

A European chemical weather forecasting portal

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Contents

- On access to EI
- The European Chemical Weather Forecasting Portal
- ECWFP: basic functionality and future developments
- Conclusions

PSI/Environment: legal framework

- Dir. 90/313/EEC:

- “Information relating to the environment” = **any** available information in written, visual, aural or database form on the state of water, soil, air, fauna, flora, land and natural sites, and on activities or measures adversely affecting, or likely so to affect these, and on activities or measures designed to protect these (including administrative measures and environmental management programmes).
- Public authorities are **required** to make available information relating to the environment to any natural or legal person at his request and without his having to prove interest.

- ...repealed by **Dir. 30/04**

- Increased access to environmental information of such information contribute to a greater awareness of environmental matters, a free exchange of views, more effective participation by the public in environmental decision making and, eventually, to a better environment.

This is how a policy requirement generates a service requirement!

- Environmental information should be disseminated by means of available **computer telecommunication** and/or **electronic technology**

A not so hypothetical scenario...

(1/2)

- Suppose that you are interested in CW forecasts
 - Air pollution
 - Meteorology
 - Other?
- You know that there should be information available on the internet
- You live in Sofia, Bulgaria (and you may identify this on a map with a simple click)
- You may be having questions in mind like:

A not so hypothetical scenario...

(2/2)

- How many CW forecasts are available for your city?
- Where can you find them?
- How can you learn more about the models themselves?
- Is it possible to compare forecasts?
- Is it possible to combine forecasts like puzzle pieces?
- Is it possible to continue asking such questions, and expect to receive an answer?



European chemical weather forecasting portal, aims and scope (1/2)

The portal is developed within the COST ES0602 action.

Aims:

- **improved usage of chemical weather forecasting information;**
- **provide an easy interface to a wide variety of web-based air quality forecasting systems in Europe**
- act as a public domain forum, through which the forecasts provided by the European countries can be viewed.

European chemical weather forecasting portal, aims and scope (2/2)

- can be used, e.g., to find out, **which services** are available for a **specific domain**, for **specific source categories** or for **specific pollutants**
- functions for obtaining relevant supplementary information
- *inter-comparison of the various available forecasting systems*
- such a single point of reference for the European chemical weather forecasting information has not previously been in operation.

You are invited to add
your own forecasting
service!

COST ESo6o2, Chemical Weather

Action ES0602: Towards a European Network on Chemical Weather Forecasting and Information Systems (ENCWF)

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European Chemical Weather Forecasting Portal

- ≡ Objectives
- ≡ Scope
- ≡ What does it do?
- ≡ What does "Relevant MDS models" mean?
- ≡ Adding another AQ forecasting system

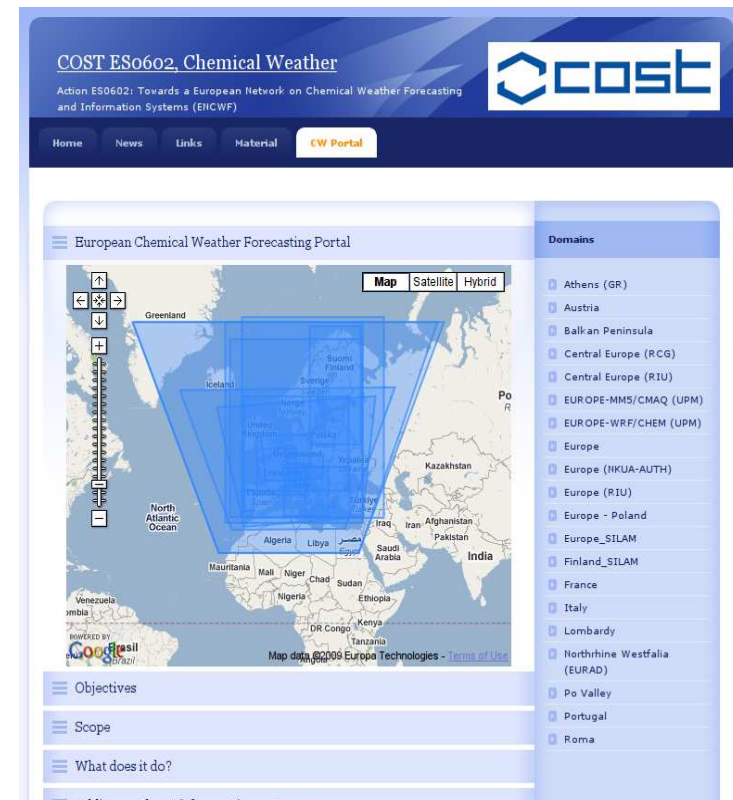
Domains

- ▶ Athens (GR)
- ▶ Austria
- ▶ Balkan Peninsula
- ▶ Central Europe (RCG)
- ▶ Central Europe (RIU)
- ▶ EUROPE-MM5/CMAQ (UPM)
- ▶ EUROPE-WRF/CHEM (UPM)
- ▶ Europe (AEA)
- ▶ Europe (AEMET)
- ▶ Europe (BSC)
- ▶ Europe (MACC)
- ▶ Europe (NKUA-AUTH)
- ▶ Europe (RIU)
- ▶ Europe (SMHI)
- ▶ Europe - Poland
- ▶ Europe_SILAM
- ▶ Finland-SILAM (FMI)
- ▶ France (PREVAIR)
- ▶ Italy (ARIANET)
- ▶ Lombardy
- ▶ Northrhine Westfalia (EURAD)
- ▶ Po Valley
- ▶ Portugal
- ▶ Roma
- ▶ Spain (AFMET)

European chemical weather forecasting portal (ECWFP)

- How will I get started ?

- ❑ Select any point on the map -> a list of the AQ modelling systems that cover that location.
- ❑ Select one of these systems -> the domain, the group, the name of the model, a description of the service, link to specific info at the EEA Model Documentation Center, etc.
- ❑ A new feature (under implementation): how to easily merge and inter-compare AQ maps.



A screenshot of the portal

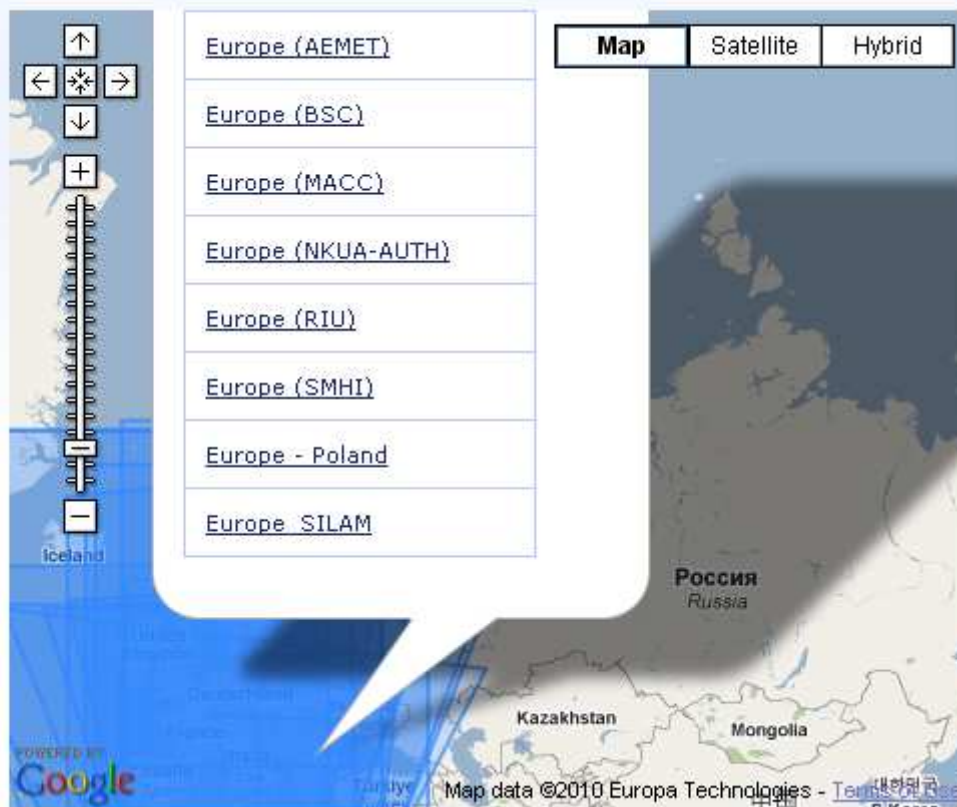
<http://www.chemicalweather.eu/Domains>

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European Chemical Weather Forecasting Portal

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Domains

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European Chemical Weather Forecasting Portal



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European Chemical Weather Forecasting Portal

Europe SILAM

Domain Name: [Europe SILAM](#)

Group: FMI

Model: SILAM

SILAM 72 hr air quality forecasts for Europe

Relevant MDS models: [SILAM](#) - (what is this?)
(autogenerated links, may be inaccurate)

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EEA services

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Long description of model 'SILAM'

Table of Contents:

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ECWFP vs. GEMS and PROMOTE

- ✓ ECWFP is **complementary**, compared with those of similar www-based services provided by the GEMS and PROMOTE projects.
- ✓ These projects have a closed membership, while ECWFM is **open to all**
- ✓ We hope to involve **various stake-holders** in a more comprehensive way

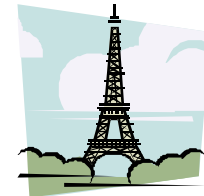
Portal	Number of CWF systems included	Physical scales included				Accessibility of services included	Harmonisation of services included	Additional features and services		
		Global	European	Regional	Urban			Ensemble	Information	
GEMS	12		X	X		Based on bi- or multilateral agreements	Regarding the model ensemble rigorously harmonised			
PROMOTE	12		X	X	X	Based on bi- or multilateral agreements	Part of the service rigorously harmonized			
ECWFP systems	19	X	X	X	X	Open access	Harmonised only by the selection criteria of CWF			X

Dreaming of inter-comparison functions, ensembles, other...

The ECWFP - Future perspectives

The ECWFP could easily be extended:

- o to include **more detailed meta-information** concerning the CWF models and the available forecasts
- o to include more **functionalities**, e.g., for easily inter-comparing the forecasts
- o include a substantially larger amount of CFW systems **on urban and global scales**
- o to be extended for **other continents**



ESWFP has been registered as a [GEOSS component](#)

A new service currently under development

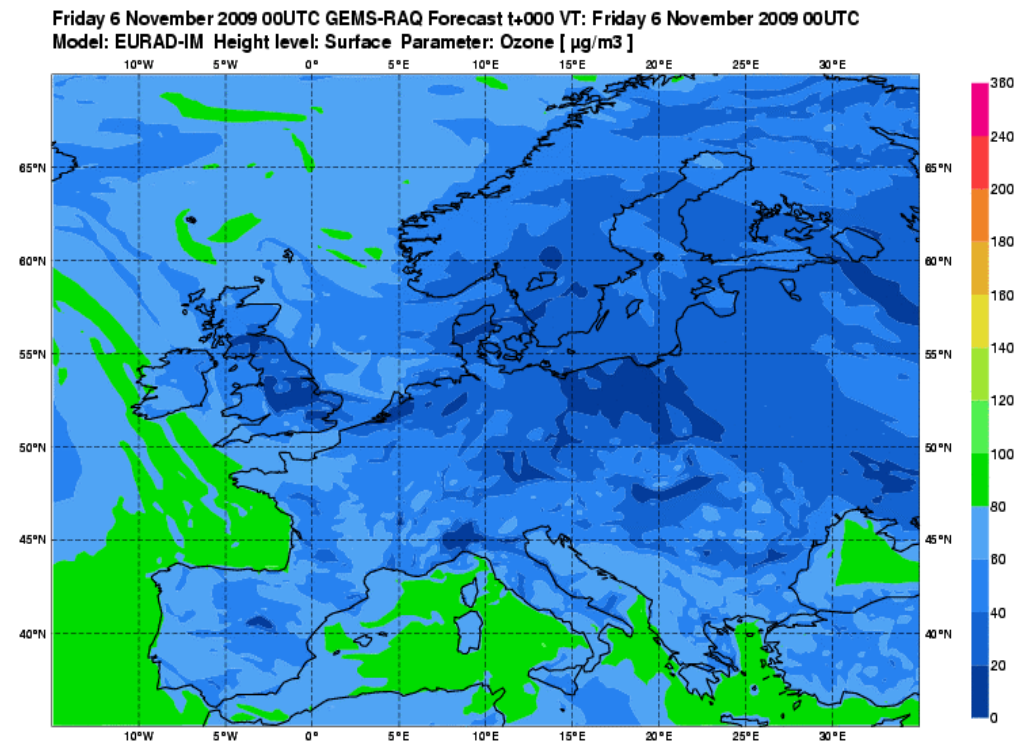
- Image parsing, data reconstruction, data combination, geographical projection harmonisation, and image reconstruction

(or how to transform an image into real data and then combine info from various images, plus making ensembles ?!)



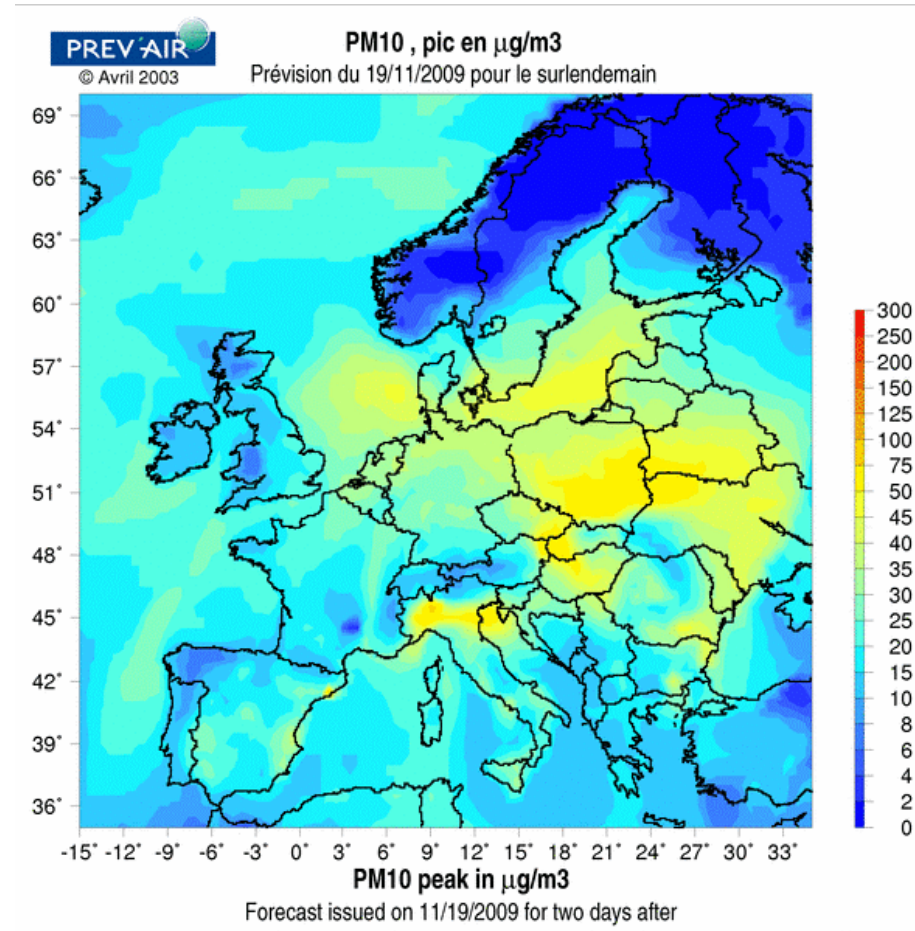
Status of data providers (CW model results)

- Image resolution, data scale, coverage, geographical region, projection and color coding vary significantly between providers.
- Any centralized data collection system must allow for an unified treatment of all sources.



Status of data providers (CW model results)

- Chemical weather predictions are given in the form of 2D color-coded contour maps in the case of the vast majority of data providers.

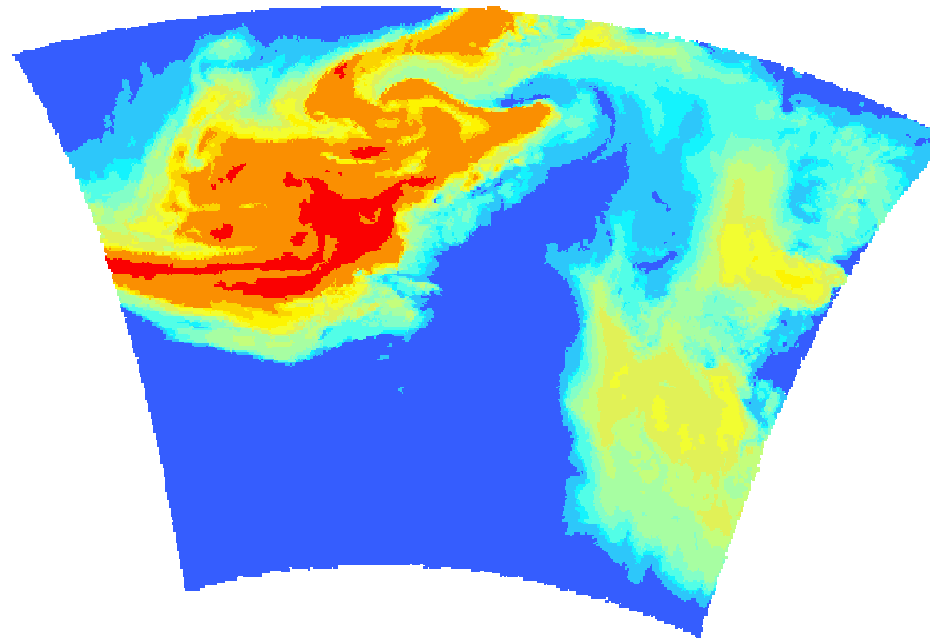
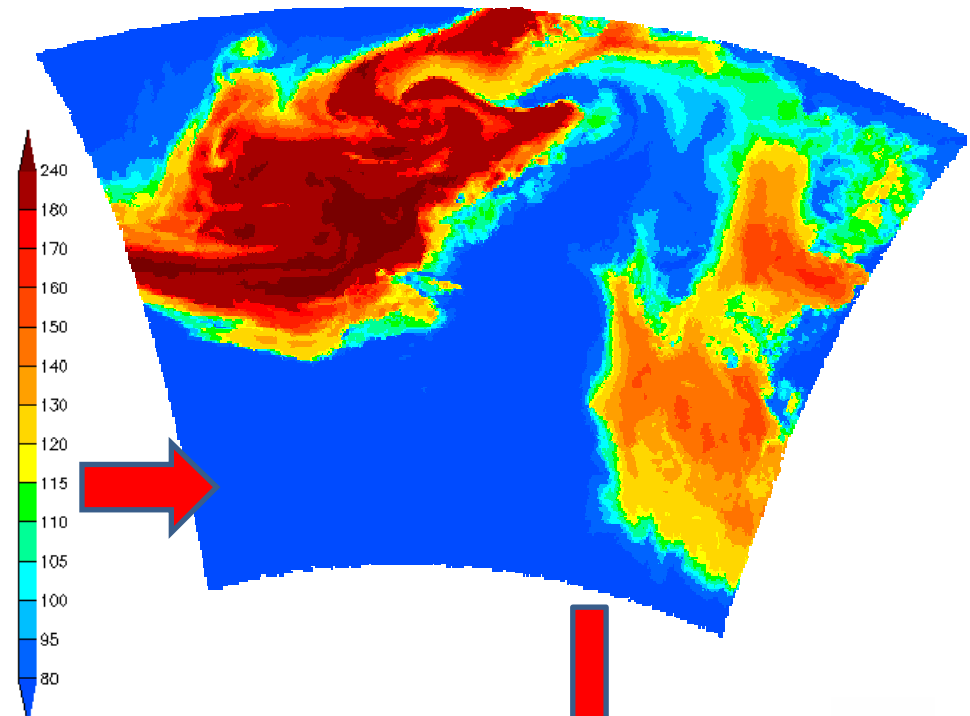
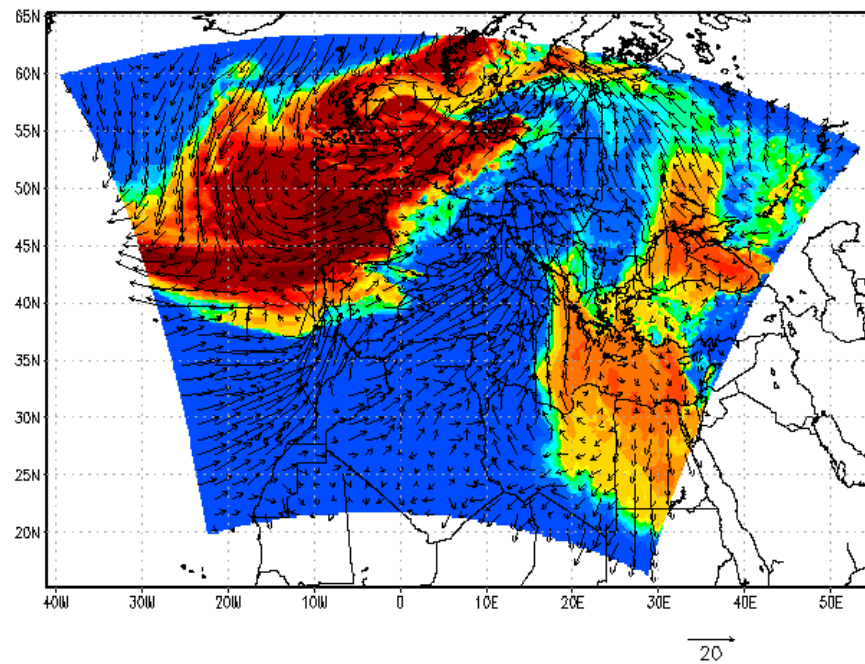


CW model result inter-comparison: Summing up what is required

1. Extraction of information from CW model result mages, via an **image processing algorithm**.
2. Transform this information into a new image.
3. Apply this procedure seamlessly for various CW model result images.
4. Apply another algorithm, that will automatically identify the geographic projection being used, and will **transform all images in the same orthogonical projection** (Mercator).
5. Superimpose all images on a google map framework.
6. Develop the necessary software that would allow the introduction and operation of the service to the ECWFP.

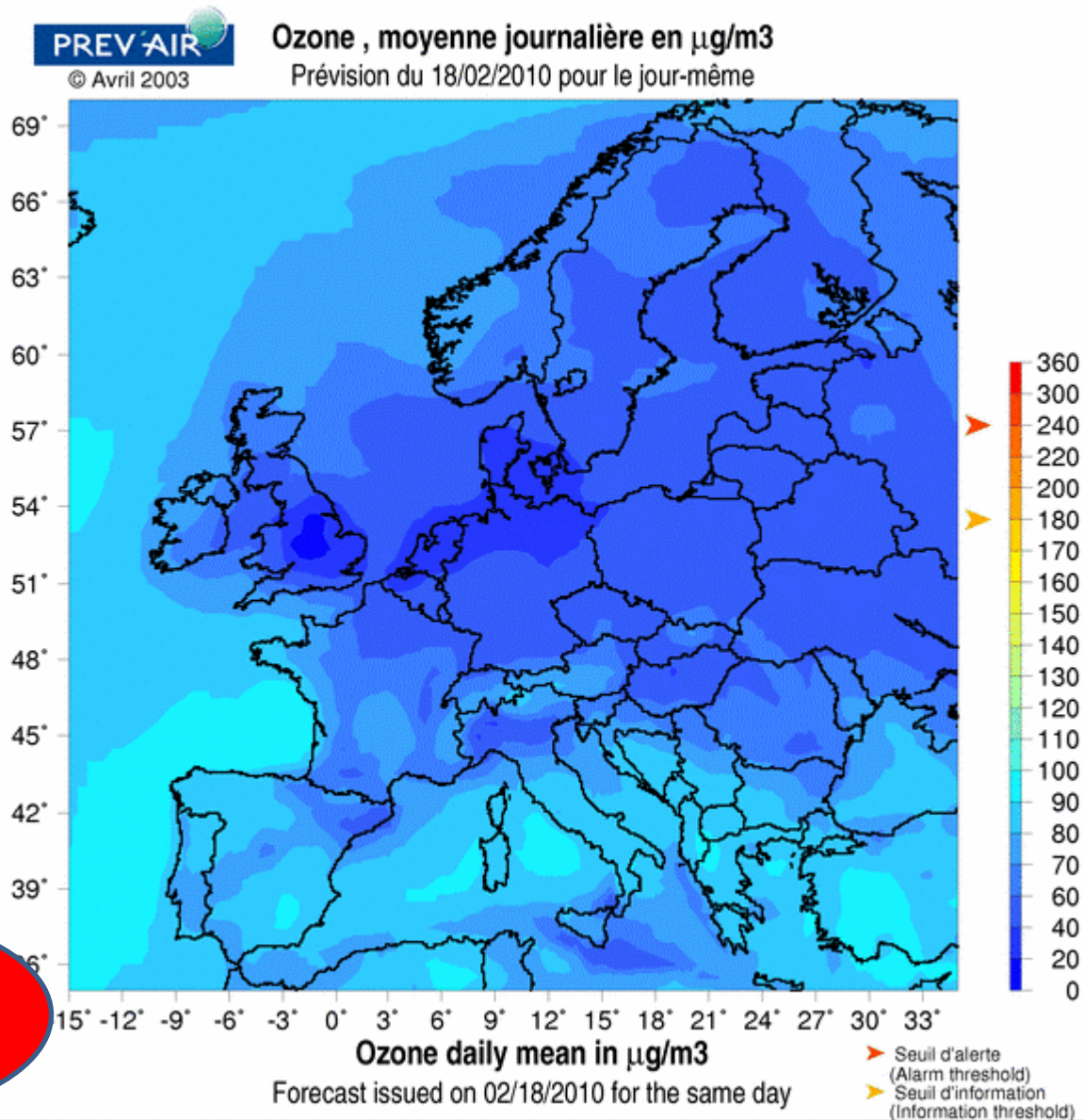
Some examples follow:

BSC-ES/Air Quality Forecast ARWv3+CMAQv4.5 Ozone (ug/m3)
0h forecast for 00z 23 DEC 09 - Europe Res:12x12km



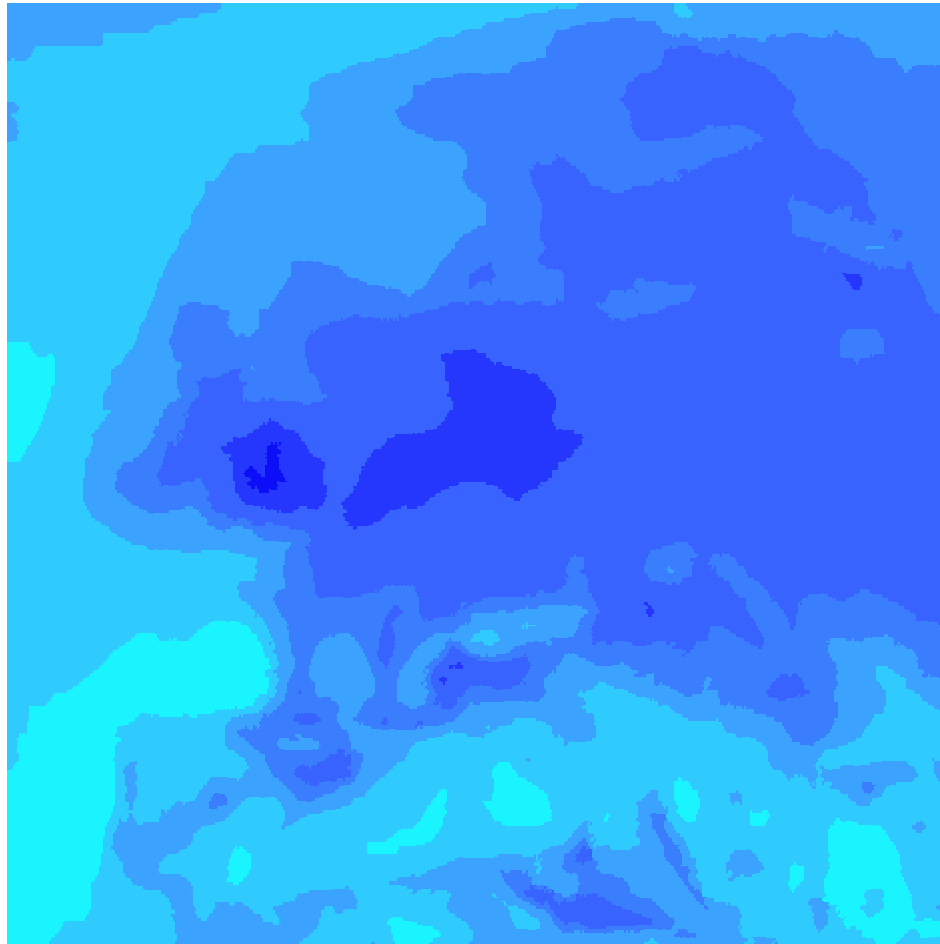
Reference
palette

Initial image



Before

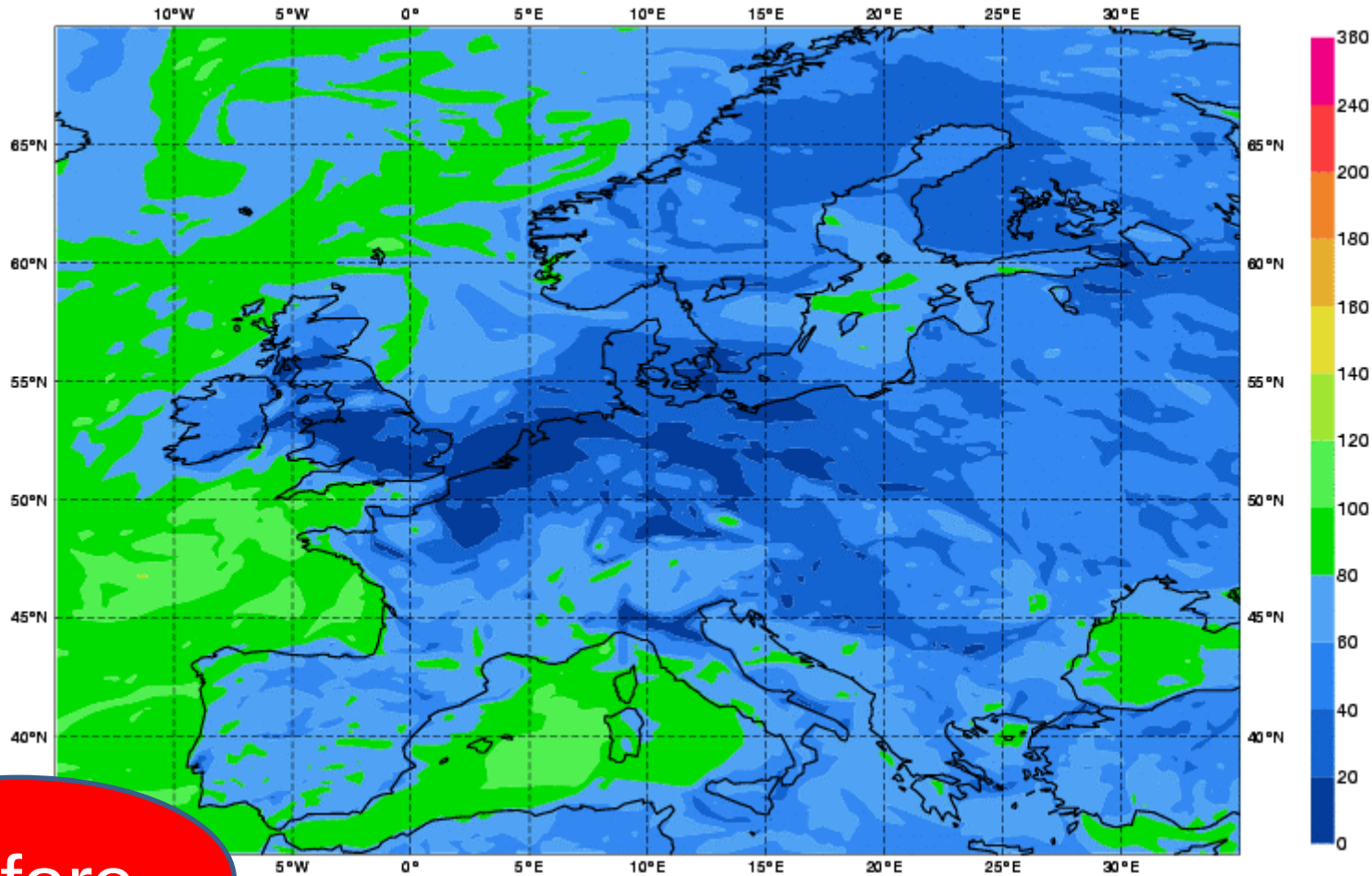
Cleaned up, harmonized.



After

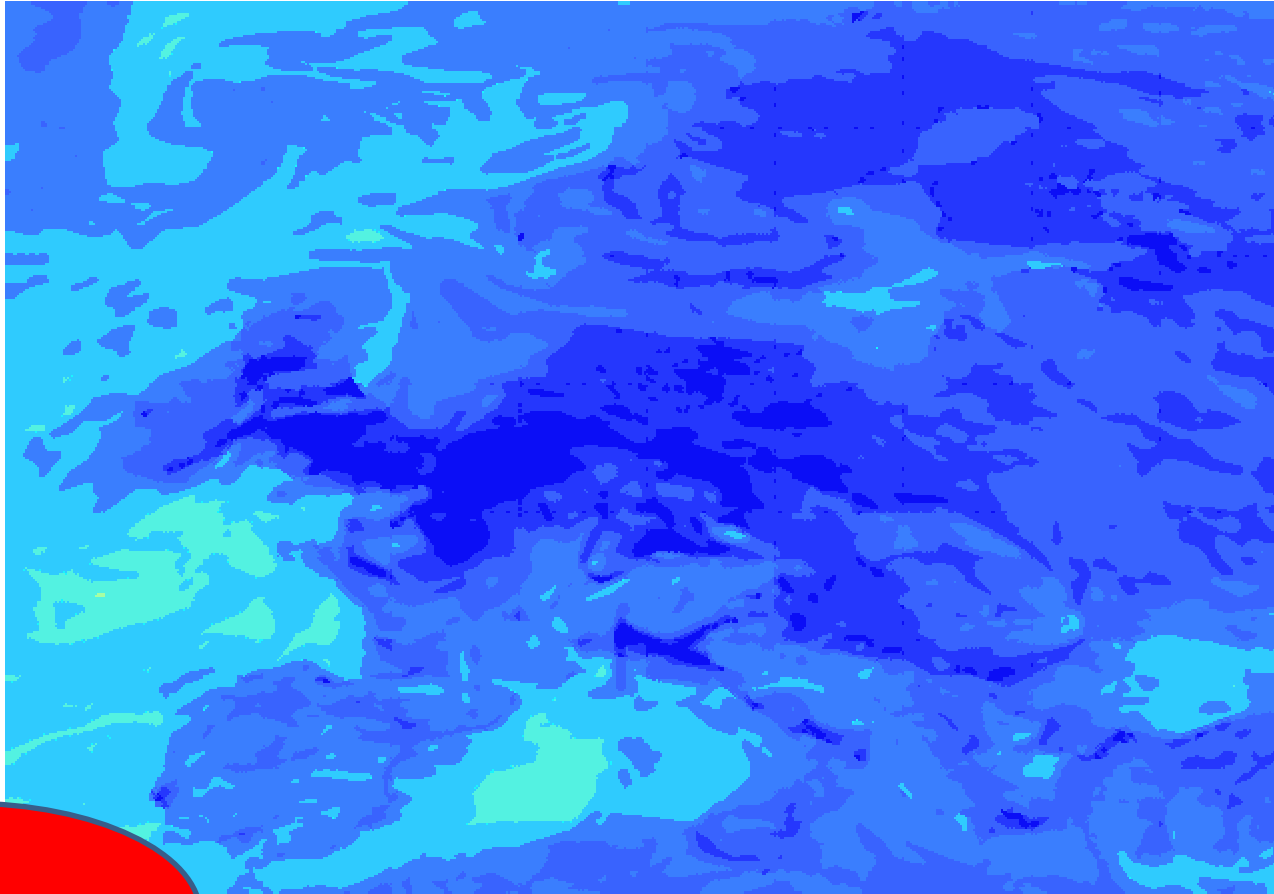
O3 max daily mean, 18 Feb 2010

Thursday 18 February 2010 00UTC GEMS-RAQ Forecast t+000 VT: Thursday 18 February 2010 00UTC
Model: EURAD-IM Height level: Surface Parameter: Ozone [$\mu\text{g}/\text{m}^3$]



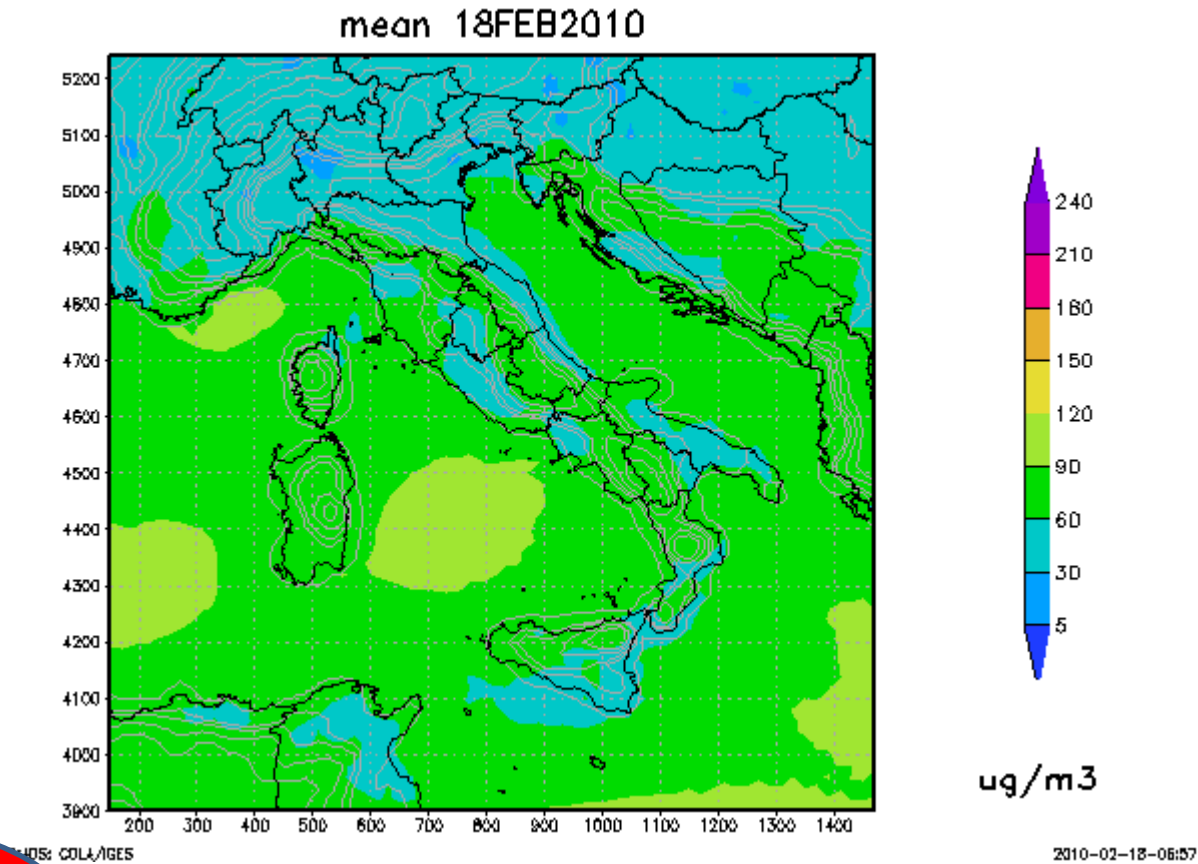
Before

Cleaned up, harmonized.



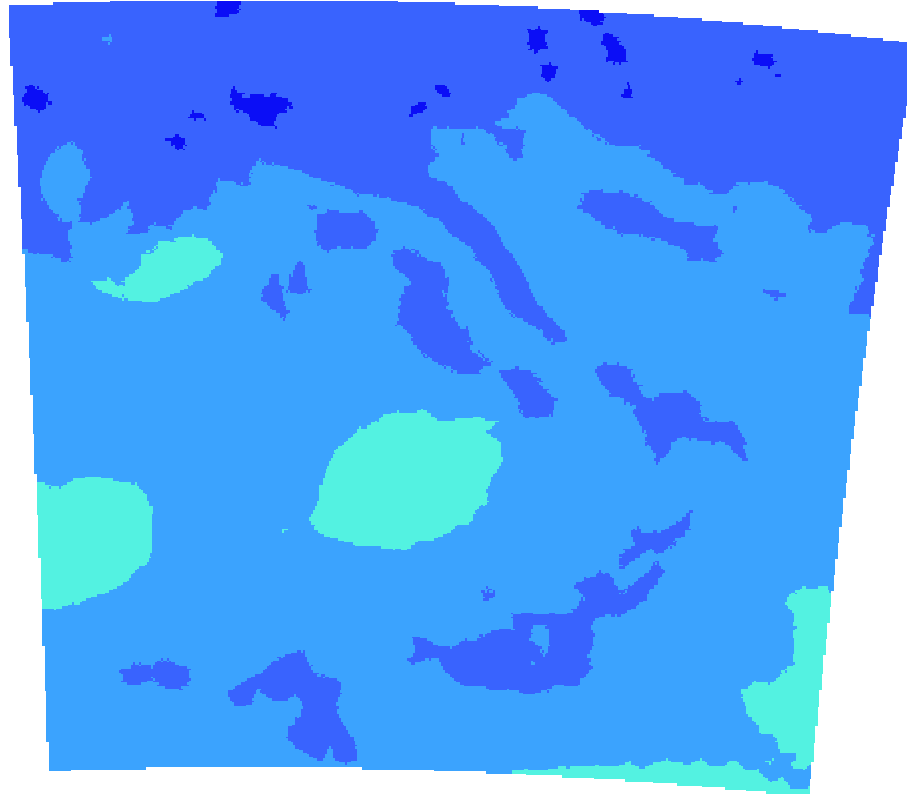
After

O3 max daily mean, 18 Feb 2010



Before

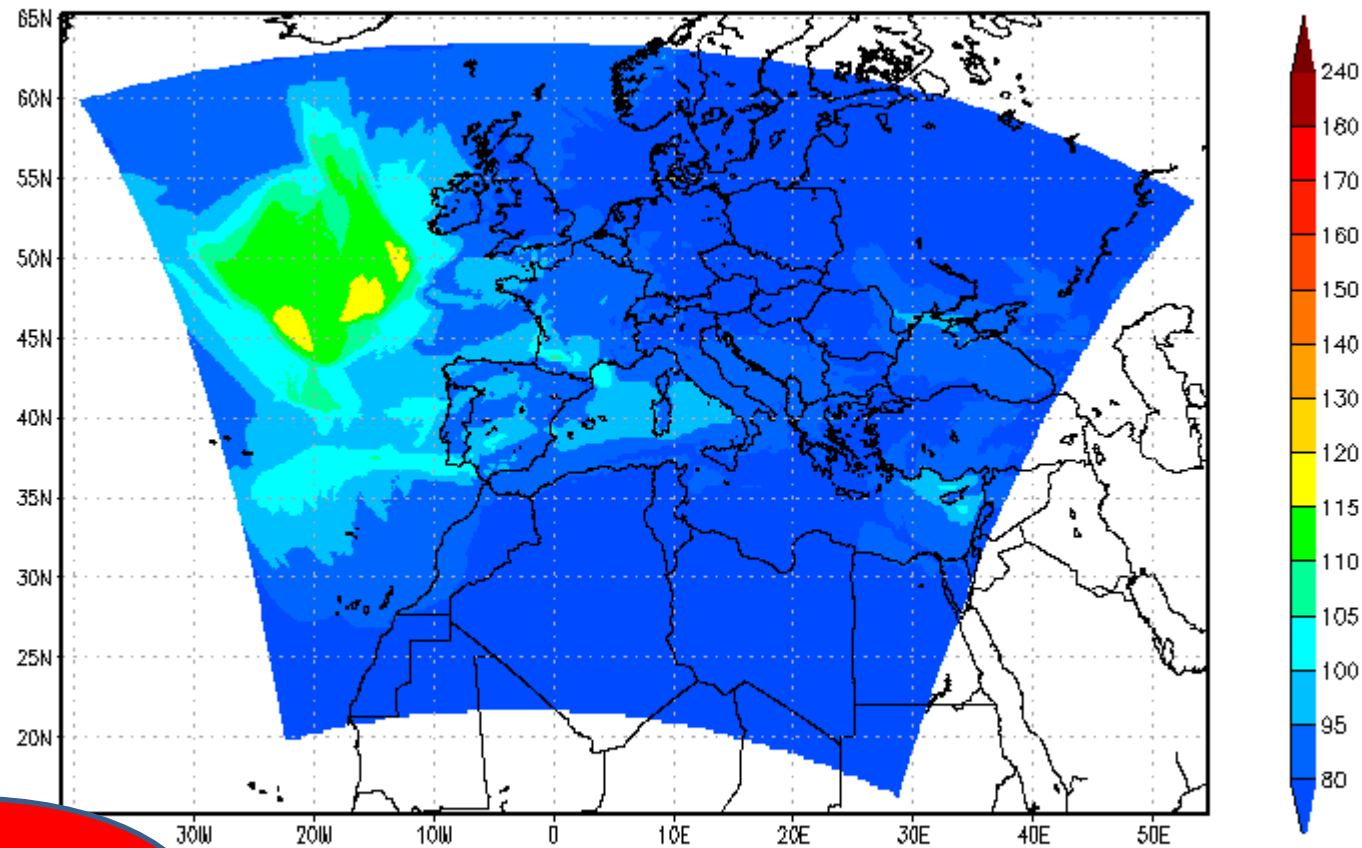
Cleaned up, harmonized.



After

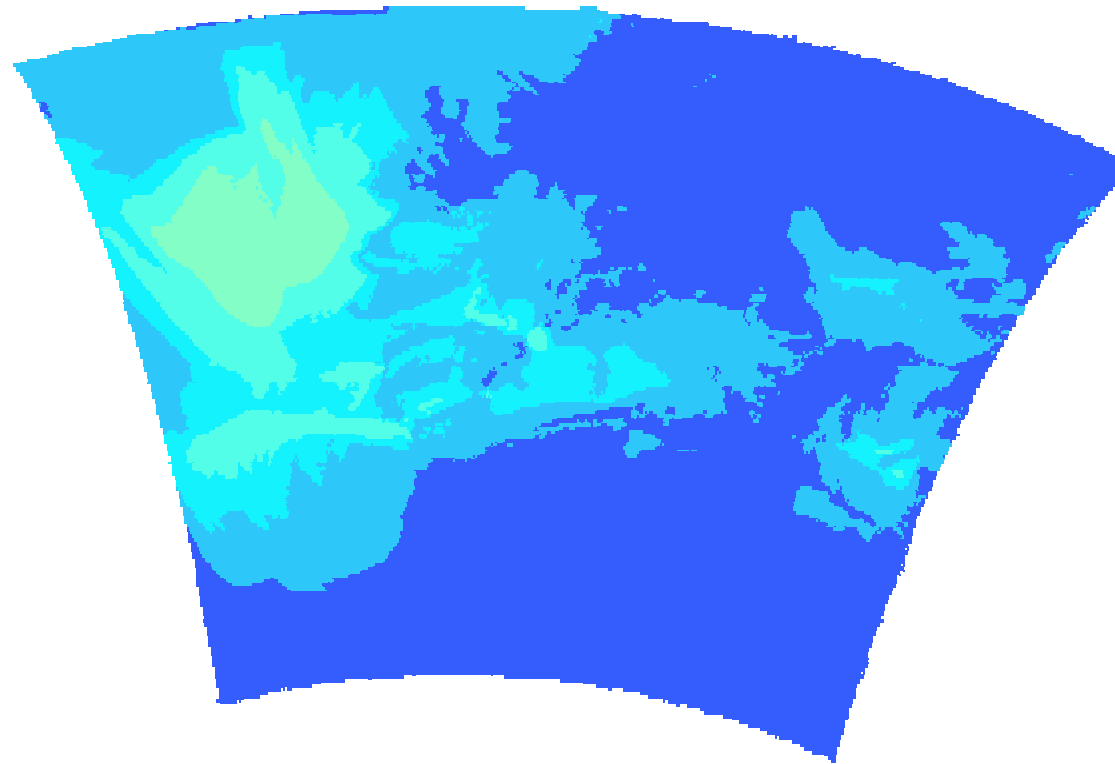
O3 max daily mean, 18 Feb 2010

BSC-ES/Air Quality Forecast ARWv3+CMAQv4.5 Max 1-hr Ozone ($\mu\text{g}/\text{m}^3$)
d+0 forecast for 18 FEB 10 – Europe Res:12x12km



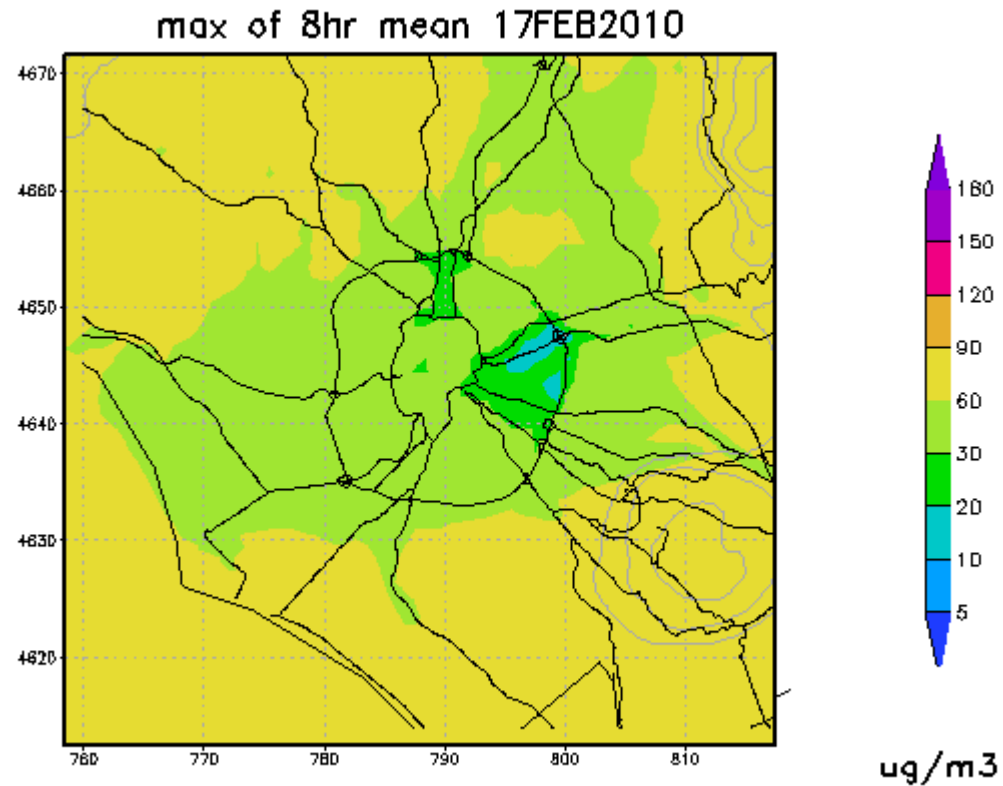
Before

Cleaned up, harmonized.



After

O3 max daily mean, 18 Feb 2010



GRADS: COLA/IGES

2010-02-17-10:55

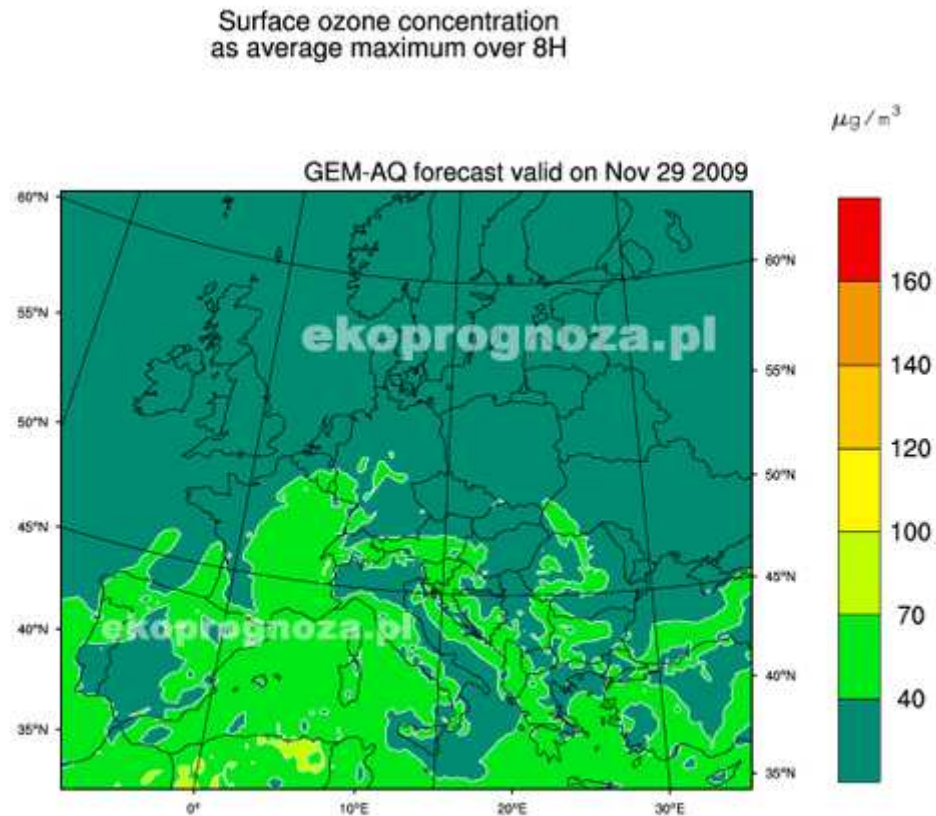
Before

Cleaned up, harmonized.



After

O₃ max daily mean, 29 Nov 2009



Before

Forecast issued on Nov 27 2009
© 2009 ekoprognnoza.pl - all rights reserved

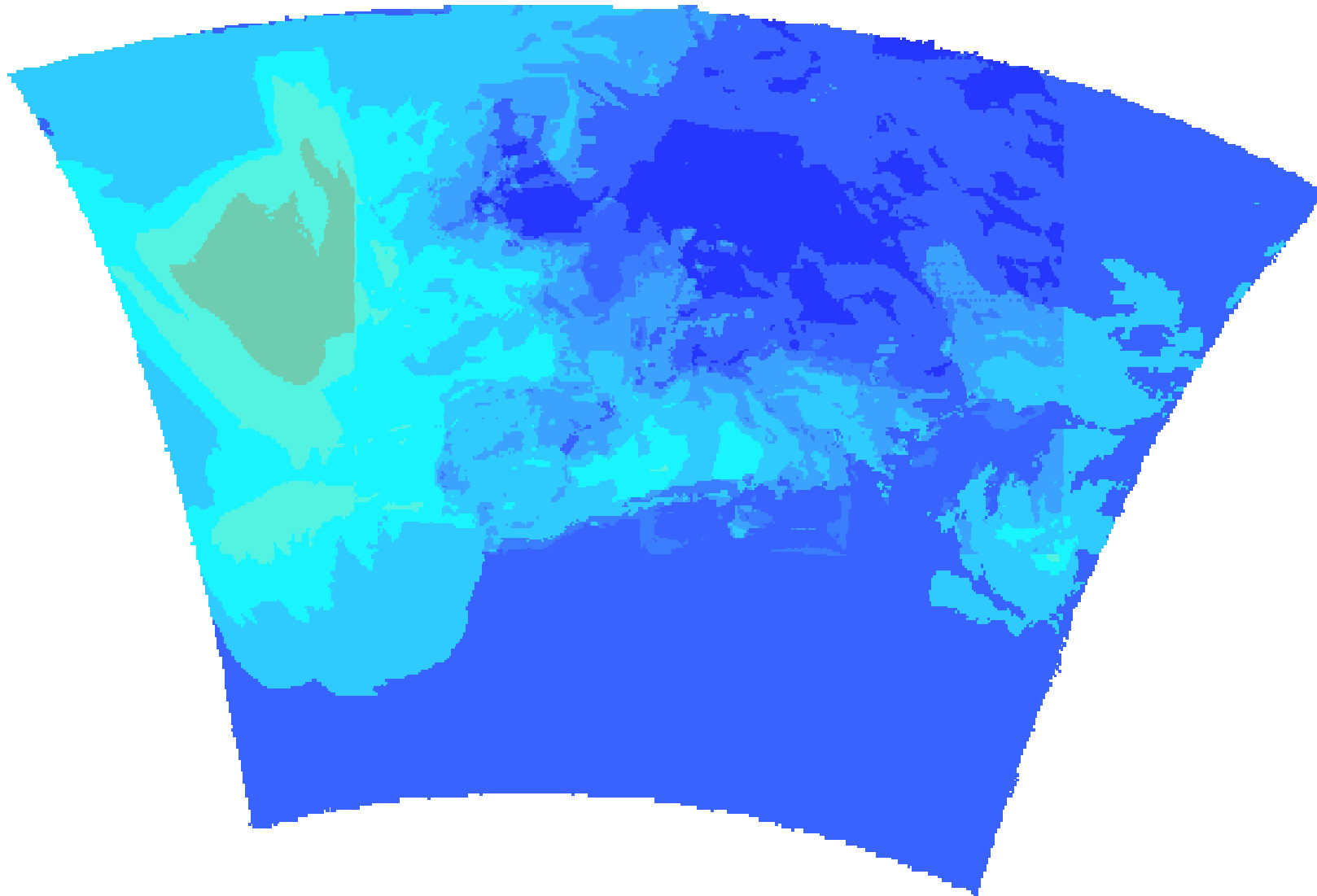
EKO
PROGNOZA

Cleaned up, harmonized.

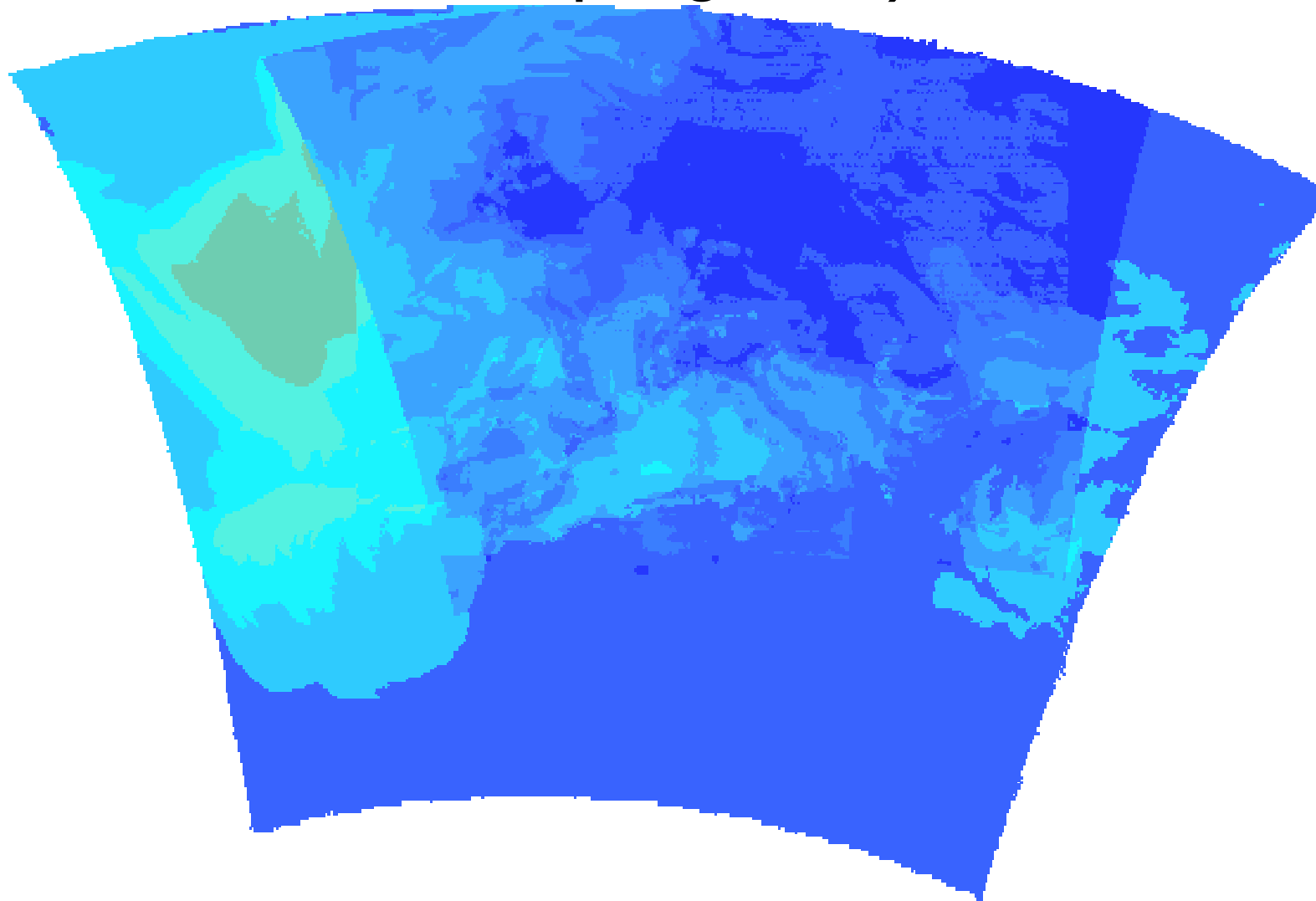


After

Final ensemble (mean values)
for O3 mean on 18 Feb 2010



Final ensemble (mean values) for O3
mean on 18 Feb 2010 (with
ekoprognnoza).



Instead of conclusions: What has been achieved

1. Extraction of information from CW model result mages, via an image processing algorithm
2. Transform this information into a new image, on the basis of a reference palette.
3. Apply this procedure seamlessly for various CW model result images
4. Apply another algorithm, that will automatically identify the geographic projection being used, and will transform all images in the same orthogonical (Mercator) projection.
5. Superimpose all images on a google map framework
6. Develop the necessary software that would allow the introduction and operation of the service to the CW portal

Related publications

Kukkonen J., Klein T., Karatzas K., Torseth K. Fahre Vik A., San José R., Balk T. and Sofiev M. (2009), COST ES0602: Towards a European network on chemical weather forecasting and information systems, *Advances in Science and Research Journal*, 1, 1–7, www.adv-sci-res.net/1/1/2009/, Contributions of the 8th EMS Annual Meeting and 7th European Conference on Applied Climatology, 2008

Epitropou V., Karatzas K. and Bassoukos A. (2010), A method for the inverse reconstruction of environmental data applicable at the Chemical Weather portal, Proceedings of the GI-Forum Symposium and exhibit on applied Geoinformatics, in press.

Balk T., Kukkonen J., Bassoukos A. and Karatzas K. (2010), A European chemical weather forecasting portal developed in the COST ES0602 action, in submission

Thank you!

