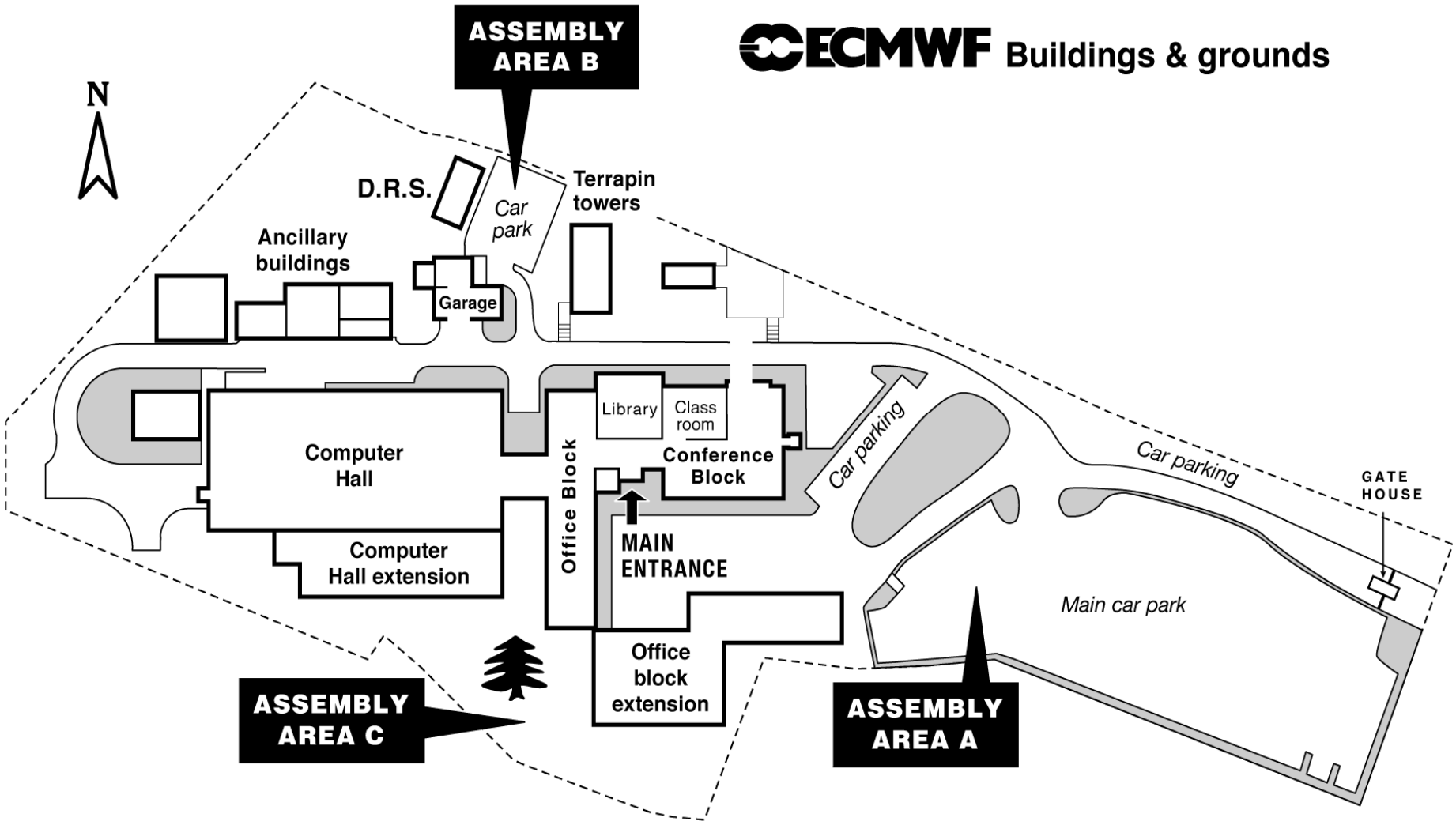
Welcome to ECMWF
&
EGOWS 2010

EGOWS 2010
Organisational notes

Stephan Siemen

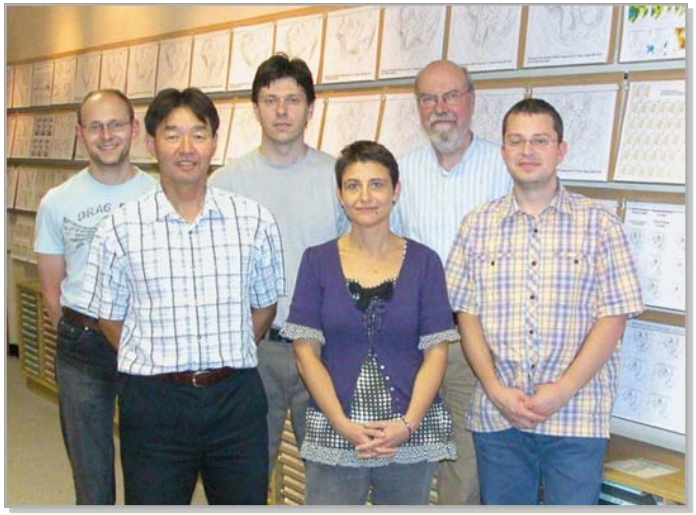
Head of Graphics Section

ECMWF


ECMWF Buildings & grounds
ASSEMBLY AREA B
N
D.R.S.
Car park
Terrapin towers
Ancillary buildings
Garage
Library
Class room
Computer Hall
Office Block
Conference Block
Car parking
Car parking
GATE HOUSE
Computer Hall extension
MAIN ENTRANCE
Main car park
Office block extension
ASSEMBLY AREA C
ASSEMBLY AREA A

At ECMWF

- **Badges – please wear them always**
- **Building is a no smoking building**
- **Location of restaurant (lunch, coffee breaks)**
- **Reception desk services, timetables, postage stamps**
- **Changing currency or traveller's cheques through Finance**
- **If you need help, look out for:**

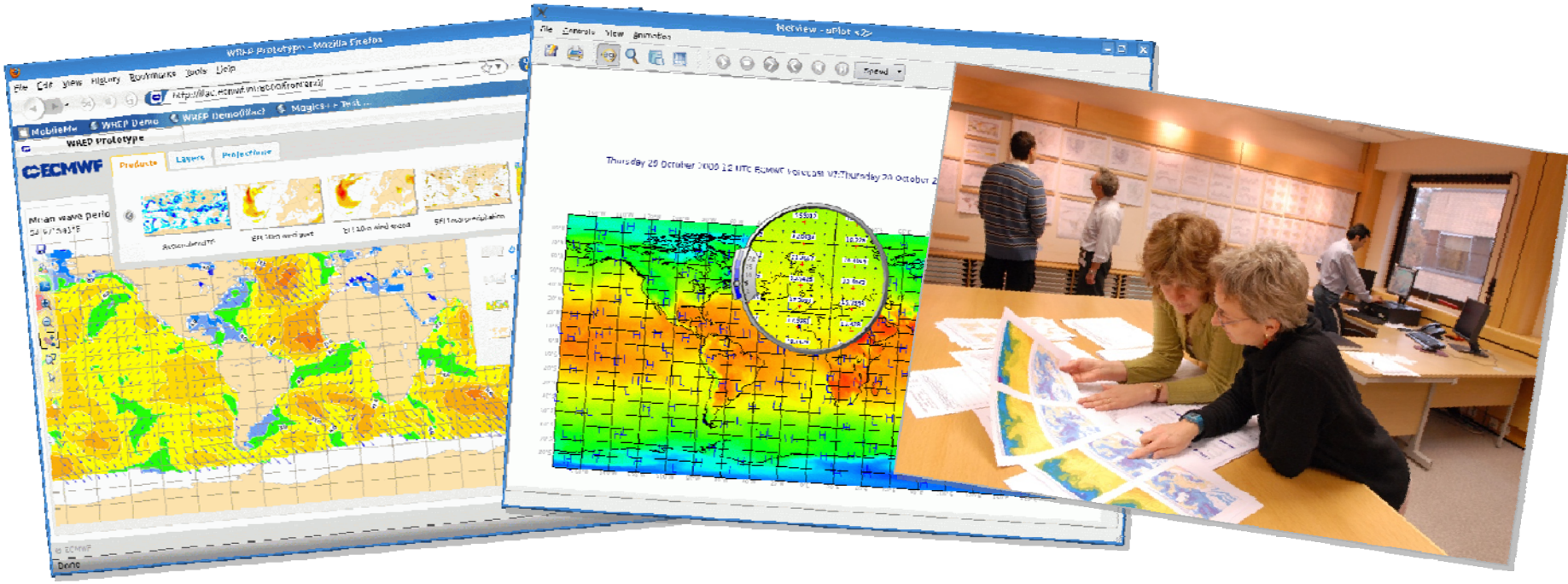


Program

- **Tour of Computer Hall & MetOps room**
- **Cocktails**
- **OGC special session**
  - **Please let us know if you plan to deploy a server**
- **Exhibition/Presentations**
- **Social program → Oxford, *Loch Fyne***
- **Friday discussions**

→ Please let us know if you are NOT happy that we put your slides on the web!

ECMWF and its use of Graphics



Stephan Siemen, Sylvie Lamy-Thépaut, Fernando Ii, Sándor Kertész , Iain Russell, Vesa Karhila

Graphics Section

ECMWF

What is ECMWF?

- **European Centre for Medium Range Weather Forecasts**
- **We provide operational medium- and extended-range forecasts and a state-of-the-art super-computing facility for scientific research.**
- **Supported by 31 States**
- **220 Employees**
- **Founded 36 years ago**
- **Amended Convention in 6 days!**

Supporting States and Co-operation

Belgium	*Ireland*	*Portugal*
Denmark	*Italy*	*Switzerland*
Germany	*Luxembourg*	*Finland*
Spain	*The Netherlands*	*Sweden*
France	*Norway*	*Turkey*
Greece	*Austria*	*United Kingdom*

Co-operation agreements or working arrangements with:

Czech Republic	*Montenegro*	*ACMAD*
Croatia	*Morocco*	*ESA*
Estonia	*Romania*	*EUMETSAT*
Hungary	*Serbia*	*WMO*
Iceland	*Slovakia*	*JRC*
Latvia	*Slovenia*	*CTBTO*
Lithuania		*CLRTAP*

ECMWF – what we provide

- **Forecast data dissemination**
  - RMDCN
  - GRIB (fields) & BUFR (weather parameters)
- **Data archive - MARS**
  - world's largest archive of numerical weather prediction data
- **Graphical (web) plots**
  - Product catalogue, Web-reengineering (WREP)
- **Meteorological software packages**
  - Libraries: Grib_API, Magics, Emoslib
  - Applications: Metview, MARS, SMS

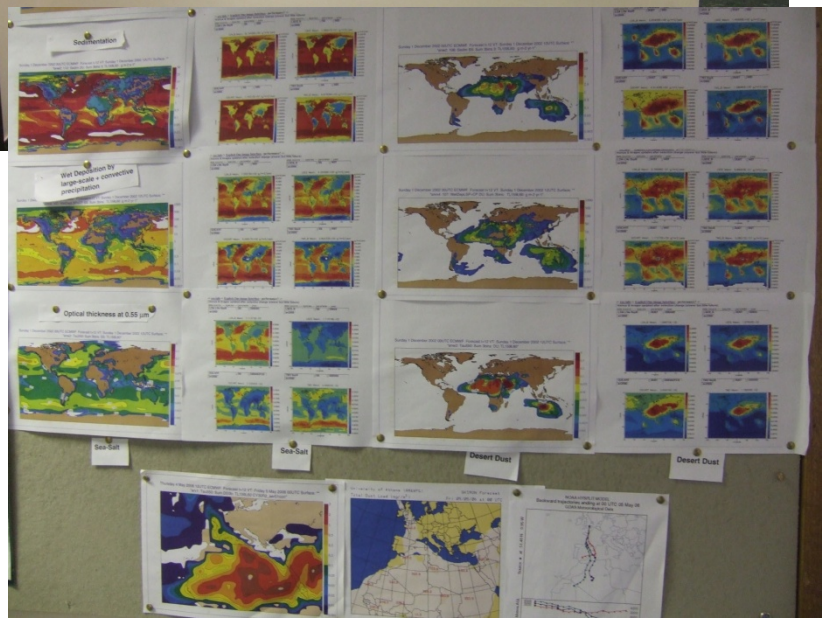
The challenges of increasing data volume

- **Large increase in satellite data**
  - **More channels, better resolution**
- **High-resolution NWP models**
  - **ECMWF (IFS): increase from T799 to T1279 meant data volume increase by factor of 2.5. In total: 2,140,704 grid points!**
- **Complex data structures**
  - **1000s of messages in GRIBs, table hierarchy in ODBs**
- **More and more data needed from non-meteorological sources**

What did we do?

- **Revise how we handle data to make it more efficient (GRIB API, ODB → benefits Metview 4)**
- **Offer tools to quickly comprehend data and its structure (→ Metview 4: data examiners)**
- **Find ways to visualise data in its complexity (→ Metview 4: ayers, zooming, data magnifier)**
- **Make more use of various dimensions (→ Metview 4: animations)**
- **Constantly working on optimising batch performance (→ Metview 4: Macro language)**

Traditional use of Graphics



More modern use ...

Evolution of media

- **Still strong legacy of PostScript for printing**
  - **Still has best quality (high DPI)**
  - **Only way for scientific publications**
- **Move to more screen/web based visualisation**
  - **More interaction on desktop → Metview 4**
  - **Use web interfaces for forecasters/analysts → WREP**
  - **Offer visualisations through OGC WMS → Metview 4 & WREP**

→ All these media need to be supported!

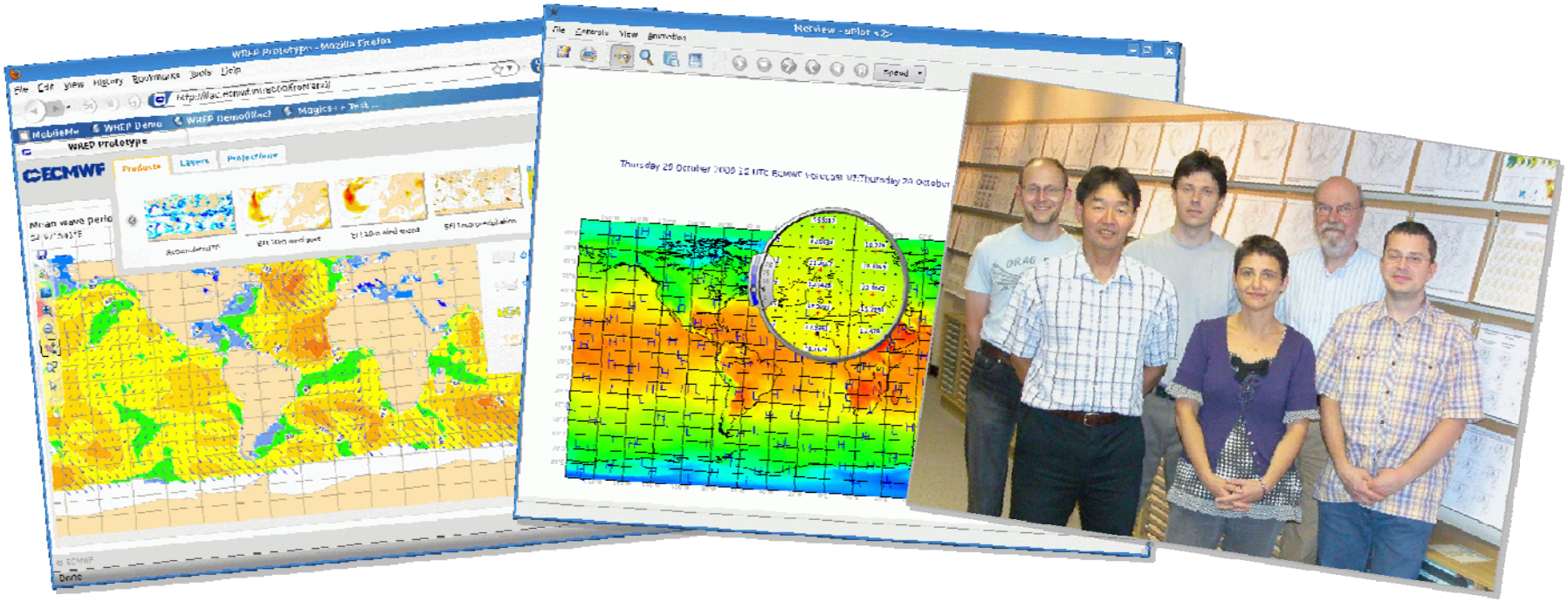
Workshop on Meteorological Operational Systems

- **Every two years**
- **Last was 12th – 16th Nov 2009 at ECMWF, Reading, UK**
- **Speakers are invited to report on "new trends in meteorological visualisation applications"**

- **Recent focus was on web services and applications.**

The presentations and conclusions are available at
www.ecmwf.int/newsevents/meetings/workshops/2009/MOS_12/

The Graphics Section



Stephan Siemen, Sylvie Lamy-Thépaut, Fernando Ii, Sándor Kertész , Iain Russell, Vesa Karhila

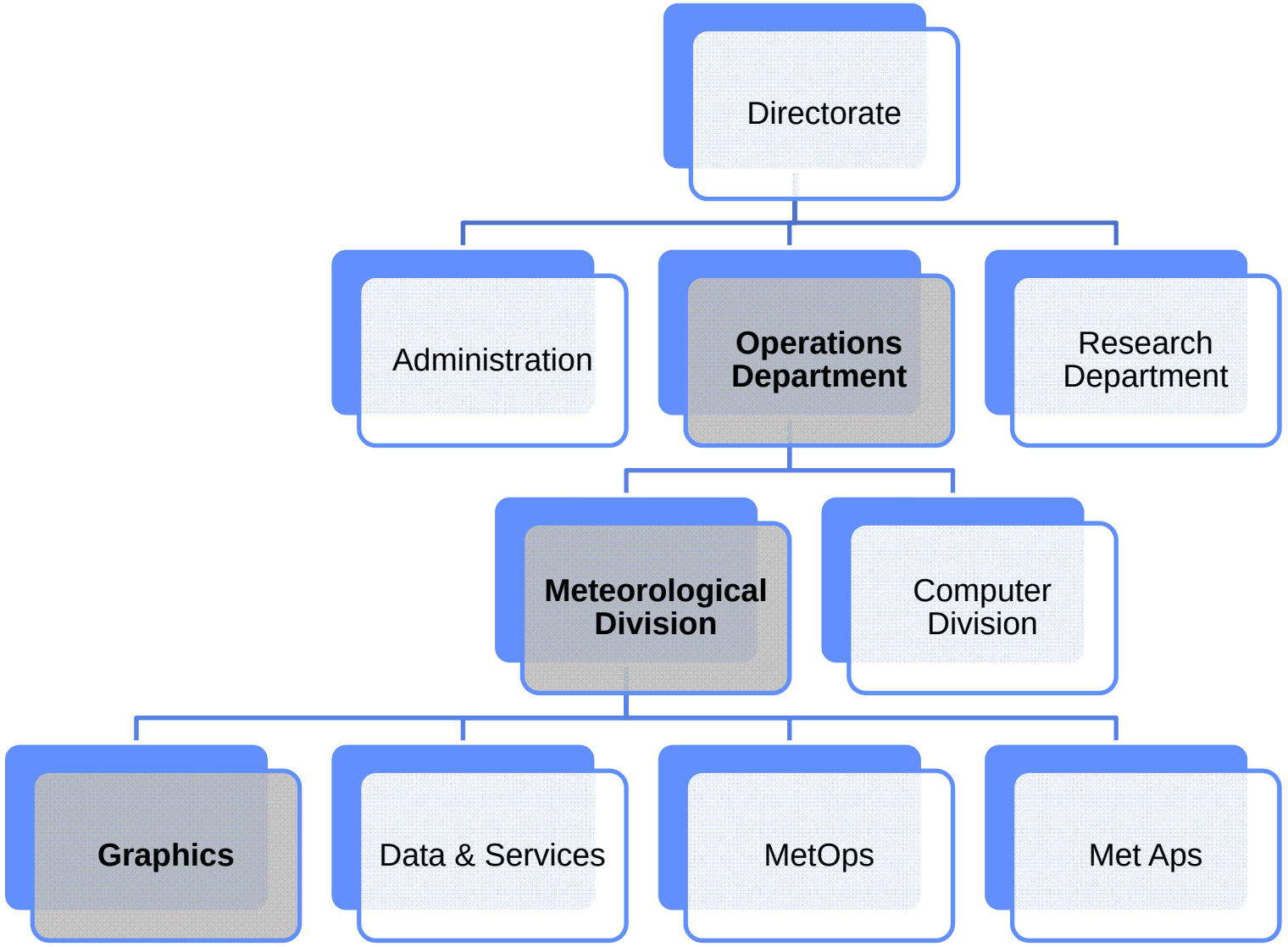
Graphics Section

ECMWF

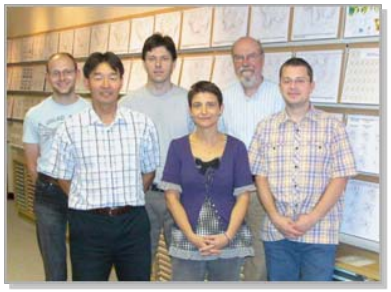
Graphics Section – History

- **Started beginning of 1980's as "MAGICS club"**
  - First not part of ECMWF
  - Then in "Telecommunication" in Computer Division
  - Now in Meteorological Division
- **1990 Work started on Metview workstation**
  - The idea: offer research and analyst a high level interface to data and processing functions to make them independent of the technical changes & challenges
- **1998 MAGICS moves from GKS to PostScript/OpenGL**
- **2004 Start of developments on Magics++**
  - C++ instead of Fortran
  - Move away from PostScript/Paper dominance
- **2010 Metview/Magics++**
  - move from Motif/OpenGL to Qt

Graphics in ECMWF



Graphics Section – Today



- **Currently 5 Staff + part-time consultant**

- **Close co-operation with other parts of ECMWF**
  - **Data and Services Section (MARS, Grib_API, Emoslib)**
  - **Meteorological Operations (MetOps room, web charts, product developments)**
  - **Research Department (forecast developments)**

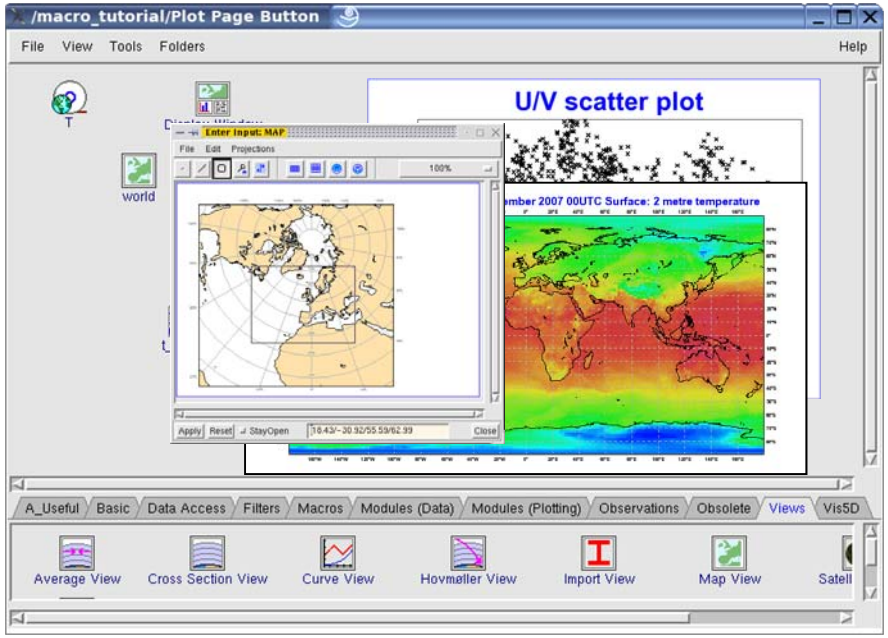
- **Close co-operation with Member States and other NWS**
  - **INPE/CPTEC (Brazil)**

Magics

- **Plotting library for meteorological data**
- **Used as Metview's plotting engine and for generating web products**
- **Open Source**

Metview

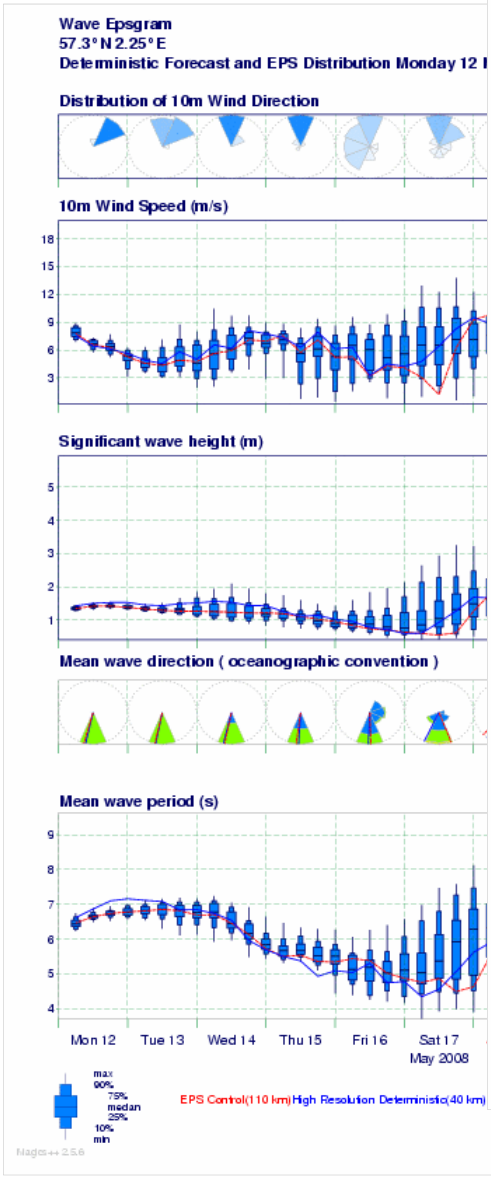
- **Working environment for Operational and Research Meteorologists**
  - **Interactive & batch**
- **Co-operative project:**
  - ***ECMWF***
  - ***INPE/CPTEC***
  - ***Météo France***

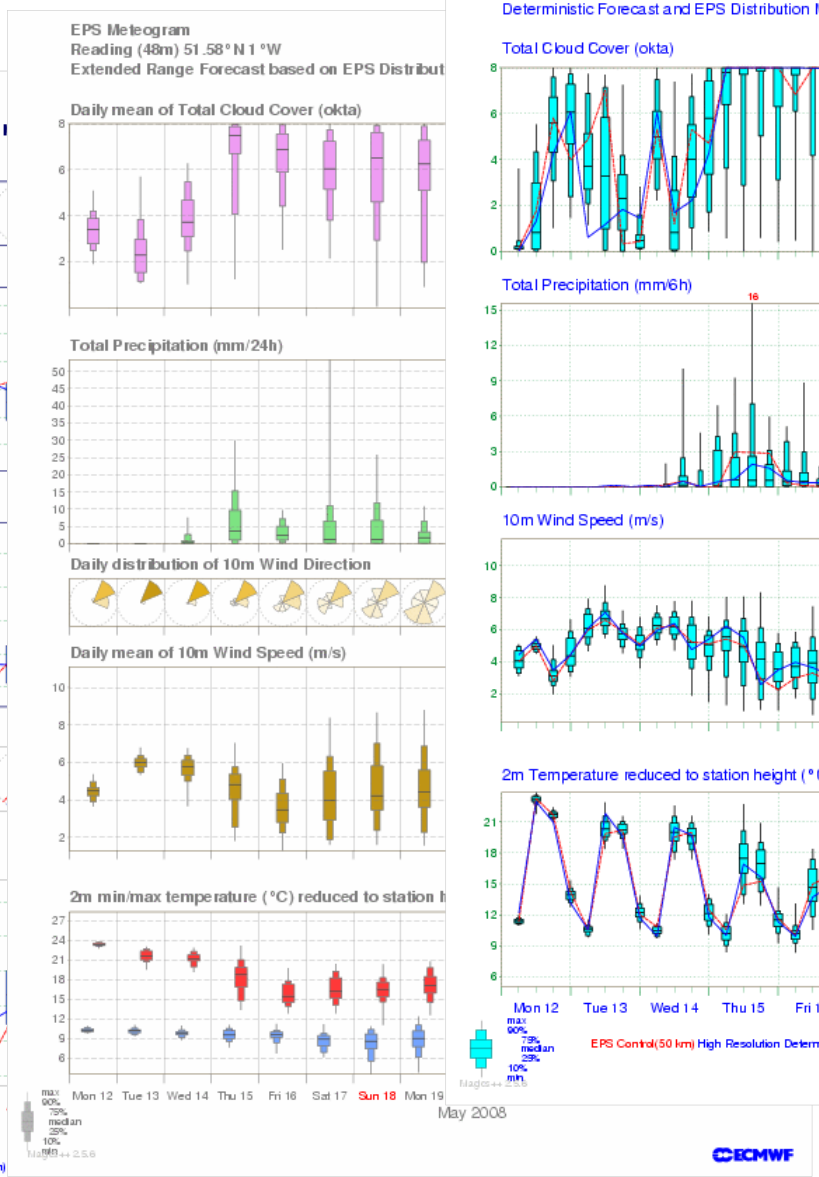


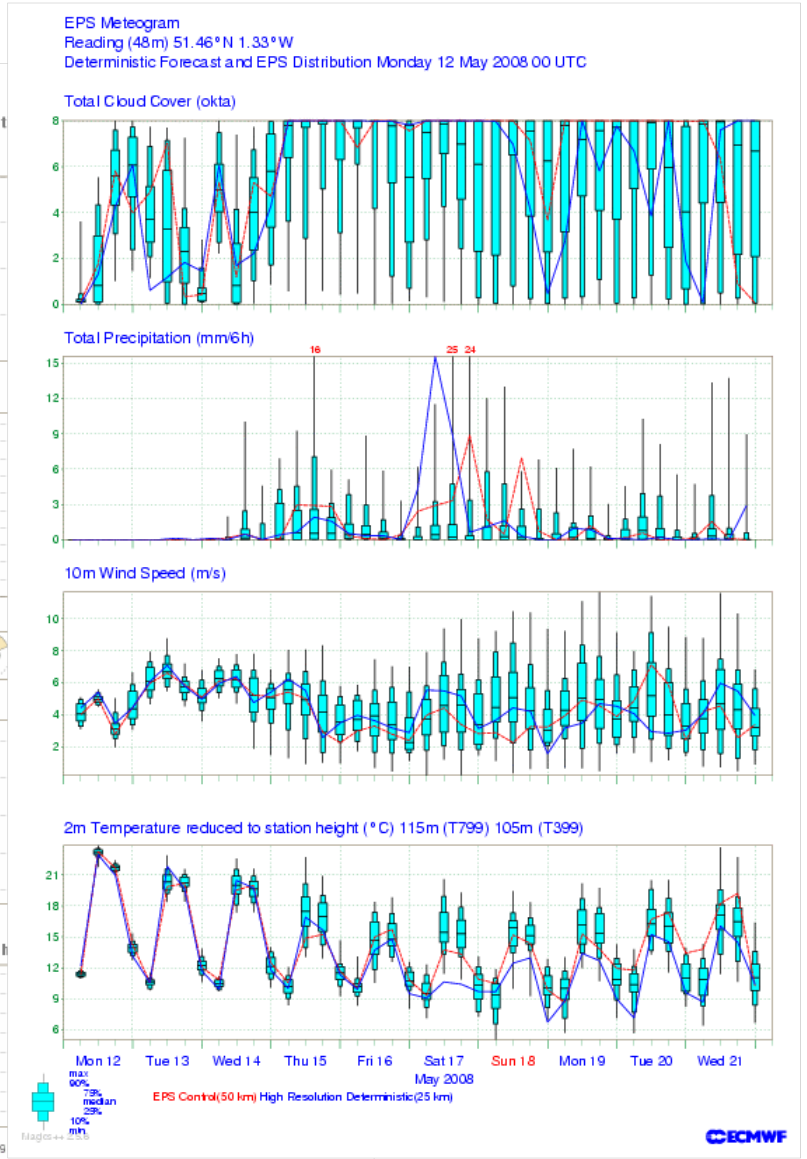
Centre wide involvement

- **Support Magics & Metview users**
  - **Researchers & analyst**
  - **Training and discuss new features**
- **Support/Maintain graphical (web) products**
  - **Meteograms**
- **WREP – web-reengineering project**
- **Observation monitoring project**
  - **Develop tools to access observations and analysis feedback**
- **Investigation of OGC & INSPIRE standards**
  - **MetOcean DWG**

Metgrams

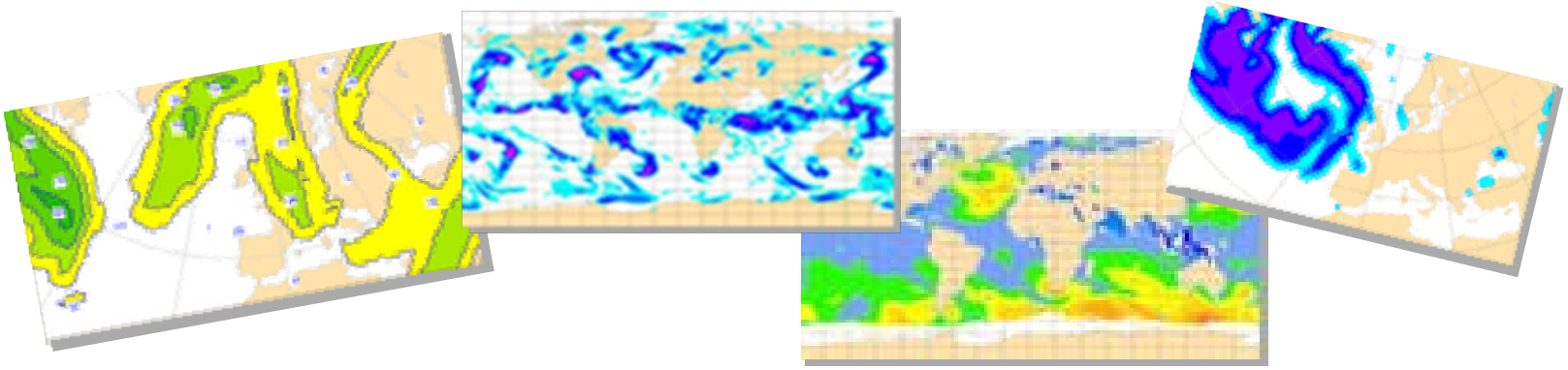




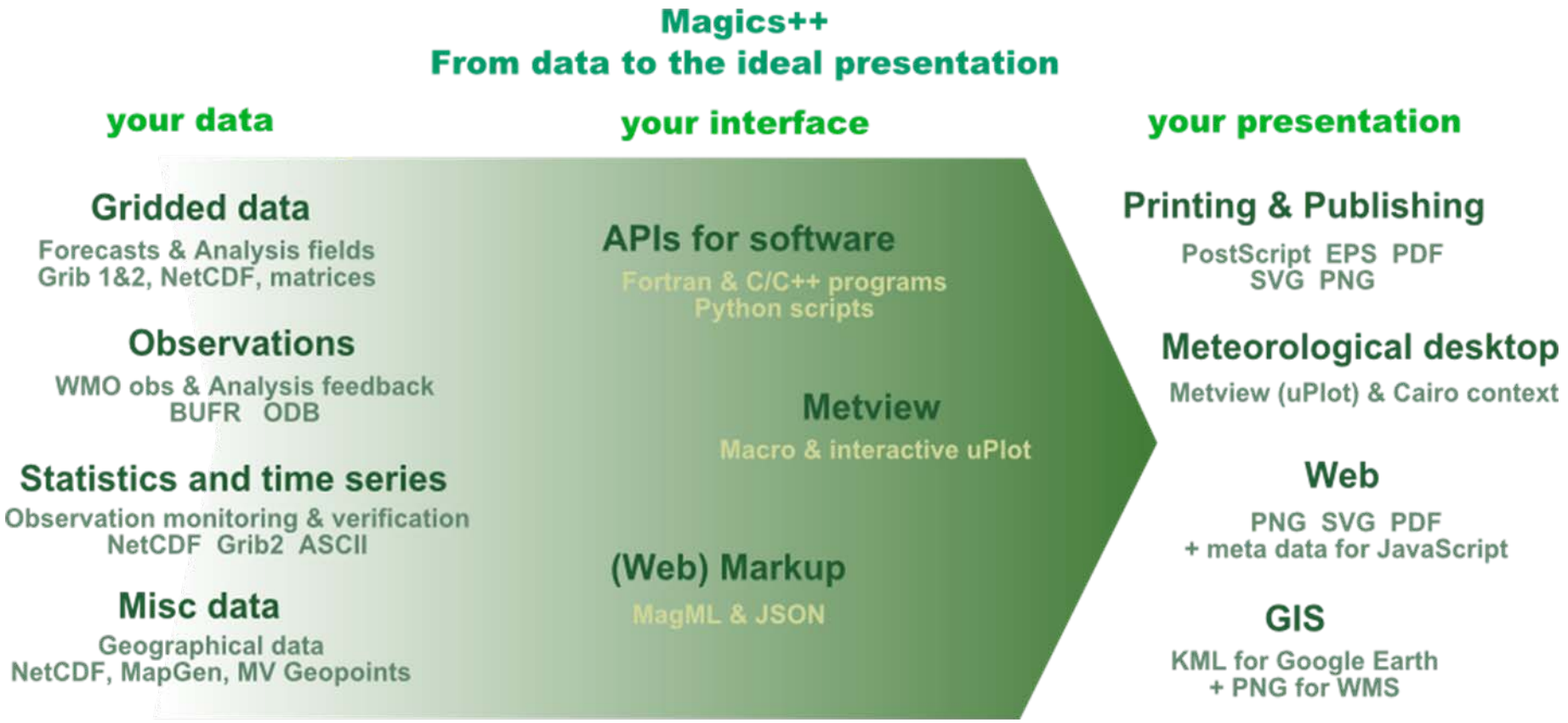


Magics++
a modern meteorologically-oriented library

- **It is able to visualise most of the meteorological data coded in GRIB1/GRIB2 and BUFR formats.**
- **Its support for netCDF opens it up to the scientific community.**
- **Enables easy integration in desktop (Metview) and web based systems, such as in ECMWF's web re-engineering project.**



The aim of Magics



Metview

- **Strength: its flexible SOA like architecture allows to easily overlay various types from various data sources**

- **Interacts with other established meteorologically oriented software and GIS systems**
  - **MARS, GRIB API, Emoslib, ODB, Terralib**

- **Offers extensive batch facilities**
  Metview Macro
  - **Powerful meteorological scripting language**

```
# Compute the coriolis parameter
omega = 2 * 3.14 / 86400.
coriolis = 2 * omega * sinlat(grad[1])

# Bitmap the tropics in the gradient fie
trop_mask=mask(grad[1],[15,0,-15,360])
trop_mask=bitmap(trop_mask,1)

for i=1 to count(grad) do
      grad[i]=bitmap(grad[i],trop_mask)
end for
```