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

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There are no existing issues for this test

Create new issue
### Web app - Data evaluation

#### Ecregrid 1.9.0

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#### Emos 392 - Ecregrid 1.9.0

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There are no existing issues for this test

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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