ECMWF Feature article

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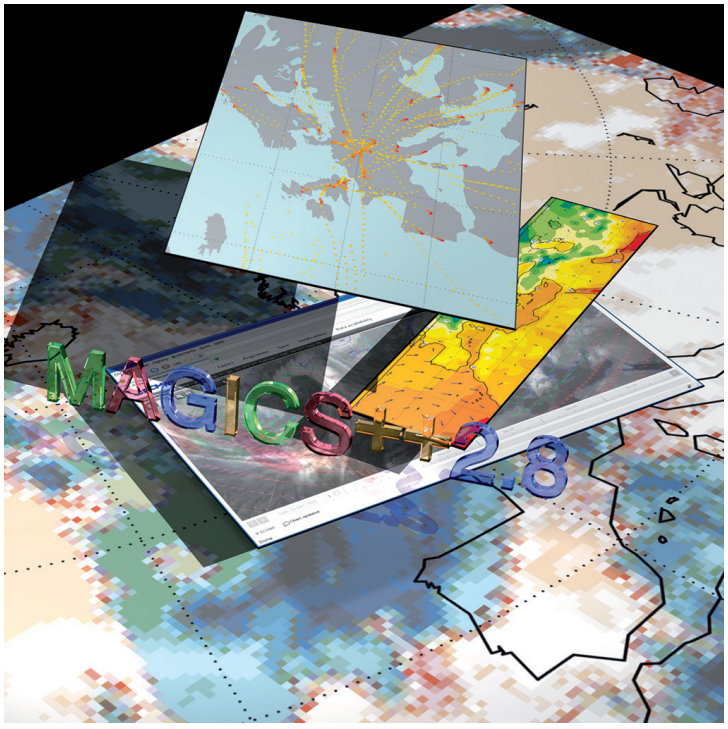
COMPUTING

Magics++ 2.8 – New developments in ECMWF's meteorological graphics library



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Magics++ 2.8 – New developments in ECMWF's meteorological graphics library

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Magics++ is the successor of Magics 6, ECMWF's meteorological graphics library that has been used successfully at the Centre and in the Member States for more than 25 years. Magics++ has been written in C^{++}, and takes advantage of the experience gained with its predecessor. More general information can be found in the article about Magics++ in *ECMWF Newsletter No. 110*, 36–41.

The newly released version 2.8 brings many new features and improvements to users. In the past year the library underwent much development for its integration into Metview 4, Web Re-Engineering Project (WREP) and the observation monitoring project. The aim in all these developments was to reach same look and feel for the visualisation between these services. Version 2.8 includes these changes along with many improvements and wishes from users outside the Centre. New features of version 2.8 include:

- Support of rotated grids (e.g. for HIRLAM models, see Figure 2)
- Introduction of Mercator projection
- Improvements in shading missing data
- Advanced symbol table mode for the support of ODB2
- Taylor diagrams (see Figure 3)
- Generalisation of the use of netCDF
- Improvement in the handling of satellites images

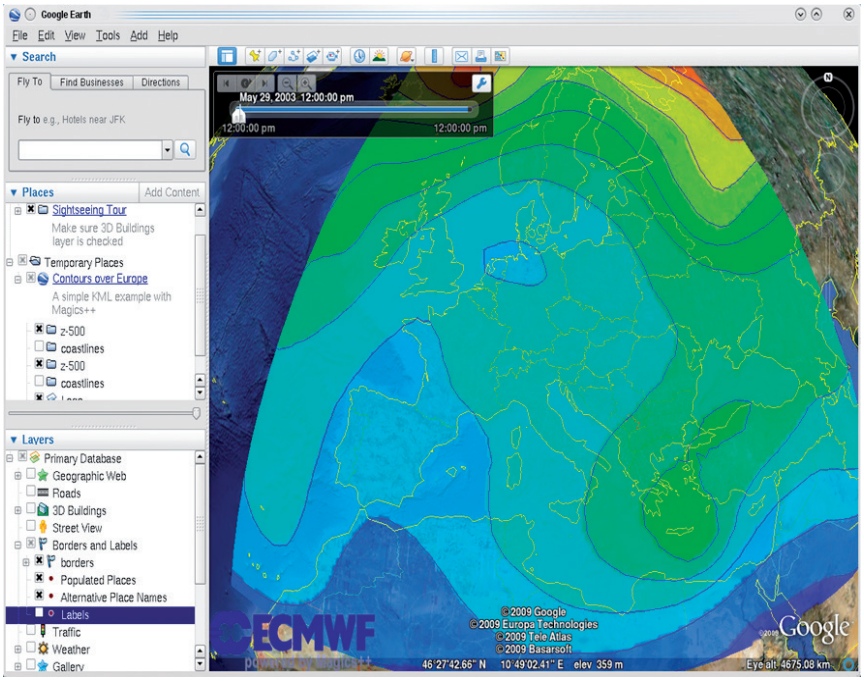

Figure 1 Magics++ also now supports KML output which can be visualised within Google Earth®. The KML output supports layers and animations.

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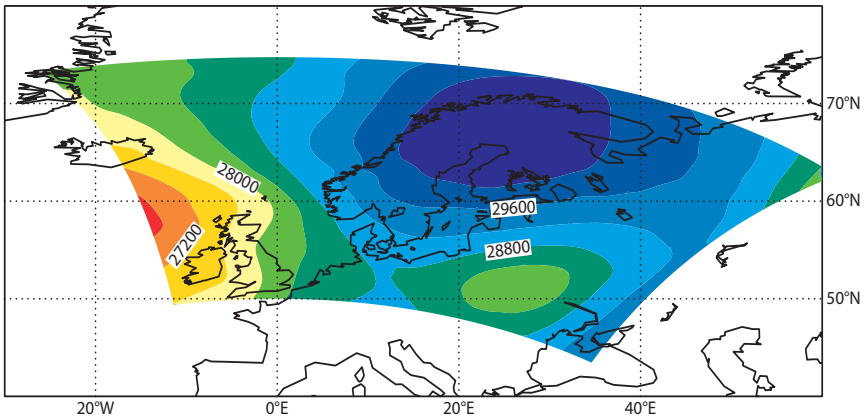

Figure 2 Example of data on a rotated grid (Hirlam) plotted by Magics++.

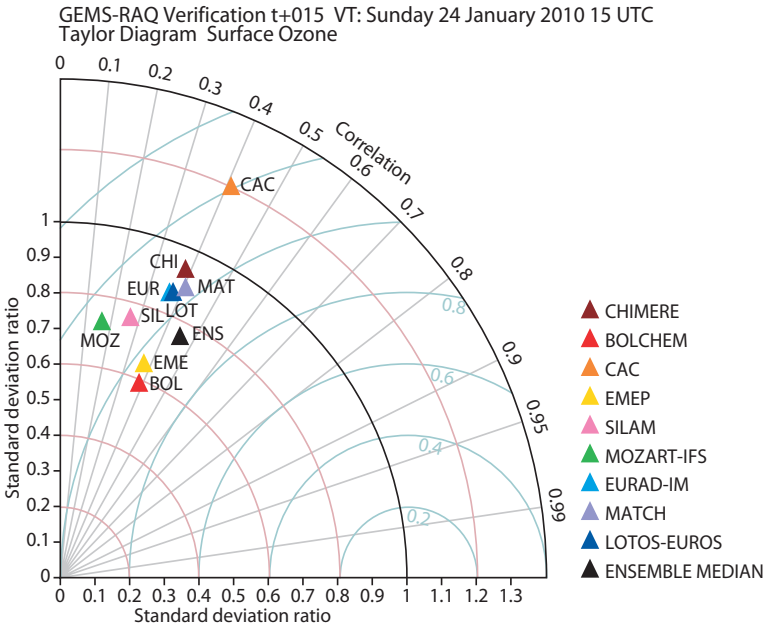

Figure 3 A Taylor diagram produced by Magics++.

The new version also handles more complex layouts as used for the extreme forecast index (EFI) support plots, as shown in Figure 4. The Magics++ documentation has been updated and now includes more examples and information. The installation guide is also integrated within the main documentation, as are descriptions of how to set up an environment to develop and run Magics programs.

To meet the challenge of the high-resolution data, Magics++ offers a wide variety of options for contouring from simple grid-shading to complex polygon shading, and also some tuning mechanisms to find the best compromise between high-quality output and processing time.

Magics 6 has always been able to produce high quality output, and Magics++ maintains this tradition. It does not only produce high-quality PS, EPS or PDF but also with version 2.8 more modern web-oriented formats such as PNG, SVG and KML/KMZ (for Google Earth®) as shown in Figure 1. To take full advantage of the latter format, Magics++ gathers some metadata about time or elevation from the data header, and integrates it in the KML output.

The family of user interfaces has been extended to offer a Python interface. This first interface is similar to the procedural Fortran and C interfaces. First user feedback is very positive and a more object-oriented interface in conjunction with Metview is currently under consideration.

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Magics++, which has been used operationally for the last four years to produce EPSgrams and EFI plots, has also been chosen to be the graphics engine for the Web Re-Engineering Project (WREP). This project provides services with features such as zooming or on-demand production of customised plots. In this context, a JavaScript library has been developed to allow the navigation of the maps and the possibility of clickable maps. An experimental OGC WMS (Web Map Service) as part of WREP is also using Magics++. Efforts have also been put into the creation of a library of meteorological styles for specific parameters that combine efficiency and readability with a new modern look.

The similarity between a MagML Style Description and a Metview Visual Definition will allow a user to easily prepare a plot using Metview 4 and push it to the new Web catalogue.

The consolidation period of Magics++ will continue into 2010. In the coming months major software packages at ECMWF, such as Metview, obstat and the verification package, will be updated to use Magics++ instead of Magics 6.

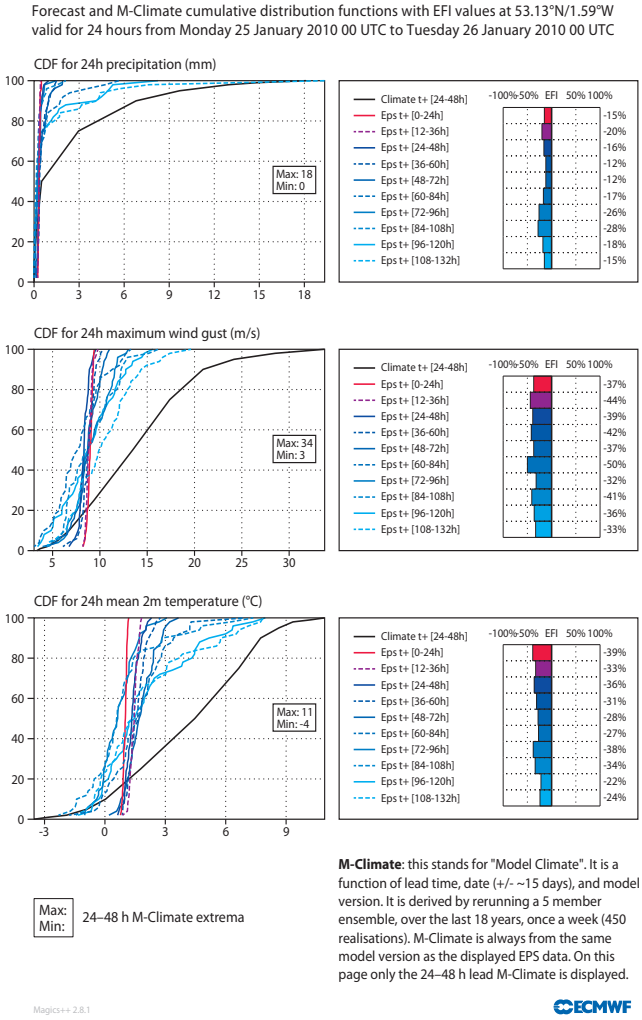

Figure 4 Example of Magics++'s ability to lay out and generate graphs. The plot shows more detailed information to support the extreme forecast index (EFI).

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