New Interpolation Package

MIR

Meteorological Interpolation and Regridding

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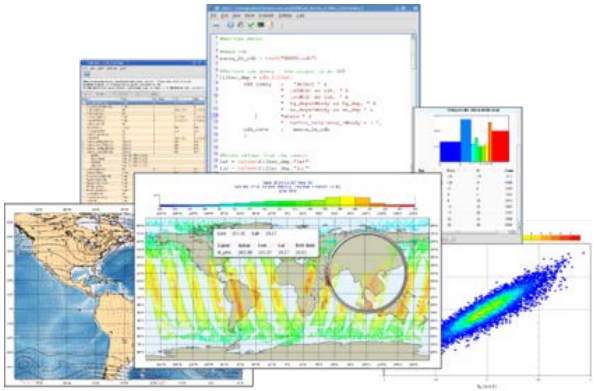
Introduction

- **Interpolation and regridding software crucial to ECMWF**
  - **Required by many software packages such as**
    - **Product Generation**
    - **Metview workstation**
    - **MARS archive**



- **Interpolation *expertise* is crucial to ECMWF**
  - **Share development effort with researchers**

Where are we now?

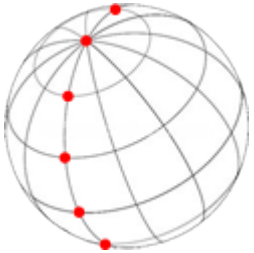
- **Emoslib currently used**
  - Over 20 years old
  - Very hard to maintain:
    - Installation
    - Development – no test framework
    - Optimisation
  - Known deficiencies
    - Precision of some calculations
    - Application of LSM to processing
- **Rewrite particularly beneficial now**
  - Product generation is being redeveloped

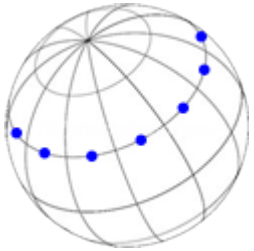
What do we want?

- **Consolidated library that can be used by all tools**
  - **Metview / MARS / Product Generation etc.**
- **Modern programming language(s)**
  - **C++ interface (Python)**
- **Ability to distribute computing**
  - **OpenMP, GPUs etc.**
- **Open architecture, Maintainable code**
  - **Open for external contributions (from Researchers and MS)**
- **Test framework**
  - **Automated regression testing**
  - **Validation of results**

What will it look like?

- **Meteorological Interpolation and Regridding: *MIR***
- **Command-line tool(s) - similar to grib_api**
- **C++ API for both Product delivery and MARS**
  - **Same results from both**
- **Internal restructuring of code base**
  - **File reading and writing (GRIB etc.)**
  - **Data representations (grids)**
  - **Meteorological logic (e.g. when to apply LSM and which one)**
  - **Maths (number crunching)**
  - ***Available to all ECMWF software***





What will it do?

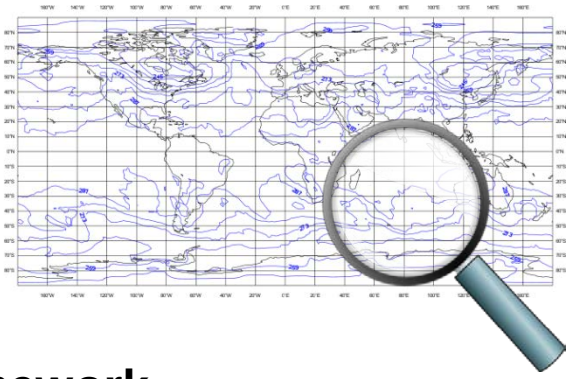
- **Major requirements of Product delivery:**
  - **From Spectral to**
    - **Regular and Reduced Gaussian**
    - **Lat / Lon (incl Rotated)**
    - **Spectral**
  - **From Reduced Gaussian to**
    - **Regular and Reduced Gaussian**
    - **Lat / Lon (incl Rotated)**
  - **From Reduced Lat / Lon to Regular Lat / Lon**
- **Also required for MARS usage:**
  - **Regular to Regular grids *etc.***

When do we want it?

- **Development is underway**
  - **Existing code (not EMOSLIB) heavily refactored into new structure**
- **In parallel with Product Delivery project**
  - **Incremental delivery of interpolation features as these are:**
    a) **Written**
    b) **Verified**
    c) **Documented**
  - **First prototype due January 2014**
    - **Single grid type to target grid type**
    - **Others will follow**

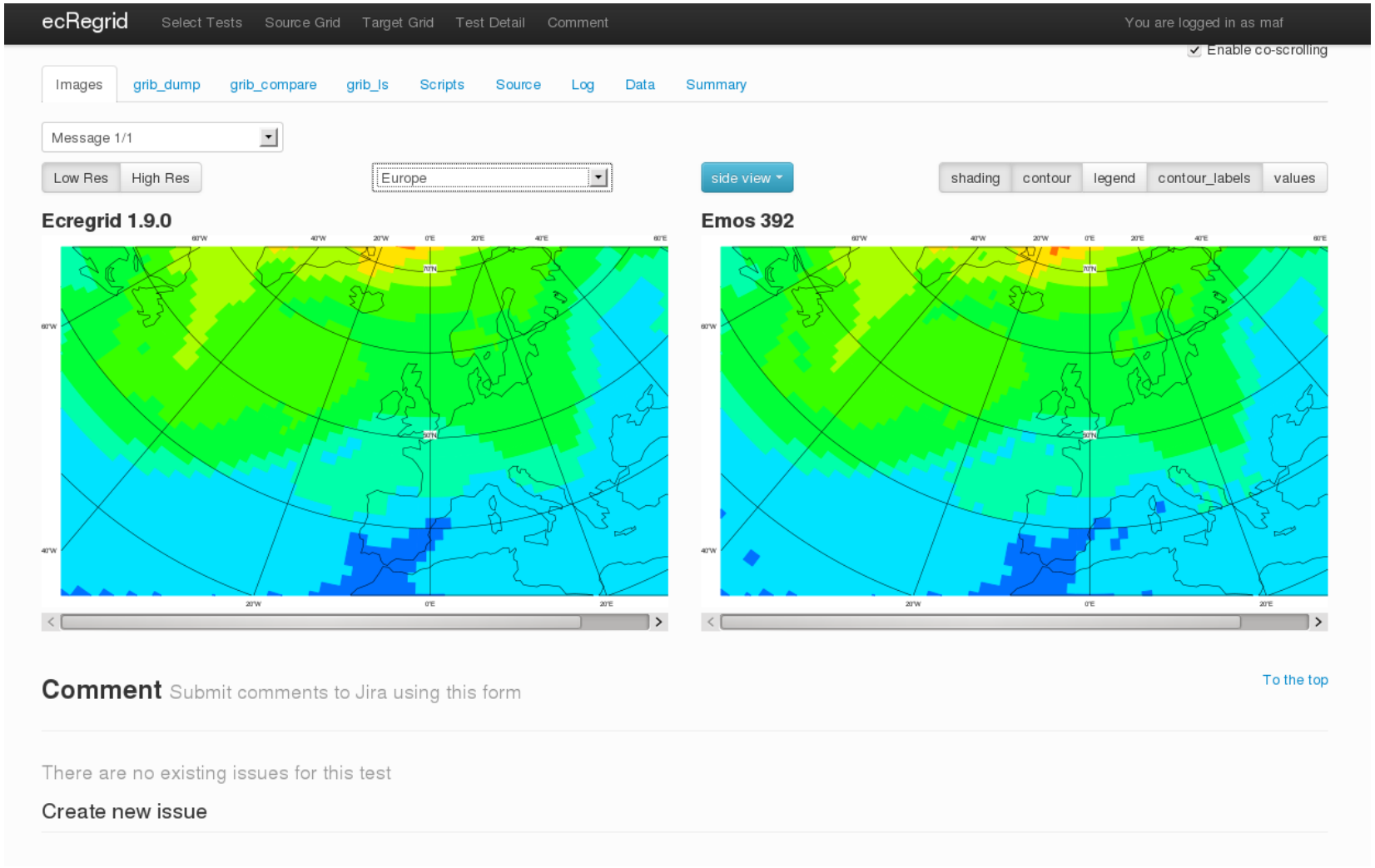
How do we test it?

- **Challenging task**
  - **Like-for-like testing not always possible**
    - **Subareas not handled in same way**
    - **Different computational resolution**

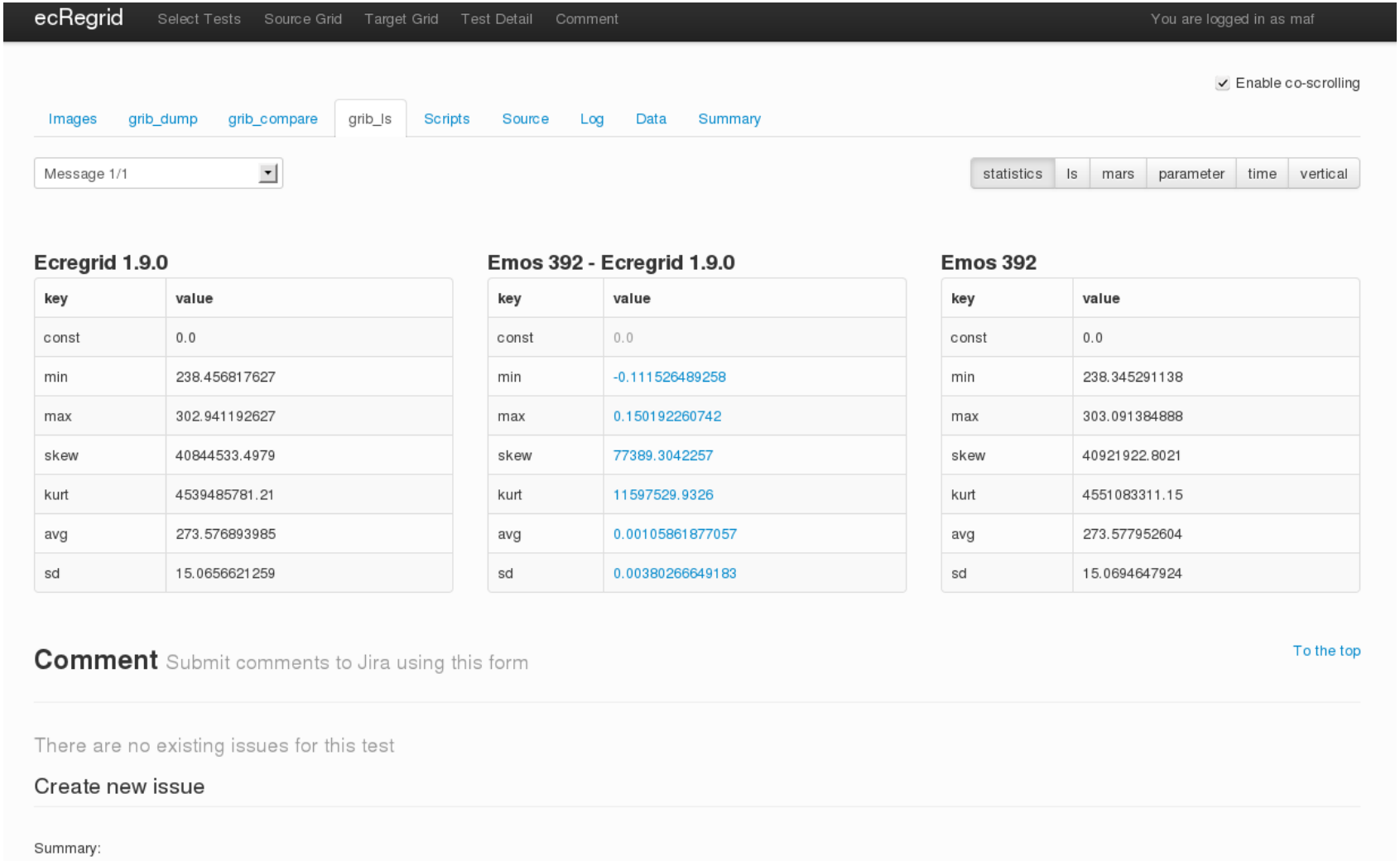


- **Continuous regression testing**
  - **New features will be submitted to test framework**
- **Comprehensive test framework**
  - **Many thousands of MARS retrievals will be made**
  - **Results compared**
  - **Custom web application developed for this purpose:**

Web app - Visual Comparison



Web app - Data evaluation



Summary

- **A new interpolation development will:**
  - **Provide robust performance for production**
  - **Give confidence in results**
    - **Consistency across outputs**
  - **Spread knowledge throughout development team**
  - **Provide improvement (reduction) in code base**

- **Interpolation working group has been set up**
  - **Involve interested parties early**
  - **New development belongs to all concerned**

- ***MIR* development is underway**