

AOPC/OOPC Mean Sea Level Pressure Working Group

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**AOPC-VIII, Easthampstead, Bracknell, Berkshire, UK May
20-24th 2002**



GCOS Surface Pressure Working Group

Role

Terms of Reference

Membership

**Some Working Group Actions
on its Terms of Reference**

GCOS Surface Pressure Working Group

Role

The role of the GCOS Surface Pressure Working

Group is to promote the development of long-term high-quality analyses of atmospheric surface pressure. The Group will normally operate through email, so that direct meetings will generally not be necessary.

Terms of Reference

The terms of reference of the GCOS Surface Pressure Working Group are

- to promote the analysis of global surface pressure from both real-time and historical sources using both daily and monthly data
- to record and evaluate differences among surface pressure analyses through comparison of basic products

Terms of Reference

- to recommend actions needed to ensure the quality and consistency of surface pressure analyses based on analysis of those differences
- to promote the recovery of atmospheric pressure data, including issues associated with data access, archiving and maintenance
- to promote the comparison of the various types of barometers and pressure sensors (including satellite estimates) used to measure surface pressure

Terms of Reference

- to report annually to AOPC and OOPC on progress, recommendations and future plans of the Group

Membership

Rob Allan (co-convener)
Hadley Centre

Climatology

Ed Harrison (co-convener)
PMEL

Diagnostics

Gilbert Compo
CDC, NOAA

Daily reconstruction

Phil Jones
UEA

Historical analysis

Membership

Masao Kanamitsu
NCEP

Reanalysis

Doug Luther
University of Hawaii

Sea level

Bob Seaman
BMRC

**Quality control
and NWP**

Scott Woodruff
CDC, NOAA

COADS/I-COADS

HadSLP

The current version of the Hadley Centre's historical, global Mean Sea Level Pressure (MSLP) data set (HadSLP) is a gridded MSLP compilation, initially of 1° latitude by 1° longitude resolution, which is filled using Reduced Space Optimum Interpolation (RSOI) (Kaplan *et al.*, 1997) to produce a globally complete coverage on a monthly basis over a regular 5° latitude by 5° longitude grid (HadSLP (OI)).

HadSLP (OI) covers the period from 1871 to 1998 and, for ease in examining broad scale climate patterns, is often interpolated onto a regular 10° latitude by 10° longitude grid. All grid point MSLP data in HadSLP (OI) are normalised with respect to their means and standard deviations for the period 1961-1990. Spatial distributions of land, island and ship observations used to construct HadSLP (OI) are published in the literature (Bottomley *et al.*, 1990; Allan *et al.*, 1996; Basnett and Parker, 1997).

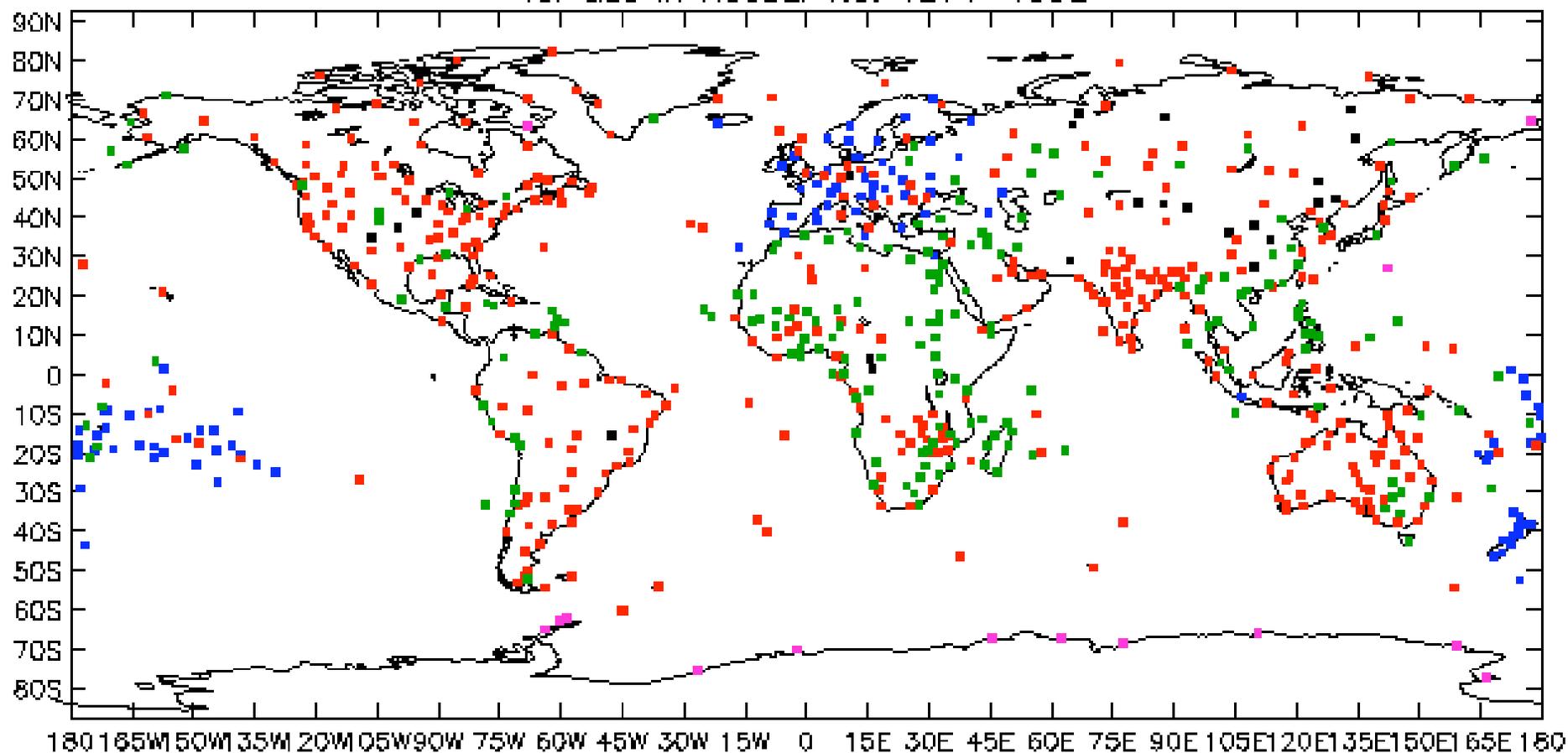
Hadley Centre MSLP Data Base and HadSLP

- Collection, collation and digitising of pressure data records not currently in the electronic MSLP data base. Application of corrections for attached temperature, standard gravity, and reduction to sea level. A number of additional pressure records were collected in 1997 by Rob Allan and though many have been put on computer disc no quality control measures have been  applied to the bulk of them.
- Reassess quality control procedures (eg. Checking for outliers and jumps, nearest neighbour tests, removal of bulls eyes etc), and look to bring them into line with those used to improve other Hadley Centre data sets.
- Development of a new version of the monthly MSLP data base which holds more than just post 1871 MSLP data, and is stored in an electronic form which is stable, easily accessed, and compatible with other new Hadley Centre data holdings. This would contain as long records as are possible for all land, island and ship-based data, with particularly long and well positioned time series highlighted (e : Gibraltar, Ponta Delgada, Stykkisholmur, London, Paris, Madras, Singapore, Jakarta, Darwin, Tahiti 

Hadley Centre MSLP Data Base and HadSLP

- Under the EC EMULATE project, work to develop a daily gridded historical MSLP product and data base for the European-Atlantic sector. Link this to US efforts to construct a broader historical North American daily MSLP compilation. 
- Emphasis on making both the monthly and daily MSLP data bases and HadSLP gridded products updateable in near-real time.
- Focus on problem areas with HadSLP and look to improve or solve them (eg. high latitude Southern Hemisphere MSLP trends). 
- Extension of HadSLP back into the mid-1800s using the new I-COADS release data in analyses involving both the addition of new MSLP records and testing of the product with wind field observations. These efforts would also hopefully provide the basis for a new historical near-surface wind data set. 
- Improve and extend the data documentation for all of the above.
- ¹¹ Develop, detail and assign error estimates for all of these MSLP data

Distribution of New Land Stations and Supplementary Data for use in HadSLP1.0: 1871–1998



Hadley Centre for Climate Prediction and Research

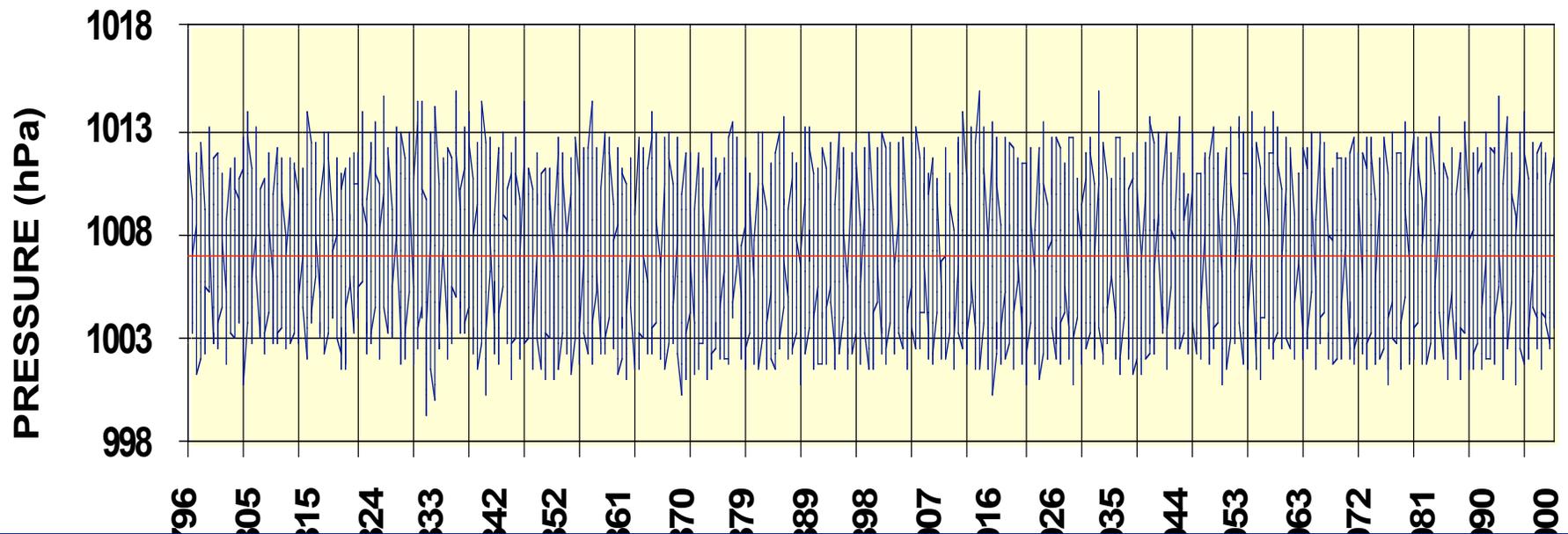
Plotted: 05/04/2002

- [1] GHCN/climat (25)
- [2/3] PJ & MJS (104)
- [4] G21 (384)
- [5] climat (15)
- [6/7/8] Supp G21 (191)

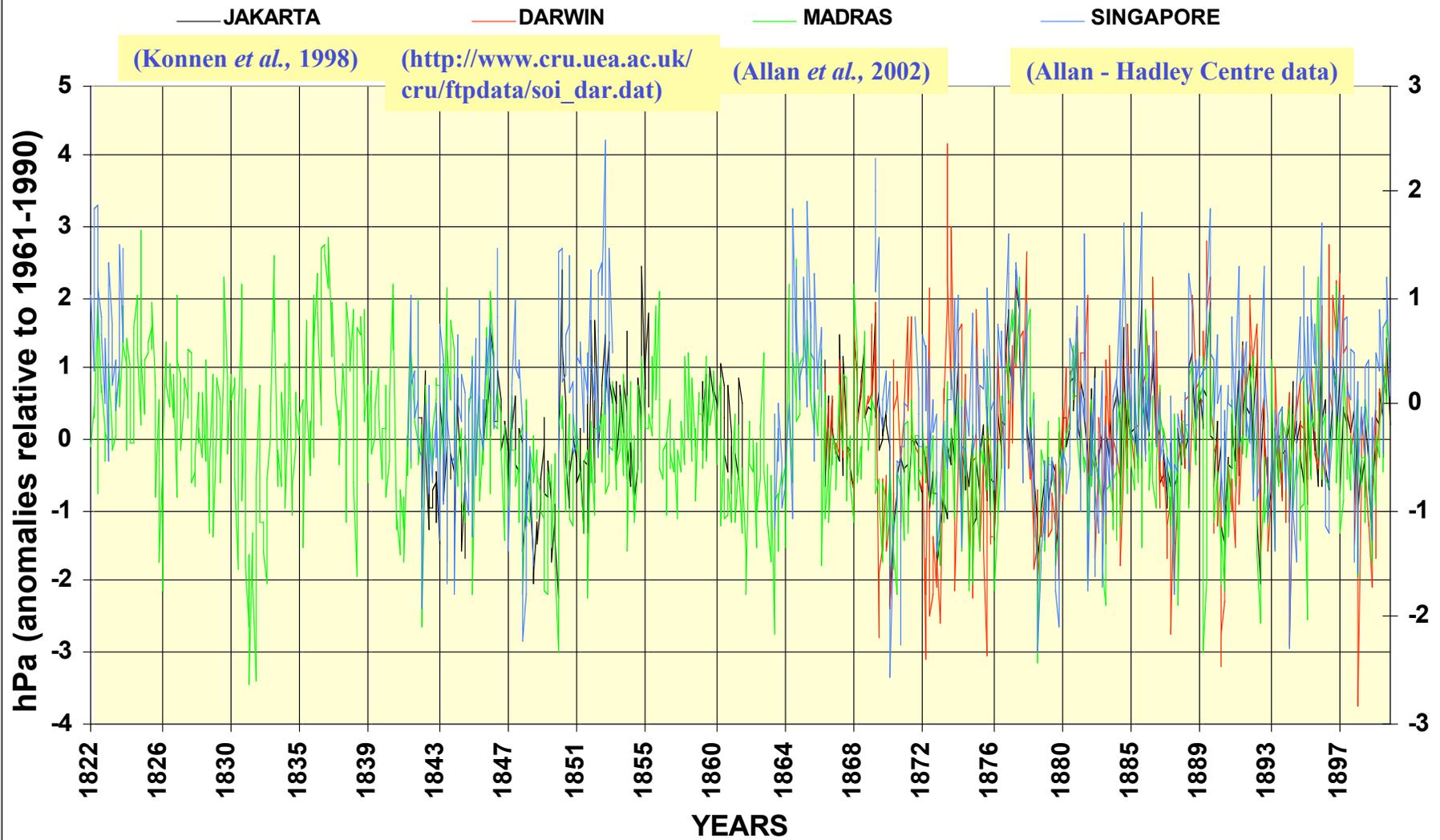
MADRAS MSLP 1796-2000

(<http://www.cru.uea.ac.uk/cru/data/madrasmstp.htm>)

— MADRAS MSLP
— Linear (MADRAS MSLP)



INDO-AUSTRALIAN MEAN SEA LEVEL PRESSURE



Collaboration with Gil Compo (NCDC, NOAA) on daily MSLP data

- **NCDC is applying for funds to perform an analysis of 4 times daily pressure and winds for North America and the surrounding oceans. Pilot study results suggest this can be done very successfully.**
- **NCDC is digitising about 100 US stations of pressure, wind, temperature, and other data back to 1893. This would be valuable to EC EMULATE analyses for the western Atlantic, and the digital holdings compiled by EMULATE would be valuable for NCDC North American MSLP effort.**

Collaboration with Vicky Slonosky (Canada Environment) on monthly MSLP data over Canada

- **Comparison of HadSLP and individual station MSLP data over Canada using data from Hadley Centre and Canadian sources**
- **Internal verifications and final checking of the Canadian MSLP data has almost been completed, and comparisons with Hadley Centre products should be completed by late boreal summer to autumn 2002.**

Interactions with Philip Woodworth (Proudman Oceanographic Laboratory (POL), Bidston Observatory, UK) concerning MSLP station data and sea level

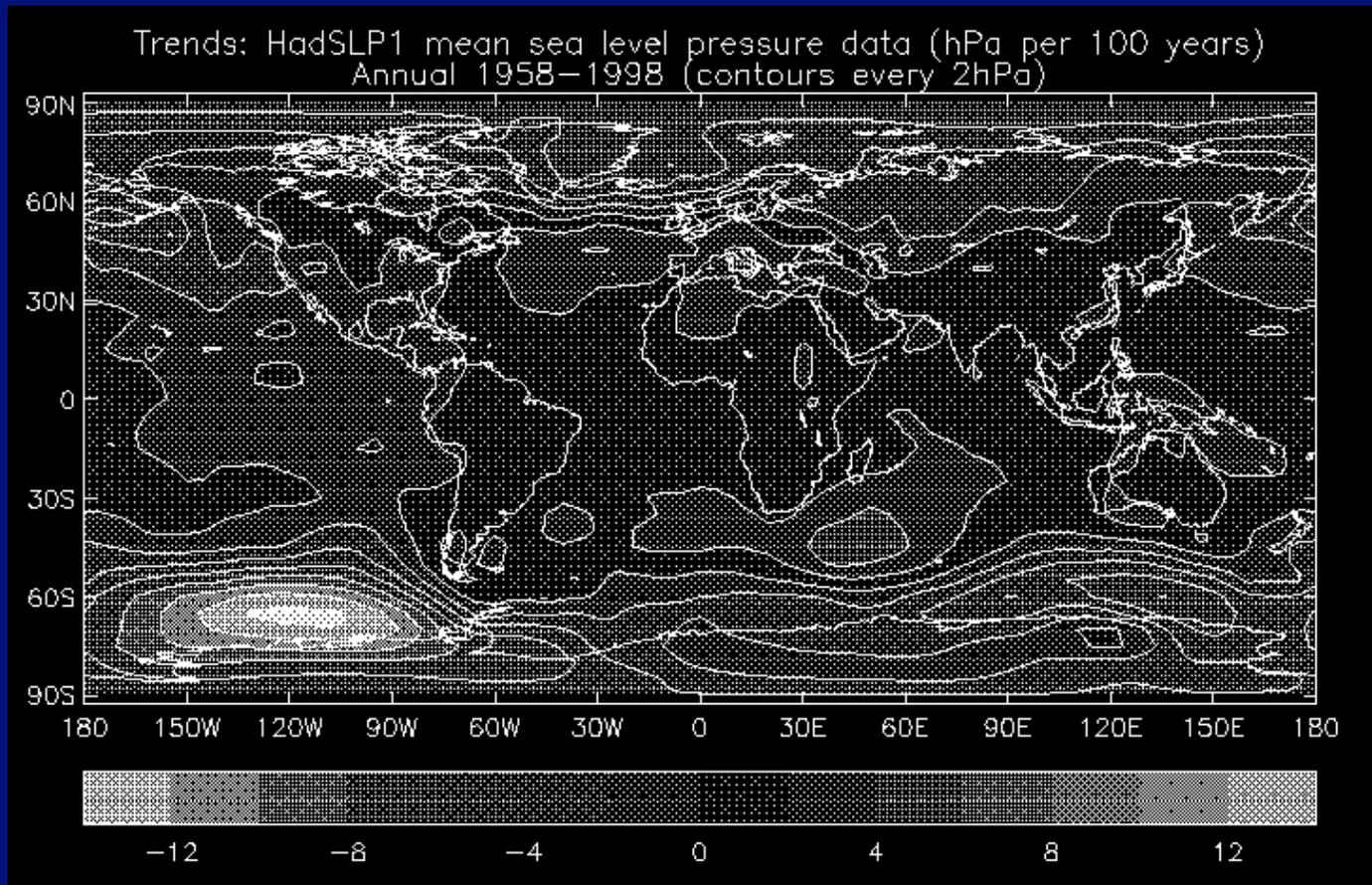


Figure 1. Trends in annual-mean sea level pressure from HadSLP1, 1958-1998.

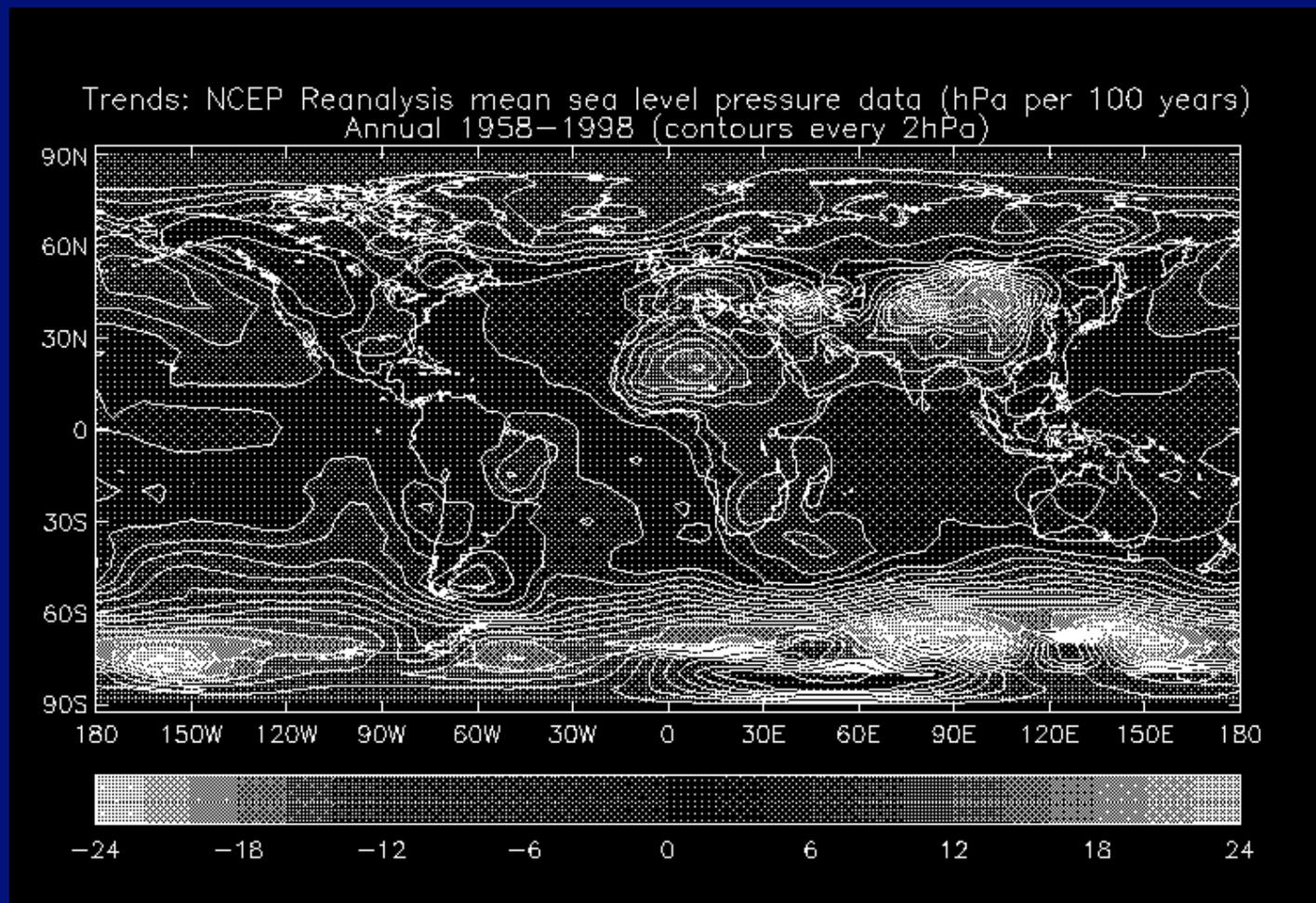
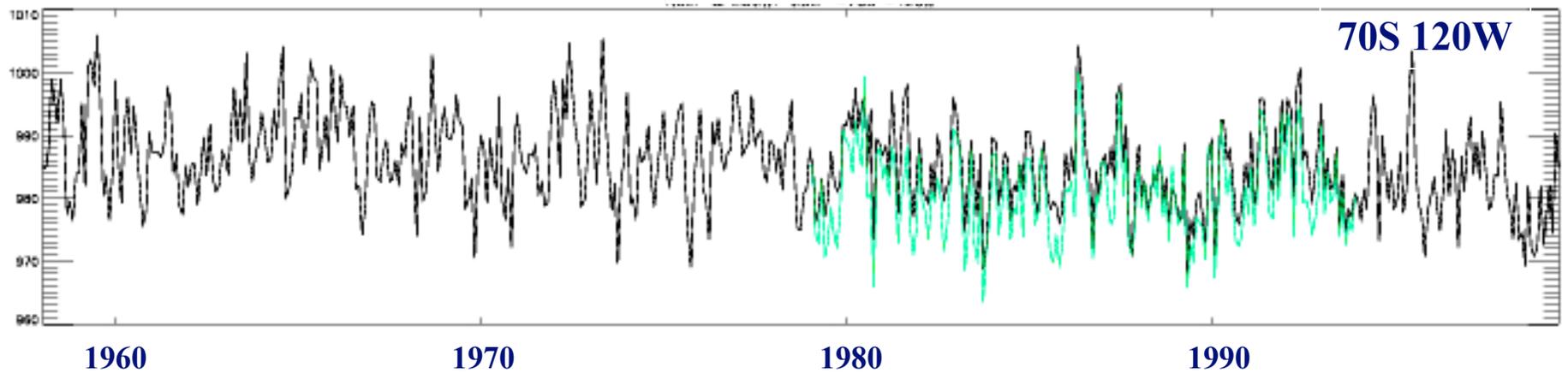
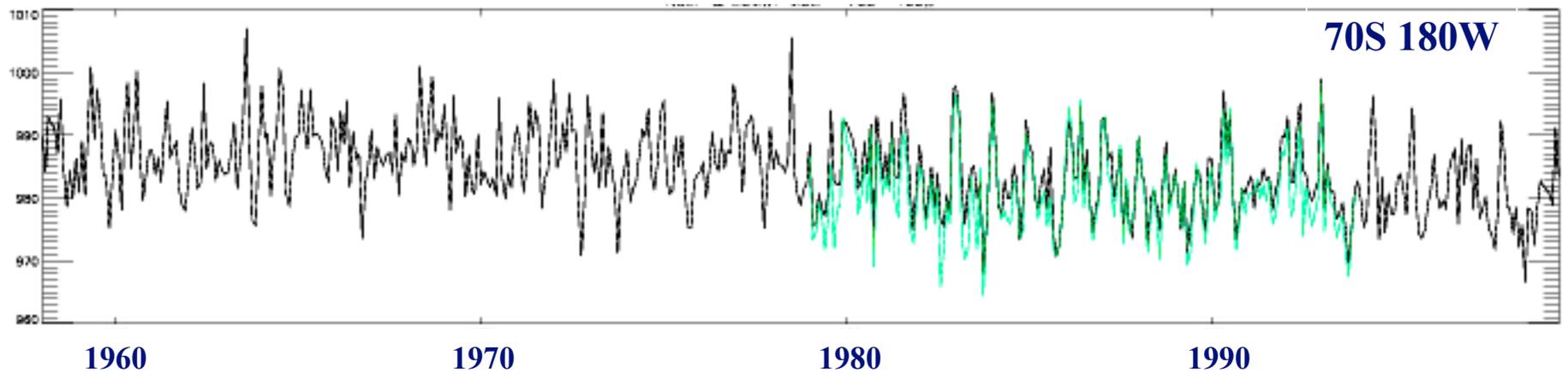
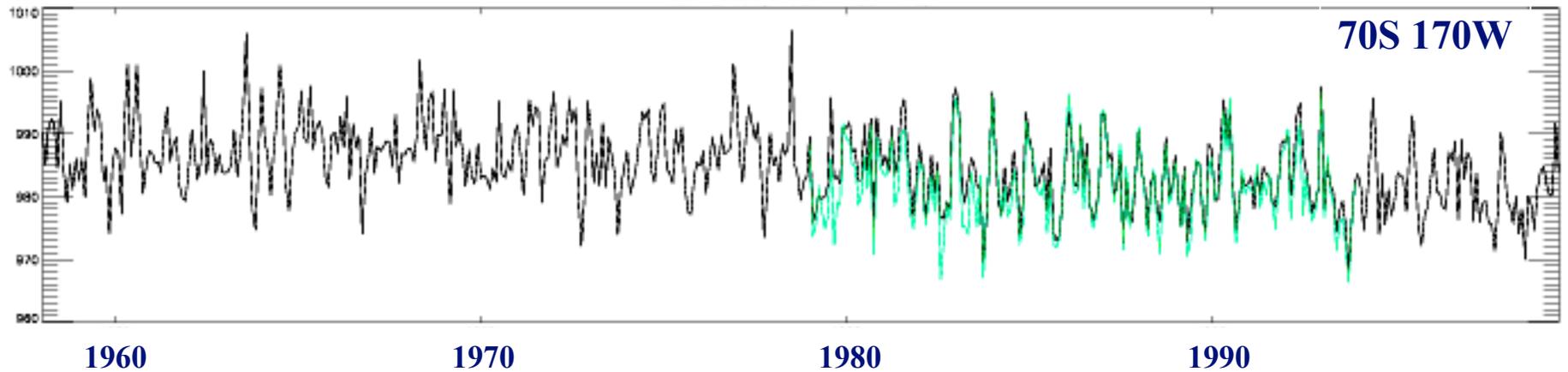
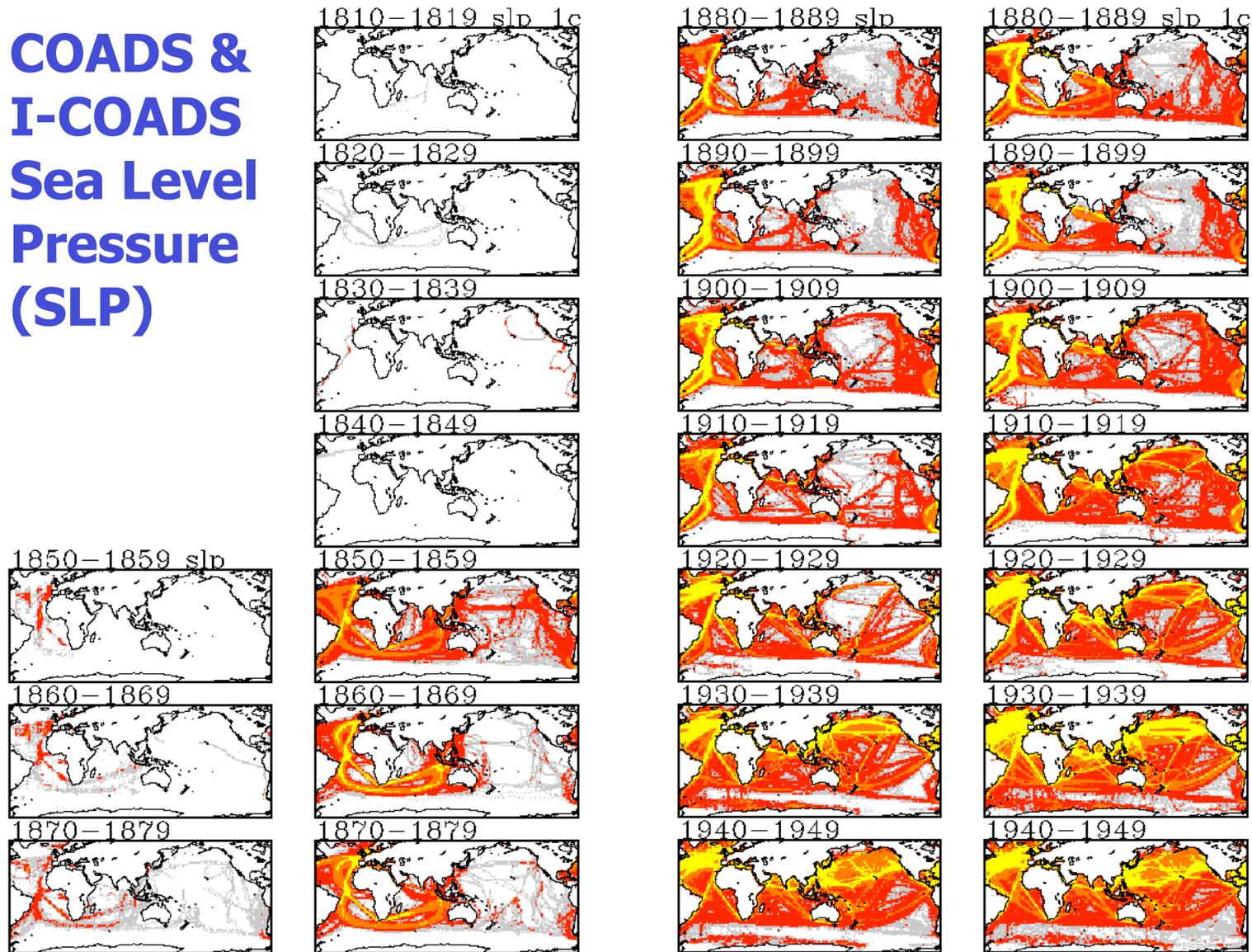


Figure 2. Trends in annual-mean sea level pressure from the NCEP Reanalysis, 1958-1998.

HIGH LATITUDE SH NCEP & ECMWF MSLP COMPARISON



COADS & I-COADS Sea Level Pressure (SLP)



International Workshop on Advances in the Use of Historical Marine Climate Data: Boulder, Colorado, USA, January-February 2002

Recommendations: Mean sea level pressure and wind (Chair: D E Parker; Rapporteur: V R Swail)

Well within the 2-year timeframe, and ideally by early 2003:

- The Hadley Centre global monthly MSLP data set HadSLP should be completed for 1871 to date, and kept up to date in quasi-real time.
- The Terms of Reference of the AOPC/OOPC MSLP Working Group should be expanded to include the homogenisation and analysis of surface winds, especially over the oceans, and their consistency with surface pressure.
- A catalogue of available wind and pressure products should be developed and maintained.

Within 2 years:

- Florida State University will have a non-global (Pacific & Indian Oceans) data set of surface wind and MSLP, fluxes, and related variables from 1950 onwards.

- **Appropriate techniques for the adjustment of both estimated and measured wind speed observations should be investigated and applied, using WMO No. 47 and the planned JCOMM buoy metadata base (Ocean Data Acquisition System (ODAS) metadata) for the measured winds. The improved winds should be made available to future reanalysis projects.**
- **Monthly wind statistics for 1854 to date should be computed using the adjusted estimated and measured winds, and compared with existing summaries. Comparisons should include wind derivatives (curl and divergence), which are important for forcing ocean models.**
- **The Meteorological Service of Canada has created a high-resolution analysis of winds over the North Atlantic for 1958-1997 by semi-manual re-assimilation of bias-adjusted observed winds into background fields based on the National Centers for Environmental Prediction (NCEP) / National Center for Atmospheric Research (NCAR) Reanalysis. The use of historical daily MSLP fields to backdate this analysis should be investigated.**
- **Biases from the US Maury Collection pressure data set should be investigated.**
- **More observations on pressure are needed to improve historical MSLP analyses. Therefore, a priority is to get new marine data sources digitized and incorporated into analyses; this activity will carry on into the 5-year time frame.**

- The new JCOMM ODAS metadata base should be populated with current and historical data. The merged COADS and WMO No. 47 data base for 1980-97, developed by E Kent (Southampton Oceanography Centre), should be made available at least on a limited, experimental basis.

In the 5-year timeframe:

- Improved monthly (and daily if possible) surface pressure for land stations should be made available for blended land-marine analysis.
- Improved Reanalysis techniques, currently being developed, should be used to produce a combined daily MSLP and surface wind product for as much of the world as possible back to the late 19th Century. This would be very useful for study of extreme winds and waves at sea, including tropical and extratropical cyclones. These extremes are crucial for coasts and oil platforms as well as shipping. However, because of an absence of observations, there are parts of the world where analysis is impossible, and this must be clearly set out.
- For all gridded data sets, error estimates of wind and pressures should include grid box uncertainties and error covariance structures.