The October 9th 2018 flash flood in Mallorca. A preliminary study

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7th MetMed. 4-6 March 2019. Palma. Spain

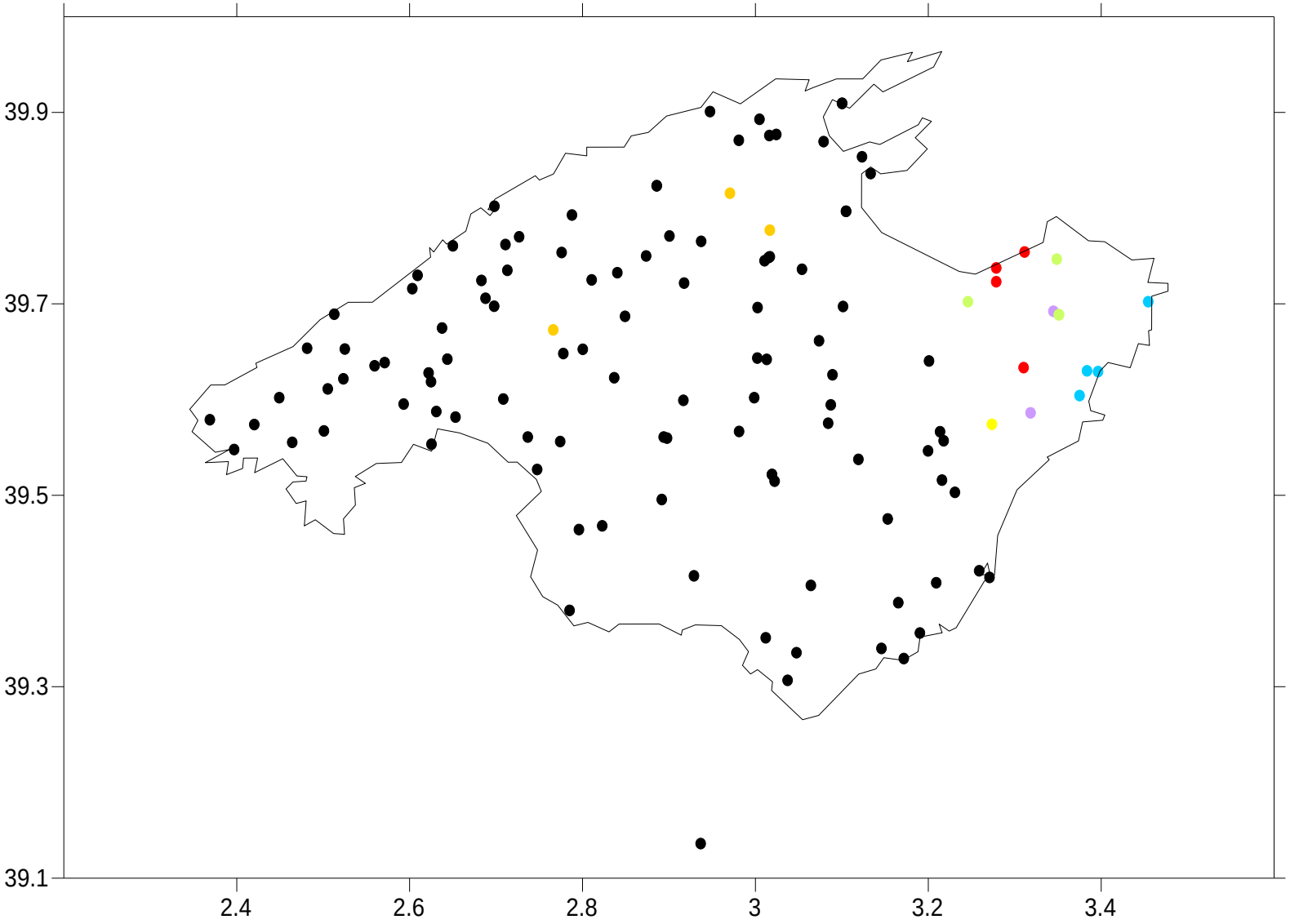
More than 90 M€

in losses.

13 people dead

OUTLINE:

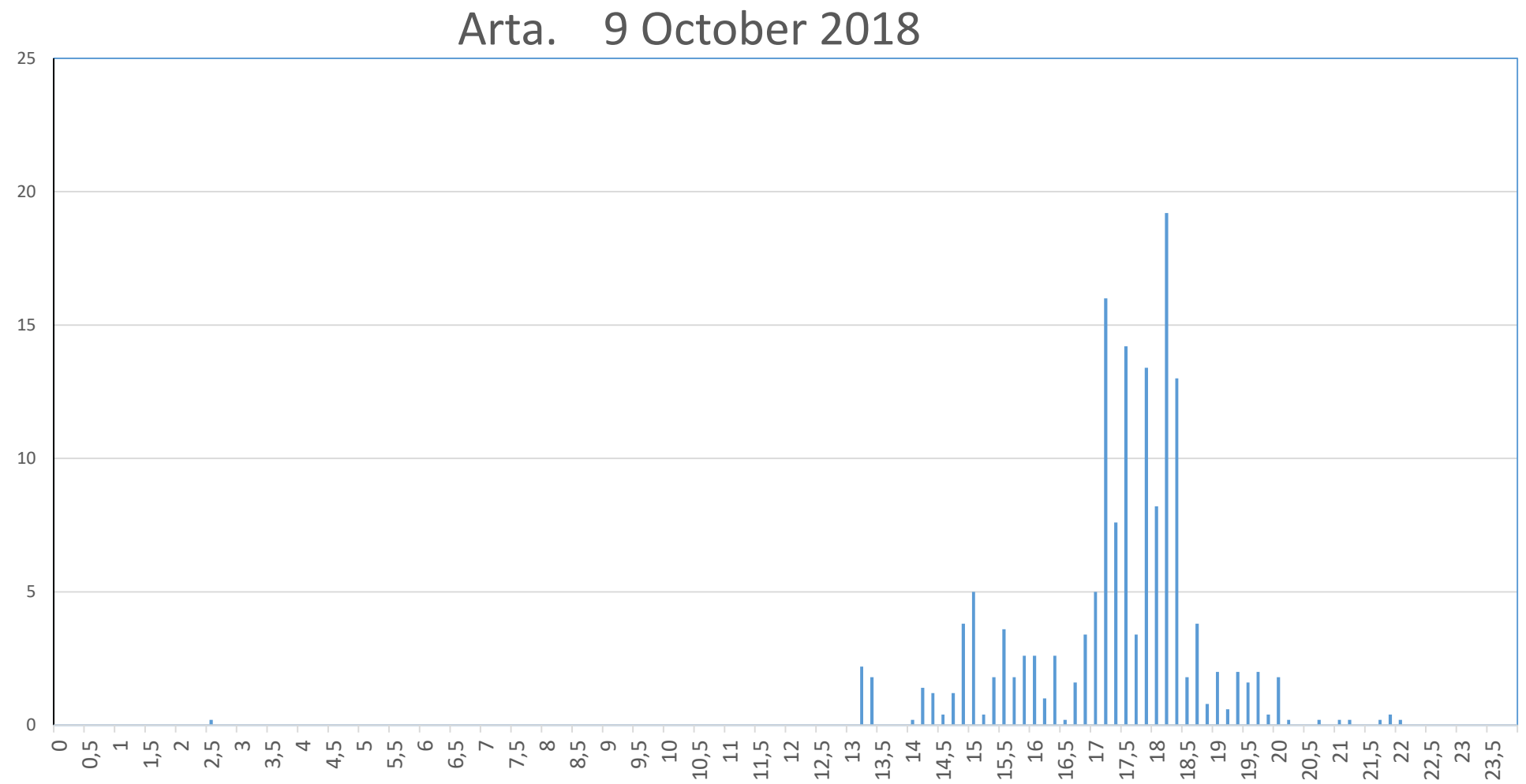
- Rainfall observations
- Satellite images
- Rainfall radar estimares
- Large scale meteorological situation
- Predictability analysis: Harmonie, ECMWF, Euro 4



Max 257,0 mm

SANT LLORENS - SA FONTPELLA

Accumulated precipitation (mm) in 24 hours. 9 Oct 2018


Arta. 9 October 2018
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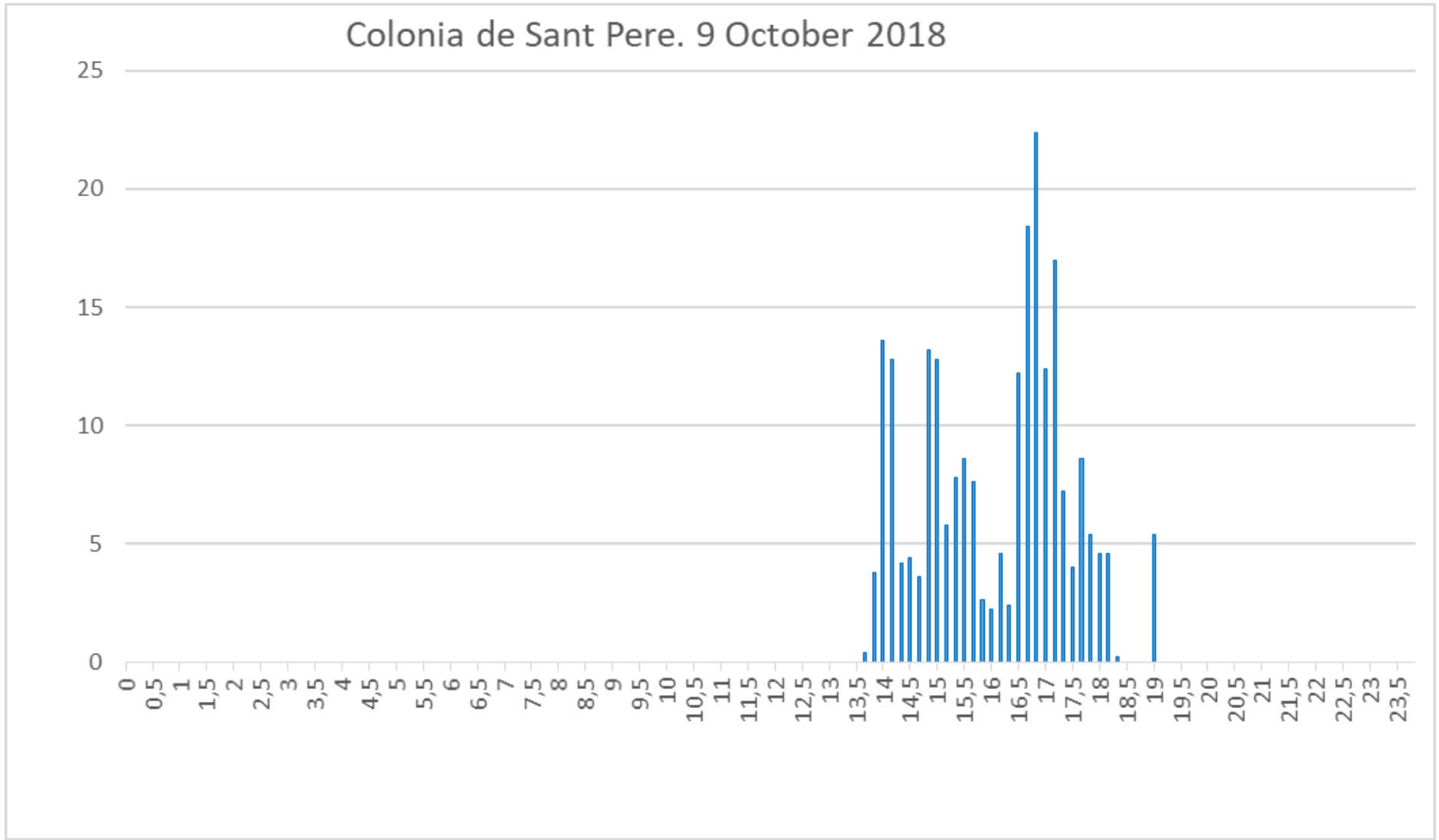
Colonia de Sant Pere. 9 October 2018
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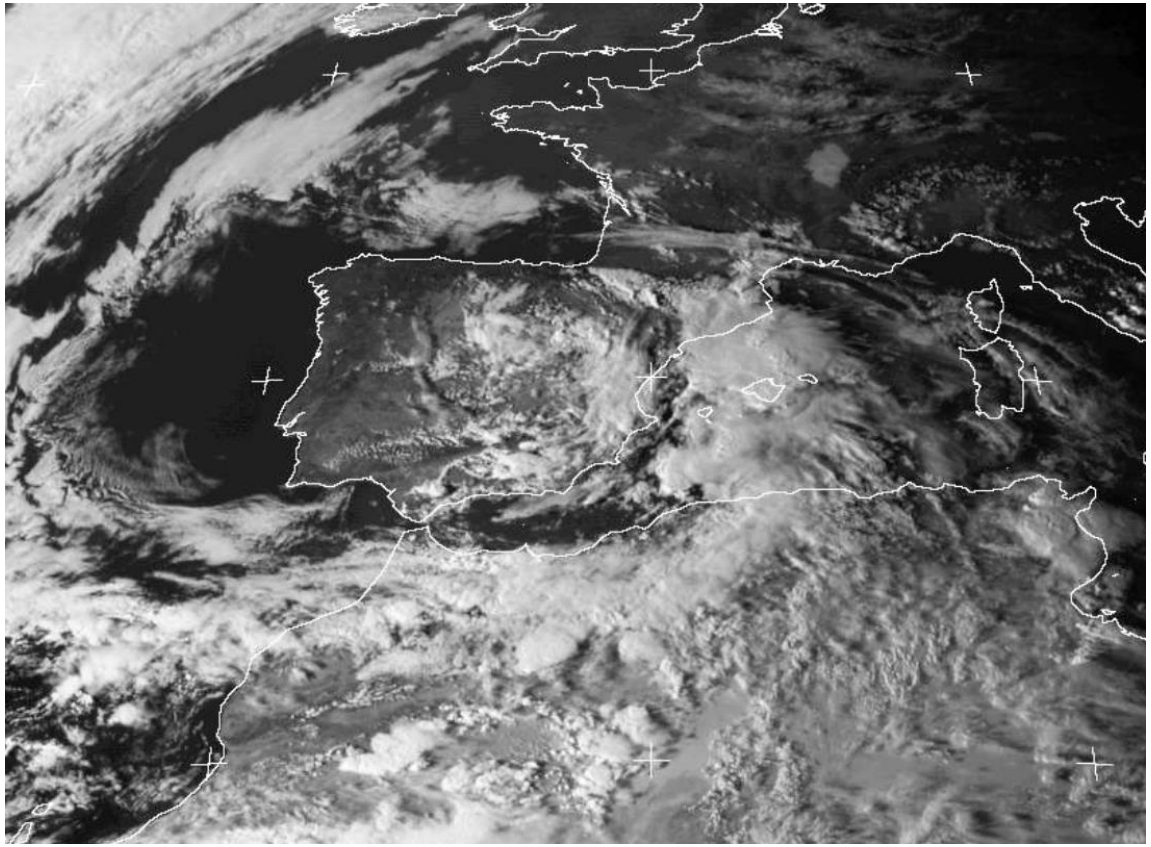
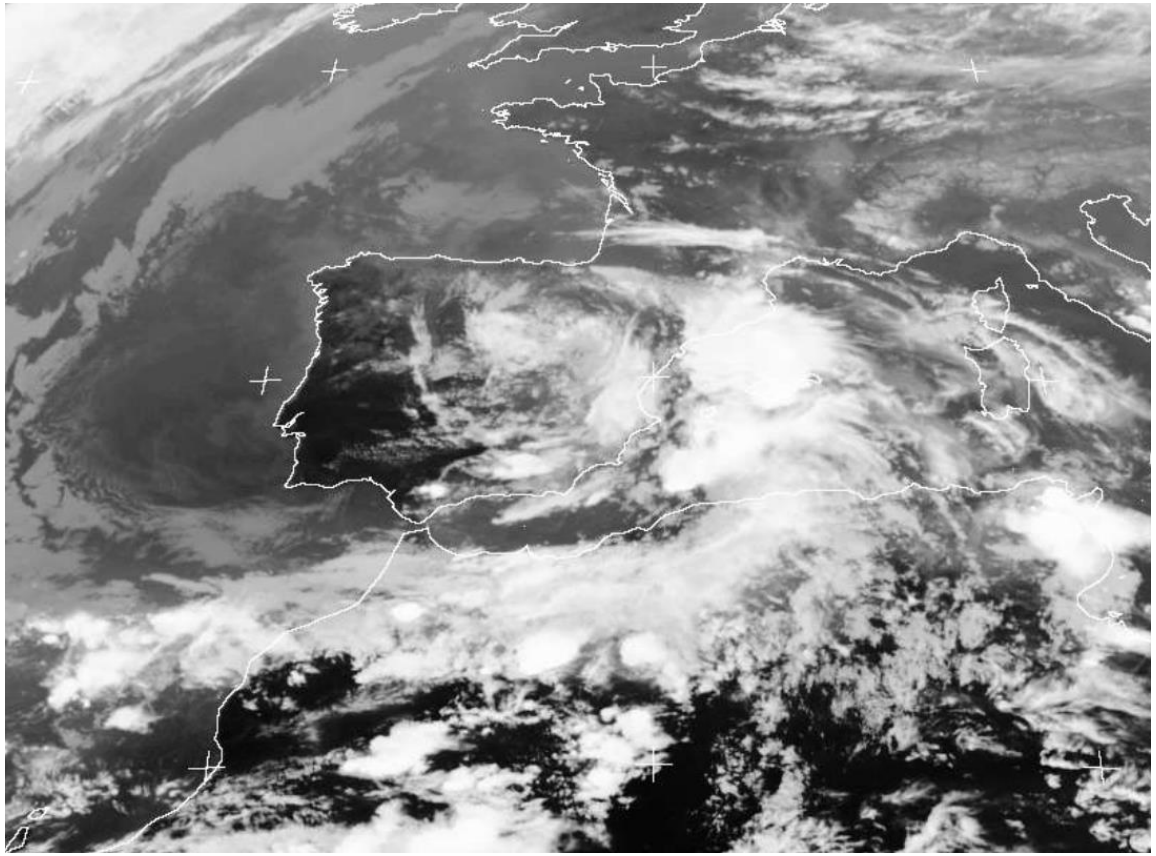
Sant Llorenç
des Cardassar


eitb.eus

Meteosat at 1600 UTC

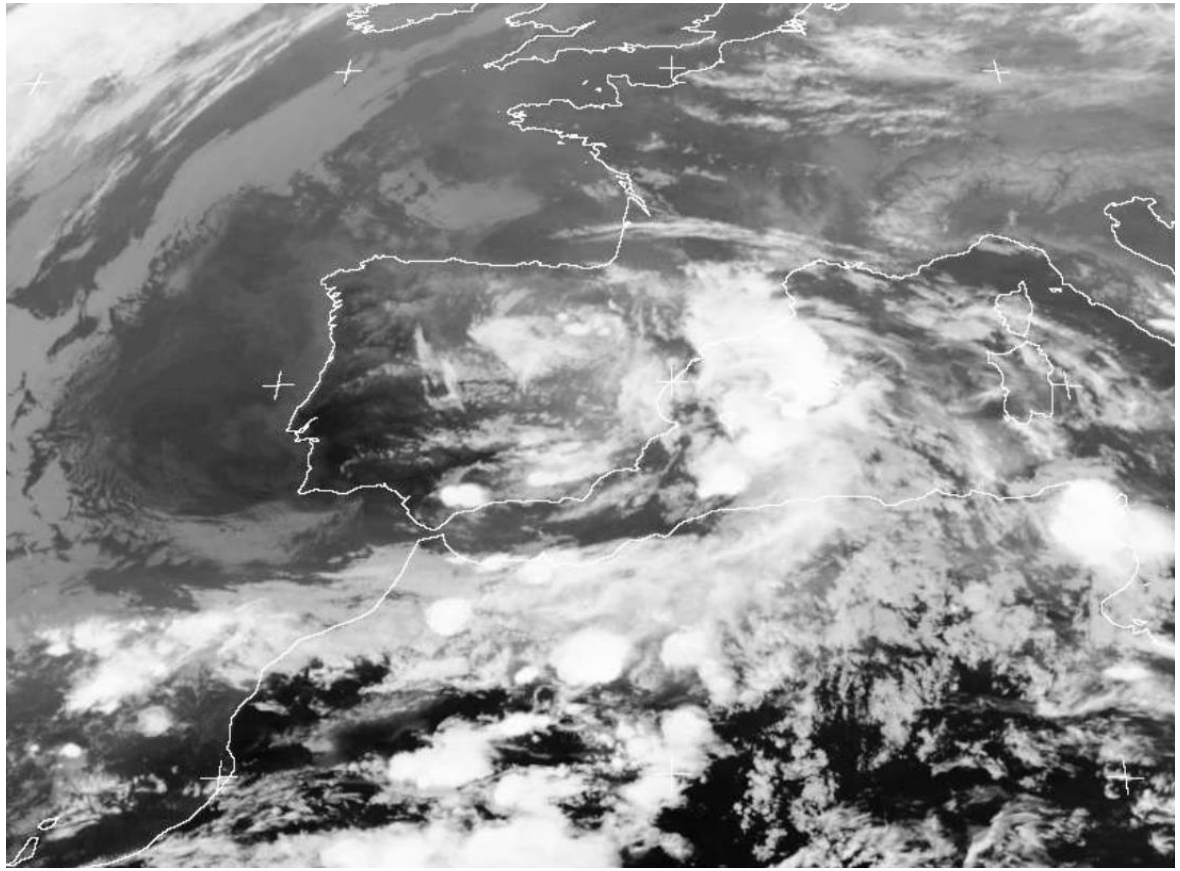


VIS

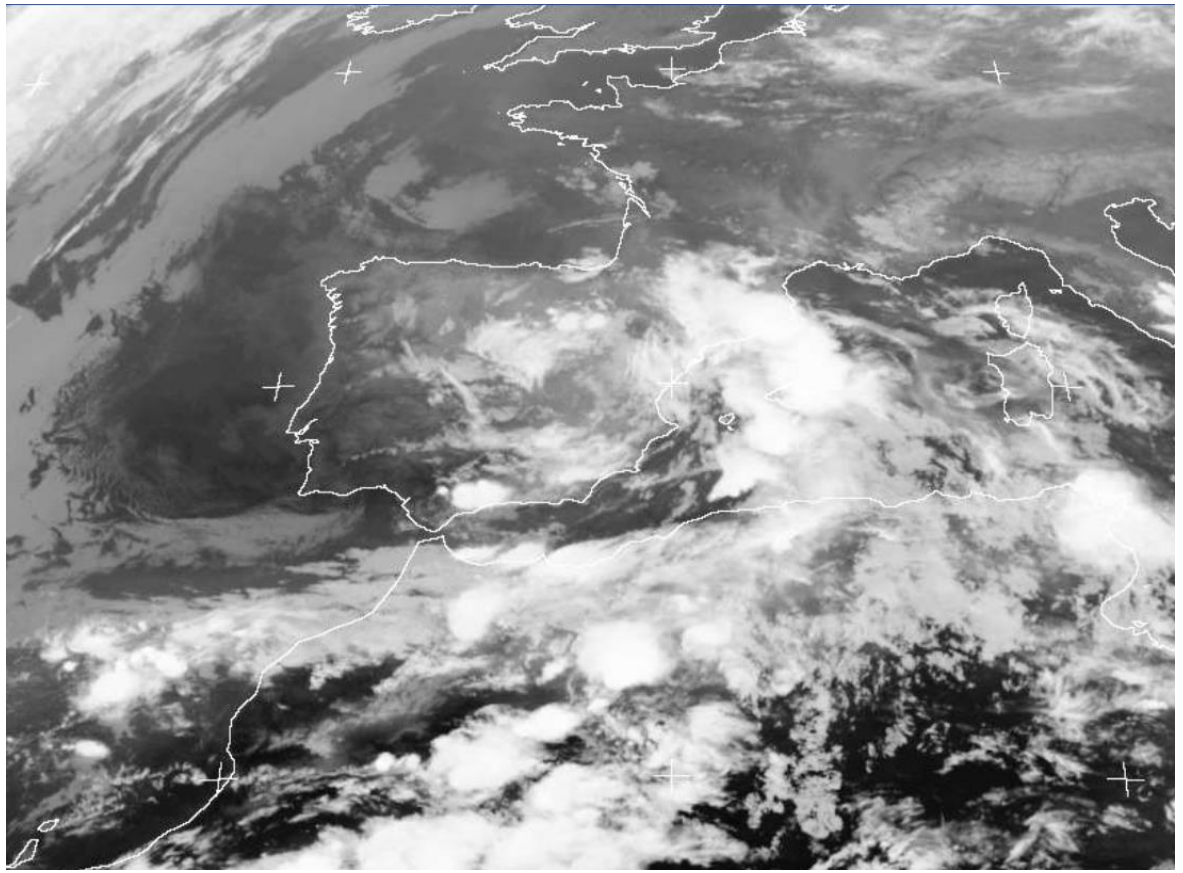


IR

Meteosat 1700 and 1800 UTC



IR



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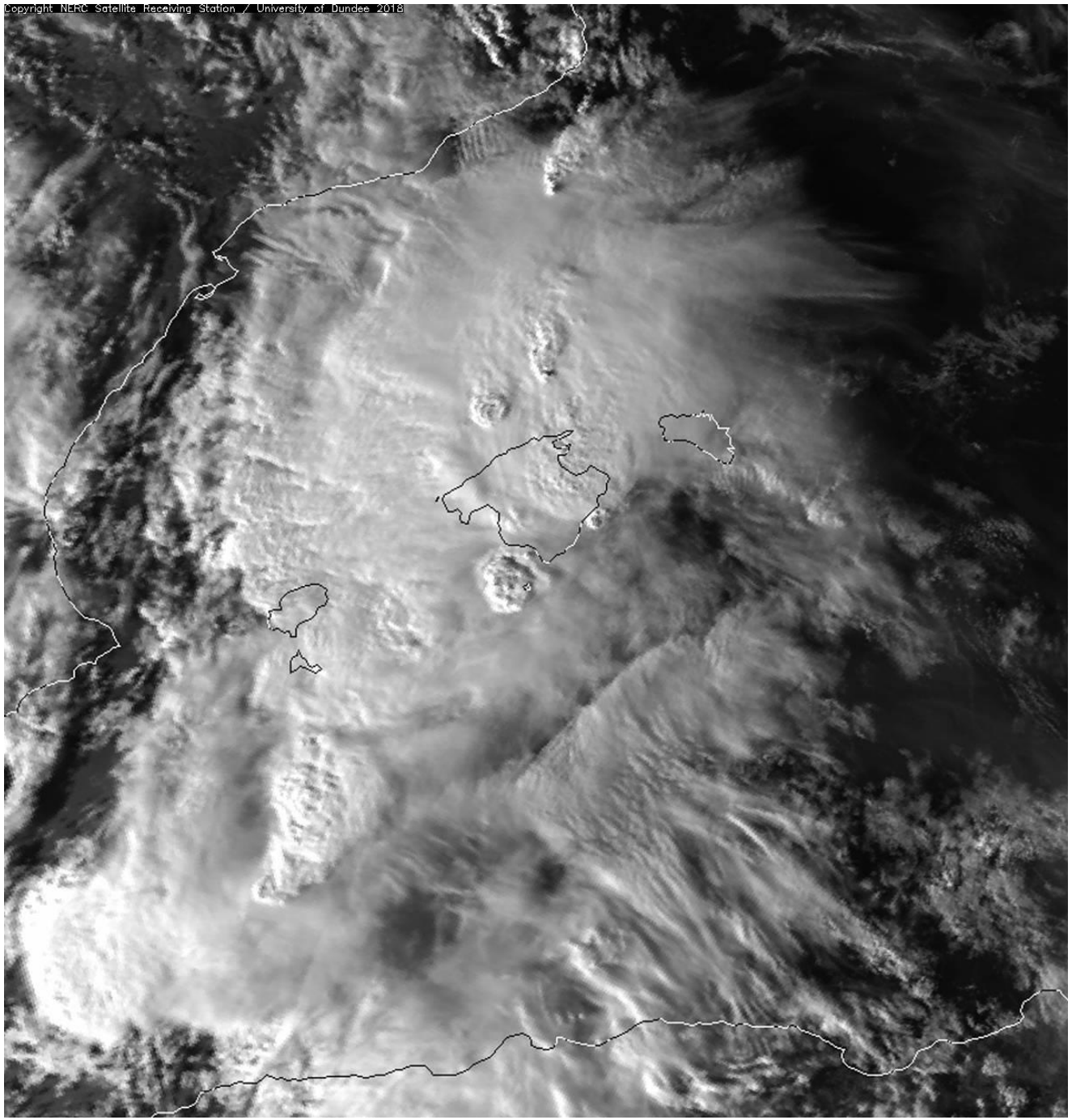
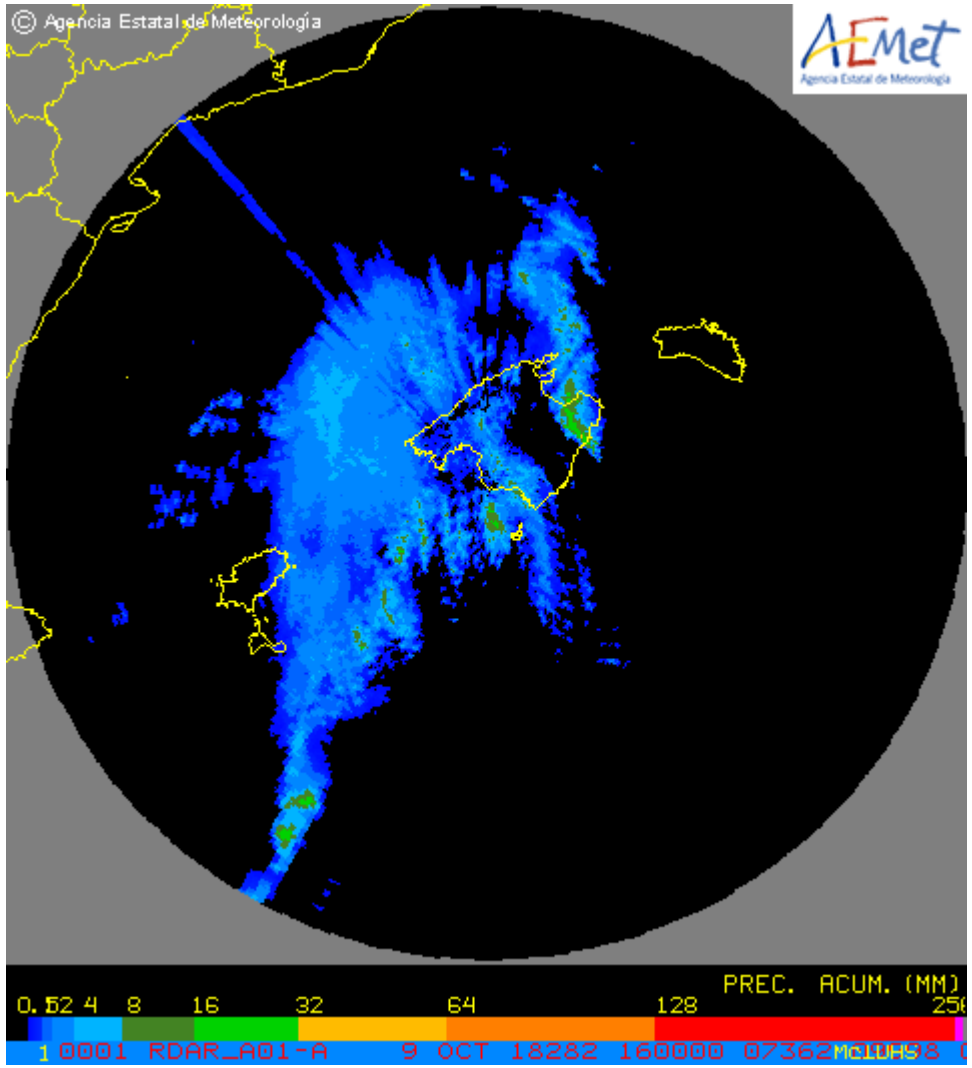


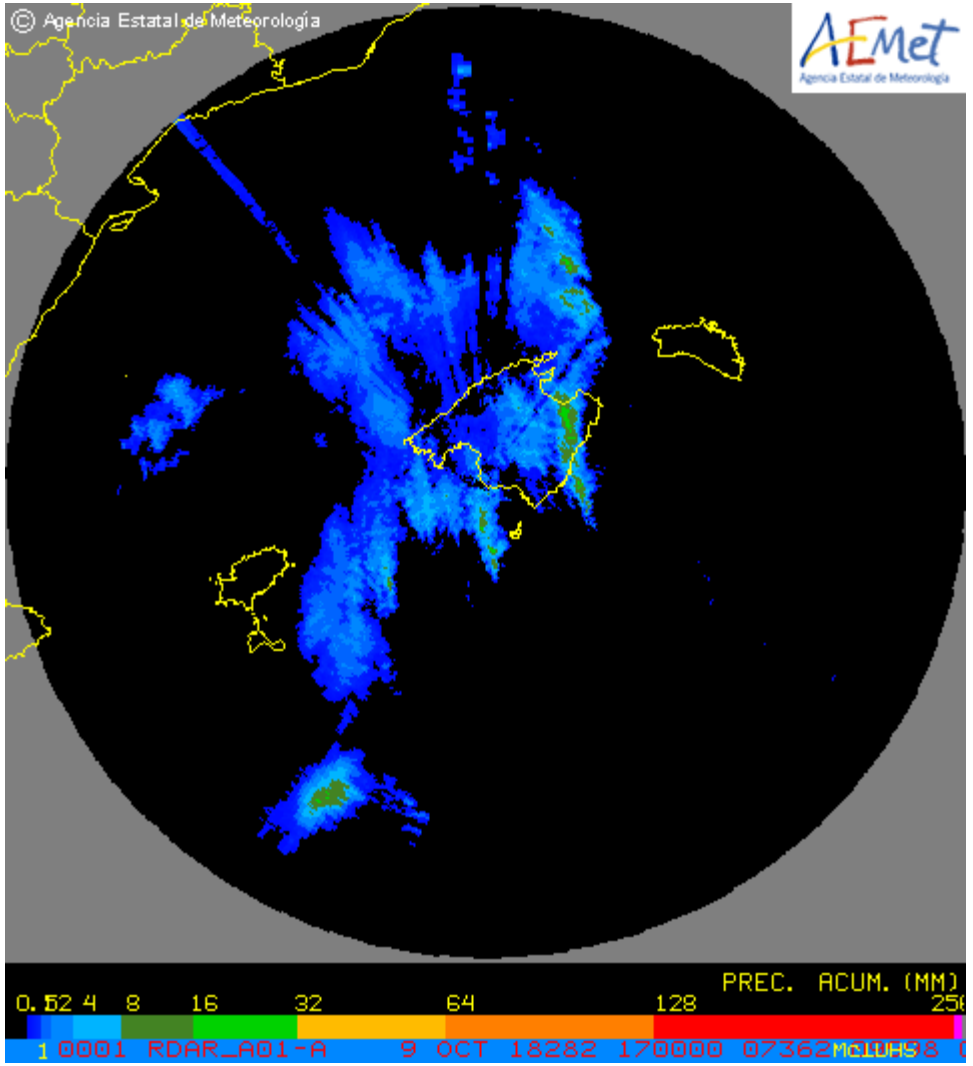
NOOAA-19 15.11 UTC

AVHRR Cloud RGB

Estimatted accumulated precipitation

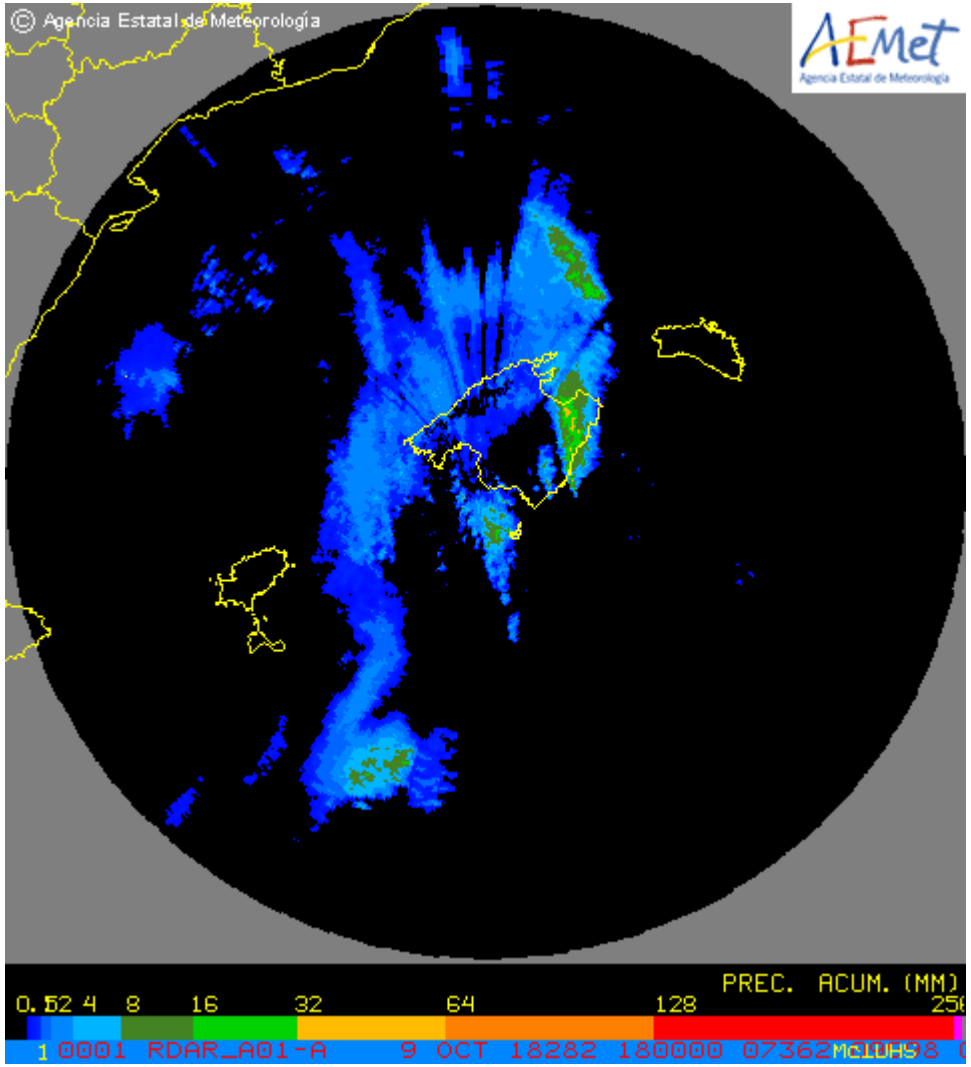


16.00 – 17.00 UTC

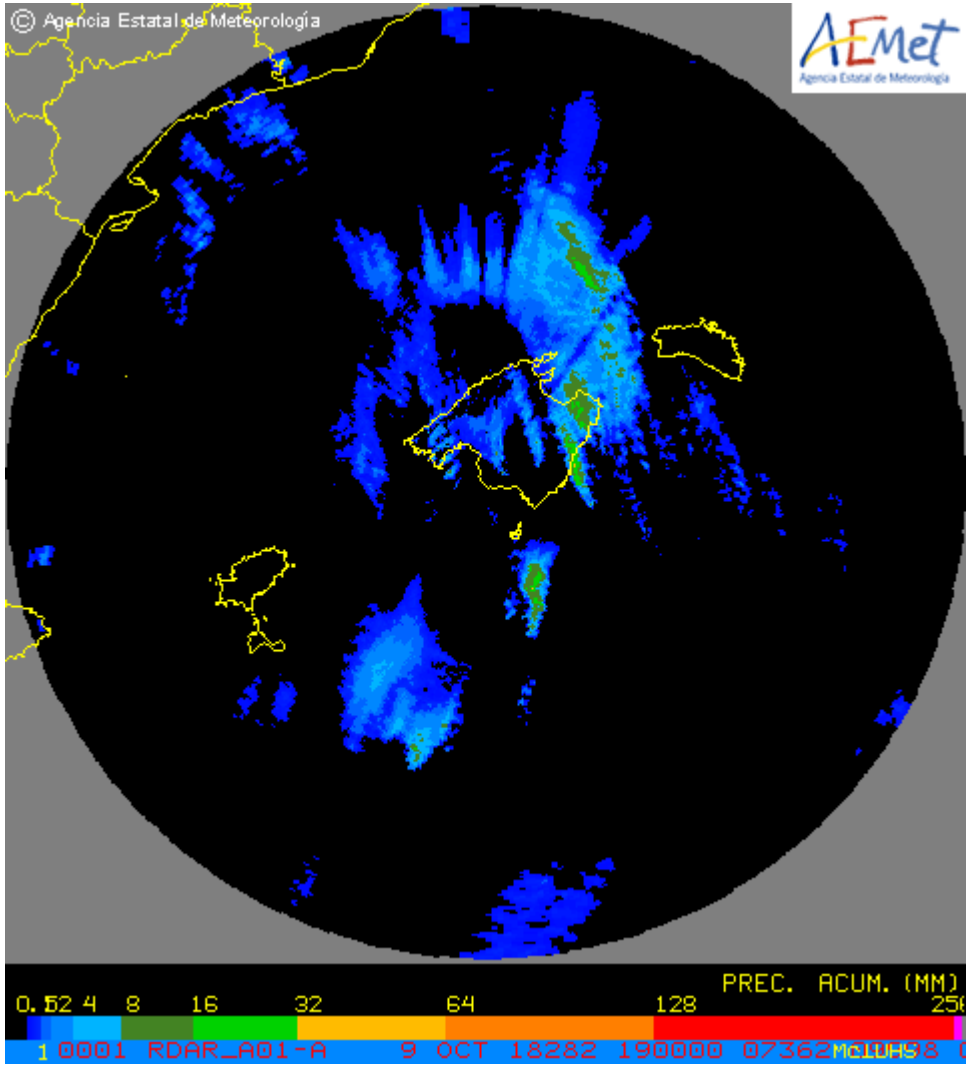


17.00 – 18.00 UTC

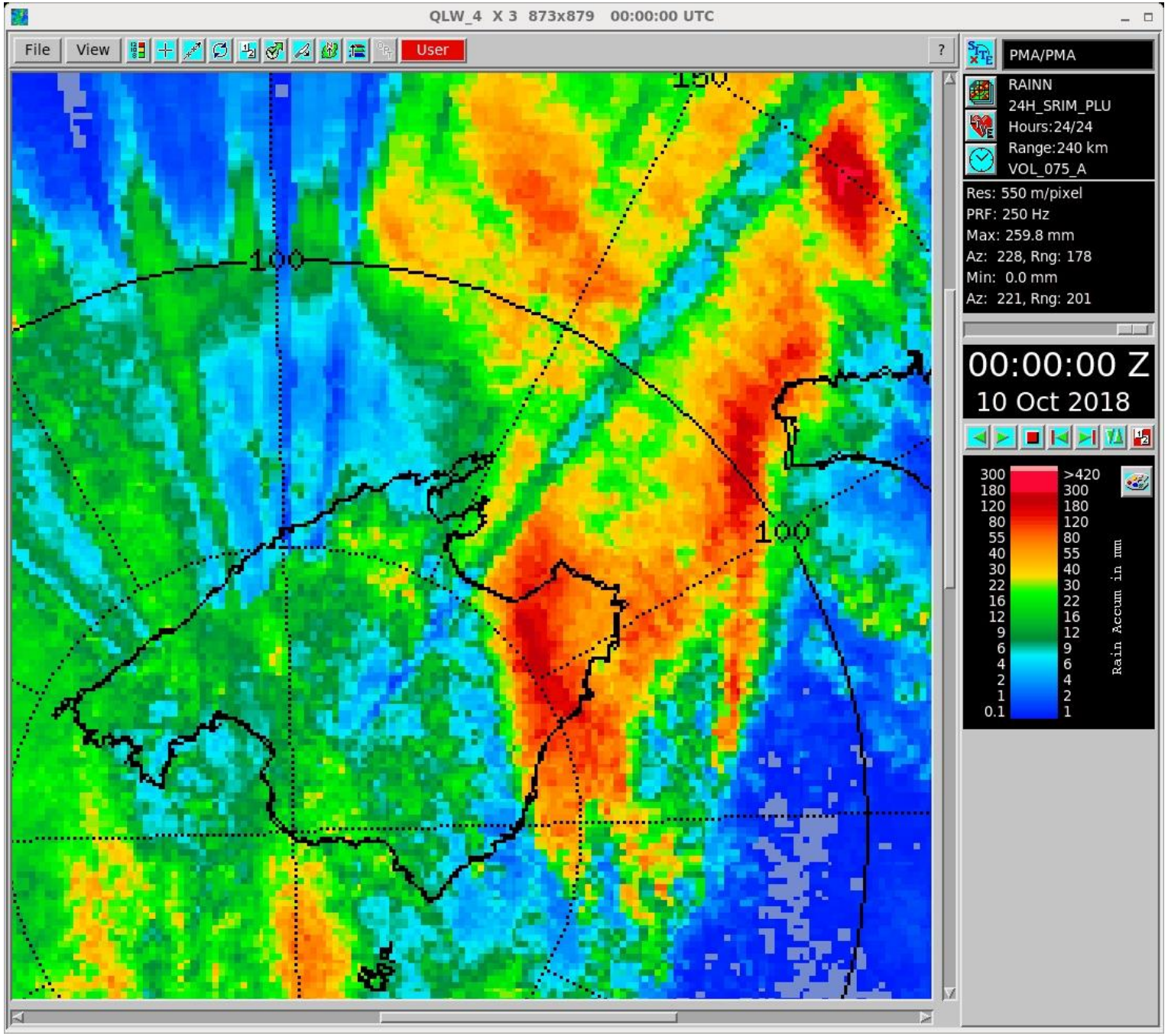
Estimated accumulated precipitation



18.00 -19-00 UTC



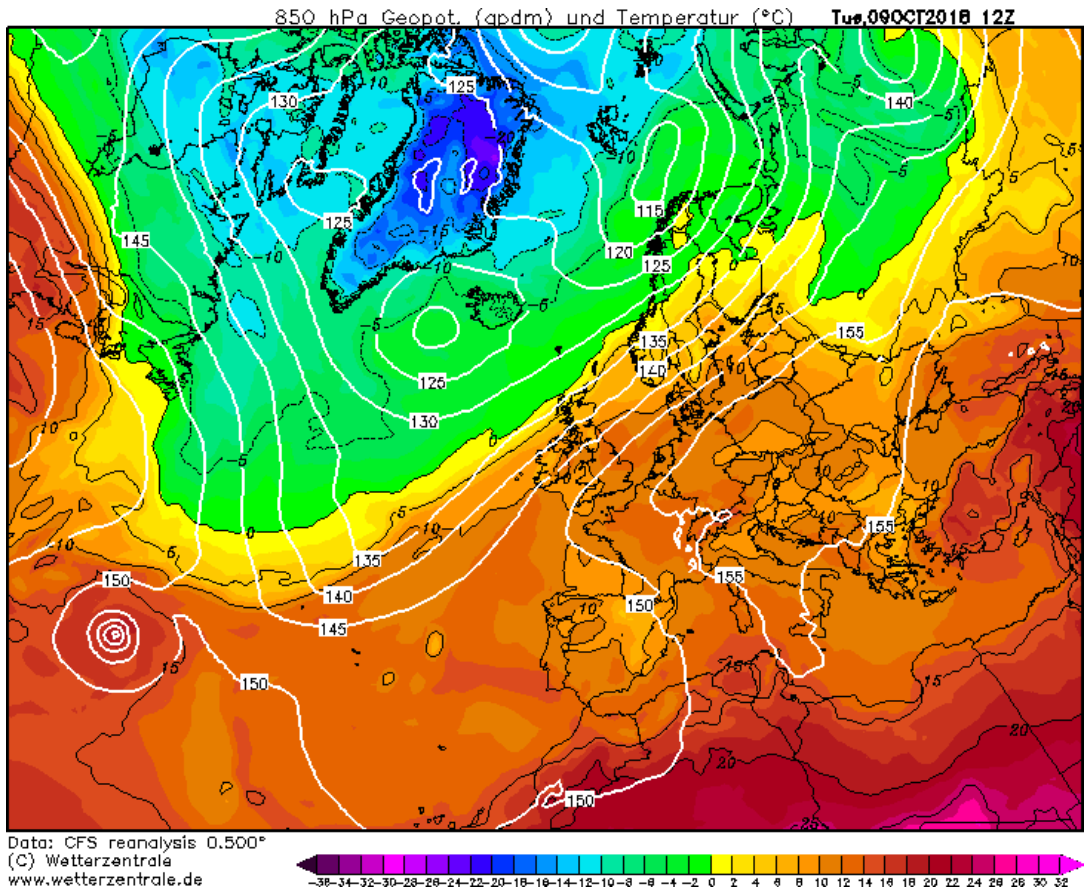
19.00 – 20-00 UTC

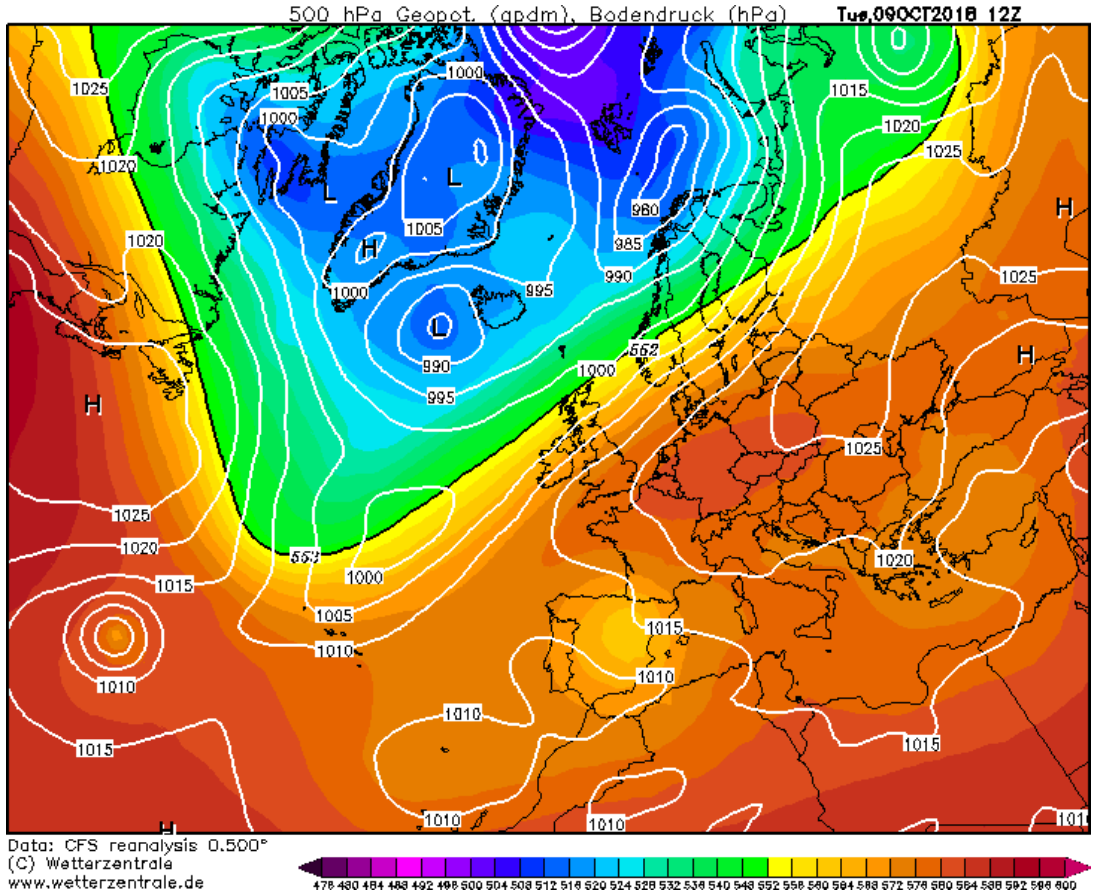


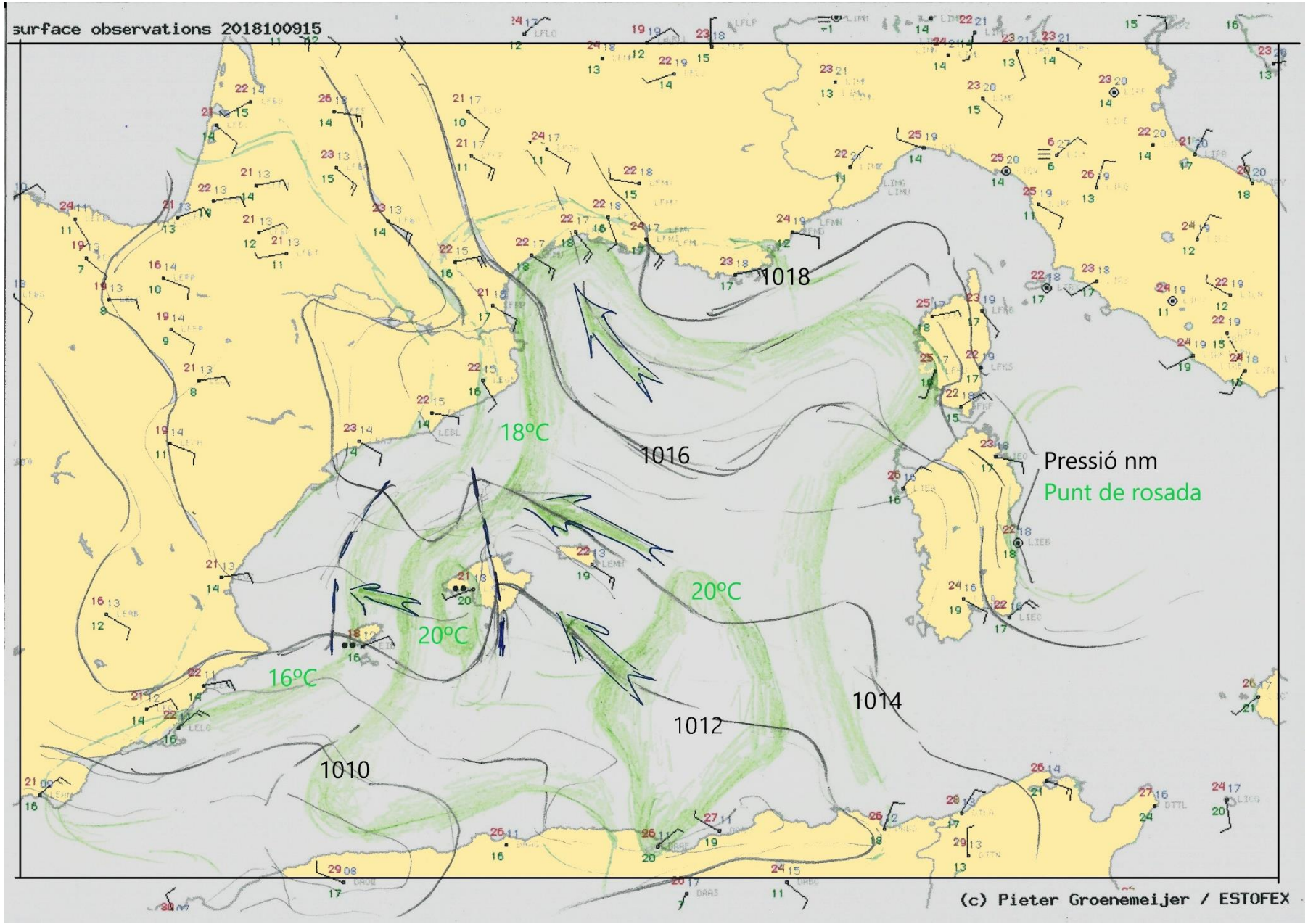
Estimated accumulated precipitation

9 Oct 2018 24 hours

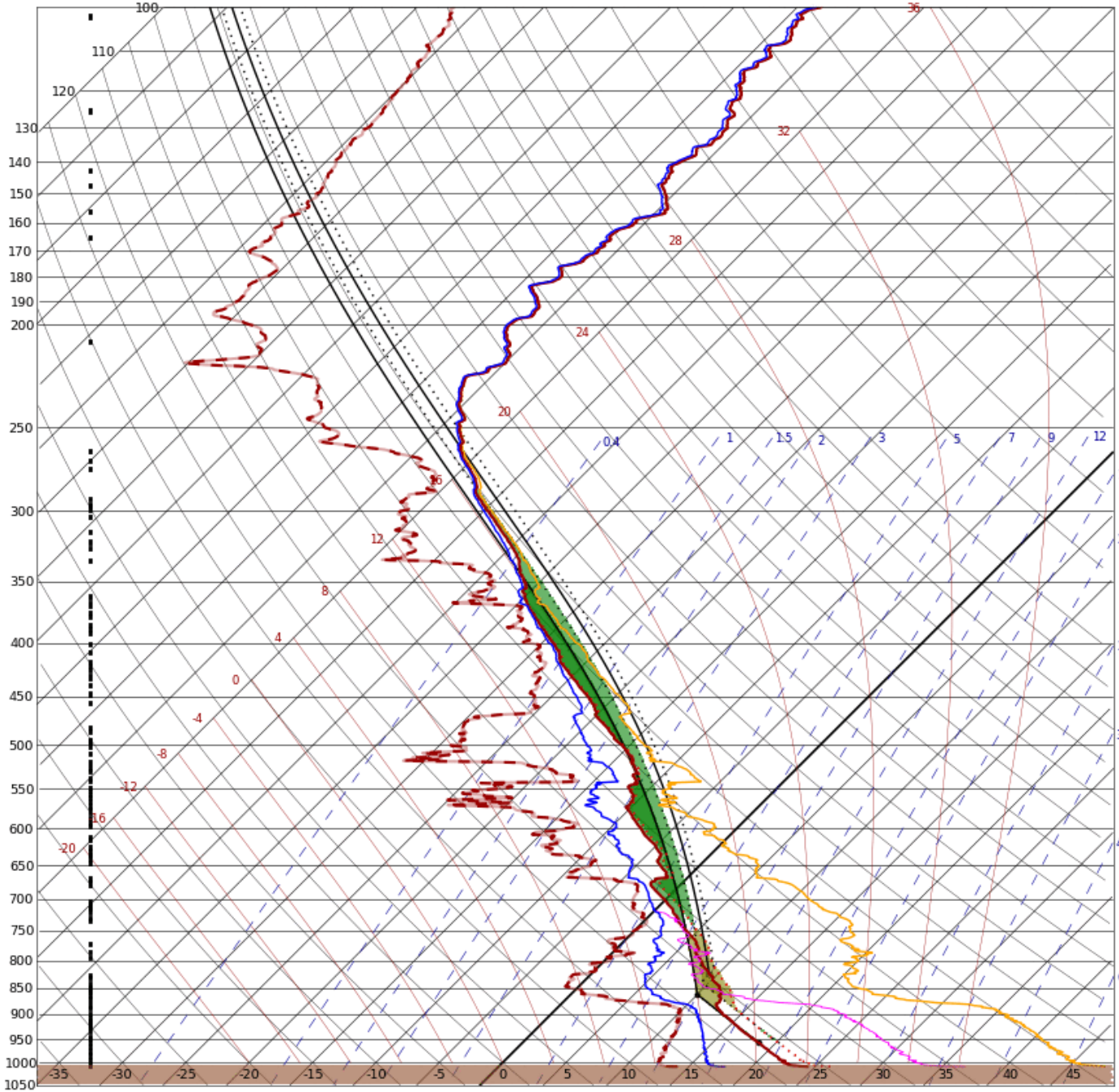
GFS reanalysis at 1200 UTC

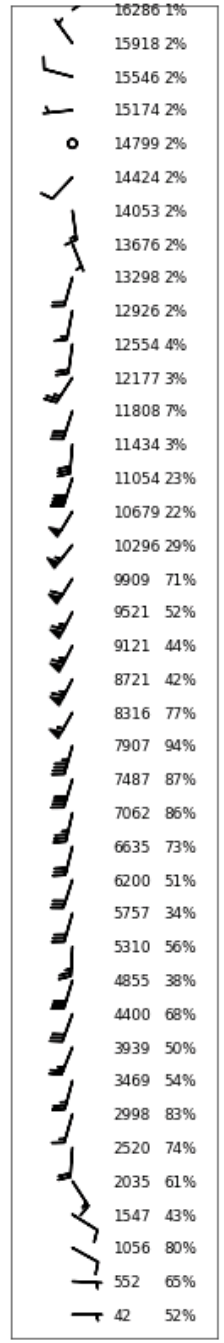






9 Oct 2018 15.00 UTC





08302 Mallorca-Son Bonet
39°36' 2°42' Alt 41 m
09/10/2018 12 UTC - BUFR

Indices de estabilidad	
K	24.0
LIFT	-0.2
LIFT7	-1.2
SHOW	5.9
TT	42.1
ISOC	3070
ISOH	2893
COTANIE	2734
PW sfc-300	26.6
PW 700-500	4.6
PW 850-700	7.3
PW sfc-850	13.4
Temperatura virtual	
$LIFT_v$	-1.0
$LIFT7_v$	-1.1

Analisis de burbuja 100 hPa	
TD	11.6
TH	22.3
MIX	9.0
THE	45.3
TCC	9.3
TNCA	10.0
TDIS	26.1
NE	343.4
NCL	749.1
NCC	824.7
NCA	861.9
CAPE3	9.6
CAPE	194.3
CIN	47.7
SBCAPE	901.2
SBCIN	2.5
Temperatura virtual	
NE_v	286.1
NCL_v	744.9
NCA_v	842.2
$TNCA_v$	9.6
NCC_v	811.3
TCC_v	9.1
$TDIS_v$	27.2
$CAPE3_v$	7.3
$CAPE_v$	360.6
CIN_v	47.1

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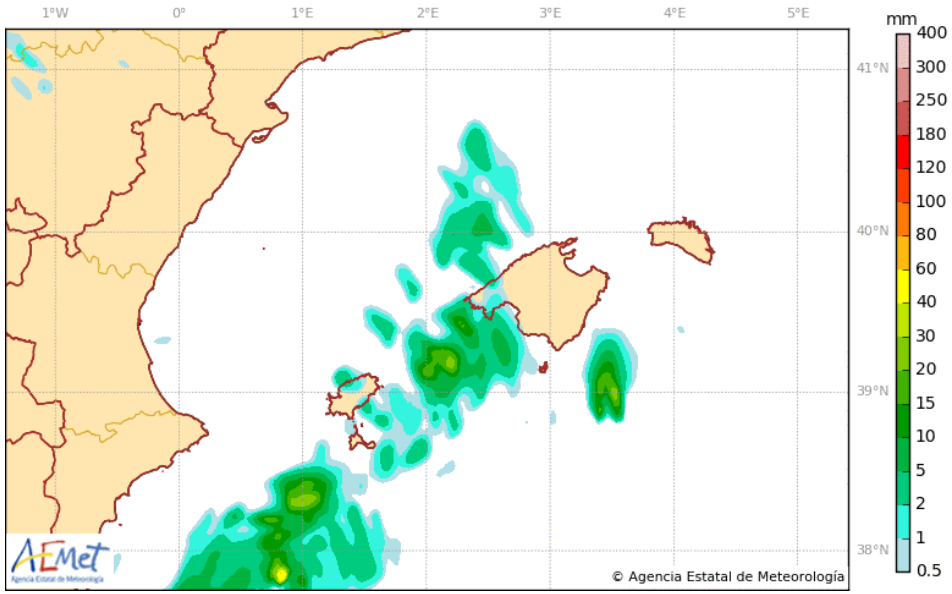
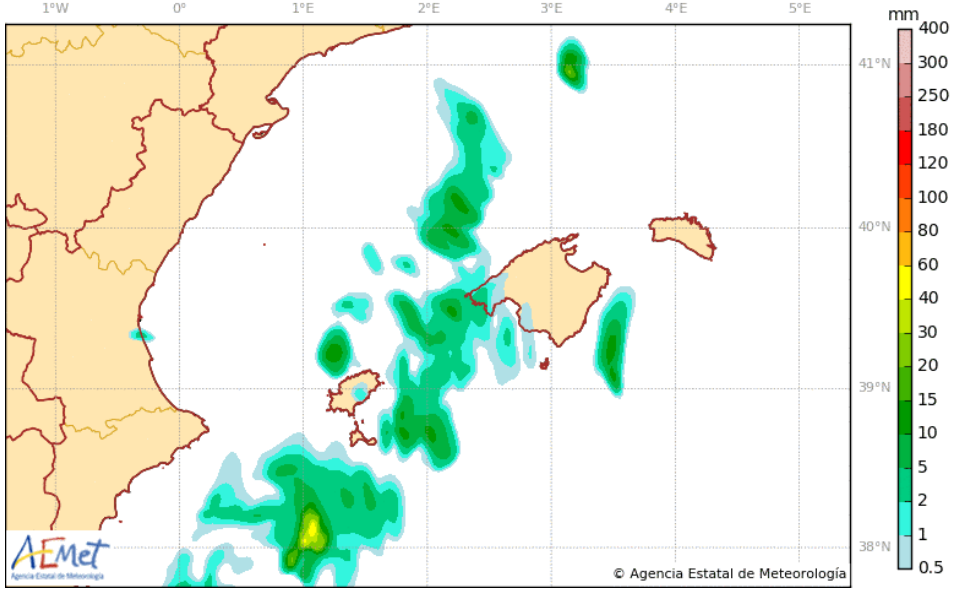
Tw
Td

HARMONIE. INITAL CONDITIONS 9 OCT 2018 00.00 UTC

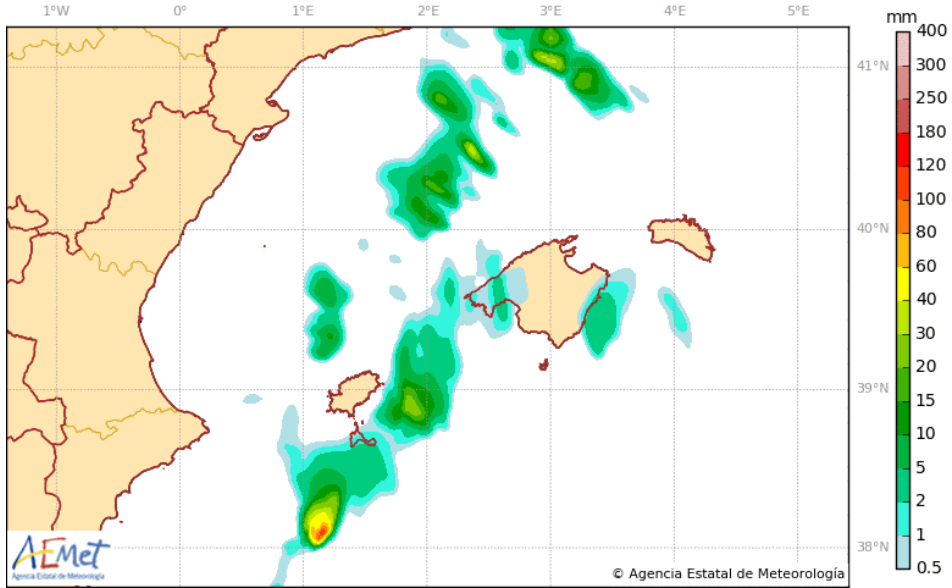
Martes 09 Octubre 2018 00UTC Predicción H+16 VAL: Martes 09 Octubre 2018 16UTC
Precipitación acumulada en 1 h



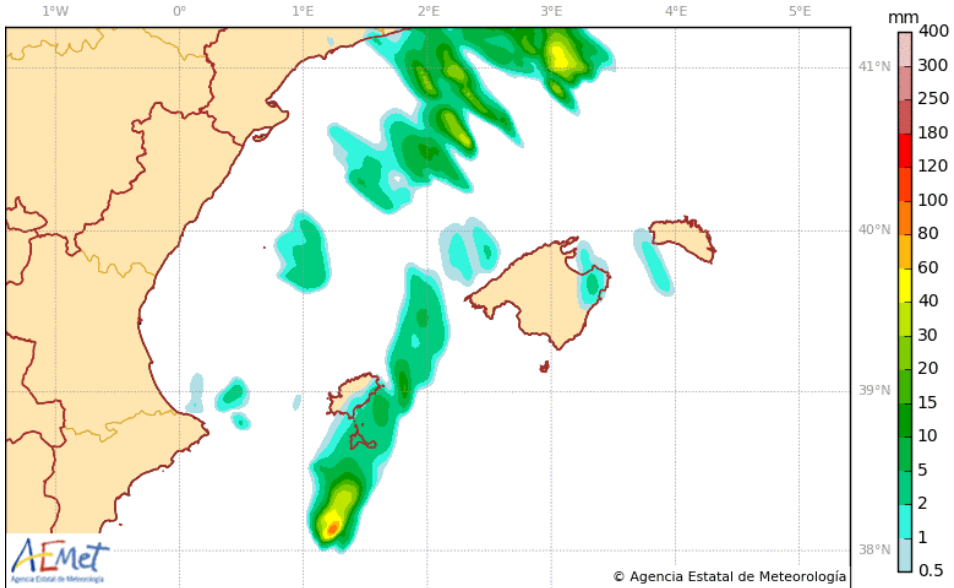
Martes 09 Octubre 2018 00UTC Predicción H+17 VAL: Martes 09 Octubre 2018 17UTC
Precipitación acumulada en 1 h



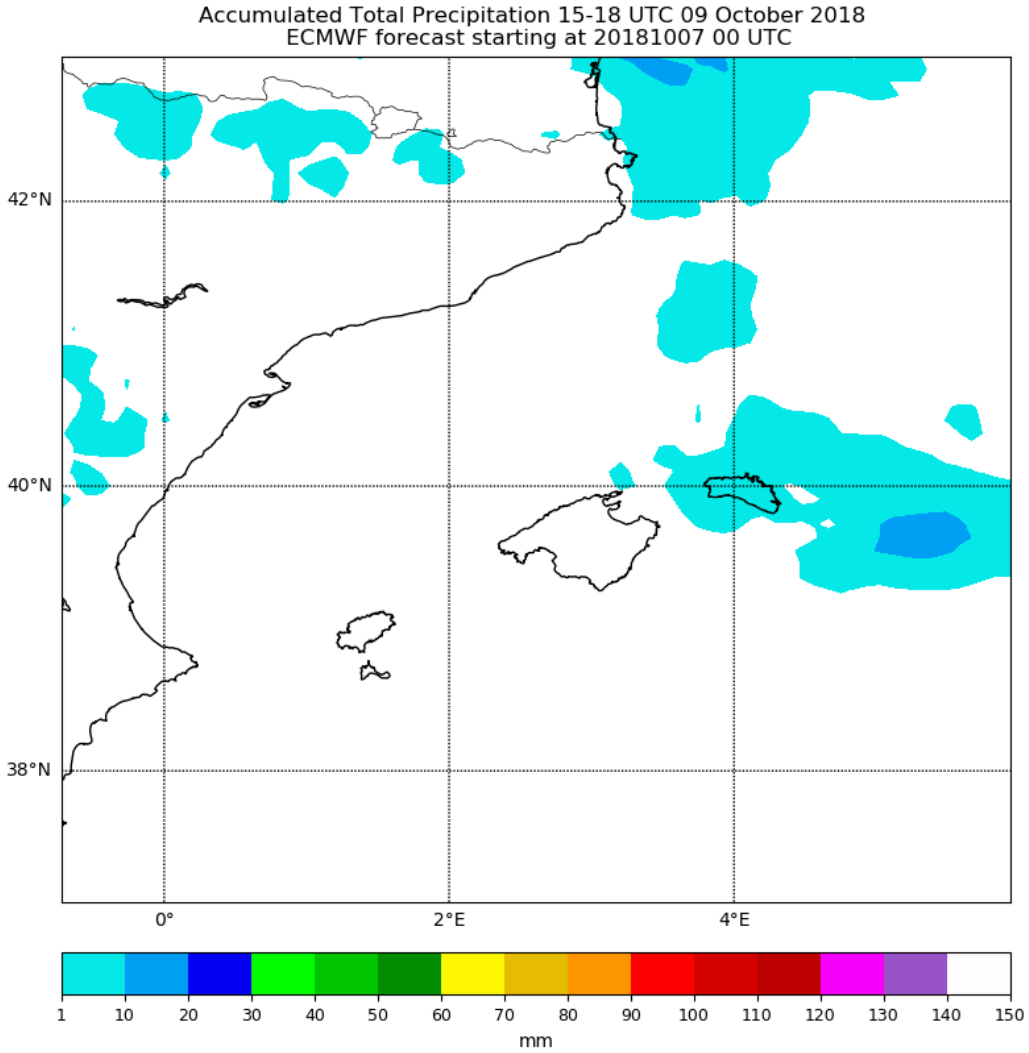
Martes 09 Octubre 2018 00UTC Predicción H+18 VAL: Martes 09 Octubre 2018 18UTC
Precipitación acumulada en 1 h

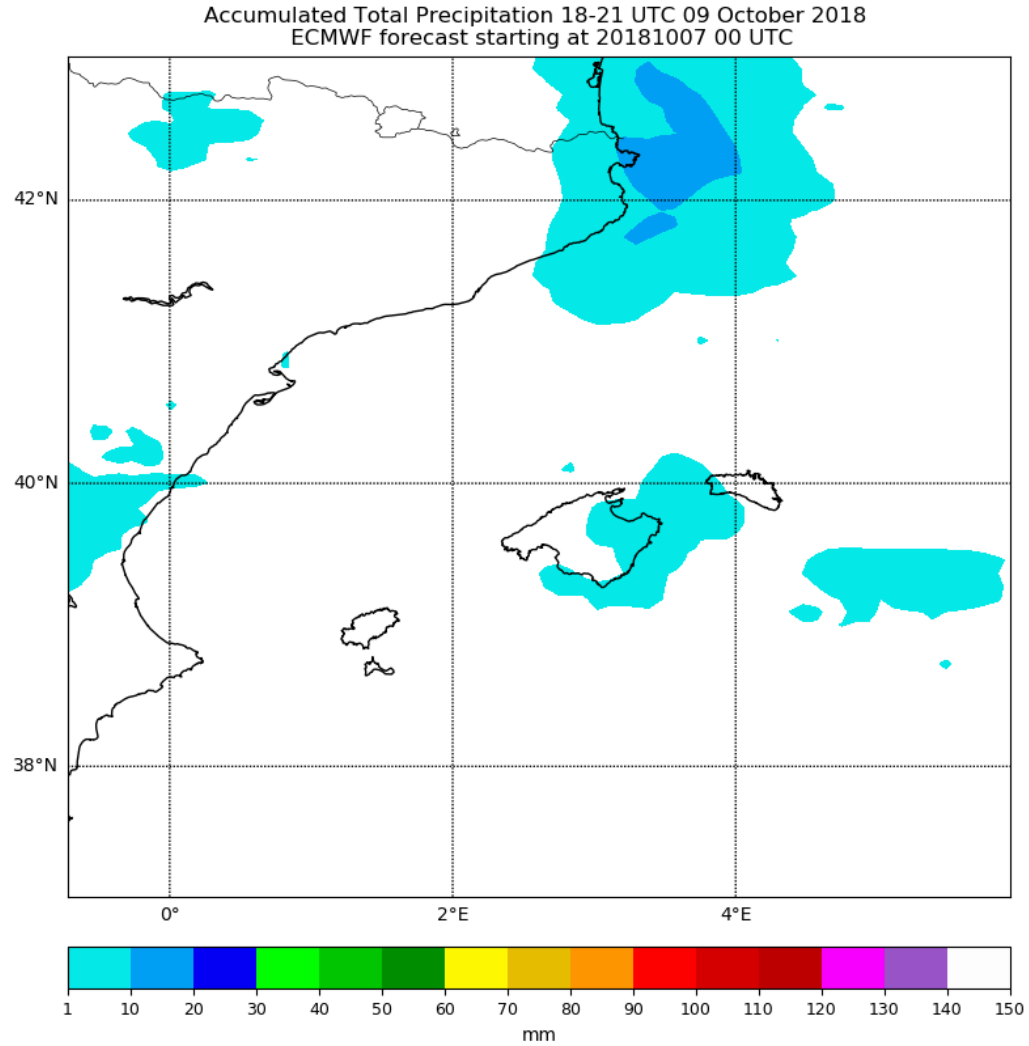


Martes 09 Octubre 2018 00UTC Predicción H+19 VAL: Martes 09 Octubre 2018 19UTC
Precipitación acumulada en 1 h



ECMWF


Accumulated Total Precipitation 15-18 UTC 09 October 2018
ECMWF forecast starting at 20181007 00 UTC
42°N
40°N
38°N
0°
2°E
4°E
1
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
mm


Accumulated Total Precipitation 18-21 UTC 09 October 2018
ECMWF forecast starting at 20181007 00 UTC
42°N
40°N
38°N
0°
2°E
4°E
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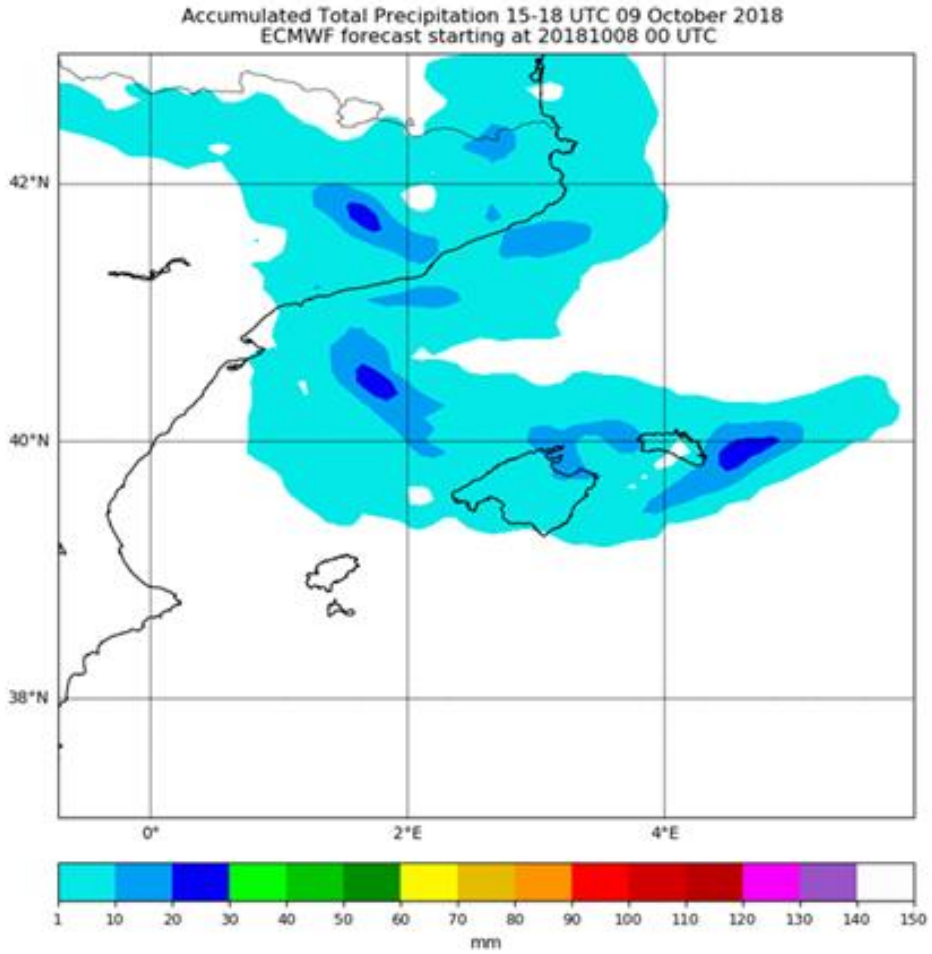
ECMWF


Accumulated Total Precipitation 15-18 UTC 09 October 2018
ECMWF forecast starting at 20181008 00 UTC
42°N
40°N
38°N
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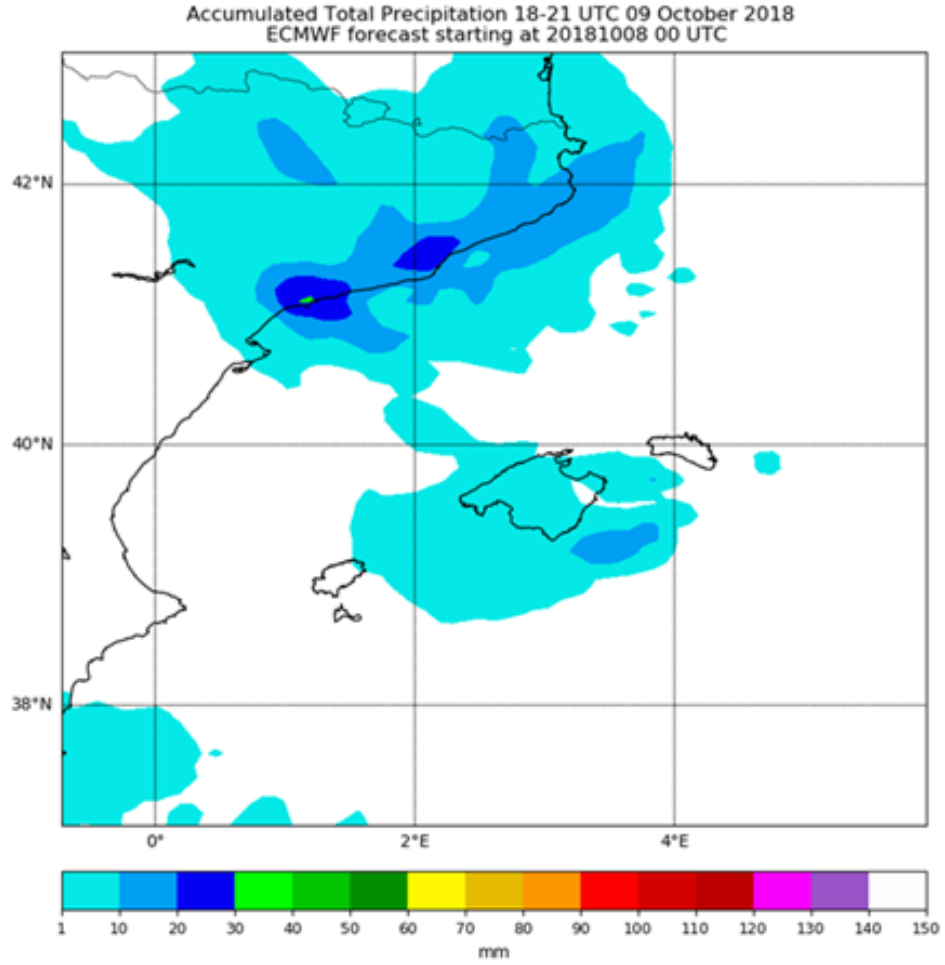
Accumulated Total Precipitation 18-21 UTC 09 October 2018
ECMWF forecast starting at 20181008 00 UTC
42°N
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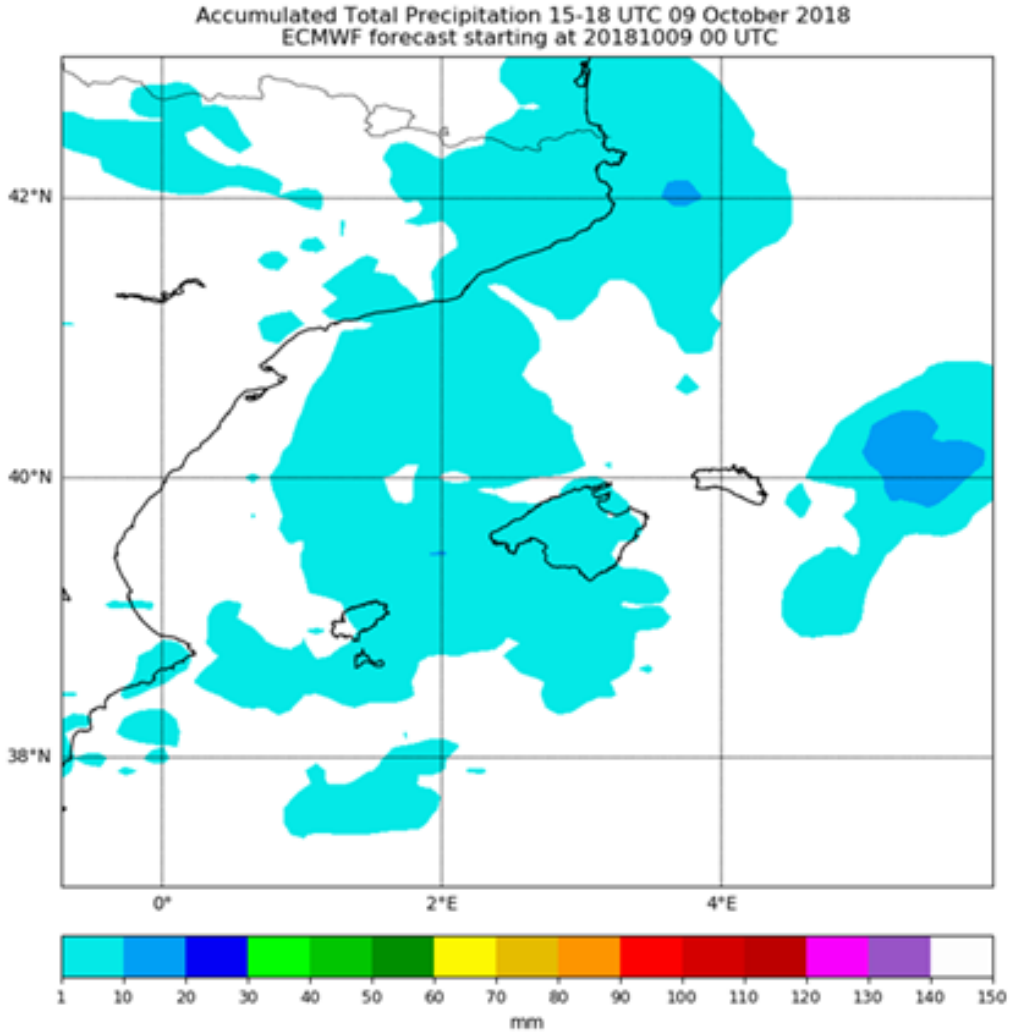
ECMWF


Accumulated Total Precipitation 15-18 UTC 09 October 2018
ECMWF forecast starting at 20181009 00 UTC
42°N
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2°E
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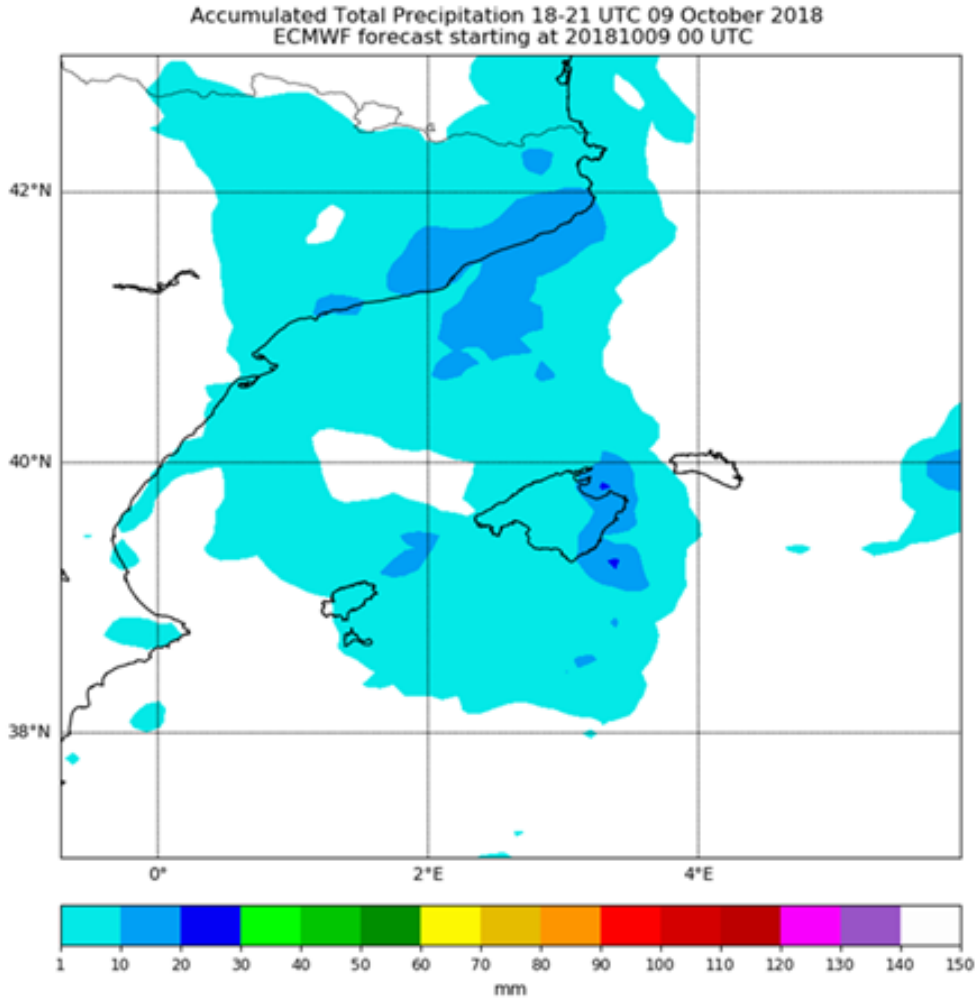
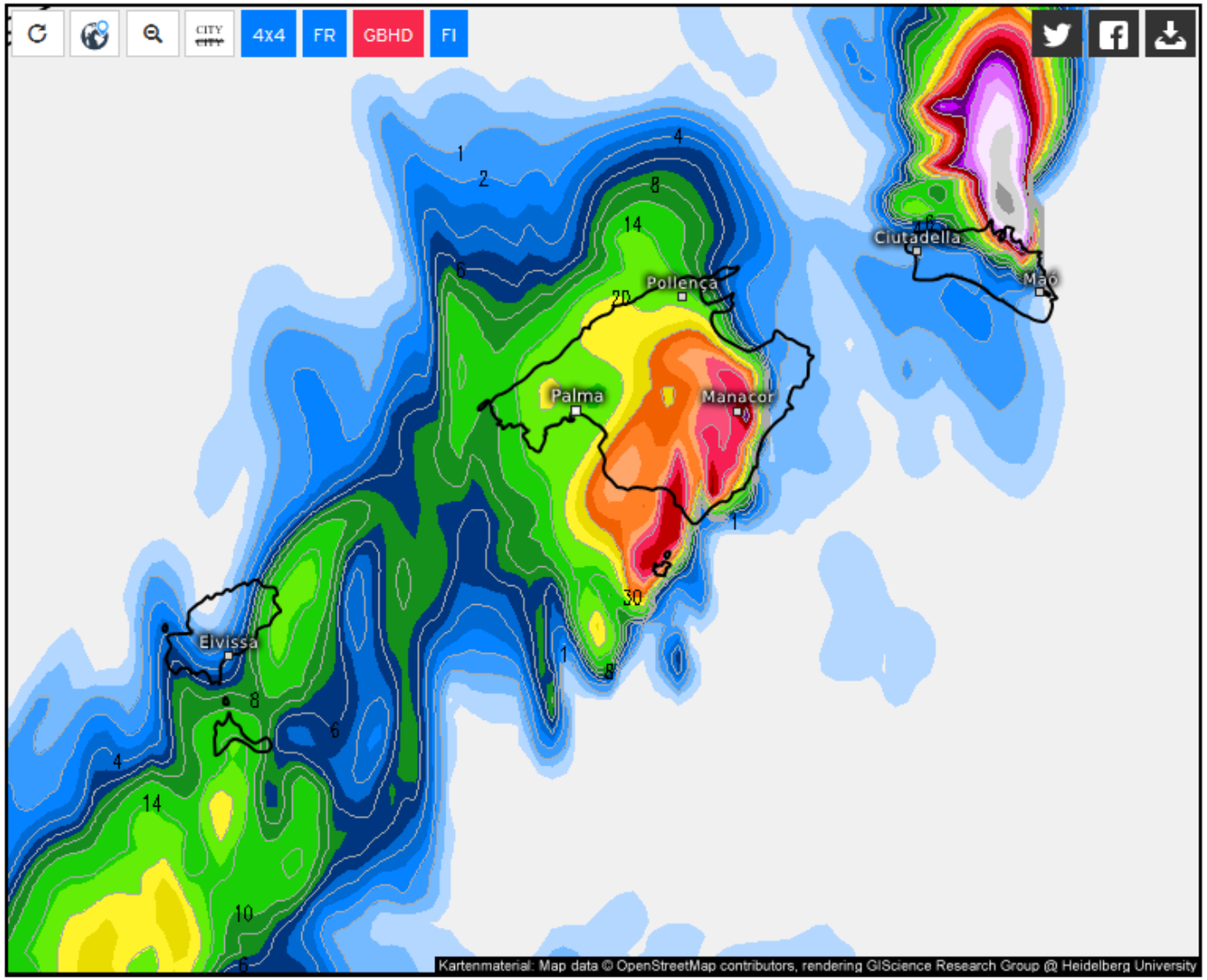
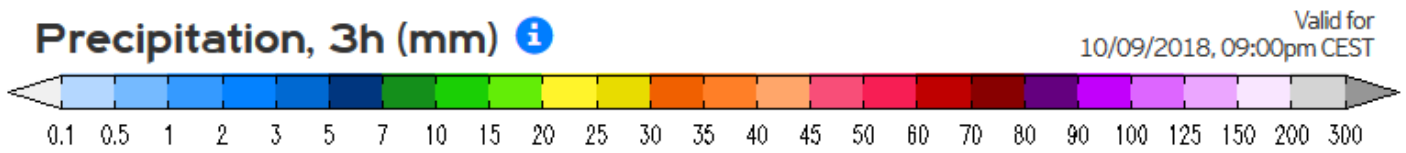
1 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
mm


Accumulated Total Precipitation 18-21 UTC 09 October 2018
ECMWF forecast starting at 20181009 00 UTC
42°N
40°N
38°N
0°
2°E
4°E
1 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
mm



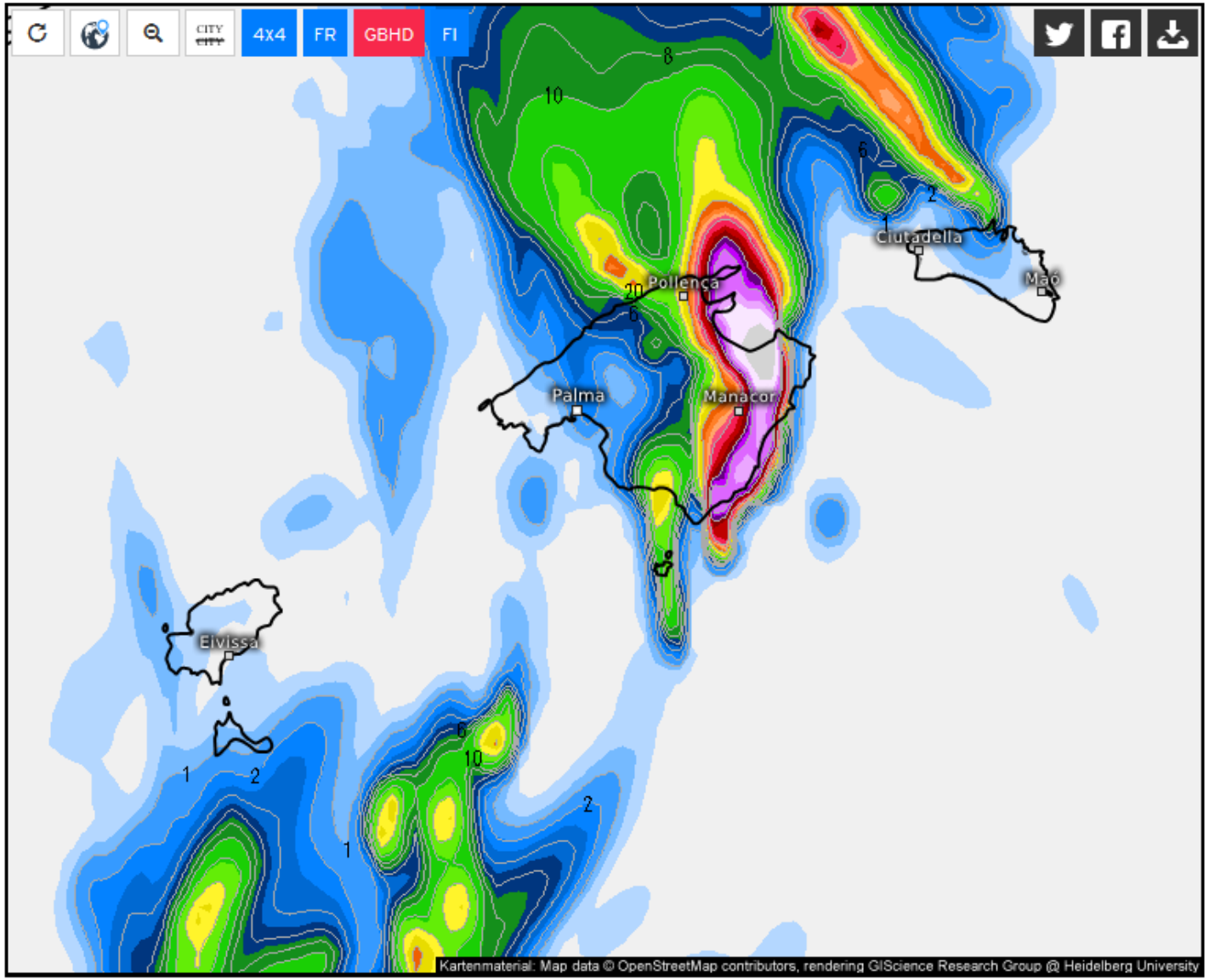


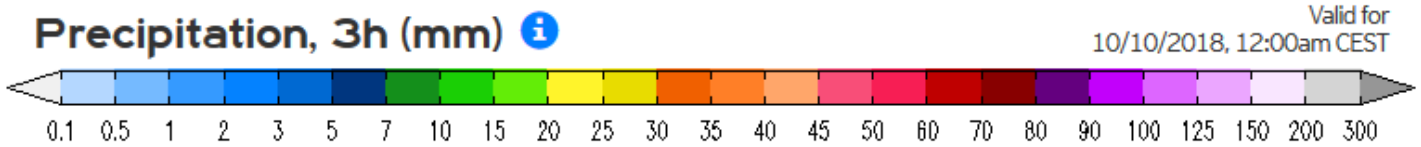
Initial conditions at

9 October 2018 at 00.00 UTC

British Euro- 4 Model

16.00 – 19.00 UTC





Initial conditions

at 9 Oct 2018 at 00.00 UTC

British Euro-4 Model

19.00 – 22.00 UTC

CONCLUSIONS

- Observations of highly localized precipitation with exceptional estimated gradients.
- Ocurred over an orographic basin with very fast hydrological response.
- Environment supported deep convection with numerous overshooting tops and train of storm along the same track.
- A general underestimation of QPF by the models most frequently used by forecasters in the region.
- A physical and numerical study will aim at identifying the most relevant factors for the event that caused this general misprediction.

Thanks for your attention