


γ SREPS

Tiempo, caos y modelos: prediciendo la incertidumbre en AEMET

The Spanish AEMET-γ SREPS

XXXVII Jornadas AME
 24º Encuentro Hispano-Luso de Meteorología
 Málaga (Spain), 25-27 February 2026


Asociación Meteorológica Española
 AEMET γSREPS Predictability Group
 Juanjo Gómez, Alfons Callado
 Miguel Gullón (new member)
 Pau Escribá, David Gil (collaborators)
 Matilde García-V. (EUMETNET SRNWP-EPS project)

Outline

- **Predictability-γSREPS Group**
 - Who are we
 - Brief history
- **CAOS: predicting the uncertainty !!!**
- **AEMET-γSREPS**
 - What is it and its design
 - Why multi-NWP model
 - Verification
 - Case studies
- **γSREPS products Web + PANEL**
 - Probabilistic products → Spaghetti: all members product
 - EPSgrams → Aeronautic products
- **AEMET LAM-EPS future**
 - ACCORD/UWC HarmonEPS

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- **AEMET LAM-EPS future**
 - ACCORD/UWC HarmonEPS


 Last years quite focused on Forecasting Offices products, BUT last year 2025 we update our NWP models

Who are we ?

The AEMET Predictability-γSREPS Group

Predictability-γSREPS group

- Since 2002 an small core group working on Limited Area (LAM) Ensemble Prediction Systems (EPS) depending on AEMET Research and Development Department (DDA)
- Members of ACCORD-EPS, UWC-South and involved in several projects:
 - EUMETNET SRNWP EPS (co-managing)
 - Spanish universities: HYDROMED (UIB), CHIONE (UB) etc.,
 - European collaborations: AromeEPS, MétéoFrance, ALARO, IPMA-AEMET (Portuguese), etc.

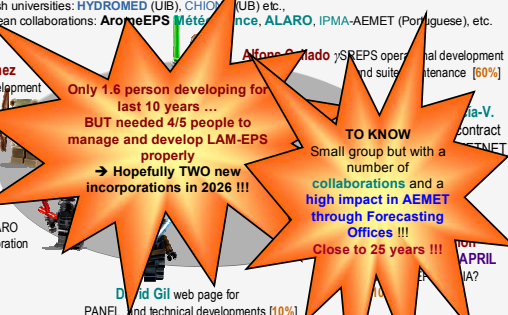
Juanjo Gómez γSREPS development and maintenance [100%]
Alfons Callado γSREPS operational development and suite maintenance [60%]
Matilde García-V. 2026-28 contract from EUMETNET SRNWP-EPS [100%]
Pau Escribá Assimilation AROME-ALARO NWP collaboration [10%]
Miguel Gullón TO BEGIN IN APRIL ¿HarmonEPS and IA? [100%]
David Gil web page for PANEL and technical developments [10%]

Full members Projects / Collaborations


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 Only 1.6 person developing for last 10 years ... BUT needed 4/5 people to manage and develop LAM-EPS properly → Hopefully TWO new incorporations in 2026 !!!
TO KNOW Small group but with a number of collaborations and a high impact in AEMET through Forecasting Offices !!!
 Close to 25 years !!!

Full members Projects / Collaborations



Brief history

Classic AEMET-SREPS




γSREPS group during the years

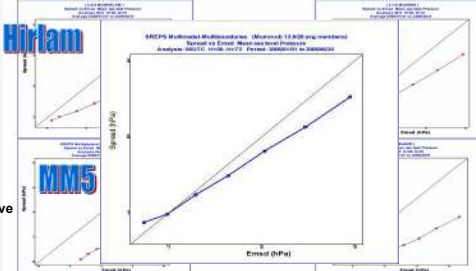
- José Antonio García-Moya (retired on May 2018, deceased 2019) Head of the group 2002-2018
- Carlos Santos
- Juan Simarro
- Daniel Santos
- David Quintero
- Mauri Martínez
- Jesús Montero
- Bartolomé Orfila
- ...

Classic AEMET-SREPS 2003-2007

- Multi-model seems to be the best strategy for sampling model error:
- Pmsl SPREAD-SKILL relationship
- More CONSISTENT LAM-EPS




Eugenia Kalnay (1942-2024) University of Maryland (USA)



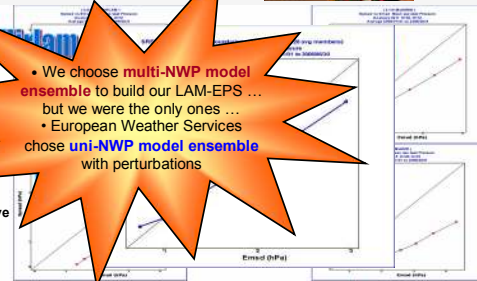
Spread-Skill
The closer to the diagonal, the better
→ Below diagonal, underdispersive

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Eugenia Kalnay (1942-2024) University of Maryland (USA)



• We choose **multi-NWP model ensemble** to build our LAM-EPS ... but we were the only ones ...

• European Weather Services chose **uni-NWP model ensemble** with perturbations

Spread-Skill
The closer to the diagonal, the better
→ Below diagonal, underdispersive

Configuration classic AEMET-SREPS 2003-2007

- 25 km short-range multi-model and multi-BCs LAM-EPS

Models / Boundaries	CMC_GEM	DWD_GME	ECMWFIFS	JMA_GSM	NCEP_GFS
HIRLAM					
IFS					
LM					
LM					

20/25-members on AEMET-SREPS: daily running 2003-2007

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20/25-members on AEMET-SREPS: daily running 2003-2007

• "High School" to learn LAM-EPS


• AEMET-SREPS performs better than any other LAM-EPS in Europe (at that time)

• BUT beautiful "frustration" (myself at least) because not used by Forecasting Offices

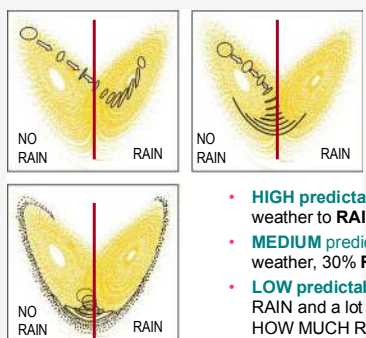
CAOS

Predicting the uncertainty

CAOS: predicting the uncertainty



Edward Lorenz
(1917-2024)
Professor at MIT (USA)
Father of chaos theory and butterfly effect



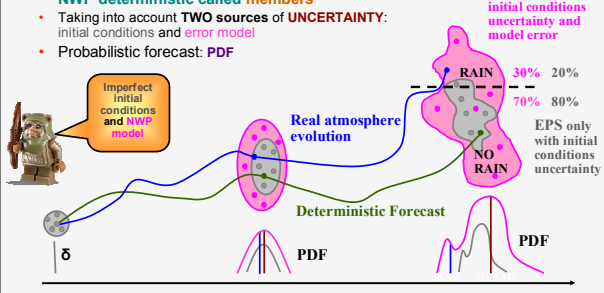
- HIGH predictability:** clear DRY weather to RAIN transition
- MEDIUM predictability:** 70% dry weather, 30% RAIN
- LOW predictability:** 50/50% no/yes RAIN and a lot of UNCERTAINTY in HOW MUCH RAIN

Why and how EPSs ?

Forecasting the uncertainty

ECMWF 1999 ENS IFS
SPPT to take into account model error
[Roberto Buizza]

- What is an ensemble ?
 - A combination of physically plausible number of NWP deterministic called members
 - Taking into account TWO sources of UNCERTAINTY: initial conditions and error model
 - Probabilistic forecast: PDF



EPS with both initial conditions uncertainty and model error

EPS only with initial conditions uncertainty

Forecast Range

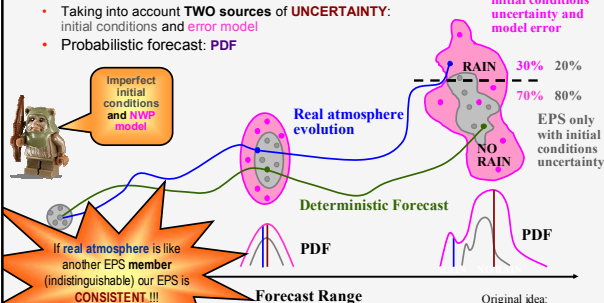
Original idea: Roberto Buizza (ECMWF)

Why and how EPSs ?

Forecasting the uncertainty

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If real atmosphere is like another EPS member (indistinguishable) our EPS is CONSISTENT !!!

Forecast Range

Original idea: Roberto Buizza (ECMWF)




GLAMEPS 2011-2019
Due to human resources limitations we decided to go directly from 25km to 2.5km and not to have a LAM-EPS at ~10km BUT meanwhile HIRLAM GLAMEPS LAM-EPS was available in AEMET

AEMET-γ-SREPS

What is it ?

What is our goal? High Impact Weather events

Any forecast is incomplete without a measure of its uncertainty or its PREDICTABILITY




AEMET-γ-SREPS

What is it ?

What is our goal? High Impact Weather events

Any forecast is incomplete without a measure of its uncertainty or its PREDICTABILITY

Spain Severe Weather



Detailed forecast with uncertainty information: airports, cities, etc.


Main goal [Organised] Convection HIW e.g. WRF




































Examples of events:

- Castellón 2011-08-30: CAP gate (Galerna)
- Fotobolcric Cenicientos (Madrid)
- Moroccan 2009-06-09: Flash-floods in Morocco
- AEROSgenerator: Seta de Burgo (Orreaga)
- Tous 1982-10-20: Flash-floods in France
- Valladolid 2011-12-24: Helicóptero
- Tous 1987-10-14: Flash-floods in France
- Cádiz 2009-12-24: Tornado
- La Safor 2007: Cut-off flow-430mm
- Algarves 2012-05-06: Storm > 38 mm/h
- Baso 1999-09-07: Tornado
- CVA 2009-09-27/28: Cut-off flow-340mm

AEMET- γ -SREPS system


- 2.5 km 20-members non-hydrostatic convection-permitting LAM-EPS
- Since April 2016 daily running at 00/12 UTC up to 72 hours (2023)
 - Since end 2019 products available to Forecasting Offices
- 3 DOMAINS: IBERIAxxm_2.5, CANARIAS_2.5 and LIVINGSTON_2.5 (Antarctica)

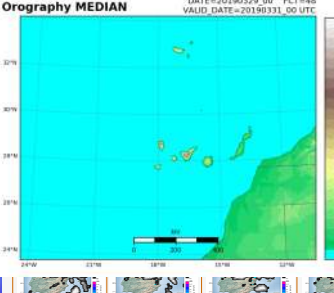










Multi-BCs	ECMWF / IFS	NCEP / GFS	MF / ARPÈGE	JMA / GSM	CMC / GEM
Multi-NWP					
HARMONIE-AROME					
ACC = RD					
ALARO					
ALADIN					
WRF ARW					
NMMB					

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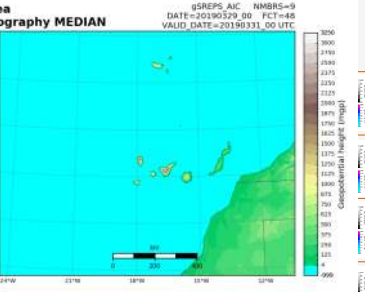










Multi-B	Area Orography MEDIAN	CMC / GEM
Multi-NWP	 <p>gSREPS AIC NMBRS=9 DATE=20190329 00 FCT=48 VALID DATE=20190331 00 UTC</p>	
HARMONIE-AROME		
ACC = R		
ALARO		
ALADIN		
WRF ARW		
NMMB		

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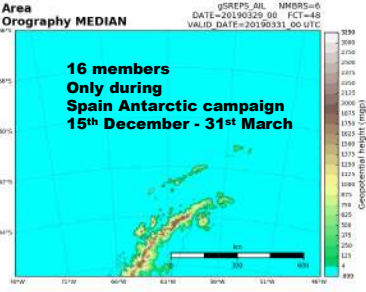










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Multi-B	Area Orography MEDIAN	CMC / GEM
Multi-NWP	 <p>gSREPS AIC NMBRS=6 DATE=20190329 00 FCT=48 VALID DATE=20190331 00 UTC</p> <p>16 members Only during Spain Antarctic campaign 15th December - 31st March</p>	
HARMONIE-AROME		
ACC = R		
ALARO		
ALADIN		
WRF ARW		
NMMB		


AEMET- γ -SREPS design

- Developing a convection-permitting LAM-EPS
- 3 sources of uncertainties
 - Multi-model Multi-Boundary Conditions LAM-EPS

There are model error in 2 BC ?




1 INITIAL CONDITIONS



HH+00

2 BOUNDARY CONDITIONS


~Synoptic uncertainty



HH+24

3 MODEL ERROR

~Mesoscale uncertainty



HH+48

Initial conditions and Multi-BCs

- ECMWF - IFS
- NCEP - GFS
- MétéoFrance - ARPÈGE
- CMC - GEM (Canadian)
- JMA - GSM (Japanese)


LAM Multi-model

- HARMONIE-AROME
- ALARO
- WRF-ARW (NCAR)
- NMMB (NCEP)


AEMET- γ -SREPS design

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1 INITIAL CONDITIONS

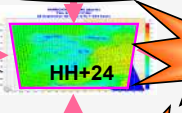


HH+00

Cold start 3DVAR EDA ?

2 BOUNDARY CONDITIONS

~Synoptic uncertainty




HH+24

More Bcs as Global ICON ?

3 MODEL ERROR

~Mesoscale uncertainty



HH+48


More NWP as ICON-LAM ?

Initial conditions and Multi-BCs

- ECMWF - IFS
- NCEP - GFS
- MétéoFrance - ARPÈGE
- CMC - GEM (Canadian)
- JMA - GSM (Japanese)

LAM Multi-model

- HARMONIE-AROME
- ALARO
- WRF-ARW (NCAR)
- NMMB (NCEP)



AEMET- γ SREPS

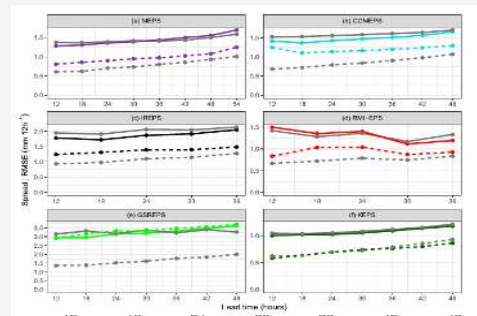
Why **multi-BCs** and **multi-NWP** models ???

Due to **higher performance** than other LAM-EPS configurations

Objective verification
Subjective verification: case studies

γ SREPS versus ECMWF EPS

- HarmonEPS system paper: review of HIRLAM EPSs
 - Comparison of 12AccPcp for 00 / 12 cycles of November 2018

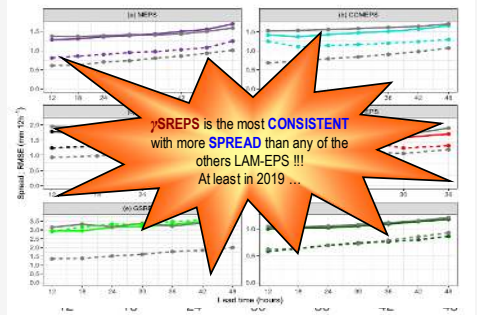


Legend: γ SREPS (dashed green), ECMWF EPS (dashed black), Spread (dashed red), em RMSE (solid green)

Frogner I.L. et al. 2019, "HarmonEPS - the HARMONIE ensemble prediction system" Weather and Forecasting, 2019, 34, p. 1909-1937, <https://doi.org/10.1175/WAF-D-19-0030.1>

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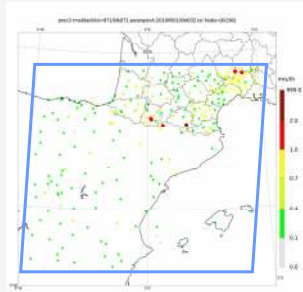
γ SREPS is the most CONSISTENT with more SPREAD than any of the others LAM-EPS !!! At least in 2019 ...

Legend: γ SREPS (dashed green), ECMWF EPS (dashed black), Spread (dashed red), em RMSE (solid green)

Frogner I.L. et al. 2019, "HarmonEPS - the HARMONIE ensemble prediction system" Weather and Forecasting, 2019, 34, p. 1909-1937, <https://doi.org/10.1175/WAF-D-19-0030.1>

γ SREPS versus AROME EPS

- MétéoFrance collaboration:
 - Results for AROME EPS (Météo-France) and γ SREPS (AEMET) intercomparison verification



Common area

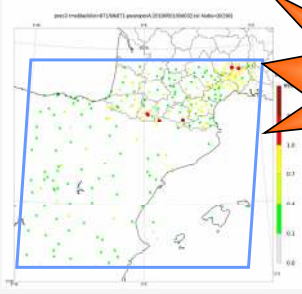
Two periods:

- 1st - 31st May 2018
- 8th - 16th October 2018 (Leslie time, very convective period)

Thanks to François Bouttier Verification [package]

γ SREPS versus AROME EPS

- MétéoFrance collaboration:
 - Results for AROME EPS (Météo-France) and γ SREPS (AEMET) intercomparison verification



TO NOTICE: AromeEPS has evolved a lot from 2019, currently with 24+1 members at 1.3 km

8th - 16th October 2018 (Leslie time, very convective period)

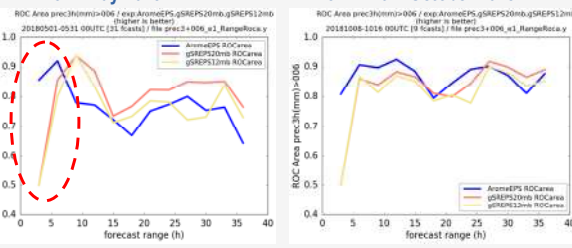
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γ SREPS versus AROME EPS

AccPcp > 6mm/3h ROC area

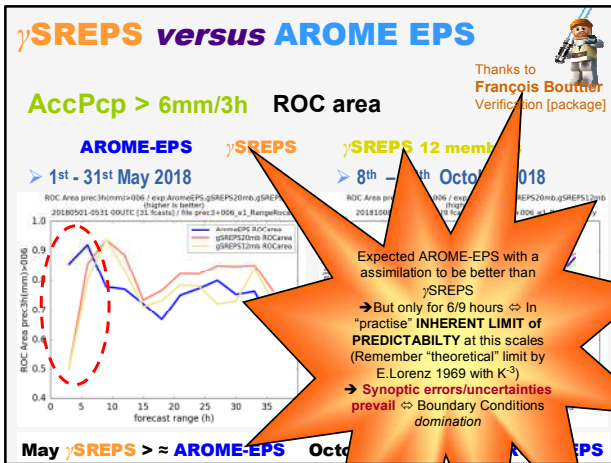
AROME-EPS γ SREPS γ SREPS 12 members

1st - 31st May 2018 8th - 16th October 2018



May γ SREPS \approx AROME-EPS October γ SREPS \approx AROME-EPS

Thanks to François Bouttier Verification [package]



In what **FORECASTERS** are more interested !!!

AEMET- γ SREPS

Why **multi-BCs** and **multi-NWP** models ???

Subjective verification:
Case Studies

Spatial uncertainty – "Spaghetti" product

Case study: 21st October 2018 ALPANDAIRE-MÁLAGA

AEMET maximum record of AccPcp in 6 hours: 289 mm

AUTHOR: Carlos Manuel Jiménez Cавero MALAGA forecasting office

- Convective Mesoscale System
 - Stationary cut-off low (DANA), blocking ridge, low level wet jet
- Low predictability ⇔ High spatial/temporal uncertainty

Estación 6H45X - ALPANDAIRE (MÁLAGA)
Precipitación en 10 min. De 11:00z 20/10/2018 a 11:00z 21/10/2018

ALPANDAIRE Rain Gauge 10 minutes

Jiménez Cавero, C.M., June 2019, "RECORD NACIONAL DE PRECIPITACIÓN EN 6 HORAS: 21 DE OCTUBRE DE 2018 - ALPANDAIRE - MÁLAGA: IMPORTANCIA DE LA VIGILANCIA INTENSIVA", internal AEMET publication

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IFS - 10mm/6h HARMONIE cy40 - 80mm/6h

Jiménez Cавero, C.M., June 2019, "RECORD NACIONAL DE PRECIPITACIÓN EN 6 HORAS: 21 DE OCTUBRE DE 2018 - ALPANDAIRE - MÁLAGA: IMPORTANCIA DE LA VIGILANCIA INTENSIVA", internal AEMET publication

Case study: 21st October 2018 ALPANDAIRE-MÁLAGA

AEMET maximum record of AccPcp in 6 hours: 289 mm

AUTHOR: Carlos Manuel Jiménez Cавero MALAGA forecasting office

- Convective Mesoscale System
 - Stationary cut-off low (DANA), blocking ridge, low level wet jet
- Low predictability ⇔ High spatial/temporal uncertainty

AccPcp PROB > 90mm/6h Spaguetti MBRs 90mm/6h γ SREPS Spaguetti PROB(Pcp>90mm/MALAGA) = 30 %

HARMONIE cy40 - 80mm/6h SPATIAL UNCERTAINTY

Jiménez Cавero, C.M., June 2019, "RECORD NACIONAL DE PRECIPITACIÓN EN 6 HORAS: 21 DE OCTUBRE DE 2018 - ALPANDAIRE - MÁLAGA: IMPORTANCIA DE LA VIGILANCIA INTENSIVA", internal AEMET publication

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AccPcp PROB > 180mm/6h Spaguetti MBRs 180mm/6h γ SREPS Spaguetti PROB(Pcp>180mm/MALAGA) = 10 %

HARMONIE cy40 - 80mm/6h Only 2 MBRs > 180mm/6h

Jiménez Cавero, C.M., June 2019, "RECORD NACIONAL DE PRECIPITACIÓN EN 6 HORAS: 21 DE OCTUBRE DE 2018 - ALPANDAIRE - MÁLAGA: IMPORTANCIA DE LA VIGILANCIA INTENSIVA", internal AEMET publication

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γSREPS Maximum AccPcp/6h
γSREPS PROB(AccPcp>40mm) = 20 %
Only 1 MBR ~ 300mm/6h

Jiménez Cavero, C.M., June 2019, "RECORD NACIONAL DE PRECIPITACIÓN EN 6 HORAS: 21 DE OCTUBRE DE 2018 -ALPANDAIRE - MÁLAGA: IMPORTANCIA DE LA VIGILANCIA INTENSIVA", internal AEMET publication

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HIW
An ensemble forecast has higher value than a deterministic one

Extreme events are usually only in the "tails" BUT hopefully there is always 1 or 2 members

Jiménez Cavero, C.M., June 2019, "RECORD NACIONAL DE PRECIPITACIÓN EN 6 HORAS: 21 DE OCTUBRE DE 2018 -ALPANDAIRE - MÁLAGA: IMPORTANCIA DE LA VIGILANCIA INTENSIVA", internal AEMET publication

Basic concepts: PDF ensemble

ENSEMBLE
Member 0
NWP outputs Member 0
Member 1
Member 2
Member 3

Members are equiprobables ?

EPS: a collection of deterministic NWP possible realizations

Discrete PDF sample

What happens with the distribution TAILS ?

PDF = Probability Distribution Function
Theoretically it is possible due to an initial PDF integrate it to predict its evolution through the so called Fokker-Planck equation (Liouville equation for meteorology). In practise no one has succeed.

Basic concepts: PDF ensemble

ENSEMBLE
Member 0
NWP outputs Member 0
Member 1
Member 2
Member 3

Members are equiprobables ?

High Impact Weather tends to be on the tails due to NWP tend to be "conservative"
Main goal forecasting offices is HIW (as Mediterranean convection)
➢ MOTIVATION to include WRF into γSREPS

EPS: a collection of deterministic NWP possible realizations

Discrete PDF sample

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Case Studies: Dana-Valencia and Alcanar Flash-Floods

DANA-Valencia case
29th October 2024

From rain-gauges

Close to Turis → 300-432mm/24h (registered 771,8mm/24h)

7 members > 180mm reflect 35% of probability with low spatial uncertainty

The Alcanar case exhibits high spatial uncertainty, in contrast to the DANA-Valencia case, as evidenced by the Spaguetti products
→ Isolines of AccPcp for each member
Both cases show AccPcp maxima that are relatively "close" to the observed values.
→ Extreme HIW events are typically well represented in the EPS maxima by a few members.

Alcanar case
1st September 2021

Close to Alcanar → 192-256mm/12h (registered 256,7mm/24h)

7 members > 120mm reflect 35% of probability BUT with spatial uncertainty

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Spaguetti members and maximum are the "starting point" products to detect High Impact Weather events



γ SREPS products

Web and PANEL

Probabilistic
 Spaghetti ⇔ all members
 Maximum
 → Looking for the worst scenario

<http://www.gsreps.aemet.es>



γ SREPS products


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FORECASTING OFFICES
 Currently γ SREPS is commonly used and in fact it is an essential part of the forecast process !!!

BUT it has been a big effort producing specific products requested by Forecasting Offices



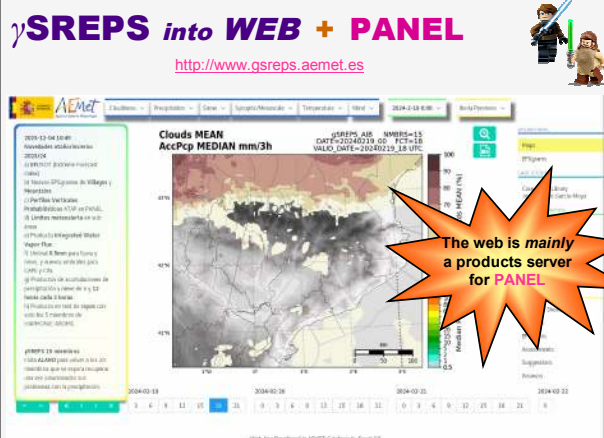
	Global	LAM
Det.	ex-HRES	Harmonie
EPS	ENS-IFS	γ SREPS

AEMET- γ SREPS

In OPERations

γ SREPS into WEB + PANEL

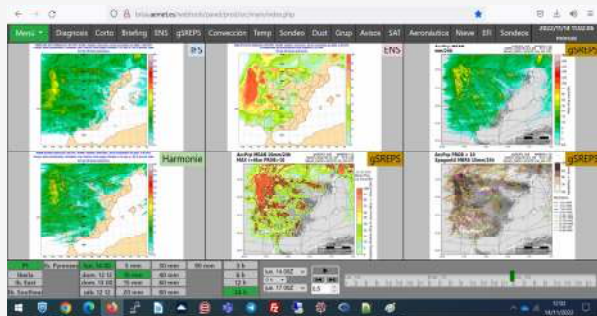
<http://www.gsreps.aemet.es>



The web is mainly a products server for PANEL

PANEL examples AccPcp

- Poor man ensemble ⇔ comparing different forecasting systems → ECMWF-IFS, HARMONIE-AROME and γ SREPS

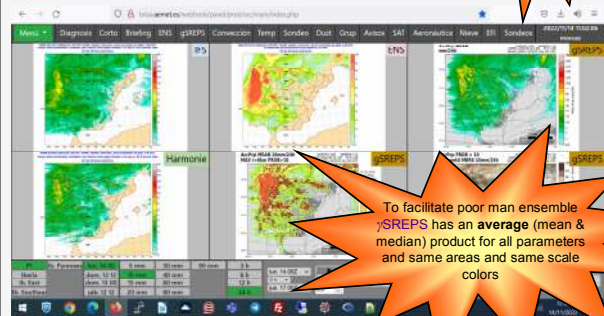


PANEL examples AccPcp

- Poor man ensemble ⇔ comparing different forecasting systems → ECMWF-IFS, HARMONIE-AROME and γ SREPS

γ SREPS success into AEMET Forecasting Offices is due to PANEL !!!

To facilitate poor man ensemble γ SREPS has an average (mean & median) product for all parameters and same areas and same scale colors



EPSgrams: airports

- AEROgrams:** EPSgrams following the runway direction
 - Probabilities over 7, 15 and 20 kts
 - Tail wind
 - Cross wind
- Shear:** trying four levels:
 - 10, 100, 200 and 457 m
 - ~ 001, 003, 006, 015 FL

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Special runways EPSgrams requested by aeronautic forecasters

SREPS2EPSgrams NOV23 Mountain and Villages

- Static EPSgrams** [2023 May Forecasting Offices Seminar]
 - Mountains ⇔ GPV Zaragoza
 - Altitude vs NWP
 - Villages ⇔ GPV Malaga / Santander / Barcelona
- On-click EPSgrams** [Delayed development to 2024 due to ADAGUC dynamic web]

Ribagorza Pico Aneto 3404m [-737]


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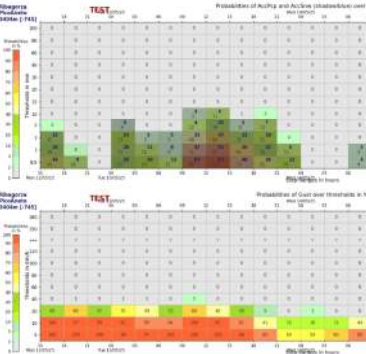
Ribagorza Pico Aneto 3404m [-737]

Request for mountain forecasters submits EPSgrams


γSREPS₂ATAPproject APR25
PROBABILITY MATRIXs EPSgrams



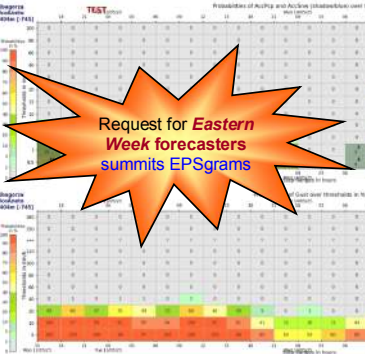
- **APR25 IFS-ENS ATAP project** [Centro Meteorológico de Málaga – Nicolás Sánchez Maldonado]
 - Gust in 6/12/24h periods
 - Updating PROB thresholds, e.g. including 300mm
 - CIN below thresholds
 - Location **PROBABILITY MATRIXs**
 - Full bunch of statistics: MEAN, MEDIAN, SPREAD, MAXIMUM, MINIMUM, UPPER and LOWER QUANTILES
 - High clouds transparency
 - Specific product for SOT



γSREPS₂ATAPproject APR25
PROBABILITY MATRIXs EPSgrams




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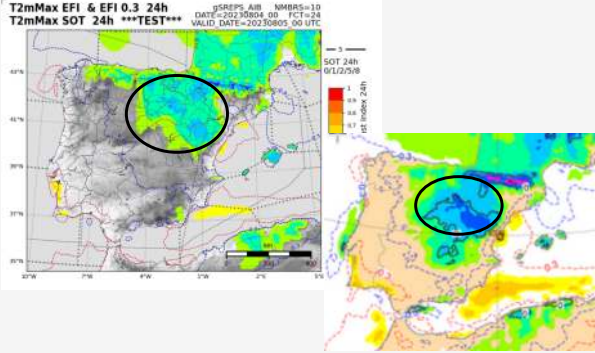


Request for Eastern Week forecasters submits EPSgrams


γSREPS₂EFlandSOT NOV23
T2mMax γSREPS versus ECMWF IFS-ENS IMPLEMENTATION



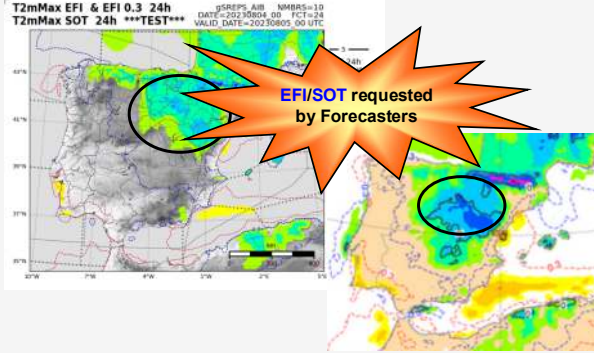
T2mMax EFI & EFI 0.3 24h
 T2mMax SOT 24h ***TEST***
γSREPS_AIR NMBRS=10 DATE=20230804_00 FCT=24 VALID_DATE=20230803_00 UTC



γSREPS₂EFlandSOT NOV23
T2mMax γSREPS versus ECMWF IFS-ENS IMPLEMENTATION


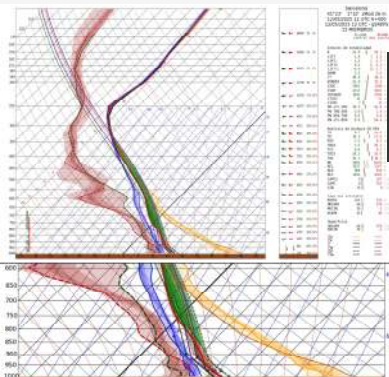


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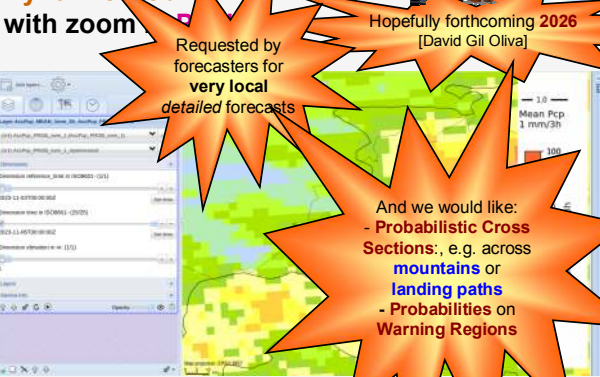
EFI/SOT requested by Forecasters

γSREPS₂ATAPverticalProfiles APR25
All EPSgrams LOCATIONS

- Available in **PANEL** for all EPSgrams **LOCATIONS**
- **Zoom** at low levels 1000-600hPa

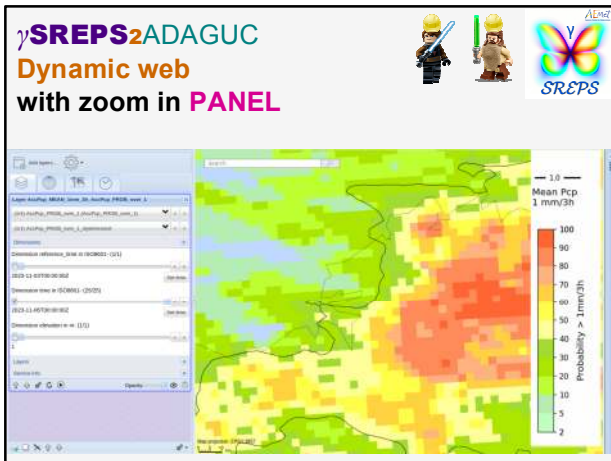
γSREPS₂ADAGUC
Dynamic web with zoom

Requested by forecasters for **very local detailed forecasts**

Hopefully forthcoming **2026** [David Gil Oliva]

And we would like:
 - Probabilistic Cross Sections, e.g. across **mountains** or **landing paths**
 - Probabilities on **Warning Regions**



AEMET LAM-EPS FUTURE

Transition from **multi-NWP** model **γSREPS**
to **uni-NWP** model **HarmonEPS**

Foreseeable future Work plan: 2025/26

- Keep 2.5 km and extend current γSREPS (~2/3 years) due to:
 - 1 km and hectometric NWP models still not work properly
 - Multi-model performs still better than another techniques to deal with model errors and uncertainties
- Extent to:
 - 25/30/36 members ⇔ Including Global ICON BCs and ICON-LAM and maybe Canadian GEM-LAM
 - IBERIAxxm 2.5 bigger domain (~better organized convection)
- Update NWP models:
 - WRF3 to 4.6
 - HARMONIE-AROME and ALARO cy40h111 to cy46h1
- Become TC2 at ECMWCF HPCF
- Auto-verification each month with HARP v3
 - BCs and NWP sub-ensembles verification
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- PRODUCTS
 - ADAGUC dynamic zoom products
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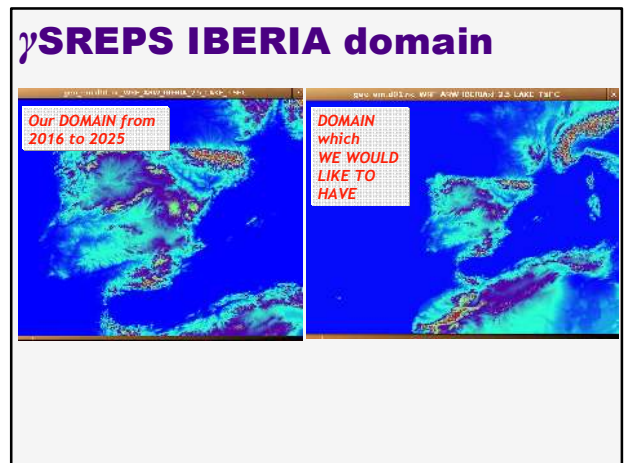
Until 4 years ago our limitation was HPC resources
→ Currently our limitation is human resources

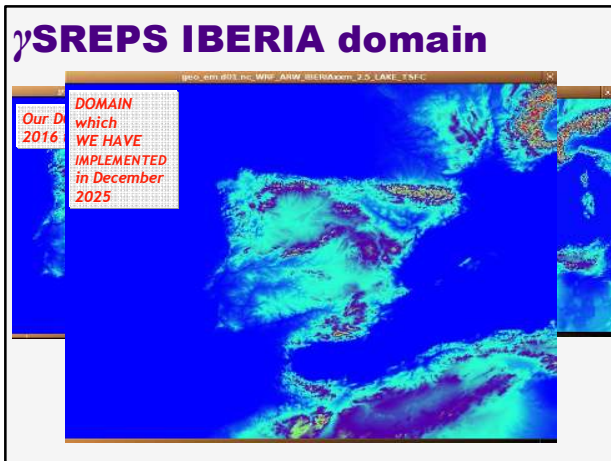
Foreseeable future Work plan: 2025/26

BUT due to human resources limitations we decide to STOP γSREPS development and move to uni-NWP. Data-driven LAM-EPs with AI/ML? HarmonEPS being more integrated into ACCORD and UWC-South

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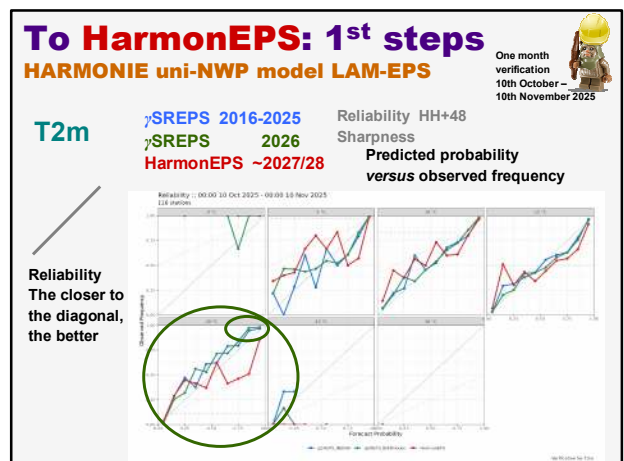
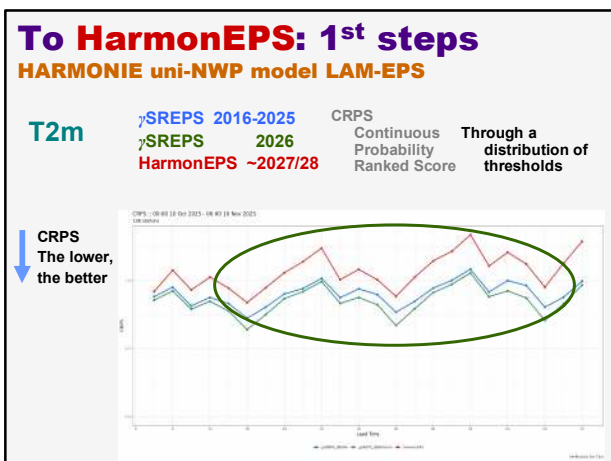
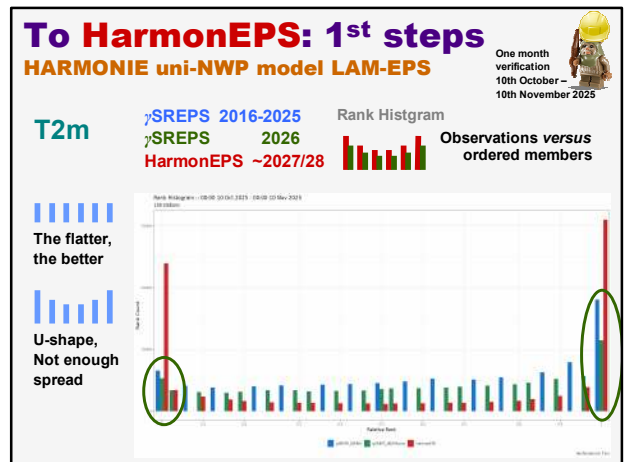
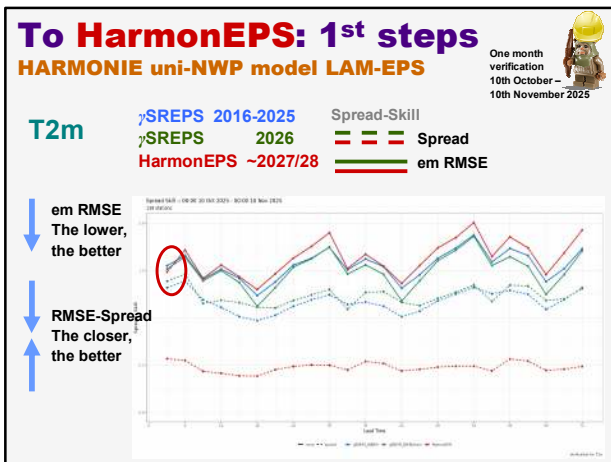


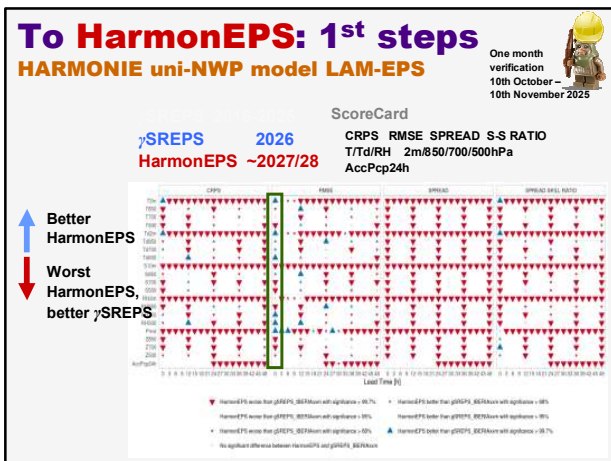
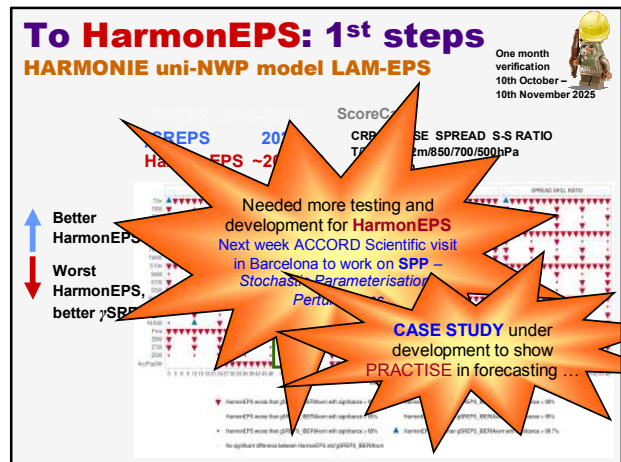
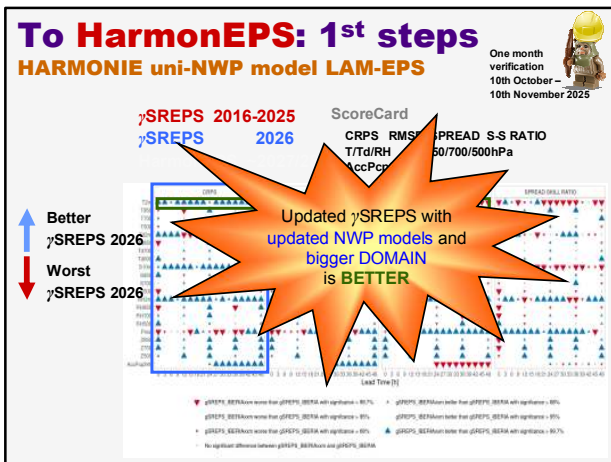
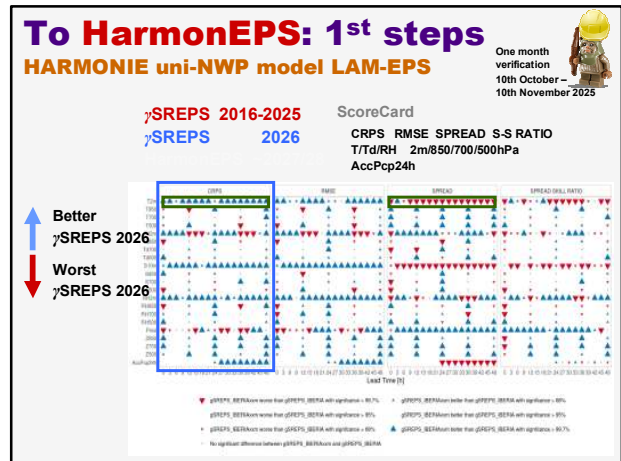
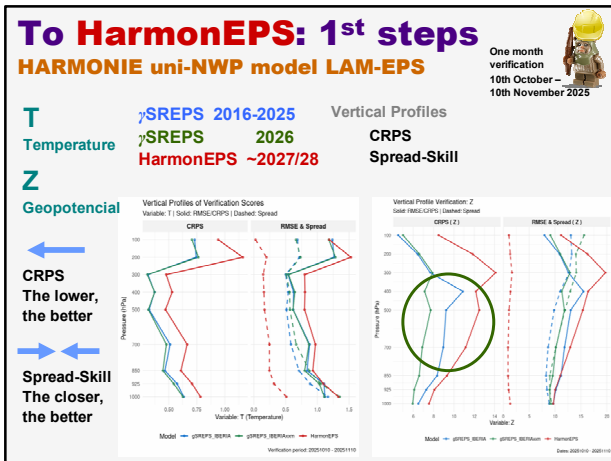
2025 γ SREPS update with updated NWP models and bigger DOMAIN

Juanjo Gómez Navarro

AEMET LAM-EPS VERIFICATION IBERIA

Updated γ SREPS 2026 versus 2016-25
HarmonEPS TEST versus γ SREPS





GOBIERNO DE ESPAÑA
VICERREINADO TECNICA DEL GOBIERNO
MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOCRÁTICO

aemet
Agencia Estatal de Meteorología

Gracias por vuestra atención y a disfrutar de las XXXVII Jornadas AME !!!

gsreps@aemet.es
acalladop@aemet.es jgomezn@aemet.es
dqilo@aemet.es

XXXVII Jornadas AME
24º Encuentro Hispano-Luso de Meteorología
Málaga (Spain), 25-27 February 2026

AMET γ SREPS Predictability Group
Juanjo Gómez, Alfons Callado
Miguel Gullón (new member)
Pau Escrivà, David Gil (collaborations)
Matielde García-V. (EUMETNET SRWMP-EPS project)

Asociación Meteorológica Española

VICERREYDENCIA
 TERCERA DEL GOBIERNO
 GOBIERNO DE ESPAÑA
 MINISTERIO
 PARA LA TRANSICIÓN ECOLÓGICA
 Y EL RETO DEMOGRÁFICO



Física del caos en la predicción meteorológica
 Carlos Santos Burguete
 (AEMET, 2018)
 Página web AEMET en publicaciones

Gracias por venir y a disfrutar de las Jornadas AME !!!



qsreps@aemet.es



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dqilo@aemet.es



Pasado, presente y futuro de las predicciones por conjuntos
 AME Aula Morán (2024)
 Página web AEMET

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