EUMETNET SRNWP-EPS State-Of-The-Art and update

44th EWGLAM and 29th C-SRNWP meetings 2022
26th September – 29th September
Brussels (Belgium)

Alfons Callado Pallarès,
Francesca Marcucci,
Chiara Marsigli and
Stéphane Vannitsem

Outline

Application Tasks: progress update

- Calibration on extremes
- Post-processed Forecasting Tools
- LAM-EPS Extreme Forecast Index (EFI) and SOT

Research activities

- Convection-permitting LAM-EPS database
- Research plan and activities
- Annual workshop 2022: delayed to February 2023 in Rome/Bologna

EUMETNET 2024-2028 phase

- Requirements proposals: today discussion

NWP Coordination Programme

Quick review of SRNWP-EPS Application Tasks' status

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API ➔ Application Programming Interface

SRNWP-EPS Application tasks

EPS_1. Calibration on extremes (AEMet) ➔ ON THE WAY

- **Maria Cortés Simó** (contract will finish May 2023)
- 1st STEP: reviewed literature and test the performance of distinct calibrations ➔ R2O
- 2nd STEP: currently developing **API software** in Python to be applied to LAM-EPSs for:
  - Daily **T2m MAX/MIN**, **10m wind gust** and **AccPcp** and **AccSnow** with a number of methodologies for each of them
- 3rd STEP: deliver API software and **User Guide** ➔ January/February 2023
  - Apply as example to **2 SYNOP stations** for each SRNWP-EPS/country participant using the **6 LAM-EPS** on the database archiving continuously ⇔ write a paper with the results

Calibration on extremes
See next presentation from Maria

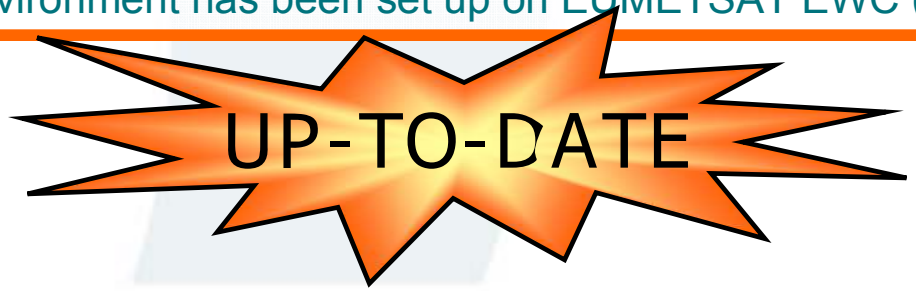
UP-TO-DATE

API ➔ Application Programming Interface

SRNWP-EPS Application tasks

EPS_2. Developing post-processing products (Itaf-Met)➔ ON THE WAY

- **Raffaele Golino** with replacement before the end of 2022
- ***Forecasting tools*** quite related to **aeronautics**:
  - Available improved **thunderstorm** (Updraft Helicity, isobaric levels) and **fog/visibility** products
  - Aviation **icing** and **clear-air turbulence** products available to use/test
  - Research about a **Machine Learning** tool to forecast/detect **thunderstorms**/heavy showers, specifically **xgboost** (from Python):
    - Using **SRI+lightning** observations training 1-year
      - Verifying performances in forecasting mode using metar over selected airports
    - Looking for better performance, expecting to try **RDT** and **nefodina** products from satellite observations to detect convective cells
    - Next future: try to use the ensemble information
    - Moreover an hybrid cpu/**gpu** environment has been set up on EUMETSAT EWC (with RAPIDS)



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SRNWP-EPS Application tasks

API ➔ Application Programming Interface

EFI and SOT
See next presentation from Joan

EPS_8. Develop EFI and SOT for LAM-EPS (AEMET) ➔ ON THE WAY

- Due to 2021-2023 extra-funding
- **Joan Montolio** (contract will finish in December 2023)
  - Two collaborations: **Météo-France** [Laure Raynaud] and **ECMWF** [Ivan Tsonevsky]
- 1st STEP: reviewing EFI/SOT documentation focussing on Météo-France EFI/SOT application on LAM-EPS [Laure Raynaud]
- 2nd STEP: currently developing an **API software** in Python to be applied to LAM-EPSs for:
  - Daily **T2m MAX/MIN**, **10m wind gust** and **AccPcp** and **AccSnow**
  - **Researching in order to improve LAM-EPS Météo-France**/Laure Raynaud methodology for coastlines and for complex orography
- 3rd STEP: deliver API software with an **User Guide** ➔ May/June 2023
  - Apply as example for each SRNWP-EPS/country participant using the 6 LAM-EPS on the database archiving continuously ⇔ write a paper with the results

UP-TO-DATE

EFI ➔ Extreme Forecast Index
SOT ➔ Shift Of Tails

SRNWP-EPS convection-permitting LAM-EPS database

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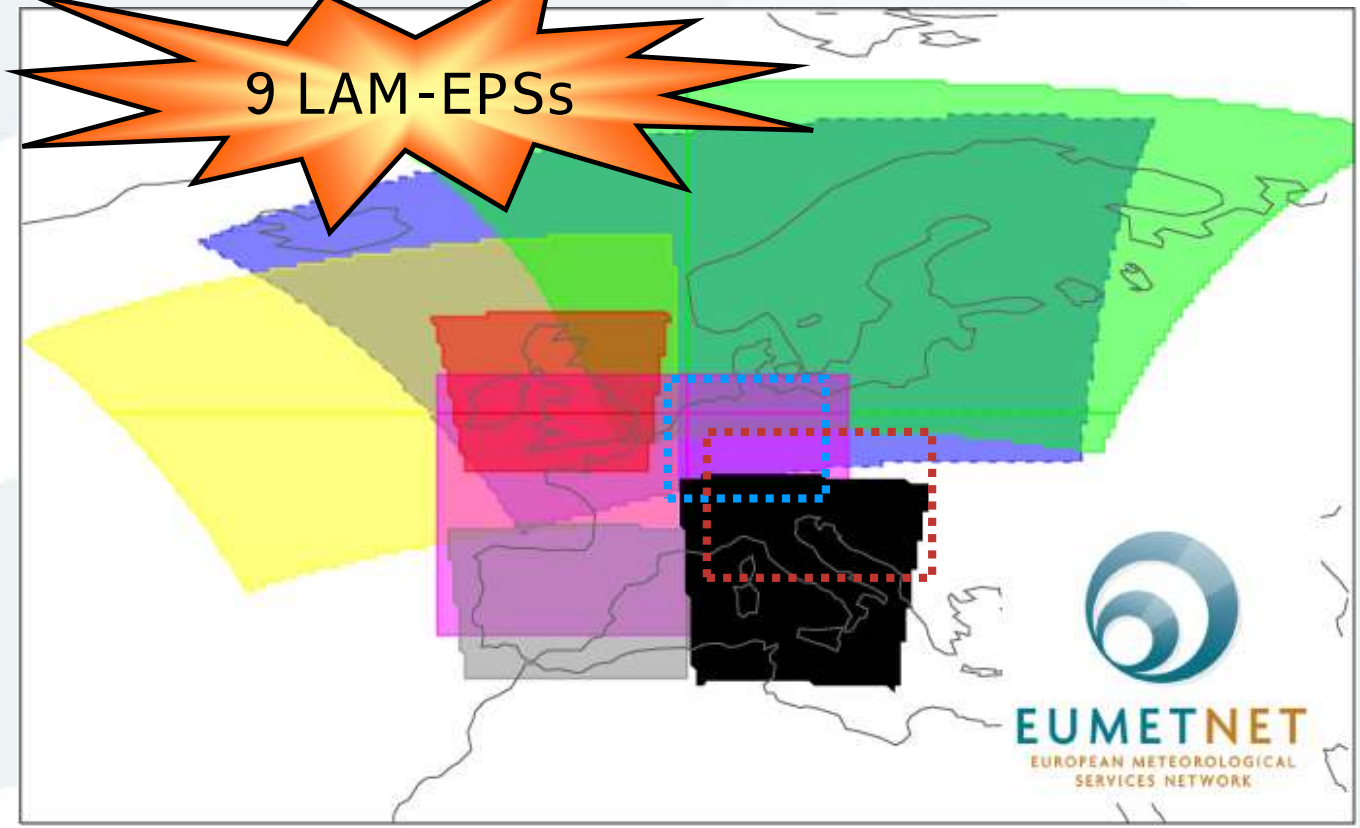
LAM-EPS domains and overlappings

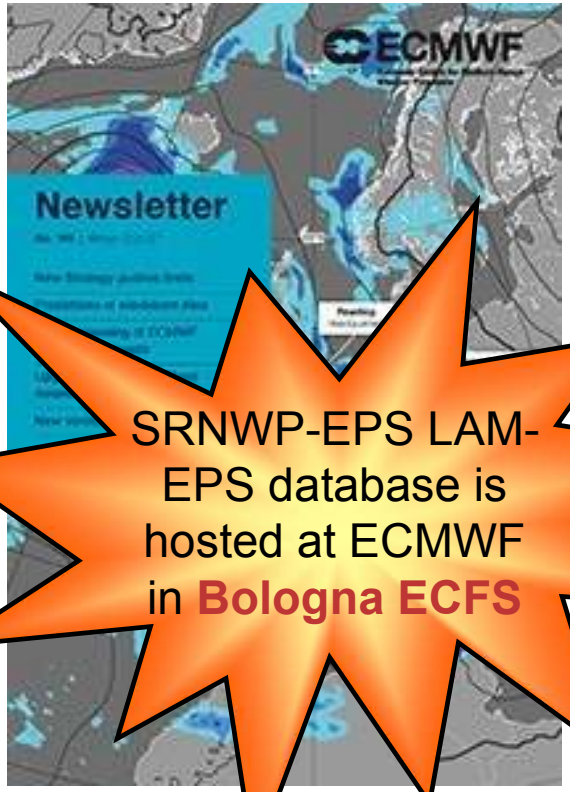


COMEPS IREPS MEPS MF-AROME-EPS

MOGREPS γSREPS IT-EPS

--- ICON-D2-EPS
--- C-LAEF

Domains



SRNWP-EPS LAM-EPS database is hosted at ECMWF in **Bologna ECFS**

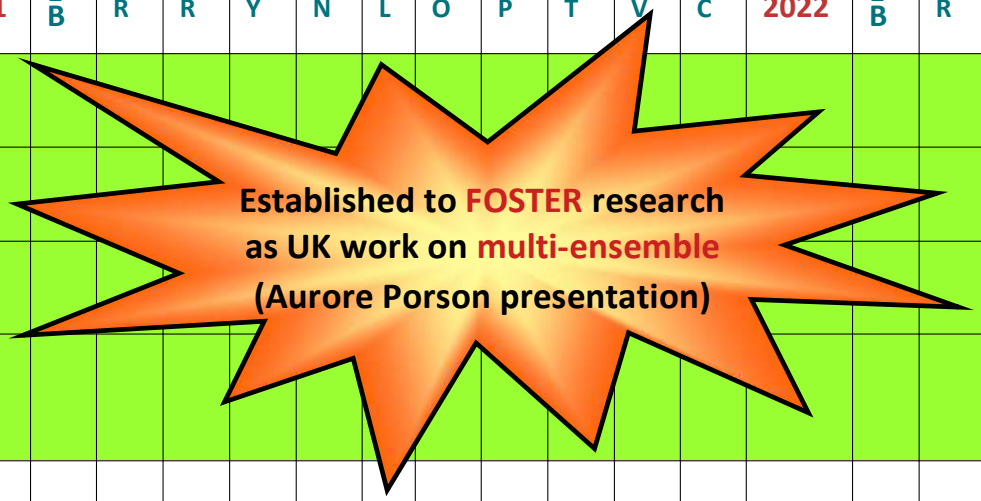
Newsletter No. 166 - Winter 2020/21

EUMETNET convection-permitting ensemble database hosted at ECMWF

srnwpepsDB STATUS

December 2021 ➔ 9 LAM-EPS

2020 Joint EPS-PP workshop
➔ **AGREE TO** archive continuously
(at least until 31st December 2023)



LAM-EPS	Jun 2020	JUL	AUG	SEP	OCT	NOV	DEC	Jan 2021	FEB	MAR	APR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DEC	Jan 2022	FEB	MAR	APR	MAY	JUN	JUL	AGO	SEP
gSREPS AEMET sp0w																												
IT-EPS ItAF-Met cm1				+6		+2																						
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srnwpepsDB STATUS

2020 EPS-PP workshop

EE TO archive continuously

east until December 2023)

December 2021 ➔ 9 LAM-

LAM-EPS	Jun 2020	JUL	AUG	SEP	OCT	NOV	DEC	M	an 2022	FEB	MAR	APR	MAY	JUN	JUL	AGO	SEP
gSREPS AEMET sp0w																	
IT-EPS ItAF-Met cm1				+													
mogreps-uk frsg Met Office																	
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MEPS MetCoOp snh				+13													
MF-AromeEps rmb MétéoFrance									¿?	¿	¿	¿	¿	¿	¿	¿	¿
COMEPS DMI nhf																	
ICON-D2-EPS gd0 DWD																	
C-LAEF zat RC LACE																	

We have to review what to do with the database

Current phase until 2023 with 6 LAM-EPS archiving continuously

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Next phase 2024-2028 ➔

Maybe one of the topics for next Requirements Proposal discussion

Research Activities

Research Plan

Chiara Marsigli (DWD)

*in-kind support***

**Official DWD in-kind contribution NOT approved during last PFAC/STAC/Assembly

➔ *Due to EUMETNET need to review/define in-kind contributions*

➔ *It is going to be discussed again in this autumn PFAC/STAC*

Research activities
Quick summary

- Based on *SRNWP-EPS convection-permitting database*
  - *Specific research archive*
- Focus on **HIW** and **convection**
- Coordinated **Research Plan** which is discussed in Annual Workshops

Time plan:

- December-January 2021: revision of this research plan by the Expert Team members. Identification of subtasks to be carried out by the different Met Services or groups. The subtasks will be written in this document.
- February 2022: meeting of the Expert Team, where each member or group briefly describes the activities they are performing or going to perform (their subtask(s)).
- February - September 2022: start or continuation of the activities, including discussion between members or groups to establish specific collaborations if needed, planning of the experiments, sharing the information on what is ongoing. Bilateral collaborations: ask for C-SRNWP support for visits?
- October 2022: Workshop. Presentation of the subtasks, presentation of the first results if any, discussion of open issues and of the details of the diagnostics.
- November 2022 - September 2023: experiments and analyses. A mid term ET meeting is likely needed.
- October 2023: Workshop. Presentation of the results of the Research Task, all subtasks. Discussion. Prepare for a publication (or a series of publications).

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My Drive ➔ srnwpEPS Research Plan
https://docs.google.com/document/d/1rdZJrfE6YTRJJ27Ls0-e7X_k_NuW_d3D
SRNWPEPS_ReserachTask_LAM-EPS_DB_v1_20211112.docx

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Research activitie

Quick summary

- Based on SR
  permitting da
  - *Specific re*
- Focus on **HIW** a
- Coordinated **Rese**
  discussed in Annual

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SRNWPEPS_ReserachTask_LAM-EPS_D

8th June 2022 Research Activities meeting

After some of us propose test/experiments to do during current autumn, Chiara wrote

*- Research Task: I invite those of us who are taking part to this activity to **write down a short description of the activity** we are performing (perturbation method, type of events, which experiments, which diagnostics) in **the Research Task document** (google doc, Alfons is going to re-send the link, thank you!). We will present our results at the [October] February 2023 Workshop and we will plan a special issue with papers about these activities by the end of the project (end of 2023)*

plan by the Expert Team members.
Met Services or groups.

group briefly
(their subtask(s)).
ties, including
ic collaborations if needed,
what is ongoing. Bilateral

tasks, presentation of the first
details of the diagnostics.
analyses. A mid term ET meeting

e Research Task, all
ublications).

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NWP Coordination Programme

EUMETNET 2024-2028 phase

SRNWP-EPS ET

requirements proposal

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2022 – 2028 EUMETNET Strategic guidelines

HoF 11th ➔ Executive director slides (Klémen Bergant)

Observations and Predictions Data	Science, Technology and Infrastructure	Partnerships	Communication and Influencing

Strategic goals		Capability areas	
A.	Collective observations, development of innovative observing methods and enabling access to third party observations to improve observations coverage	OBSERVATIONS	OBS
B.	Federated community approach to efficiently deliver high-quality and user-friendly weather- and climate-related information - data, products, and services	INFORMATION	INF
C.	Coordinated development and knowledge exchange to enhance Members' capacity for weather and climate-related services and advice for policymakers	CAPACITY	CSA
D.	Effective policy support and collective representation of Members to promote and enable their missions and protect their collective interests	SUPPORT	SUP

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Observations

Forecasting

Others

2022 – 2028 EUMETNET Strategic guidelines

HoF 11th ➔ Executive director slides (Klémen Bergant)

New flexible phase more based on common strategic goals than a NM(H)Ss' coordination

Observations and Predictions Data

Science, Technology and Infrastructure

Strategic goals

A. Collective observations, development of innovative observing methods and enabling access to third party observations to improve observations coverage

B. Federated community approach to efficiently deliver high-quality and user-friendly weather- and climate-related information - data, products, and services

C. Coordinated development and knowledge exchange to enhance Members' capacity for weather and climate-related services and advice for policymakers

D. Effective policy support and collective representation of Members to promote and enable their missions and protect their collective interests

Coordinated NWP programme with **NWP**, **EPS** and **PP** BUT including **nowcasting** ➔ *seamless*

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Observations

More info ➔ EUMETNET portal

SRNWP-EPS 2024-2028 requirements proposal

2022 – 2028 EUMETNET Strategic Guidelines by last Assembly

➔ Two-track requirements-drafting process

- Fast-track ➔ e.g. C-SRNWP/EWGLAM ⇔ Very few changes
- Normal track ➔ SRNWP-EPS ⇔ **REQUIREMENT DRAFTING** to **Requirements Drafting Team**

All to be shared in **srnwpeps@gmail.com**

SCHEDULE

- From now to 1st week October (4 weeks):
  - "Open board" (document) to **write proposals** / any ideas on ***
  - **Discussion on EWGLAM/C-SRNWP Predictability and EPS parallel session**
- 1st week of October: **meeting to discuss and agree on proposals** / ideas
- 2nd week of October: **write requirements proposal** (managers) ^^^
- 3rd week of October: **review proposal** by ET (meeting again if needed)
- Last week of October: delivery to Requirements Drafting Team [*deadline 31st*]

SRNWP-EPS 2024-2028
Requirements proposal

General Guidelines

- Try to accommodate requirements to our sharing **real needs** on our NM(H)Ss
- Try to have **flexible** requirements which could be update or evolve during 2024-2028
- Set only to **mandatory** requirements what is really affordable for us, other
  - RU ➔ Really Useful
  - NTH ➔ Nice To Have

2. Open board to proposals / ideas NM(H)Ss / needs / anything to discuss

2.1 Cooperation on model uncertainties – ET
From in-kind to partly funded (8th June meeting)
Contract someone to **support research activities**: LAM-EPS database, diagnostics, verification, workshop organisation and so on.
Aline kraai: ***better in two requirements****: research in-kind and one Application Task partly funded and related to research on uncertainties*

2.2 Post-processing tasks – A.Callado-Pallarès
What are our needs from LAM-EPS??? Maybe someones could be done by Post-processing project: for instance, calibration on extremes

2.3 Application tasks – A.Callado-Pallarès
Flexible partly funded application tasks to contract 1/" people but to be able to decide later what to do from a list: for instance, some current ones: further EFI/SOT development, further thunderstorms machine learning development, etc.

2.4 End-users needs / relationship (externals to NM(H)Ss) - **A.Callado-Pallarès**
Contact to be done from other parts of EUMETNET, not directly from SRNWP-EPS with a more scientific/development profile. But open to collaborate.

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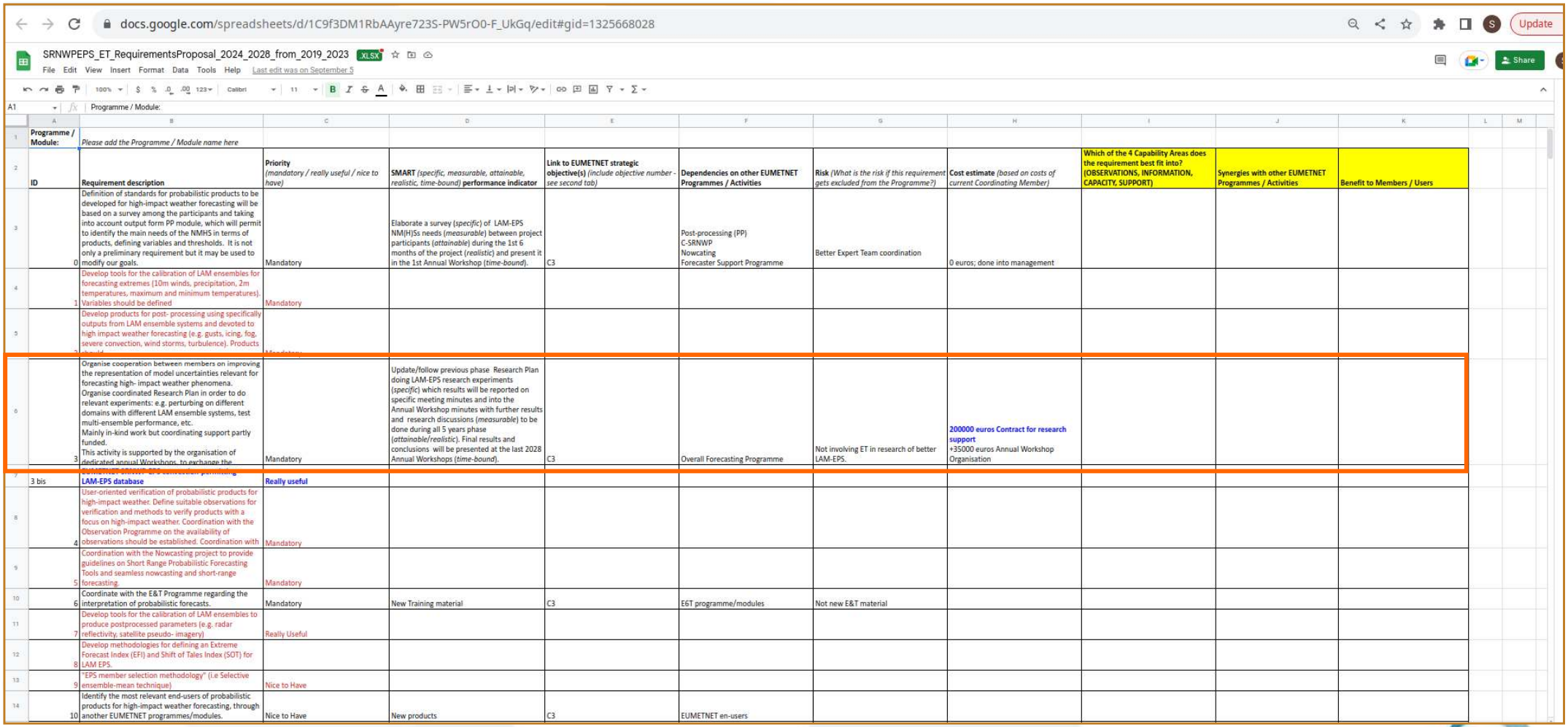

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Update Share

A1 Programme / Module:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Programme / Module:**	*Please add the Programme / Module name here*											
2	**ID**	**Requirement description**	**Priority** *(mandatory / really useful / nice to have)*	**SMART** *(specific, measurable, attainable, realistic, time-bound)* **performance indicator**	**Link to EUMETNET strategic objective(s)** *(include objective number - see second tab)*	**Dependencies on other EUMETNET Programmes / Activities**	**Risk** *(What is the risk if this requirement gets excluded from the Programme?)*	**Cost estimate** *(based on costs of current Coordinating Member)*	**Which of the 4 Capability Areas does the requirement best fit into? (OBSERVATIONS, INFORMATION, CAPACITY, SUPPORT)**	**Synergies with other EUMETNET Programmes / Activities**	**Benefit to Members / Users**		
3	0	Definition of standards for probabilistic products to be developed for high-impact weather forecasting will be based on a survey among the participants and taking into account output form PP module, which will permit to identify the main needs of the NMHS in terms of products, defining variables and thresholds. It is not only a preliminary requirement but it may be used to modify our goals.	Mandatory	Elaborate a survey (*specific*) of LAM-EPS NM(H)Ss needs (*measurable*) between project participants (*attainable*) during the 1st 6 months of the project (*realistic*) and present it in the 1st Annual Workshop (*time-bound*).	C3	Post-processing (PP) C-SRNWP Nowcating Forecaster Support Programme	Better Expert Team coordination	0 euros; done into management				
4	1	Develop tools for the calibration of LAM ensembles for forecasting extremes (10m winds, precipitation, 2m temperatures, maximum and minimum temperatures). Variables should be defined	Mandatory										
5		Develop products for post- processing using specifically outputs from LAM ensemble systems and devoted to high impact weather forecasting (e.g. gusts, icing, fog, severe convection, wind storms, turbulence). Products											
6	3	Organise cooperation between members on improving the representation of model uncertainties relevant for forecasting high- impact weather phenomena. Organise coordinated Research Plan in order to do relevant experiments: e.g. perturbing on different domains with different LAM ensemble systems, test multi-ensemble performance, etc. Mainly in-kind work but coordinating support partly funded. This activity is supported by the organisation of dedicated annual Workshops, to exchange the	Mandatory	Update/follow previous phase Research Plan doing LAM-EPS research experiments (*specific*) which results will be reported on specific meeting minutes and into the Annual Workshop minutes with further results and research discussions (*measurable*) to be done during all 5 years phase (*attainable/realistic*). Final results and conclusions will be presented at the last 2028 Annual Workshops (*time-bound*).	C3	Overall Forecasting Programme	Not involving ET in research of better LAM-EPS.	**200000 euros Contract for research support** +35000 euros Annual Workshop Organisation				
7	3 bis	**LAM-EPS database**	**Really useful**										
8	4	User-oriented verification of probabilistic products for high-impact weather. Define suitable observations for verification and methods to verify products with a focus on high-impact weather. Coordination with the Observation Programme on the availability of observations should be established. Coordination with	Mandatory										
9	5	Coordination with the Nowcasting project to provide guidelines on Short Range Probabilistic Forecasting Tools and seamless nowcasting and short-range forecasting.	Mandatory										
10	6	Coordinate with the E&T Programme regarding the interpretation of probabilistic forecasts.	Mandatory	New Training material	C3	E6T programme/modules	Not new E&T material						
11	7	Develop tools for the calibration of LAM ensembles to produce postprocessed parameters (e.g. radar reflectivity, satellite pseudo- imagery)	Really Useful										
12	8	Develop methodologies for defining an Extreme Forecast Index (EFI) and Shift of Tales Index (SOT) for LAM EPS.											
13	9	"EPS member selection methodology" (i.e Selective ensemble-mean technique)	Nice to Have										
14	10	Identify the most relevant end-users of probabilistic products for high-impact weather forecasting, through another EUMETNET programmes/modules.	Nice to Have	New products	C3	EUMETNET en-users							

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SRNWP-EPS 2024-2028

Requirements proposal

Programme / Module:	*Please add the Programme / Module name here*						
ID	**Requirement description**	**Priority** *(mandatory / really useful / nice to have)*	**SMART** *(specific, measurable, attainable, realistic, time-bound)* **performance indicator**	**Link to EUMETNET strategic objective(s)** *(include objective number - see second tab)*	**Dependencies on other EUMETNET Programmes / Activities**	**Risk** *(What is the risk if this requirement gets excluded from the Programme?)*	**Cost estimate** *(based on costs of current Coordinating Member)*
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3 bis	**EUMETNET SRNWP-EPS convection-permitting LAM-EPS database**	**Really useful**					

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The LAM-EPS probabilistic products are the present and future of High Impact Weather forecasting

Thank you for your attention

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difesa.it Francesca Marcucci (ItAF-REMET)

de Chiara Marsigli (DWD)

Stéphane Vannitsem (RMI)

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