

# AOPC/OOPC Mean Sea Level Pressure Working Group

## Co-Convenors:

**Rob Allan, Hadley Centre, Met Office, UK**

**Gil Compo, CIRES, University of Colorado, USA**

## Presenter:

**Phil Jones, CRU, UEA, UK**

**AOPC-X, Geneva, Switzerland, 19<sup>th</sup> April 2004.**

## Presentation Outline

Report of Working Group meeting at CLIMAR-II, Brussels,  
Belgium, 20<sup>th</sup> November 2003

Recent activities under the Group's Terms of Reference

- Data Development: Gridded fields
- Feasibility of a Reanalysis without Soundings

Work Plan for 2004

# Report of AOPC/OOPC Surface Pressure Working Group meeting, CLIMAR II, Brussels, Belgium, 20<sup>th</sup> November 2003.

## Present:

Rob Allan, Tara Ansell & David Parker – Hadley Centre, Met Office, UK

Gil Compo – NOAA/OAR/CDC, USA

Gunter Können – KNMI, Netherlands

Val Swail & Bridget Thomas - Environment Canada

Scott Woodruff – NOAA/OAR/CDC, USA

## Main issues discussed:

- Expanding our work to the collation and analysis of wind data?
- A need to more widely promote the work of the AOPC surface pressure working group. This issue was raised by Savi Narayanan (JCOMM co-president) at the CLIMAR II meeting, earlier that morning.
- What format should we adopt for our data archive?
- Formalising a work plan for 2004

## Expanding our work to the collation and analysis of wind data?

- Gil Compo asked whether we needed to expand our brief to encompass a focus on wind data. David Parker suggested the best course would be to bring on board someone whose role will be to stay up to date with progress with marine wind observations and analysis issues and report back to the group. This was accepted. *We are looking to identify a suitable person for this task. We have taken a step that widens our overall expertise by bringing Alexey Kaplan, LDEO, USA into the Group.*

## Promotion of the AOPC/OOPC Surface Pressure Working Group

- Those present decided it was worth setting up a Working Group web site, with a link from the JCOMM and GCOS sites. The content of web site will include contact details of members, the role and terms of reference of the group and include a list of the available terrestrial data. The ultimate aim will be to make the data freely available to download, though a number of copyright issues will need to be sorted out prior to this stage. *Gil Compo has just obtained approval for CDC to host our Surface Pressure Working Group website with links to datasets and data analysis pages. The site would also describe the Group and its membership, provide links to surface pressure gridded analyses and some data analysis/plotting. More complicated issues, such as making data available for downloading, will be reviewed at a later date.*



## What format should we adopt for our data archive?

- Two potential formats were discussed; the International Maritime Meteorological Archive (IMMA) format and the format recently developed and adopted at NCDC, called Integrated Surface Daily format. The advantage of IMMA is that it is easily expandable and is already used for the ICOADS data. The advantage of the NCDC format is that it gives full details of the quality control applied to the data, while retaining all of the original data. The potential for combining these two data formats was discussed and the development of a new format called the World Integrated Surface Hourly (WISH) archive to suit our specific requirements was proposed. *Gil Compo is examining the potential for adopting the NCDC or IMMA format and to decide upon an appropriate format for our data archive.*

## Formalising a work plan for 2004

- One of the terms of reference for the group is to record and evaluate differences among surface pressure analyses through comparison of basic products. Good progress has been made and that this subject should be included specifically in the 2004 work plan. Based on discussion of the issues above, a work plan for 2004 was proposed. *This plan is detailed following a brief overview of recent activities under the Group's Terms of Reference.*

# Recent activities under the Group's Terms of Reference

## Data Development: Gridded fields

### HadSLP

#### HadSLP1 (exists)

monthly 5 x5 degree blended land and marine product from 1871-1998

#### HadSLP2m (completed in 2003)

monthly 5x5 degree marine only product from 1850-2002

#### HadSLP2 (in progress due November 2004; March 2005 near-real time)

monthly 5x5 degree blended land and marine product from 1850-2003

### EMULATE (European and North Atlantic daily to MULTidecadal climATE variability)

#### EMSLP (in progress)

daily 5x5 degree blended land and marine product over the north Atlantic – European region from 1850-2002 *Also available: daily 1x1 degree global (marine only) data set*

# HadSLP2: Monthly pressure sources & data set construction

## Terrestrial data

- Meteorological Services
- NCDC – GHCN1 & GHCN2 Projects
- CLIMAT
- Reseau Mondial, World Weather Records, Monthly Climatic Data for the World, Meteorological Magazine, Meteorological Zeitschrift
- Phil Jones (UEA), Jim Salinger (NIWA), Kenneth Young (Arizona Uni)
- Hildebrandsson, Hahn, De Tillo, Dove, Angot, Walker, Lockyer's
- Board of Trade, UK Royal Engineers & Army Medical Department, Royal Met. Society, French Met. Society, UKMO
- Missionary records, Diaries, British East India Company

## Marine data

- ICOADS (blend of COADS and Met Office's marine data bank, plus newly digitised Japanese Kobe and US Maury collections) data used to develop HadSLP2m

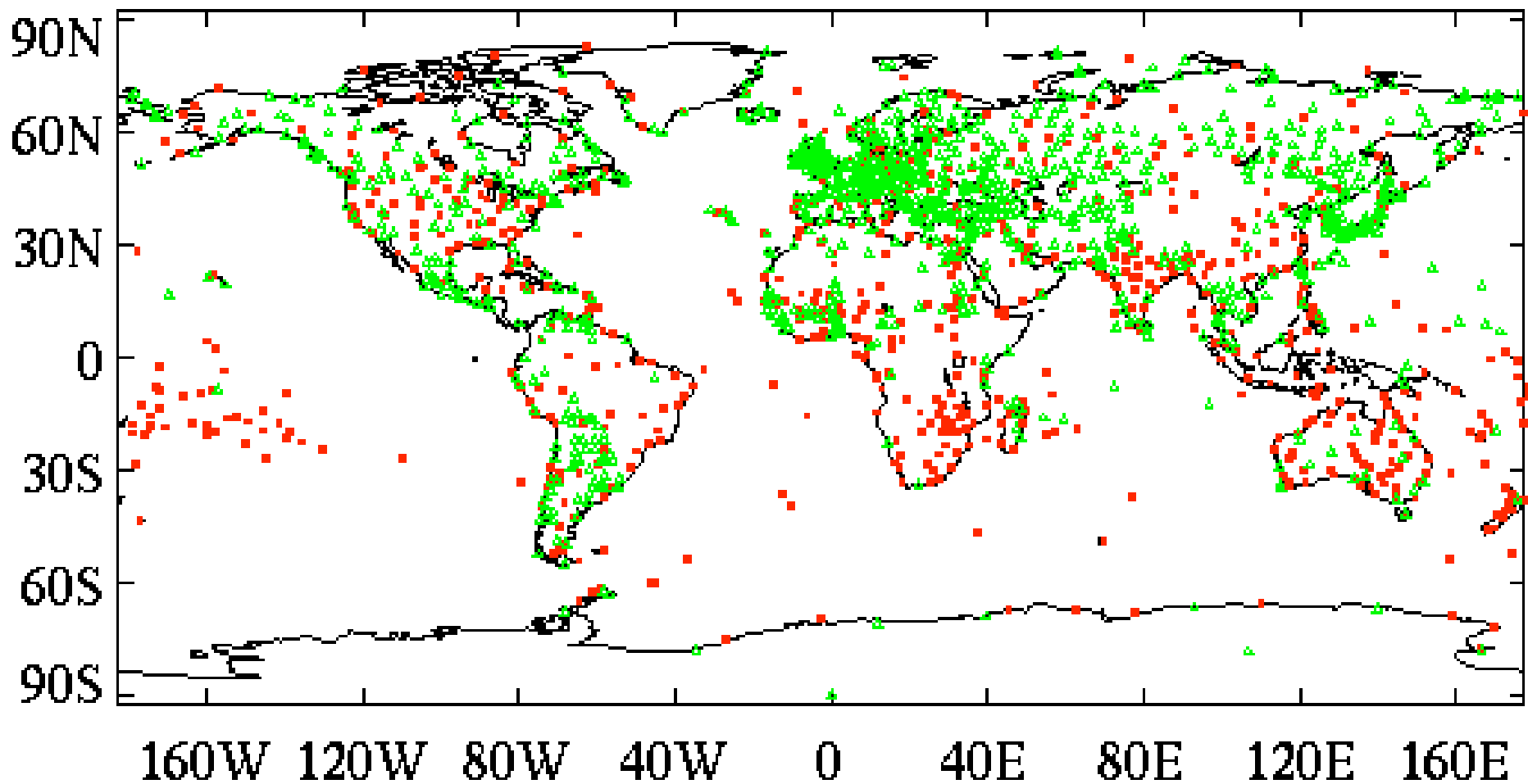
## Data set construction issues

- land station adjustments & corrections
  - standard gravity & temperature
  - mean sea level
  - diurnal cycle
  - correct to GMT

- QC background field for gridding marine data and for blending of land and marine



# Potential HadSLP2 land & island station coverage

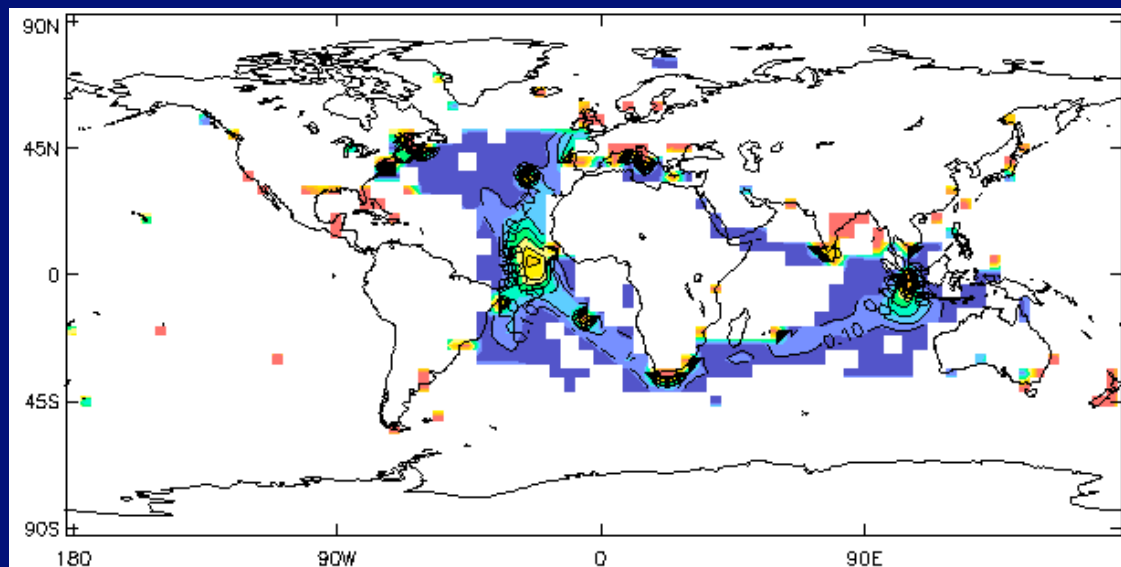


**719 HadSLP1 stations (red)**

**1036 new stations for HadSLP2 (green)**

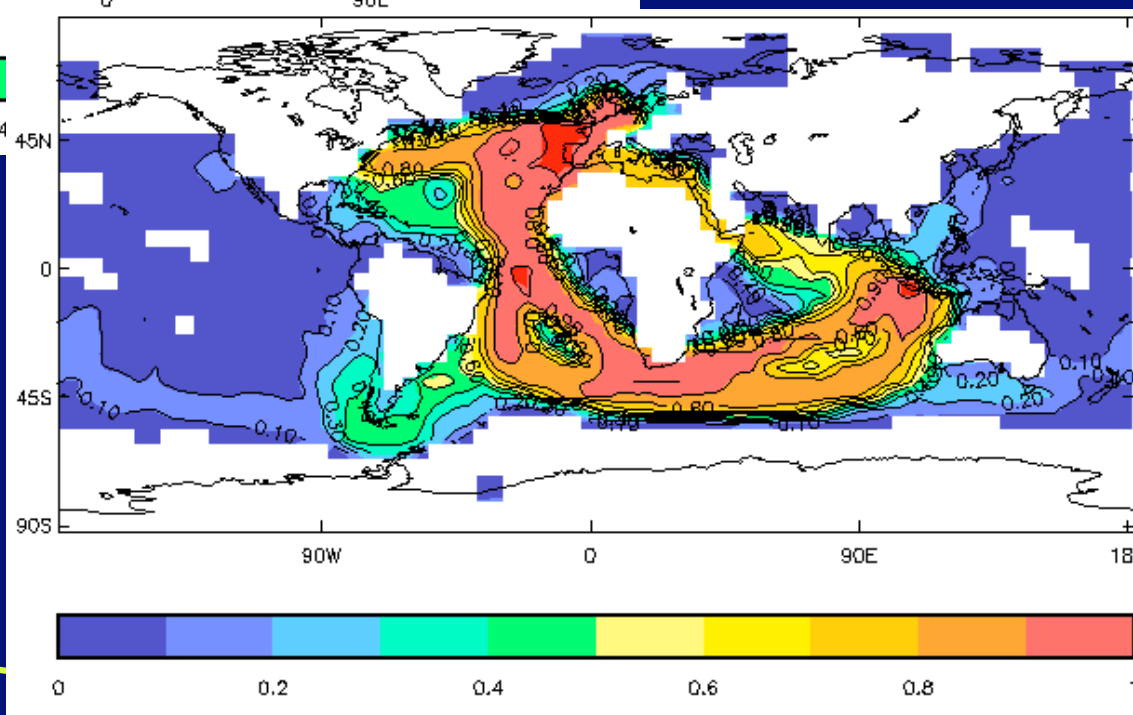


# Fraction of months with marine pressure data: 1871-1880



HadSLP2m

GMSLP2.1f



# EMULATE: Daily - sub daily pressure sources

- **Terrestrial data**
  - EU projects e.g. IMPROVE
  - WASA
  - Digitised Russian, UK, French and Middle Eastern.
- **Marine data**
  - ICOADS (blend of COADS and Met Office's marine data bank, plus newly digitised Japanese Kobe and US Maury collections)
  - NCEP – GTS observations
- **Met Office Northern Hemisphere operational 'superfiles'**
- **NCEP-NCAR reanalyses**

# EMULATE Strategy

- **Use and modify Superfiles 1881-2003**
- **Extend back to 1850 with blended land station data and ICOADS obs**
- **Interpolate to obtain complete coverage**

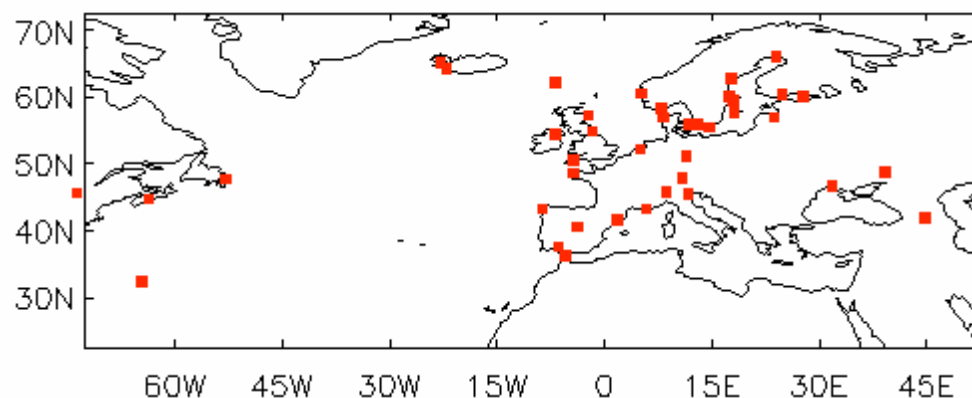
# EMULATE Progress

- **Version 1 (complete)**
  - **gridded marine obs and 41 stations from 1850-1880**
  - **combined with superfiles 1881-2002**
- **Version 2 (complete by end May)**
  - **gridded marine obs and 82 stations from 1850-2002 and blended with superfiles**
- **Version 3 (complete by end June)**
  - **Additional land station observations**

# EC EMULATE Project Terrestrial Daily Pressure Stations for EMSLP

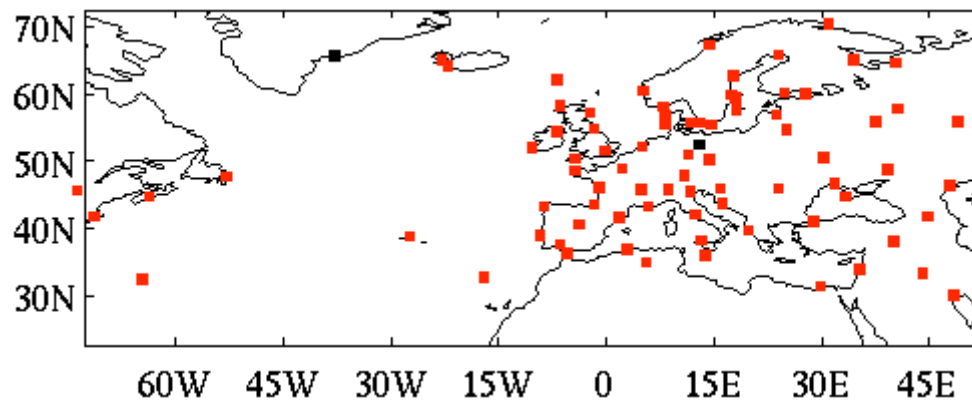
## EMSLP1

41 Stations



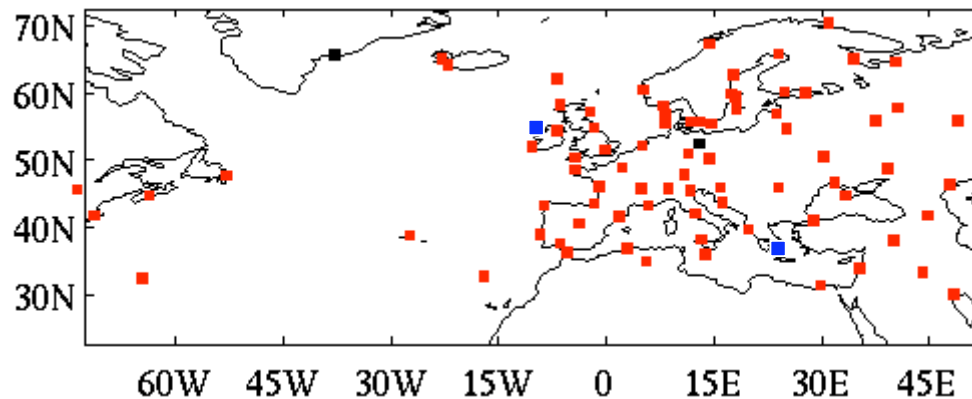
## EMSLP2

82 Stations

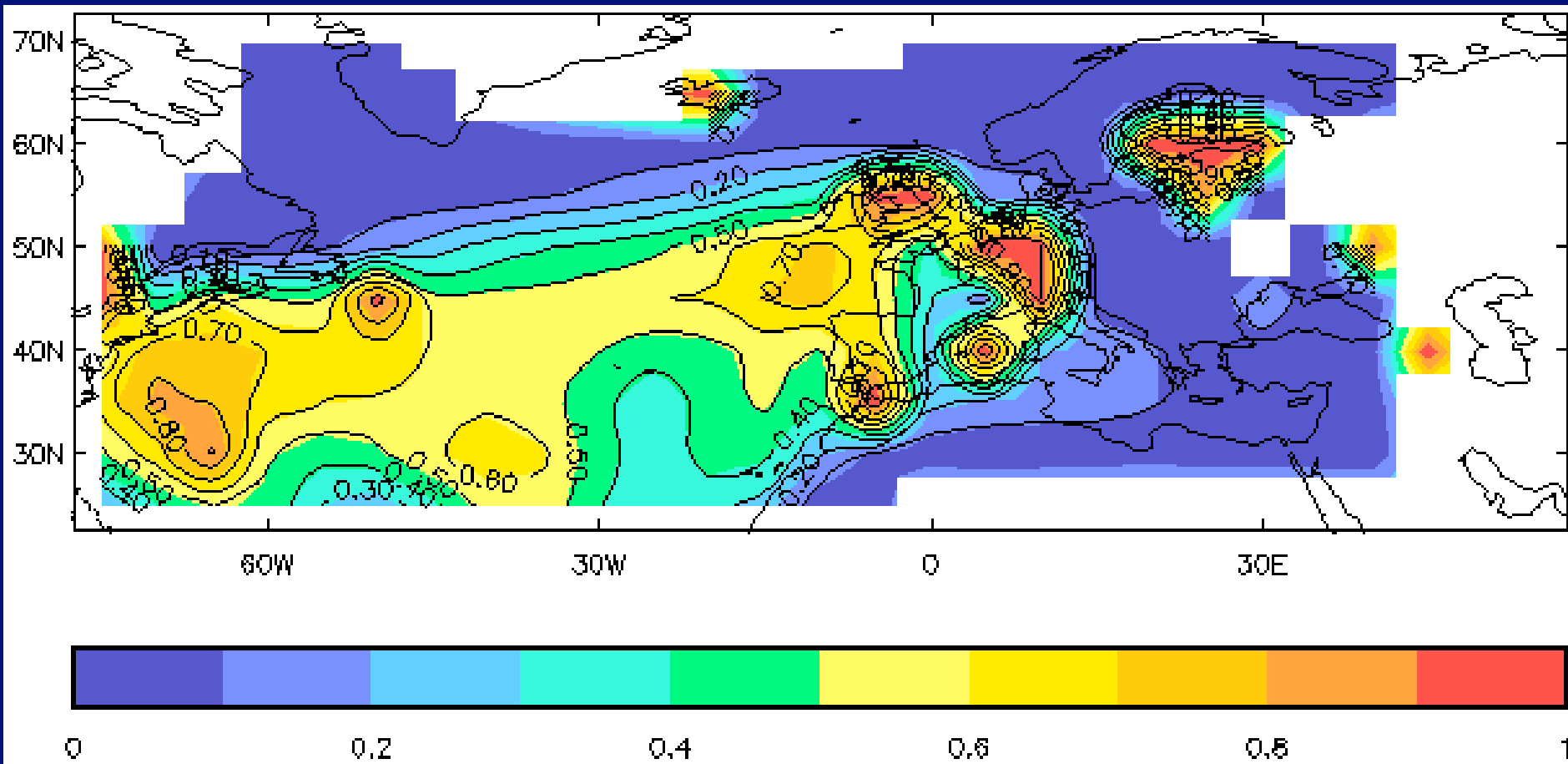


## EMSLP3

84 Stations



# EMSLP1 data density: 1850 to 1860



# Recent activities under the Group's Terms of Reference

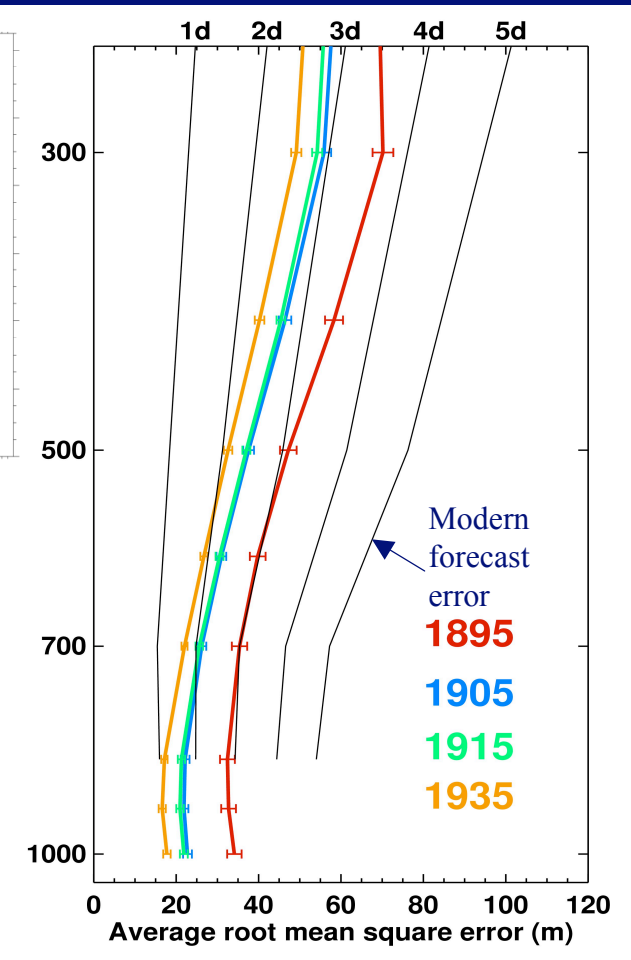
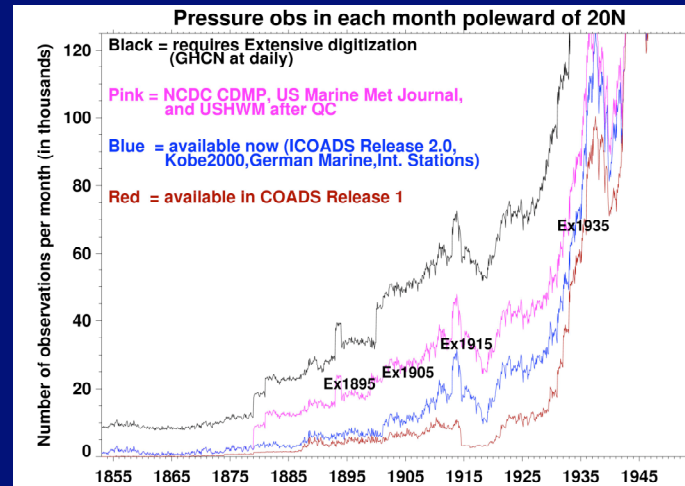
## Feasibility of a Reanalysis without Soundings

Dec 2001 RMS Skill

Can historical surface pressure observations alone provide a useful analysis of Northern Hemisphere circulation (20-90°N)?

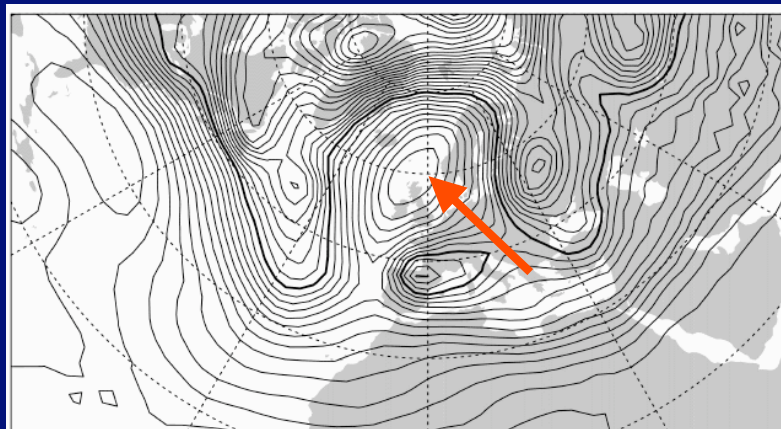
**RMS Skill of analyzing 6-hourly December 2001 geopotential height with *Ensemble Filter* using Only Surface Pressure Obs at 1895, 1905, 1915, and 1935 densities. Results for June 2001 are similar.**

**Result: 100 year Northern Hemisphere Reanalysis is feasible using only surface pressure observations. Upper-tropospheric error is equivalent to 2-3 day forecast error.**



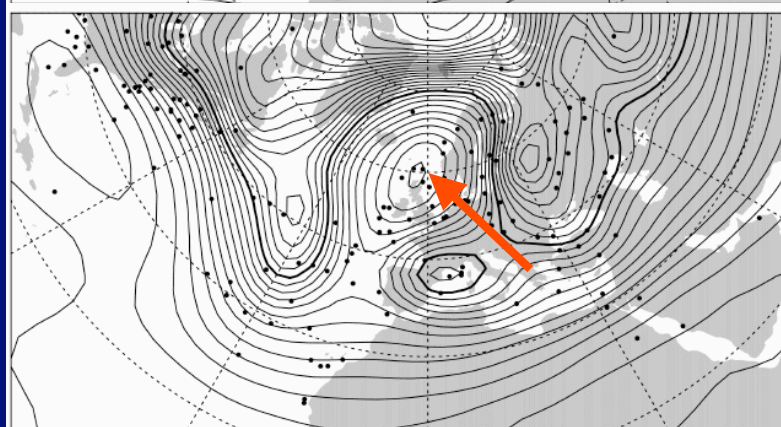
Compo, Whitaker, and Sardeshmukh: NOAA-CIRES Climate Diagnostics Center Met Office

Full CDAS  
(120,000+ obs)



5500 m contour is thickened

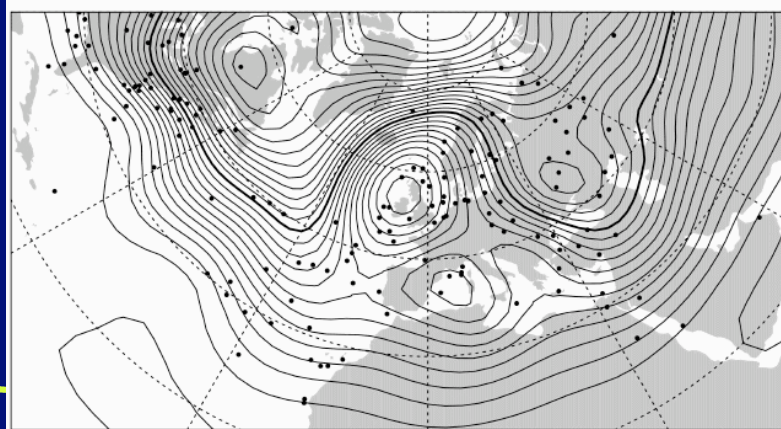
EnSRF 1895  
(214 surface pressure obs)



Black dots show pressure ob locations

RMS = 39.8 m

Optimal Interpolation 1895  
(214 surface pressure obs)



RMS = 82.4 m



# Work Plan for 2004

- Creation of the AOPC surface pressure working group web site.
- Look to initiate developments leading to the creation of an international MSLP data base (both on monthly and operational timescales) that will be a useful research product in itself, as well as a source of additional observations for ongoing gridded pressure data sets.
- Formulation of World Integrated Surface Hourly (WISH) data format.
- Examination of the 'Superfile' daily pressure gridded product to check its veracity.
- Clearly document data issues such as marine data duplicates, the low pressure bias in the Maury data, and work on grid box uncertainties.