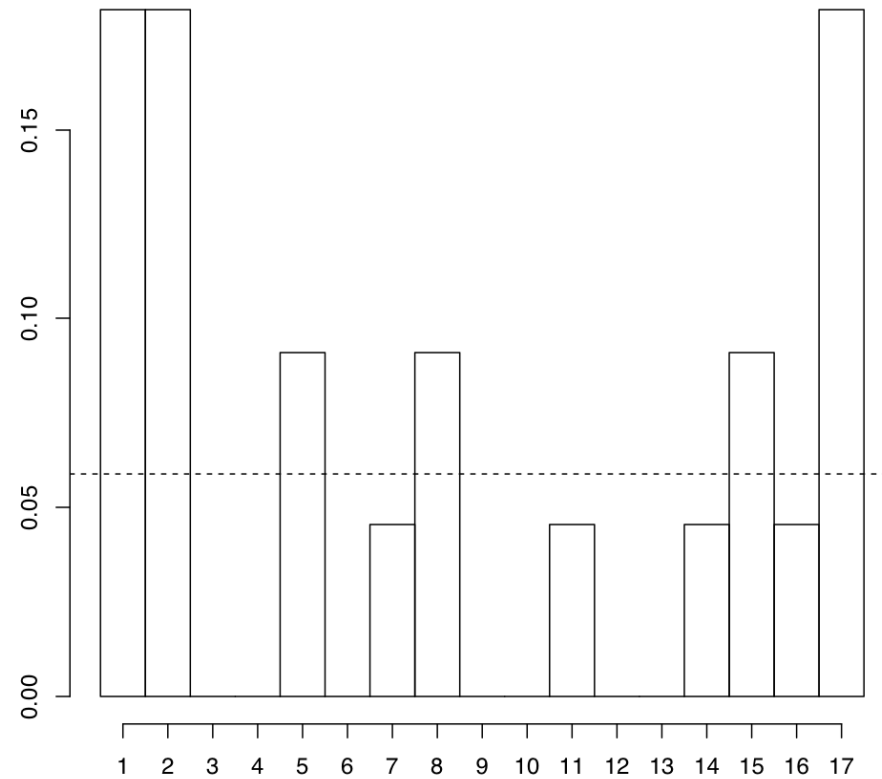
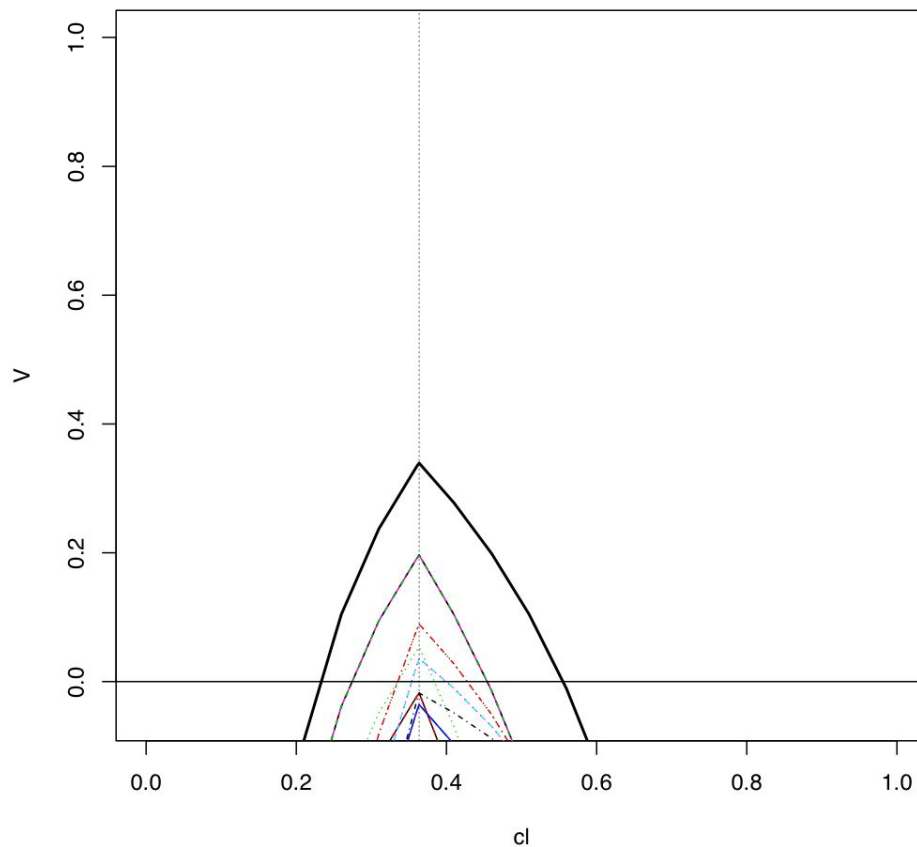
EPS Graphic: Some Examples

Cost Loss

Rank

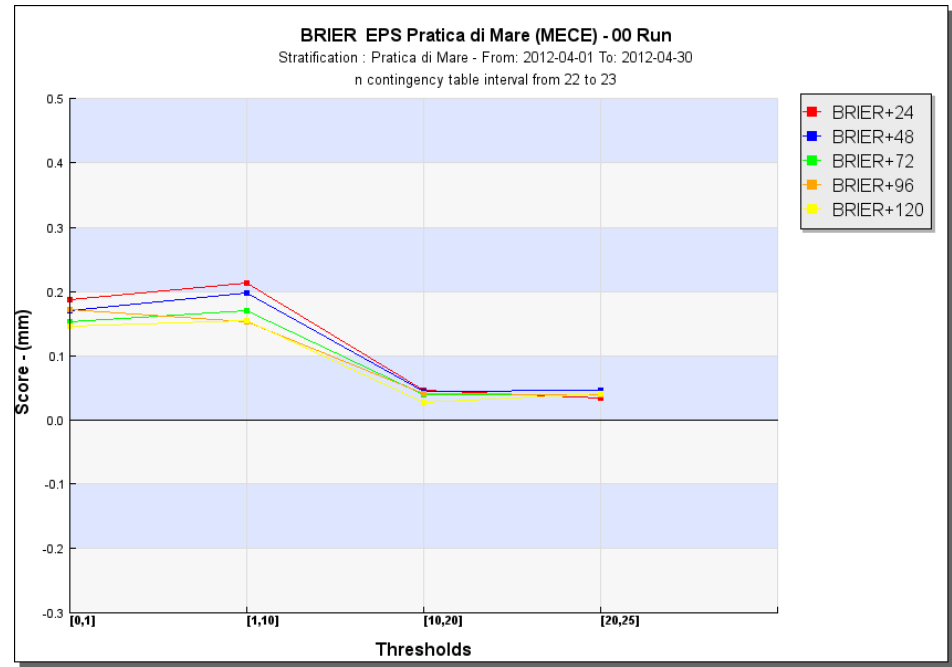
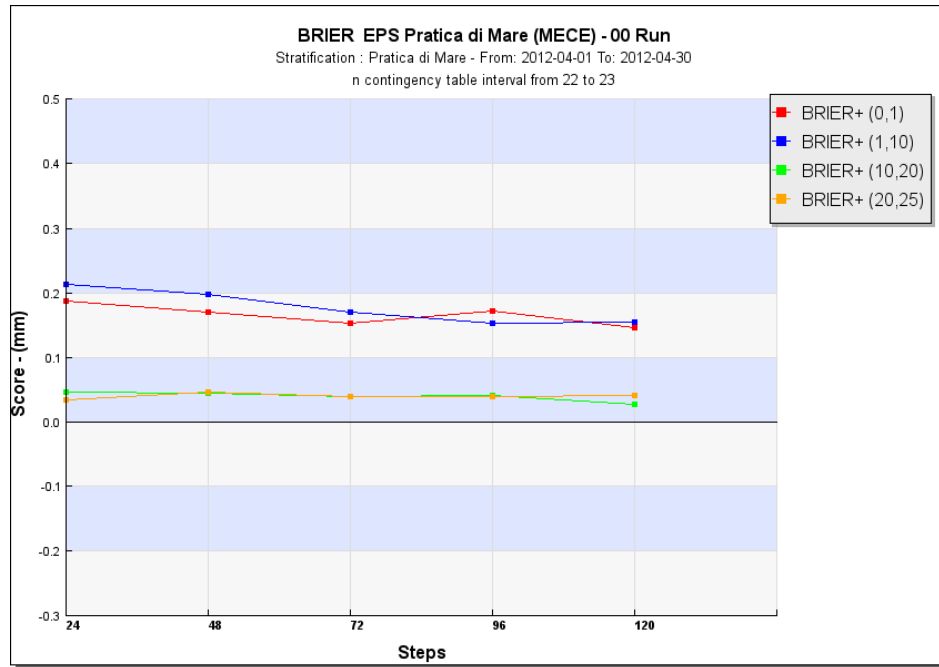
From: 2012-04-01 To: 2012-04-30 Step: 24 Th: 1 -9999

Verification Rank Histogram





EPS Graphic: Brier



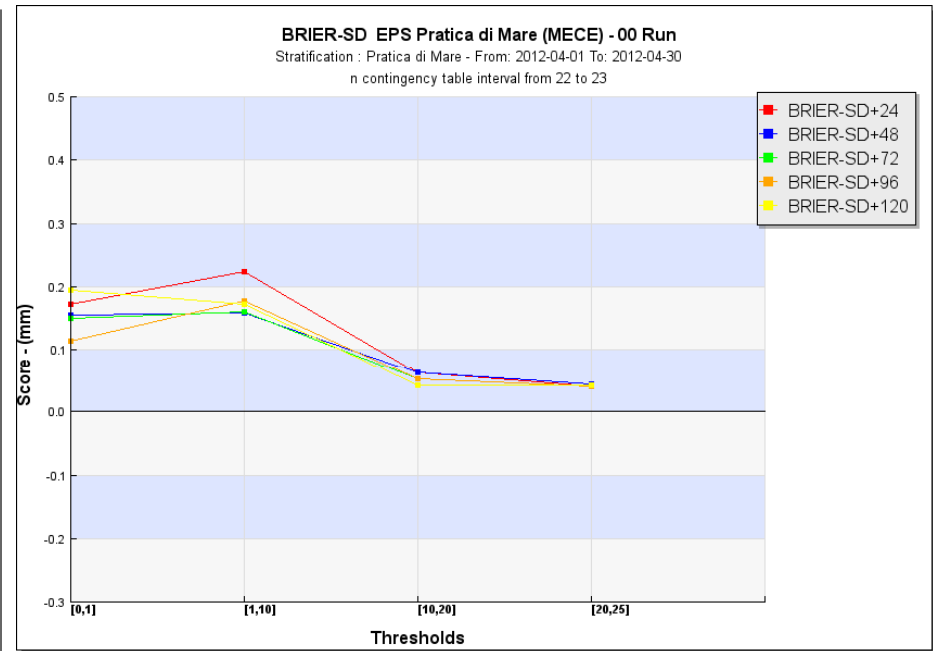
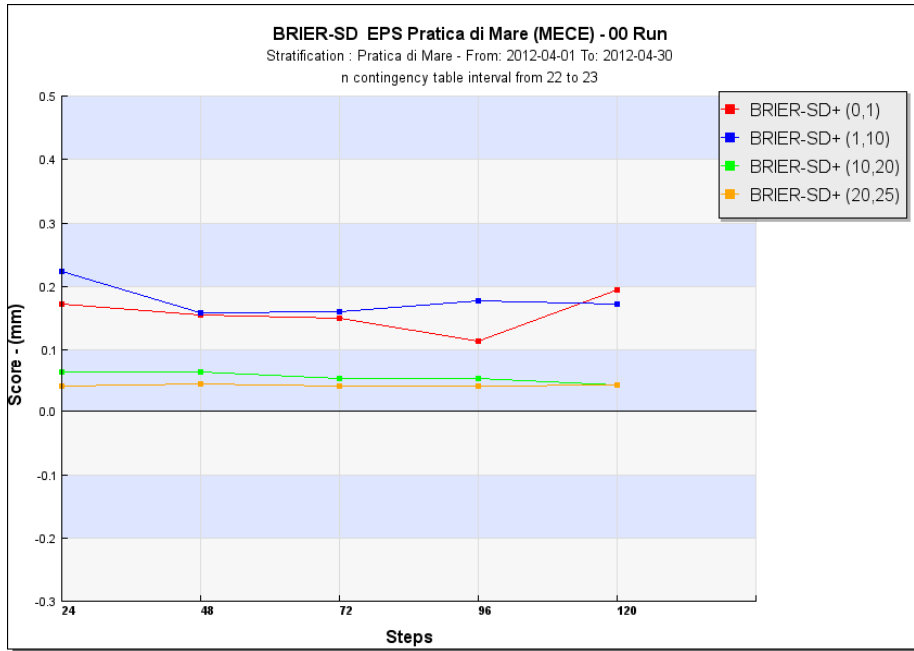
By thresholds

By steps



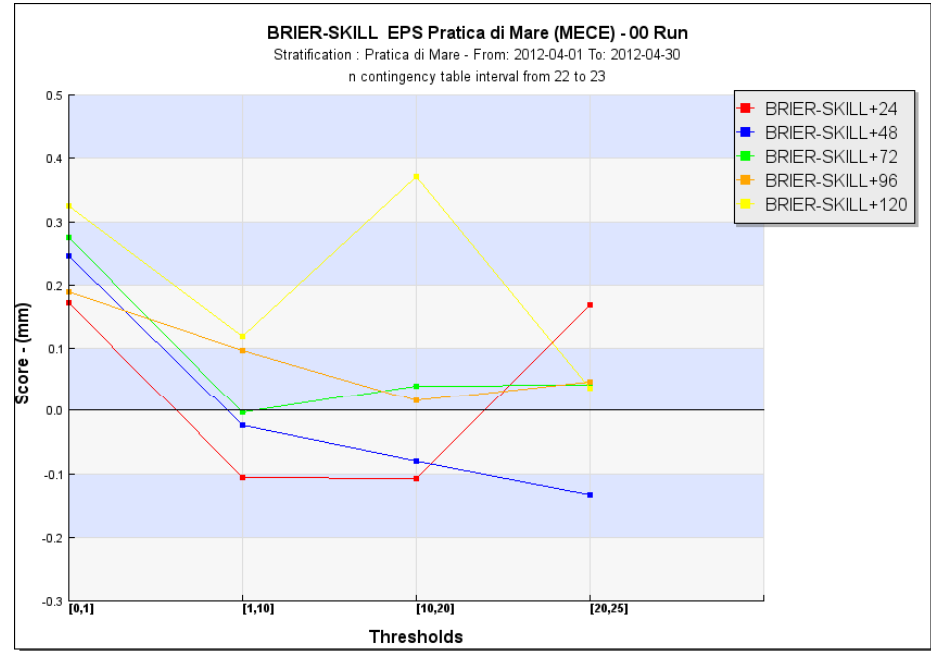
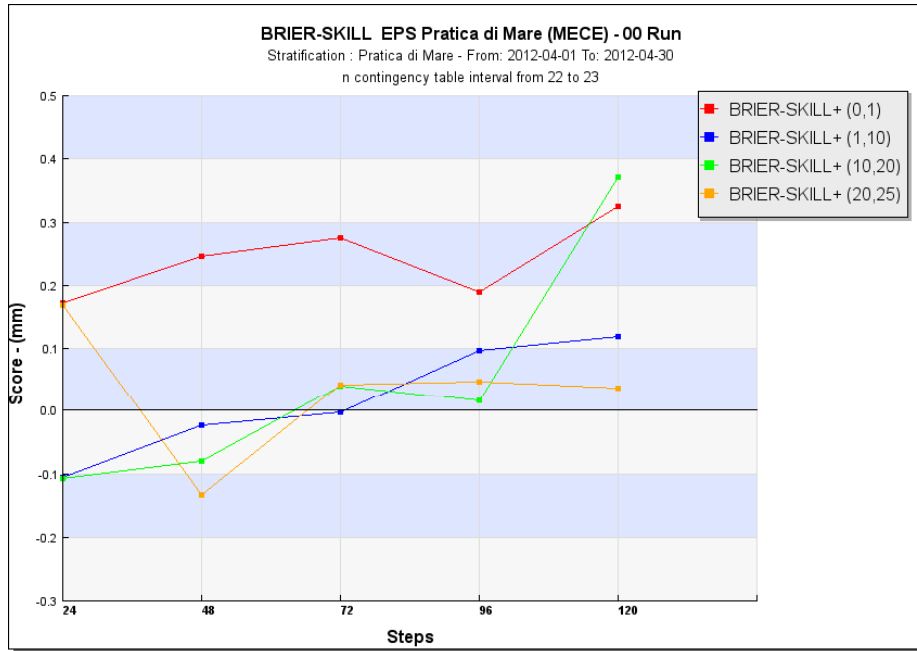


EPS Graphic: Brier SD



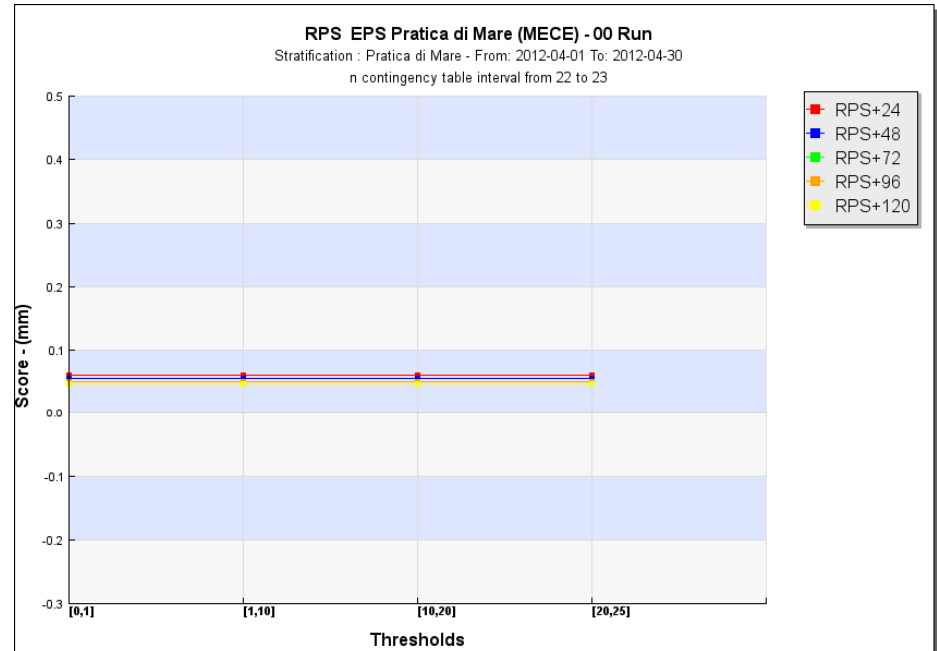
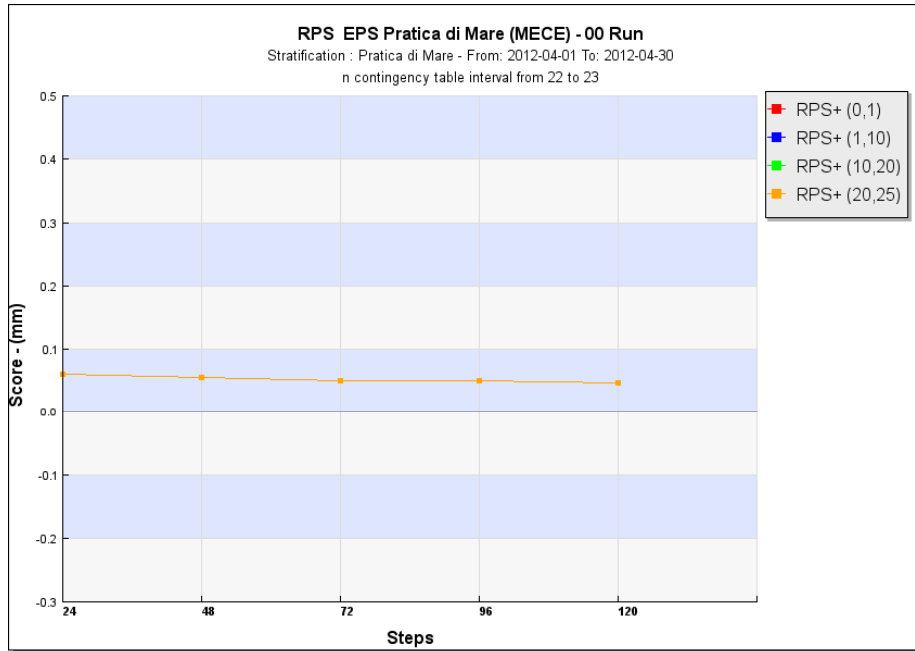


EPS Graphic: Brier Skill





EPS Graphic: RPS/RPSS/RPS.clim





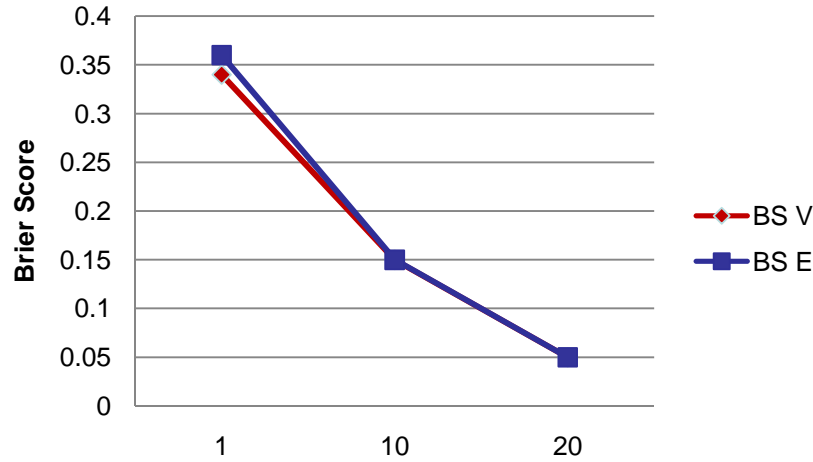
Comparison Results

- Versus and ARPA
- Model: Cosmo-Leps 16 Members
- Parameter: Precipitation
- Thresholds: 1,10,20
- One station: Pratica di MARE
- One Month: April 2012

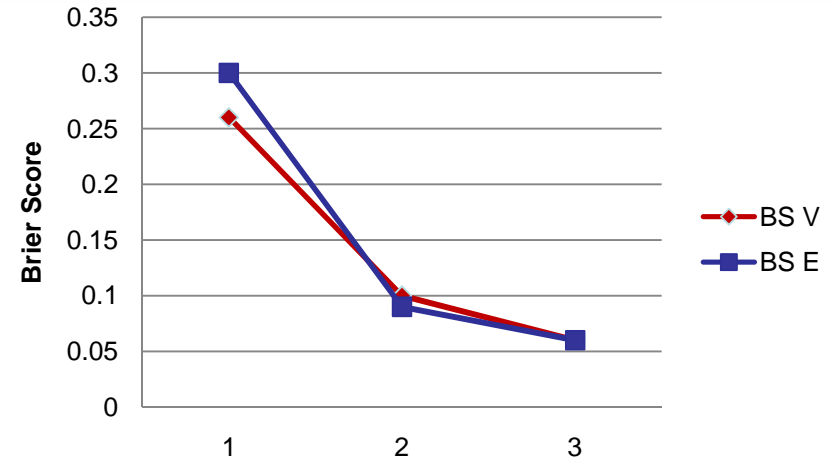


Brier Score

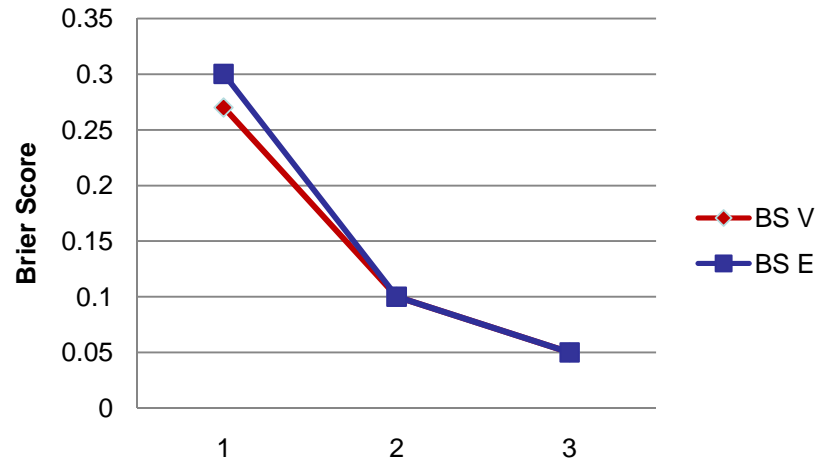
+24h



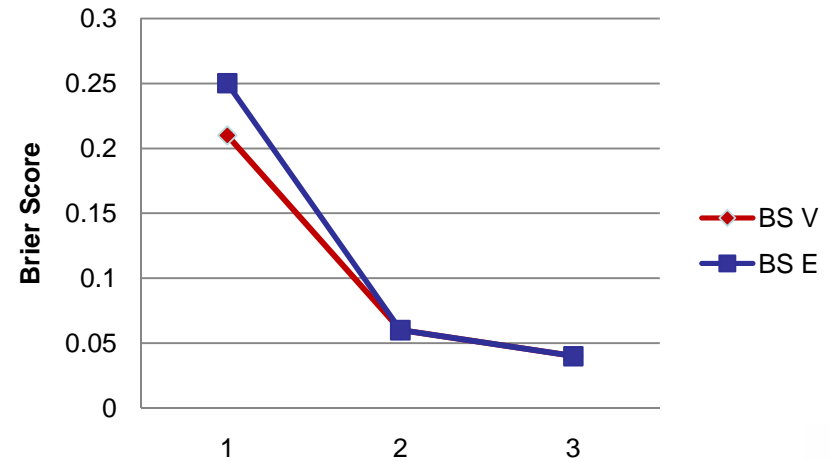
+48h



+72h

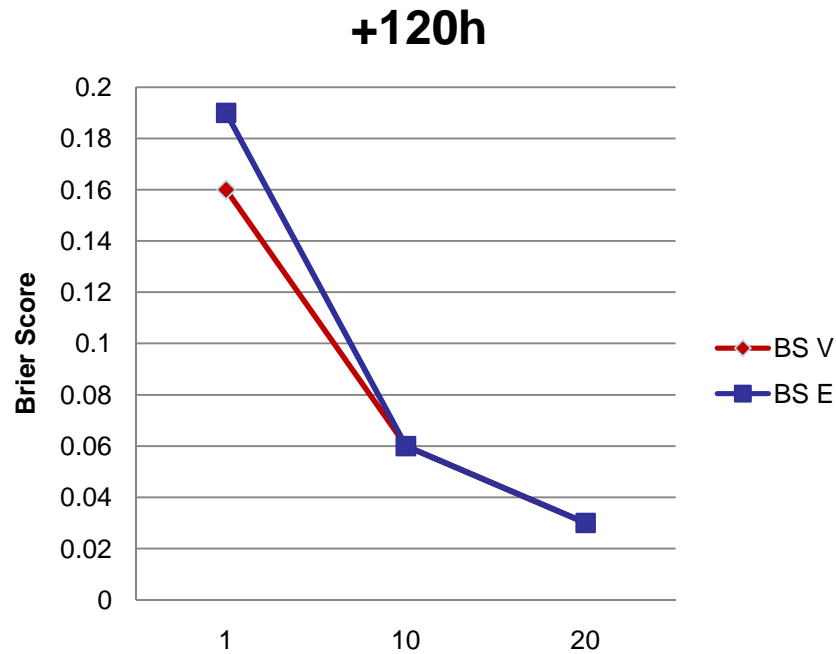


+96h





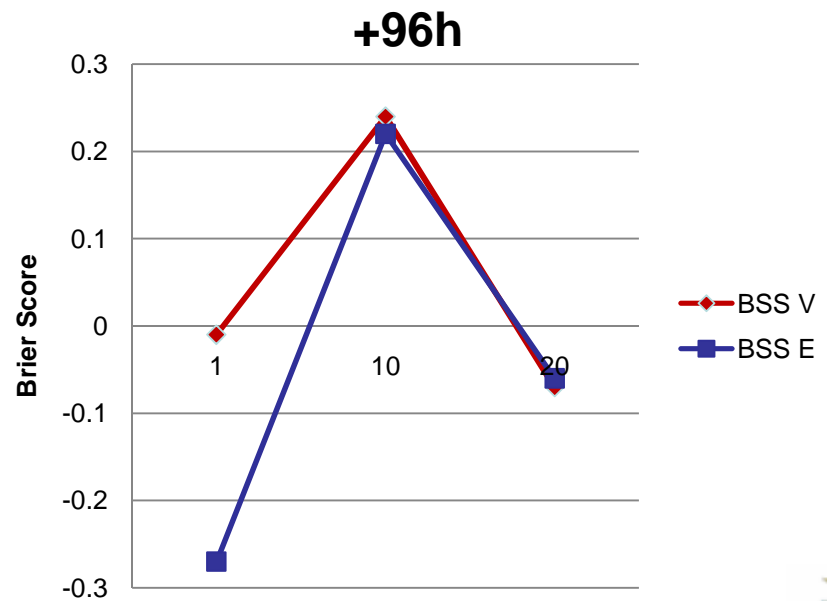
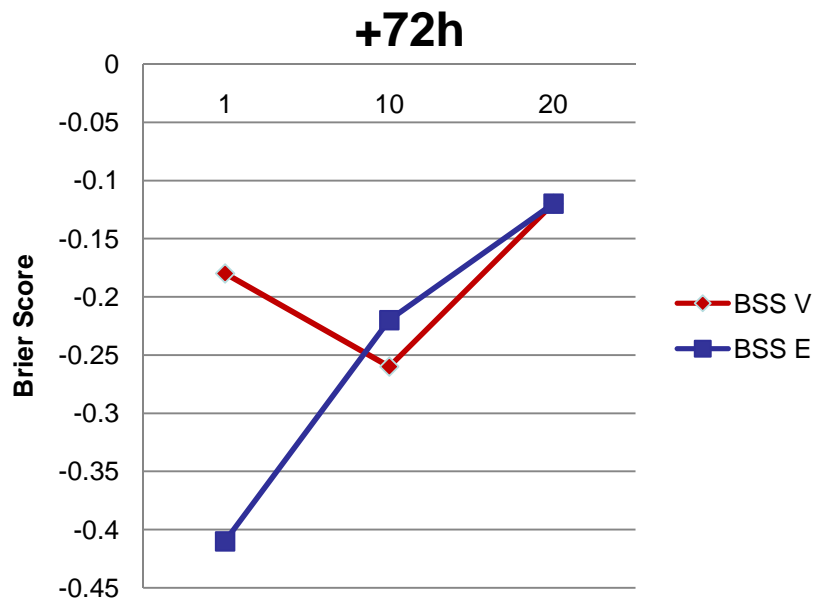
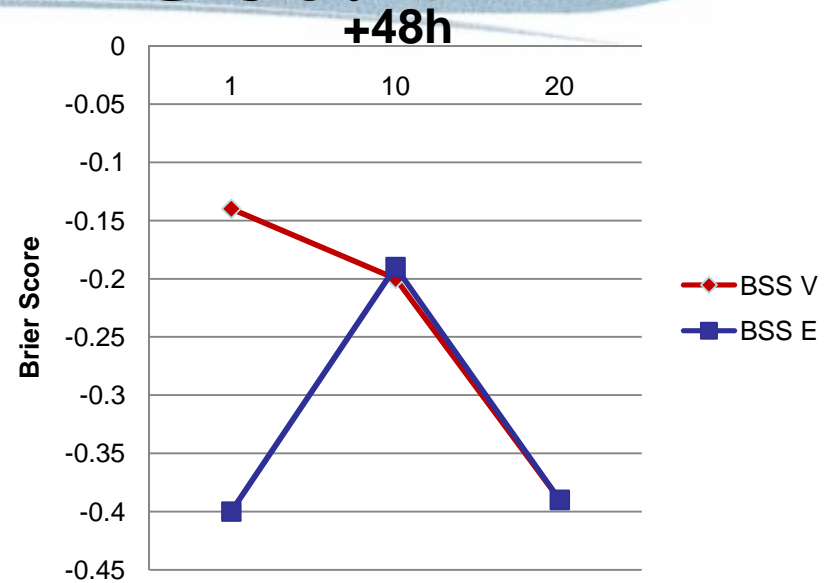
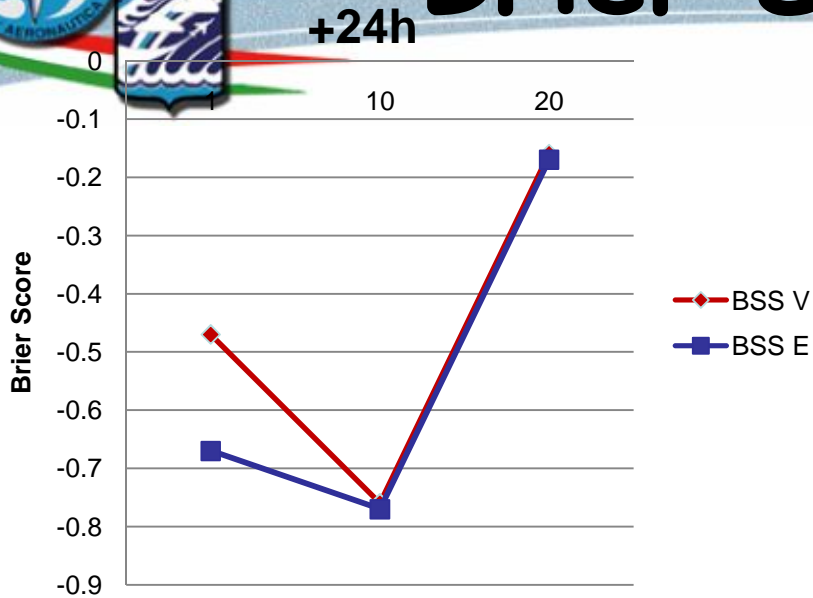
Brier Score



Remarkably similar pattern
Differences in the first threshold



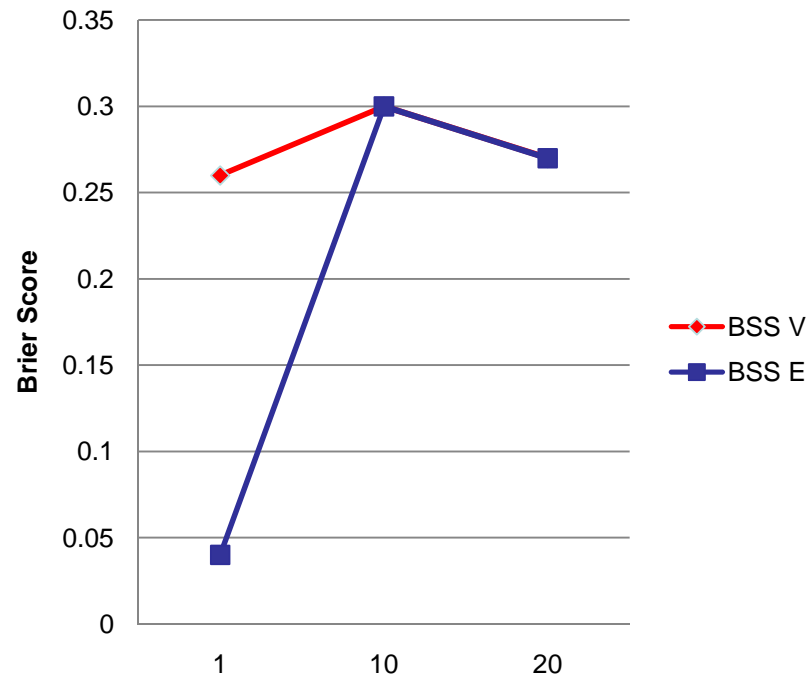
Brier Skill Score





Brier Skill Score

+120h

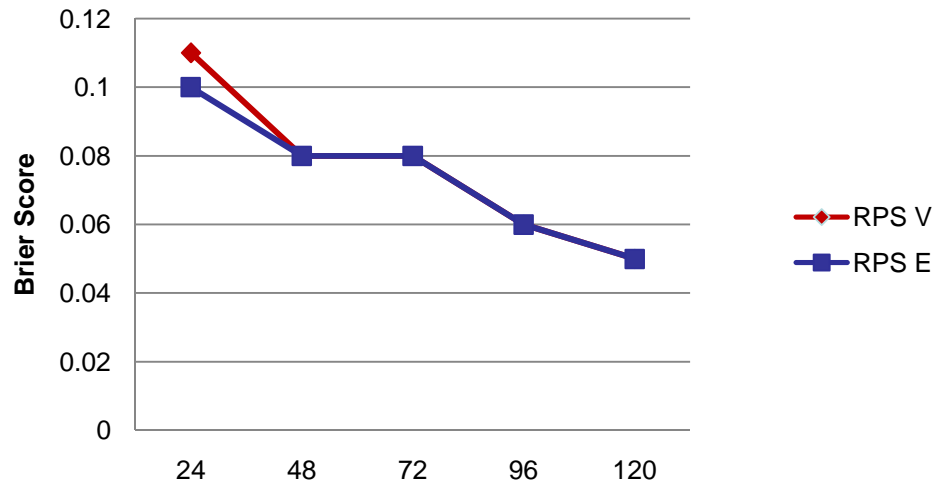


In the first threshold the difference is considerable. We need to investigate!!



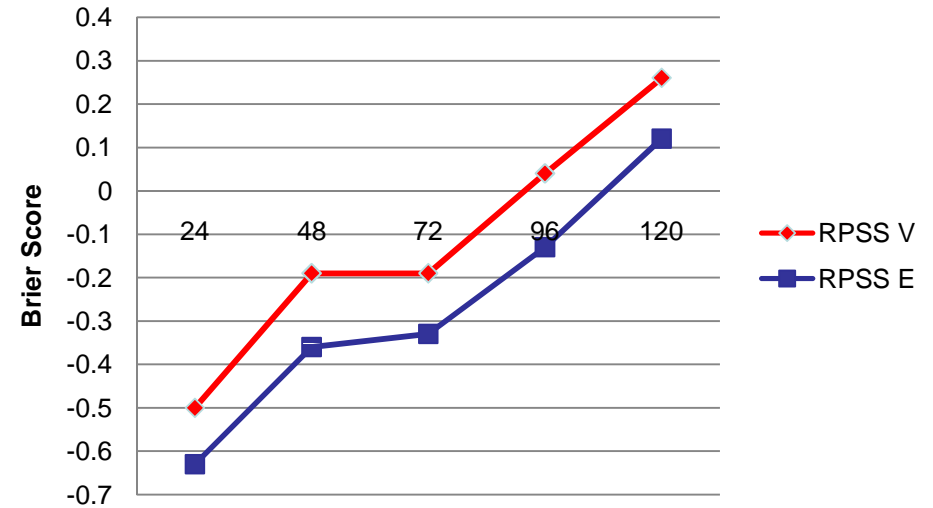


RPS



RPS: Difference in the first step.

RPSS



RPSS: Similar pattern but systematic error