Jason 1 Data Quality Assessment and Dealising from High-Frequency Wind and Pressure Variability.

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v0112

MODEL DESCRIPTION

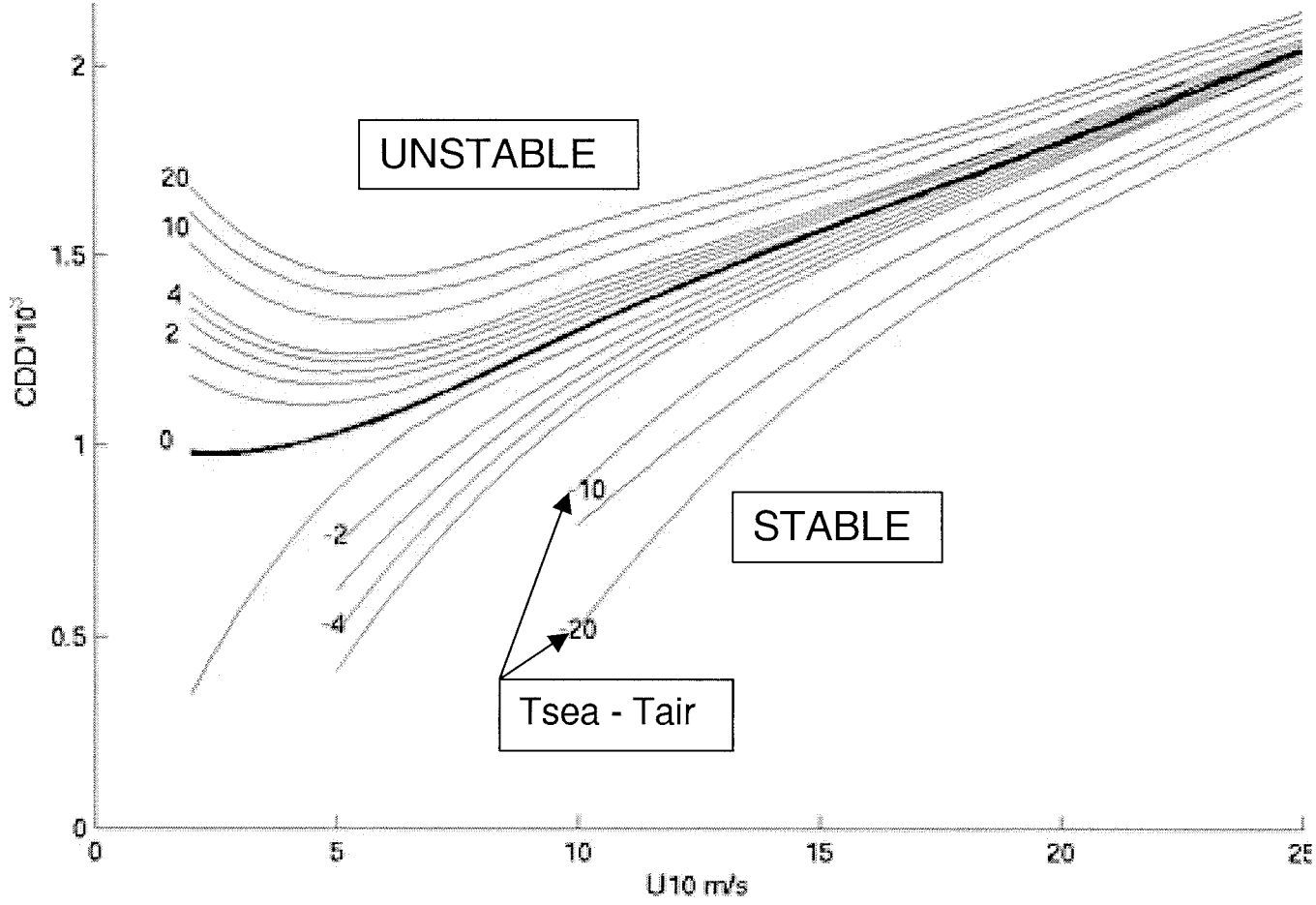
- Barotropic model of Pacanowski (Ponte 1991, 93, 97), with following modifications (Hirose et al, 2001):
  - subsurface no-slip condition
  - fine topography
  - optimized friction parameter: -bu/H, b=2 cm/s
- Resolution: 1.125° x 1.125°
- Coverage: global, 75°S to 65°N.
  Includes Mediterranean, smaller enclosed seas and bays.
- Winds and pressure: 6 or 12 hourly, from NCEP or ECMWF, operational or reanalysis.

WIND PRODUCTS COMPARED

- ►All wind comparisons are for Jan 2000-Dec 2000
- ►Wind and Pressure forcing
- ►Data Sources:
  - ►NCEP operational, 2.5 deg, 12 hr, NCAR DS083.0 (also available in NRT from ftp.ncep.noaa.gov)
  - ►ECMWF operational 2.5 deg, 12 hr, NCAR DS111.2
  - ►NCEP REANALYSIS, NCAR DS090.0, gaussian 2.5 grid, 6 hr.
  - ►QUIKSCAT blended with NCEP reanal, NCAR DS744.4, 1 deg grid.
- ►NCEP REANALYSIS is the only one with wind STRESS, others have 10 m wind.

WIND *VELOCITY* TO WIND *STRESS (1)*

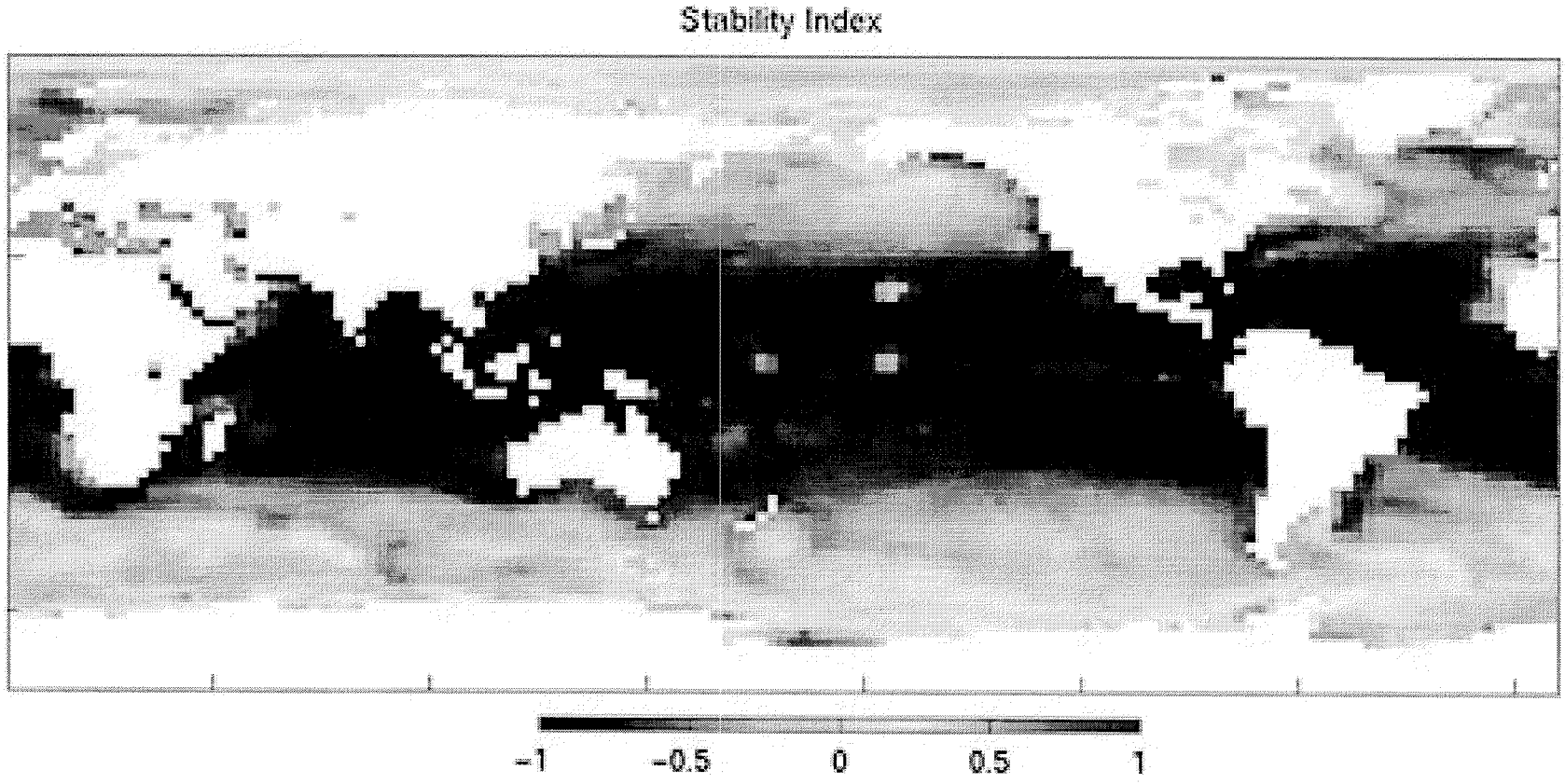
- $\tau = C_d \; U_{10} | U_{10} |$
- C_d function of wind speed itself, atmospheric stability, waves and swell.
- Atmospheric stability= function(Tair, Tsea, RelHumid, Pmsl)



WIND *VELOCITY* TO WIND *STRESS(2)*

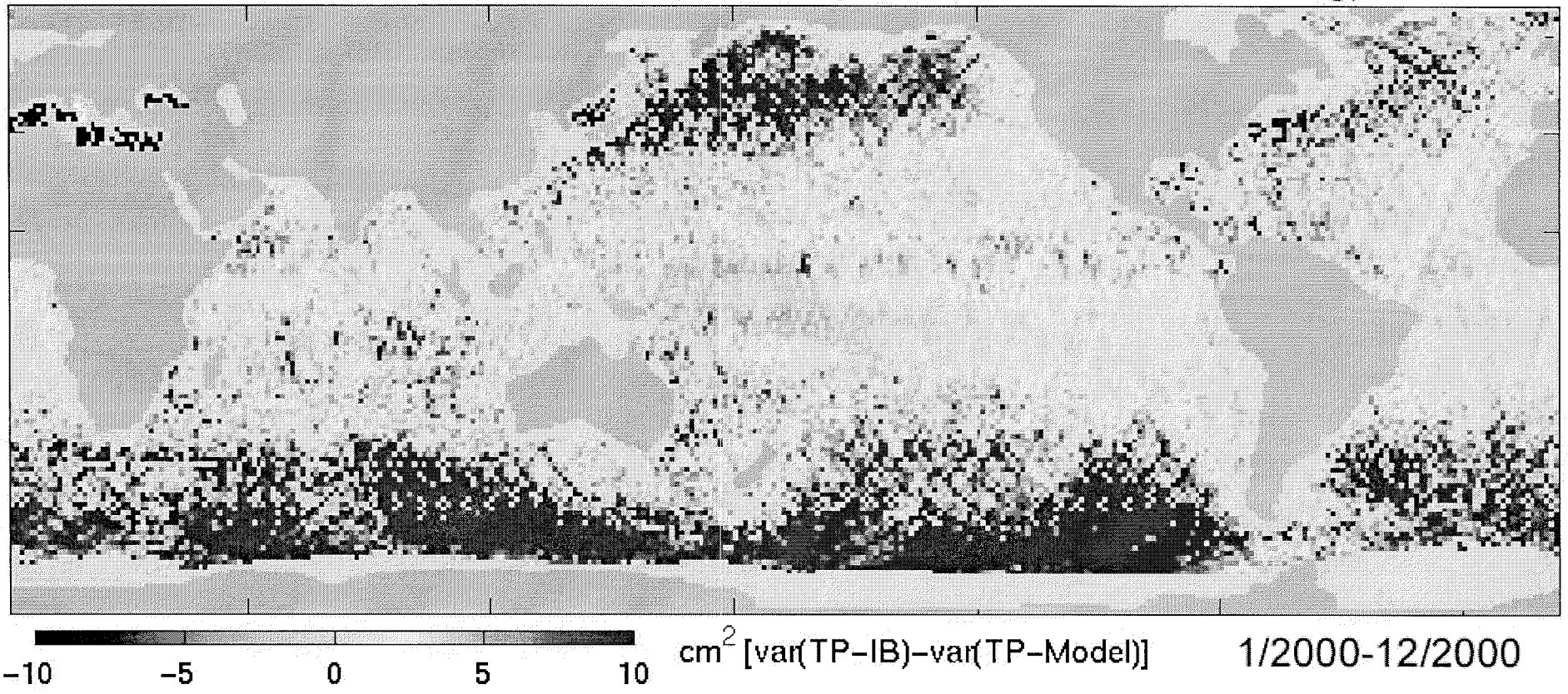
- Some Neutral Stability Algorithms:
  Kondo, J., 1975
  Large W. and S. Pond 1982.

- Some Stability-Dependent Algorithms:
  Liu, W. T., K. B. Katsaros, and J. A. Businger, 1979.
  Smith S.D.1988



VARIANCE REDUCTION in TOPEX DATA due to MODEL

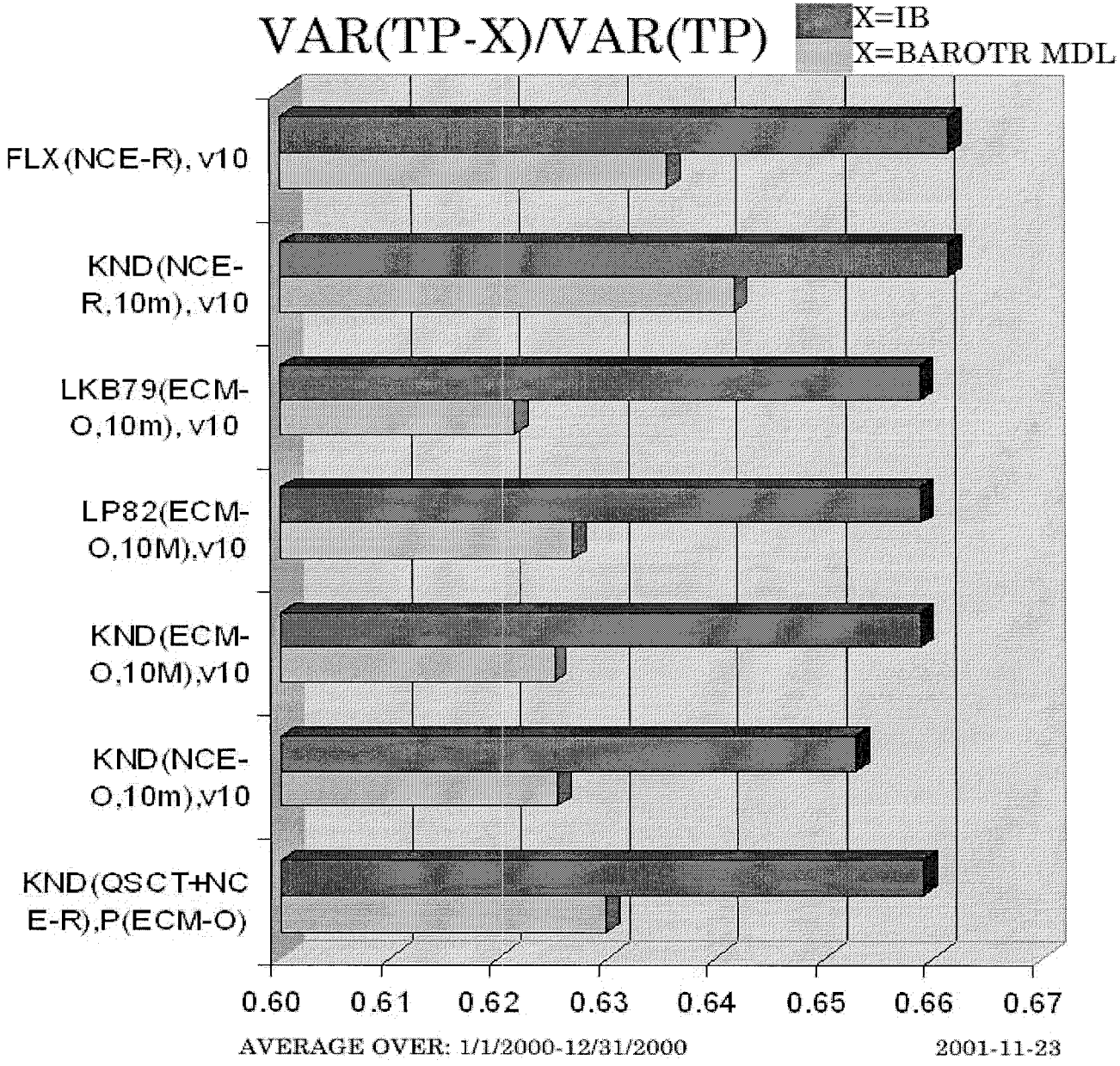
BAROTROPIC MODEL PPHA V1.1, forced by LKB(ECMWF 10m, 2.5deg)



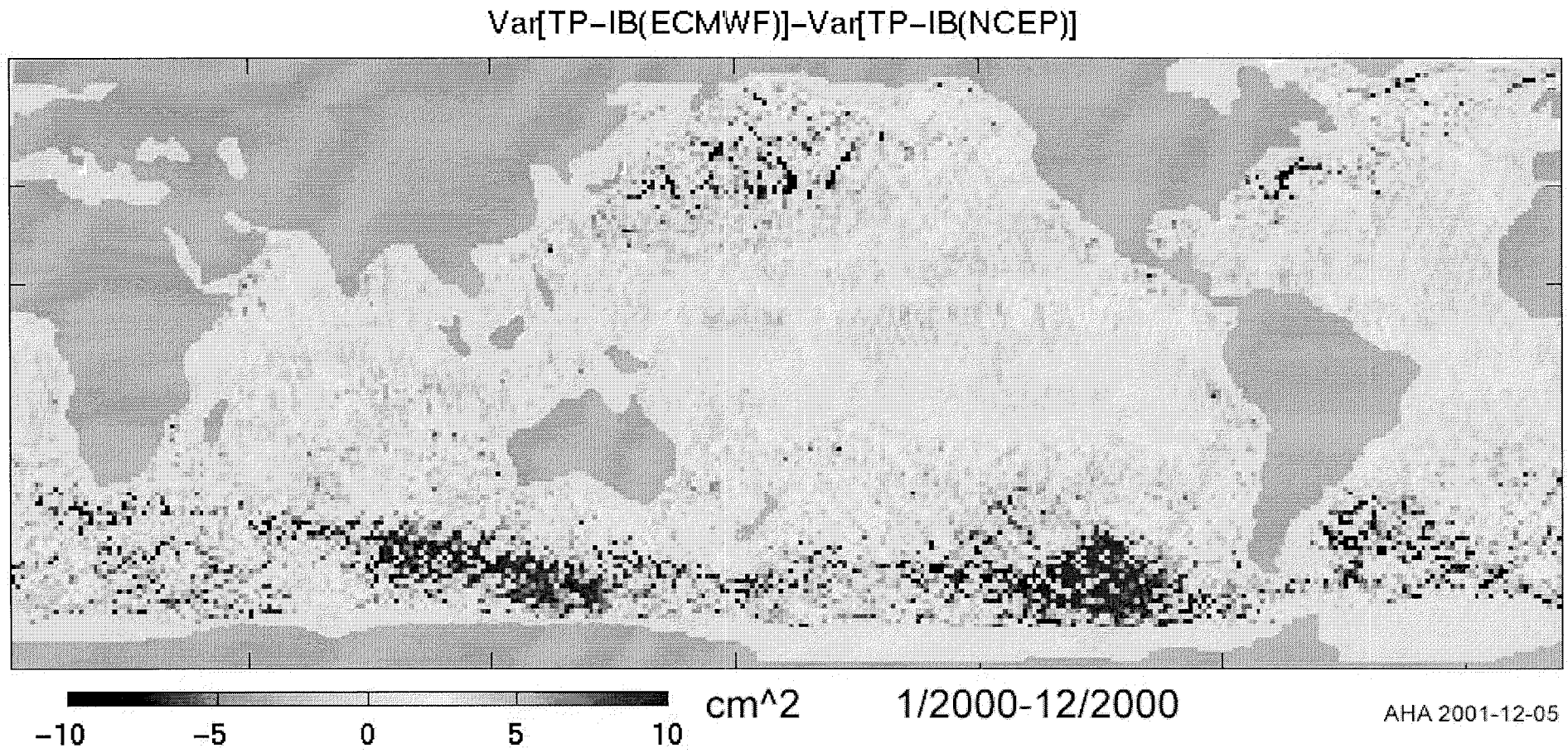
AHA 2001-11-20

- Variance difference is wrt IB.
- Yellow, Red = Good.
- Light and dark blue: not good.

VARIANCE REDUCTION in TOPEX DATA

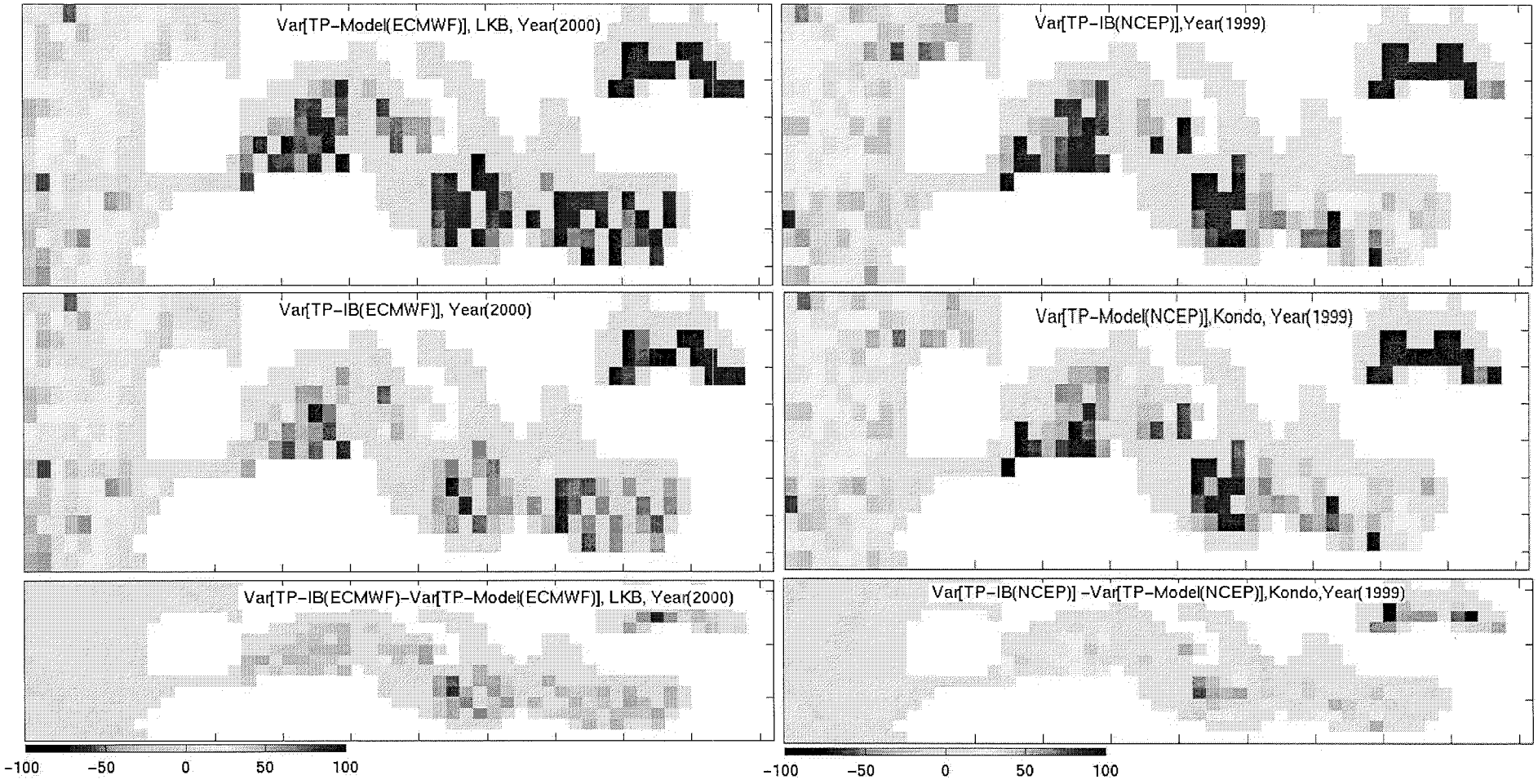


VARIANCE REDUCTION in TOPEX DATA
NCEP-O vs ECMWF FORCING



- NCEP-O PRESSURE (2.5 DG GAUSS) DOES BETTER THAN ECMWF-O PRESSURE (2.5 DEG) IN CY 2000

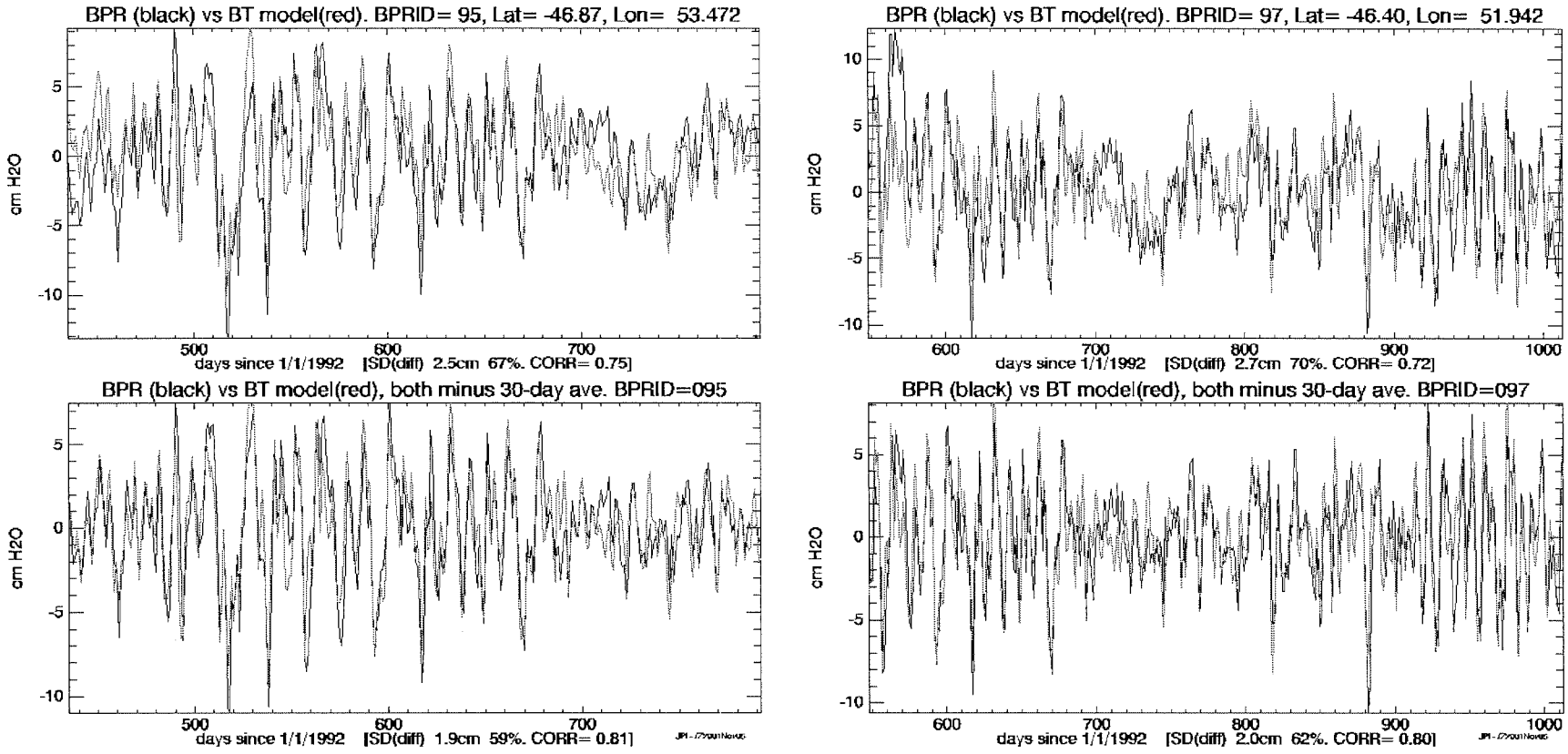
MEDITERRANEAN: PROBLEM



- ► MEDITERR: NEEDS TO BE OPTIMIZED
- ► 2000/ECMWF RESULT NOT AS GOOD AS IB.

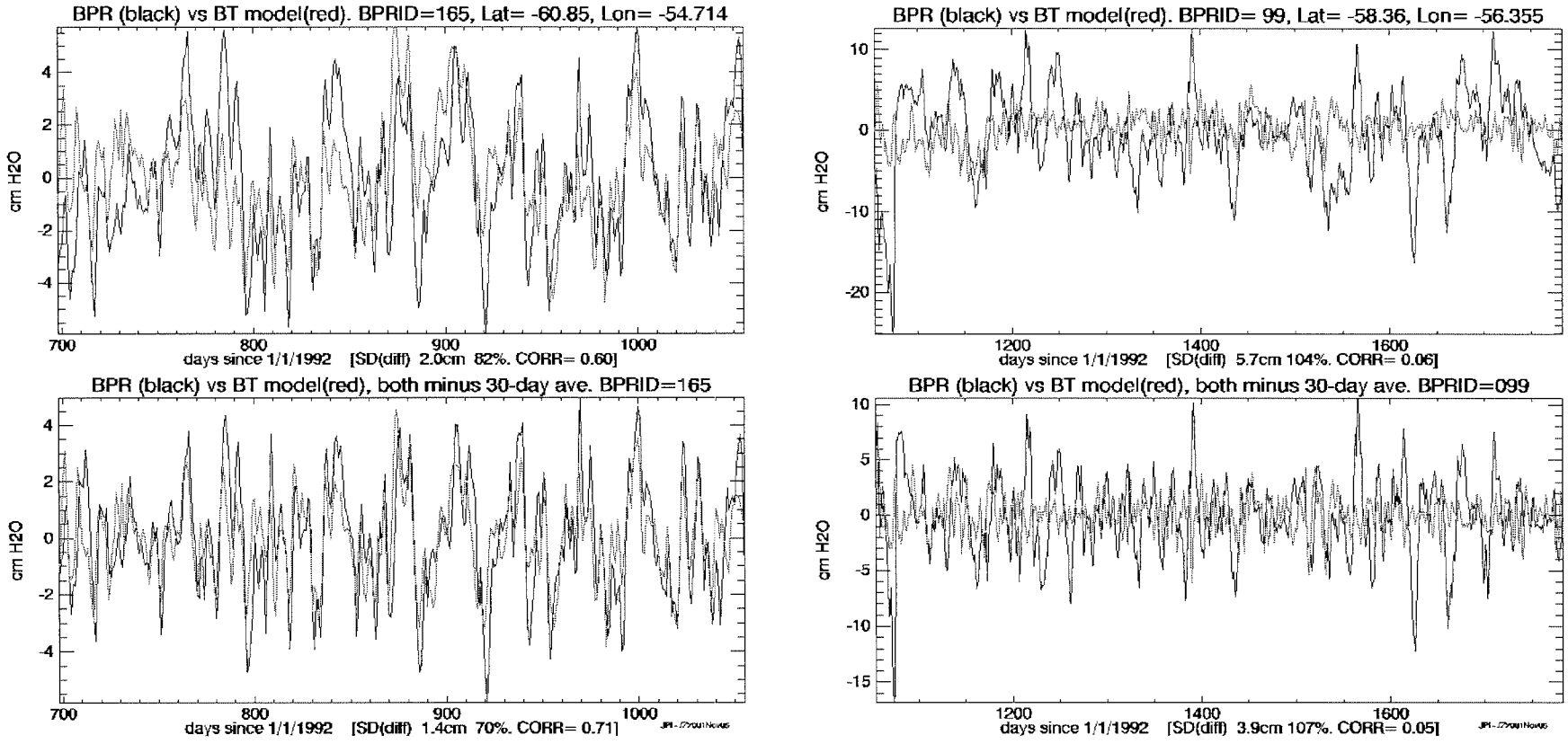
1999/NCEP-R RESULTS BETTER THAN IB.

VARIANCE REDUCTION in BPR DATA 1

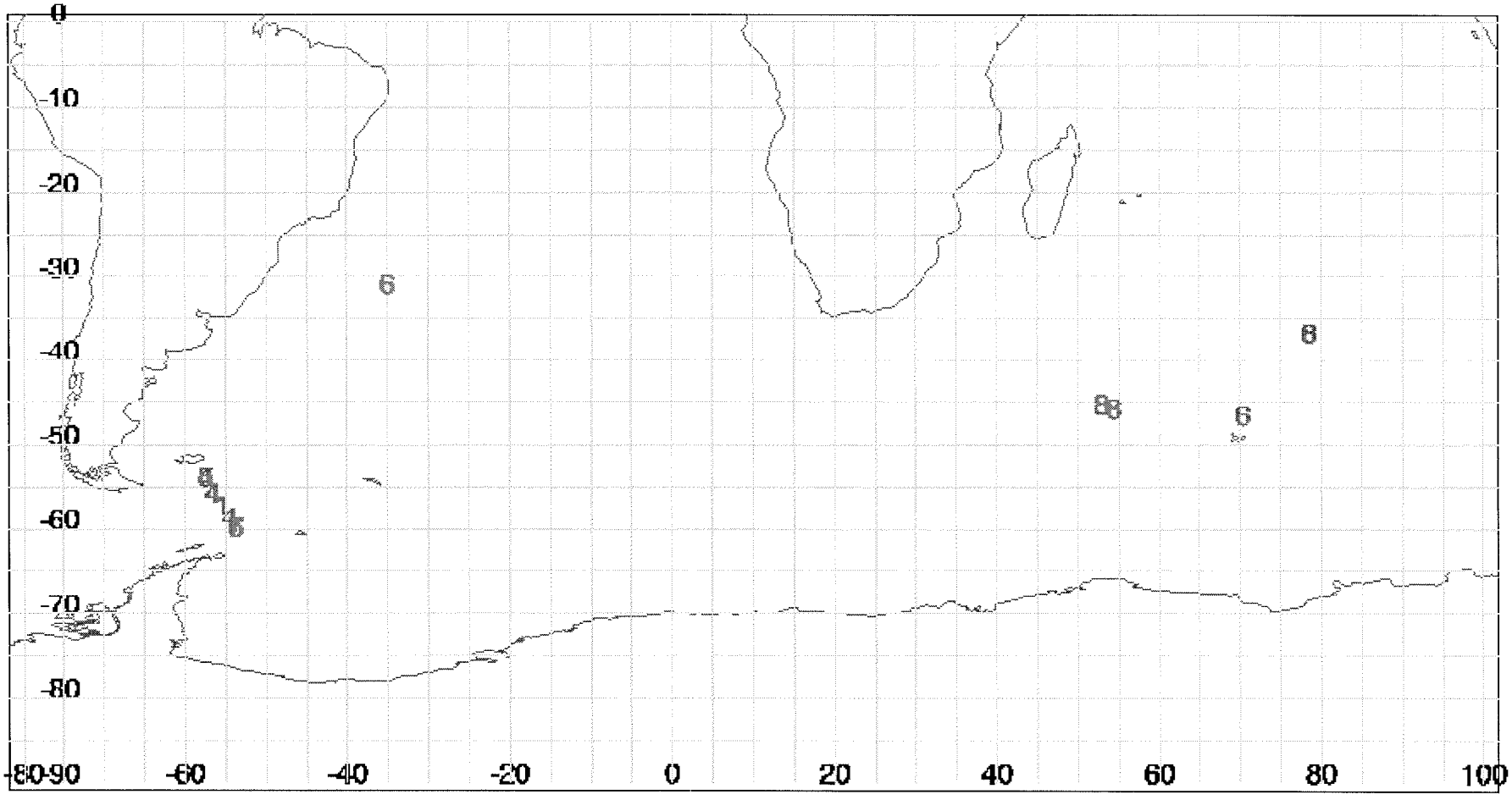


(Model driven with P(NCEP-R), Kondo(NCEP-R, 1000mb))

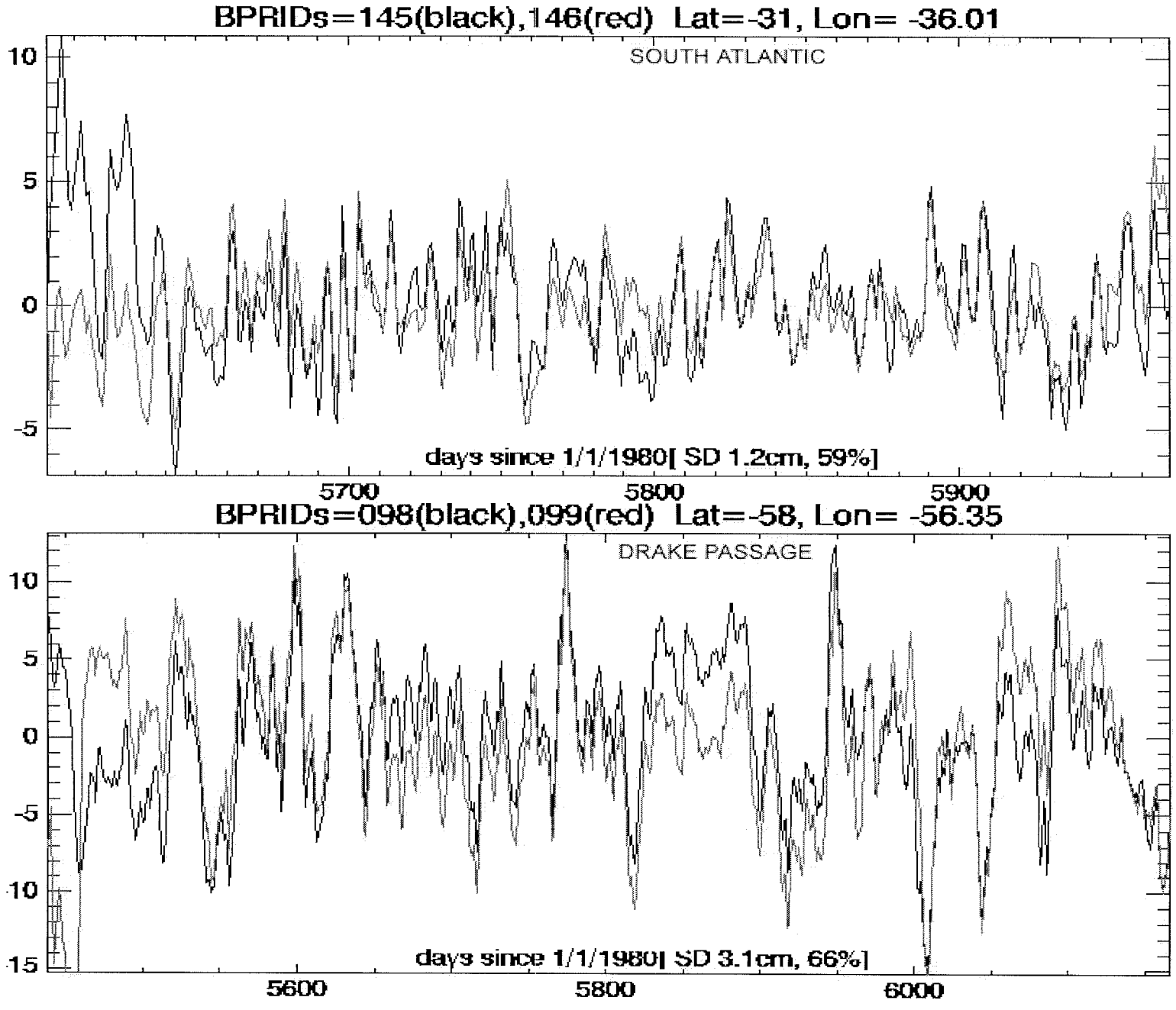
VARIANCE REDUCTION in BPR DATA 2



VARIANCE REDUCTION in BPR DATA 3 CORRELATION*10, HIGH FREQ (<30d)

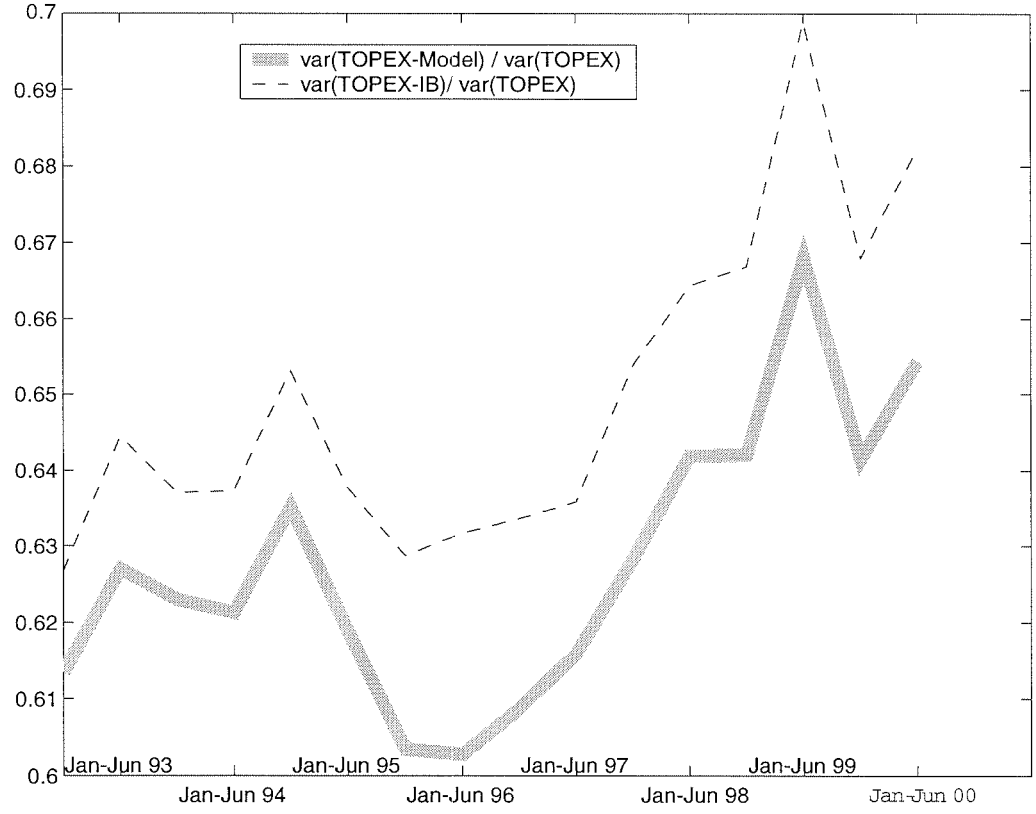


COLOCATED BPR-BPR AGREEMENT



OPERATIONAL MODEL

- Even with Kondo(NCEP reanalysis, 1000mbar wind) for 1992-2000 the model removes more variance than just IB at all times.



CONCLUSIONS

- ►IN THE SOUTHERN OCEAN, THIS BAROTROPIC MODEL EXPLAINS UP TO 40% OF THE TP DATA VARIANCE, MOST OF IT A HIGH-FREQUENCY (< 30 day) SIGNAL
- ►BAROTROPIC MODEL IS GOOD FOR T < 100 DAYS (TIERNEY ET AL)
- ► ECMWF-O AND NCEP-O (OPER) DO BETTER THAN NCEP-R (REANALYSIS). NOT SURPRISING: THE MODELS HAVE EVOLVED.
- ► STABILITY-DEPENDENT LKB ALGORITHM DOES BETTER THAN NEUTRALLY STABLE ALGORITHMS (KONDO, L&P).
- ► NCEP-O PRESSURE DOES BETTER THAN ECMWF-O PRESSURE IN CY 2000
- ► NCEP-O AND ECMWF-O WIND & PRESSURE COMBINED PERFORM INDISTINTIGUISHABLY IN CY 2000.
- ►FOR 1999, NCEP-O REDUCED MORE VARIANCE THAN ECMWF-O.
- ► MEDITERR: NEEDS TO BE OPTIMIZED: RESULT NOT AS GOOD AS IB
- ►OUR INTENTION IS TO USE THE NCEP-R UNTIL 1999 (FOR T/P, ERS ALTIMETRY), AND NCEP-O THEREAFTER (GRACE, JASON, T/P).