



# European Composite of Convection Nowcasting for SESAR Deployment

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# Outline

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**1. SESAR Deployment**

**2. Products & Partners of the Project**

**3. Merging Process for Convection Nowcasting**

**4. Composite Results**

# Single European Sky ATM Research (ATM: Air Traffic Management)



Source: [https://www.sesarju.eu/sites/default/files/documents/reports/SESAR\\_Solutions\\_Catalogue\\_2019\\_web.pdf](https://www.sesarju.eu/sites/default/files/documents/reports/SESAR_Solutions_Catalogue_2019_web.pdf)

# EUMETNET and SESAR Projects



Following the successful conclusion of SESAR1, the EUMETNET consortium deployment projects include:

**1) European Harmonised Forecasts of Adverse Weather:  
Icing, Turbulence, Convection and Winter Weather**

**2) European Weather Radar Composite  
of Convection Information Service**

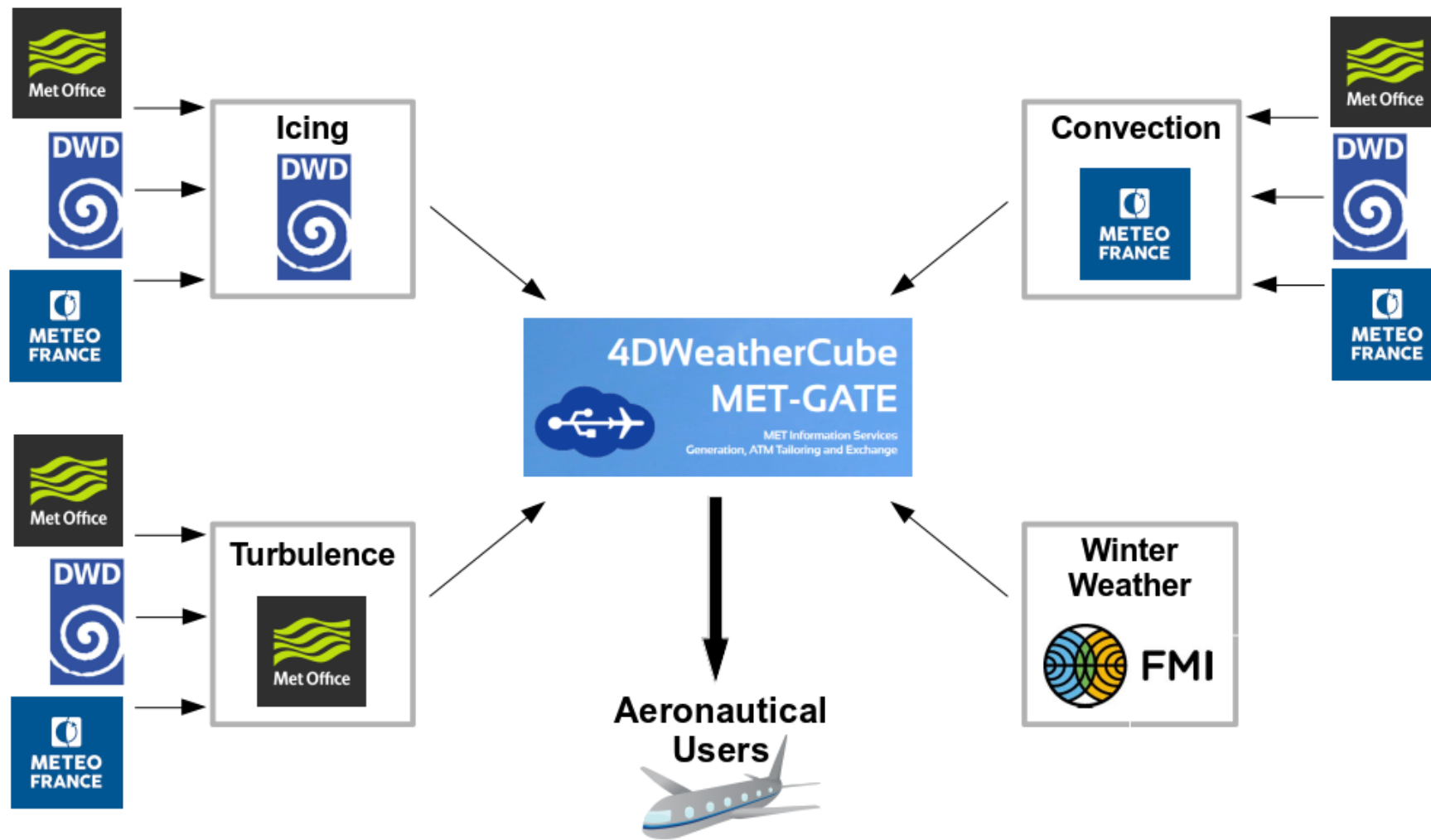
**Linked to 1 → Convection composite validation**

**3) European MET Information Exchange (MET-GATE)**

**Linked to 1 → Convection composite delivery to MET users**

# Products & Partners

## European Harmonised Forecasts of Adverse Weather



# Convection Products

## Convection Nowcasting

(Forecasts: +0h to +1h)

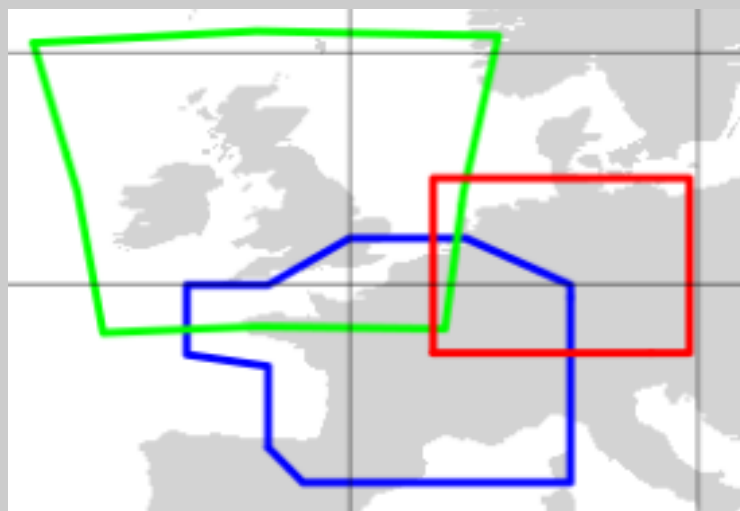
From 3 high resolution products

Blending observations and NWP

Updated every 15'

Providing harmonised convection  
severity (low, medium, severe)

Providing cloud top height (hPa)



## Convection Probability

(Forecasts: +6h to +24h)

From 3 ensemble models

Blending forecasts of

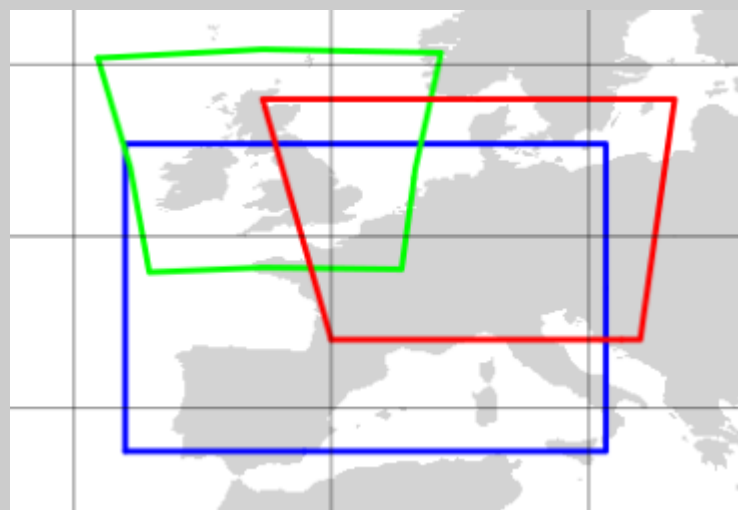
65 model members:

24 (MF), 21 (MO) and 20 (DWD)

Updated every 6 hours

Providing harmonised convection  
probability (percentile)

Providing cloud top probability



# Composite Convection Nowcasting Operational Production



	Implemented during the project	Possible upgrade
<b>Update Rates</b>	15'	5'
<b>Forecast Time Steps</b>	15'	5'
<b>Forecast Ranges</b>	60'	120' or 180'
<b>Availability after Contributions Reception</b>	< 5'	< 5'
<b>Grid Resolution</b>	1 km	1 km

# Operational Convection Products from Partners



	Meteo-France (ASPOC-3D)	Met Office (UKPP)	DWD (NowCastMIX- Aviation)
<b>Update Rates</b>	5'	15'	5'
<b>Forecast Time Steps</b>	5'	15'	5'
<b>Forecast Ranges</b>	60' (or 180' with PIAF)	360'	60'
<b>Availability after Observation</b>	5'	15'	5'
<b>Grid Resolution</b>	1 km	2 to 4 km	1 km

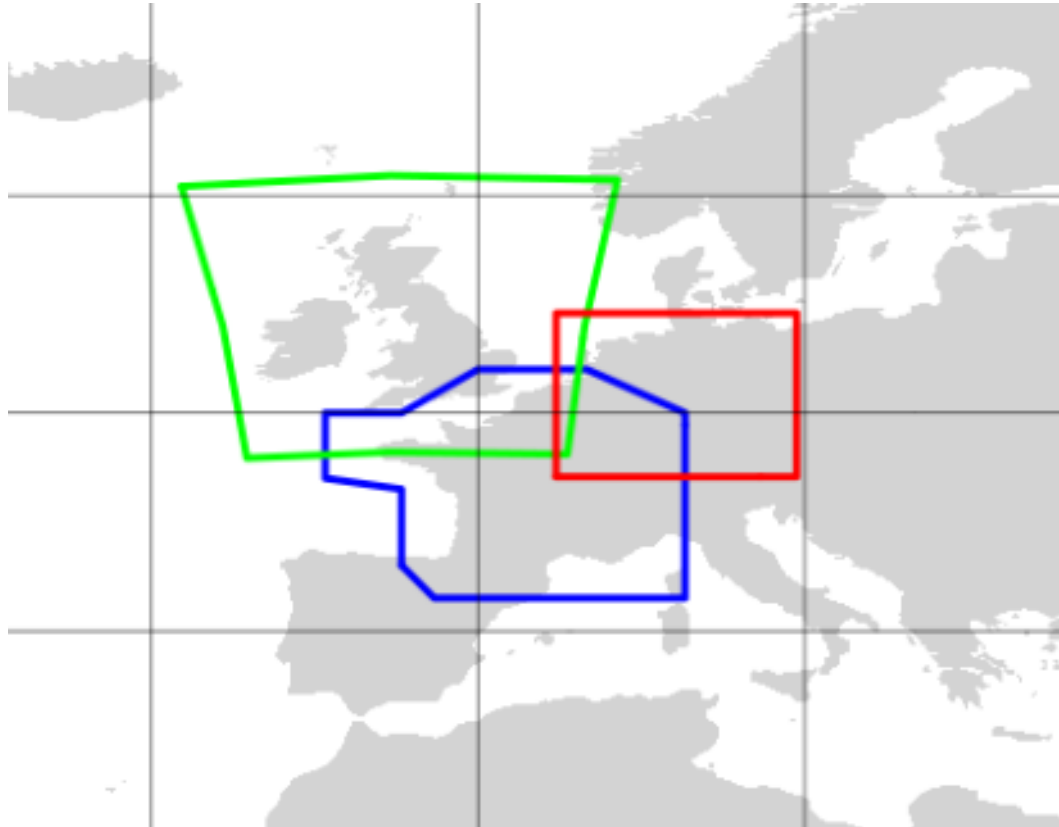


# Convection Severity Levels



SESAR1 Severity Levels	Meteo-France (ASPOC-3D)	Met Office (UKPP)	DWD (NowCastMIX-Aviation)
<b>Level 3: Severe Thunderstorm</b>	<p>Level 4: reflectivity <math>\geq</math> 48 dBZ very high convection</p> <p>Level 3: reflectivity <math>\geq</math> 40 dBZ high convection</p>	<b>Level 3: High Lightning Potential</b>	<p>Level 14: critical risk area</p> <p>Level 8: high risk area</p>
<b>Level 2: Thunderstorm</b>	<p>Level 2: reflectivity <math>\geq</math> 36 dBZ moderate convection</p>	<b>Level 2: Moderate Lightning Potential</b>	<b>Level 6: moderate risk area</b>
<b>Level 1: Shower</b>	<p>Level 1: reflectivity <math>\geq</math> 32 dBZ low convection</p>	<b>Level 1: Low Lightning Potential</b>	<p>Level 4: slight risk area</p> <p>Level 192: cells with <math>&gt;37</math>dBZ but no severity level</p>

# Convection Nowcasting Domains



## Contributed Sources for the Convection Composite:

**Meteo France:**  
0.01° Resolution  
Cylindrical Equidistant Projection  
XML File Format

**Met Office:**  
0.02° to 0.04° Resolution  
Mercator Transverse Projection  
NetCDF File Format

**DWD:**  
0.01° Resolution  
Regular Lat-Lon Projection  
GRIB2 File Format

# Merging Process in Overlapped Area



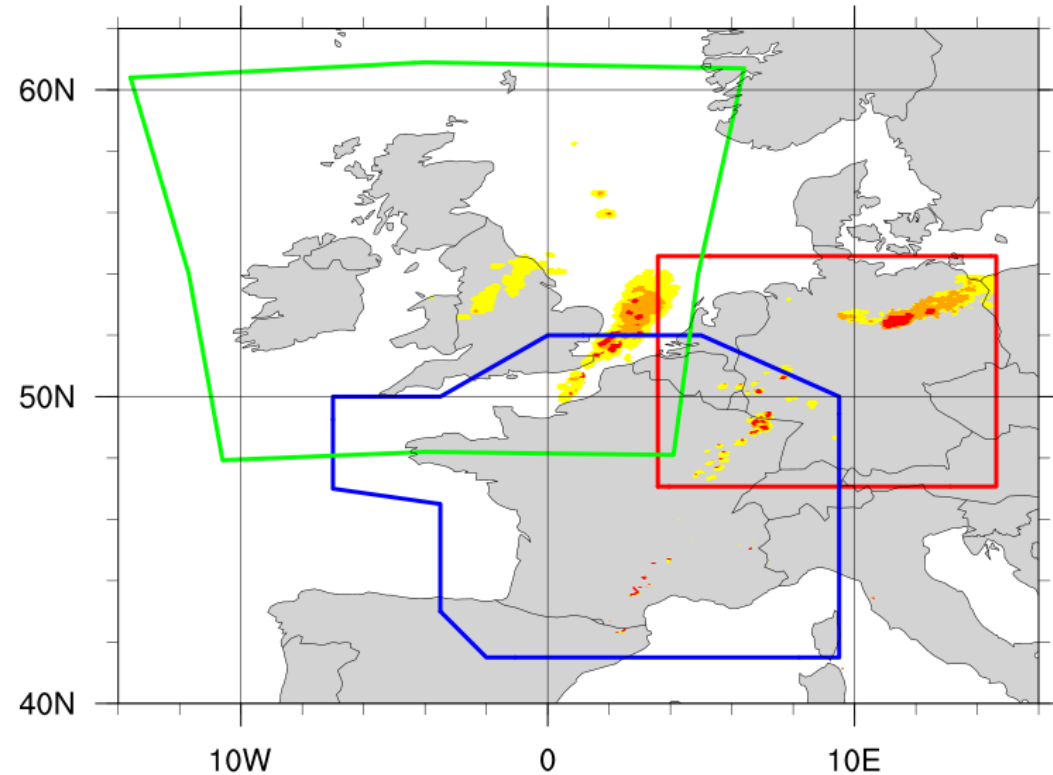
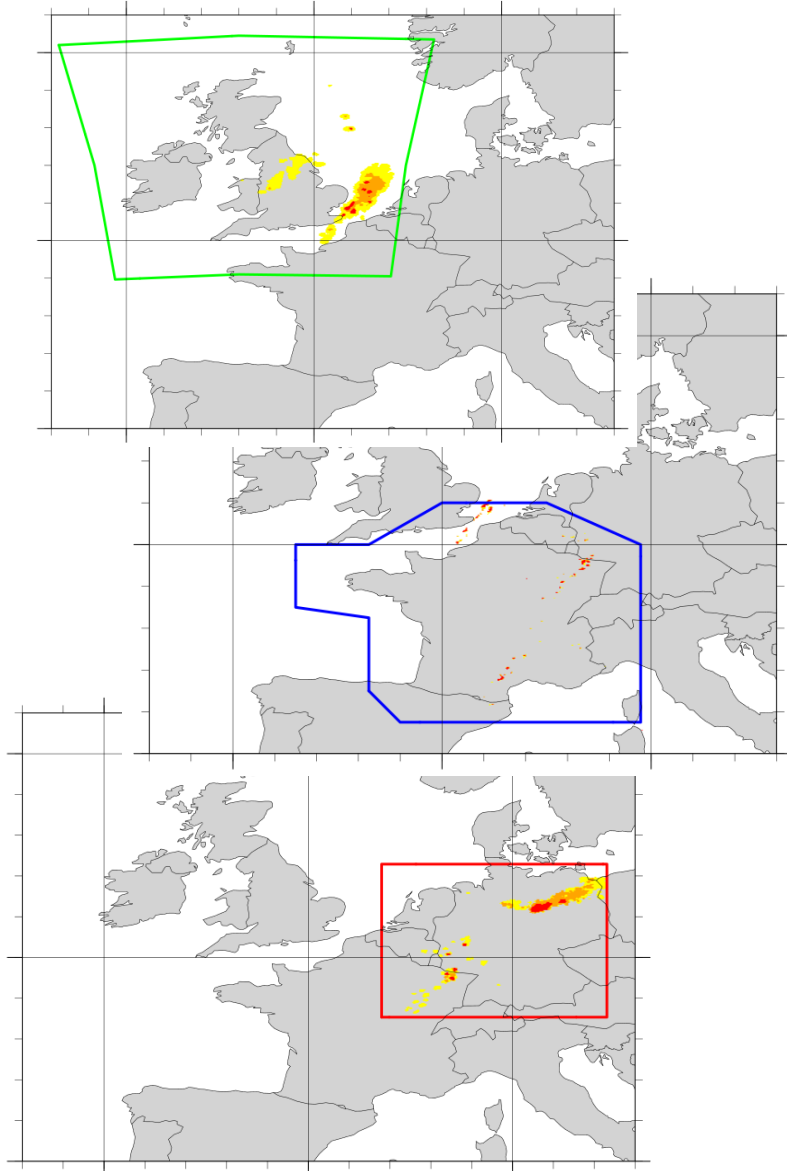
As defined in SESAR1 (Development Phase):

Take the **MAXIMUM** convection severity  
and

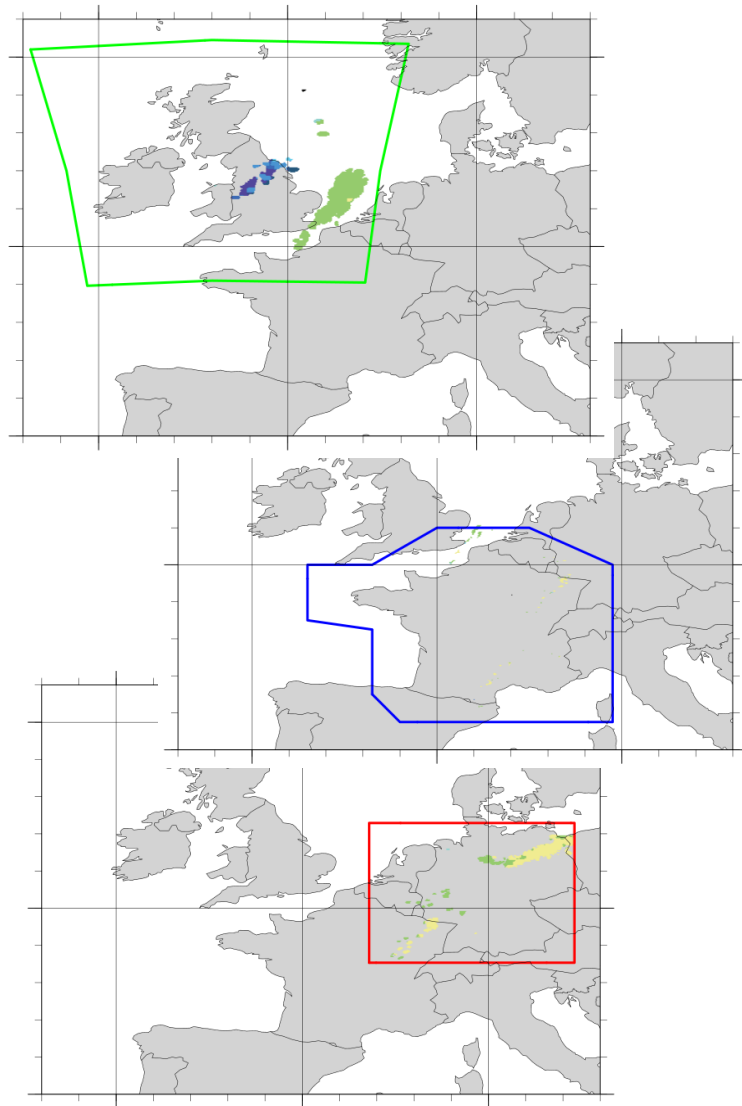
Take the **HIGHER** cloud top

# Convection Nowcasting Composite of Convection Severity

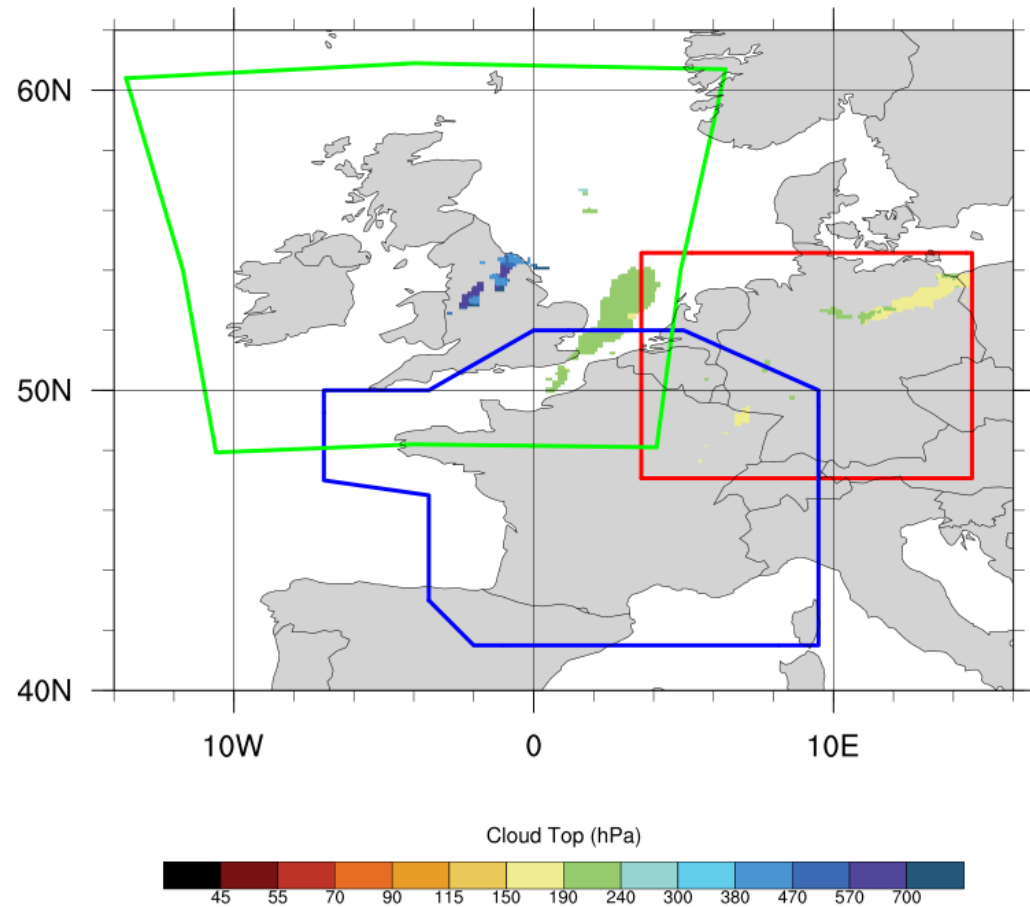
Composite Convection Nowcasting Product of MF, MO and DWD for SESAR-IP068  
Validity (Forecast) Date is 2017-06-22 12:00:00 from Initial (Run) Date 2017-06-22 11:45:00  
(High Resolution, 0.01 degree)



# Convection Nowcasting Composite of Convection Cloud Top



**Composite Cloud Top Nowcasting Product of MF, MO and DWD for SESAR-IP068**  
Validity (Forecast) Date is 2017-06-22 12:00:00 from Initial (Run) Date 2017-06-22 11:45:00  
(Low Resolution, 0.1 degree)



# Conclusion



## **Past & present work:**

**Lot of data to collect, read, transform, handle and store**

**Harmonisation effort: file formats, grid and map projections, overlapping areas, convection severity levels translation to end-users (low, moderate, severe), cloud top definition, etc.**

**Put in place the operational system: data exchange, fasten data transformation, merging process and quality control, test robustness of the system, etc.**

# Conclusion



## **Future work:**

**Integrate feedback from end-users**

**Extend the forecast horizon to +2h or +3h  
(see J.-M. Moisselin presentation of PIAF)**

**Add flexibility to the operational system:**

- **Partners can change their input contributions (domain, file format, convection product, etc.)**
- **New partners can add their contribution to the system**

**European Composite  
of Convection Nowcasting  
should be available in 2021  
to aeronautical users  
through MET-GATE Web Services  
in gridded (GRIB2 and NetCDF)  
and vector (XML) formats**





## Météo-France

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