Evolution of forecast skill: verifications and comparisons

Contents

- Forecasting the weather - we are really getting better!

- Why: Better obs? Better models? Better data assimilation?

- Intro to data assim: a toy scalar example 1, we measure with two thermometers, and we want an accurate temperature.

- Another toy example 2, we measure radiance but we want an accurate temperature: we will derive OI/KF, 3D-Var, 4D-Var and EnKF for the toy model.

- The equations for the huge real systems are the same as for the toy models.

Data Assimilation: We need to improve observations, analysis scheme and model
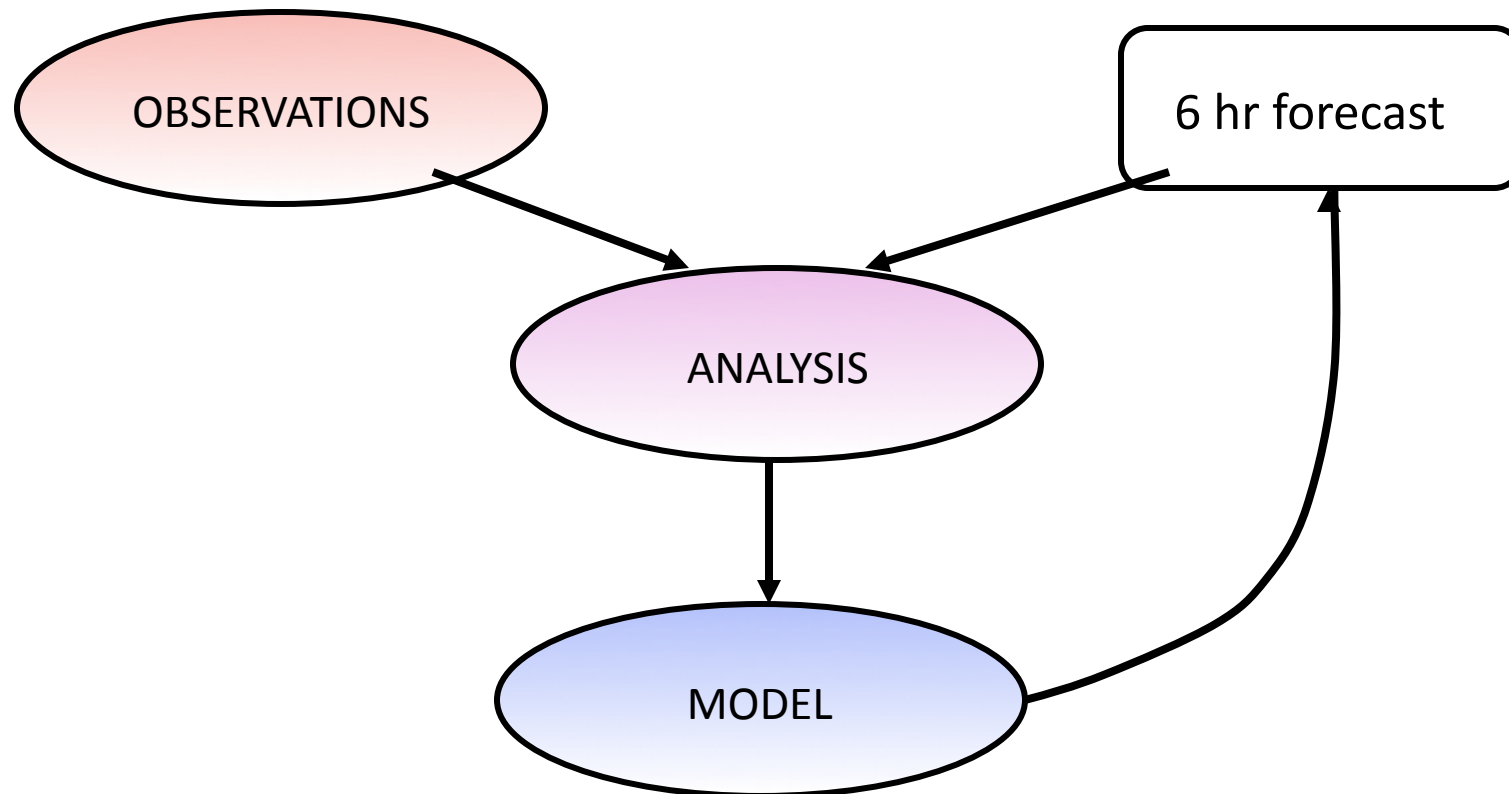
Some statistics of NWP…

Permanent verifications of the forecasts

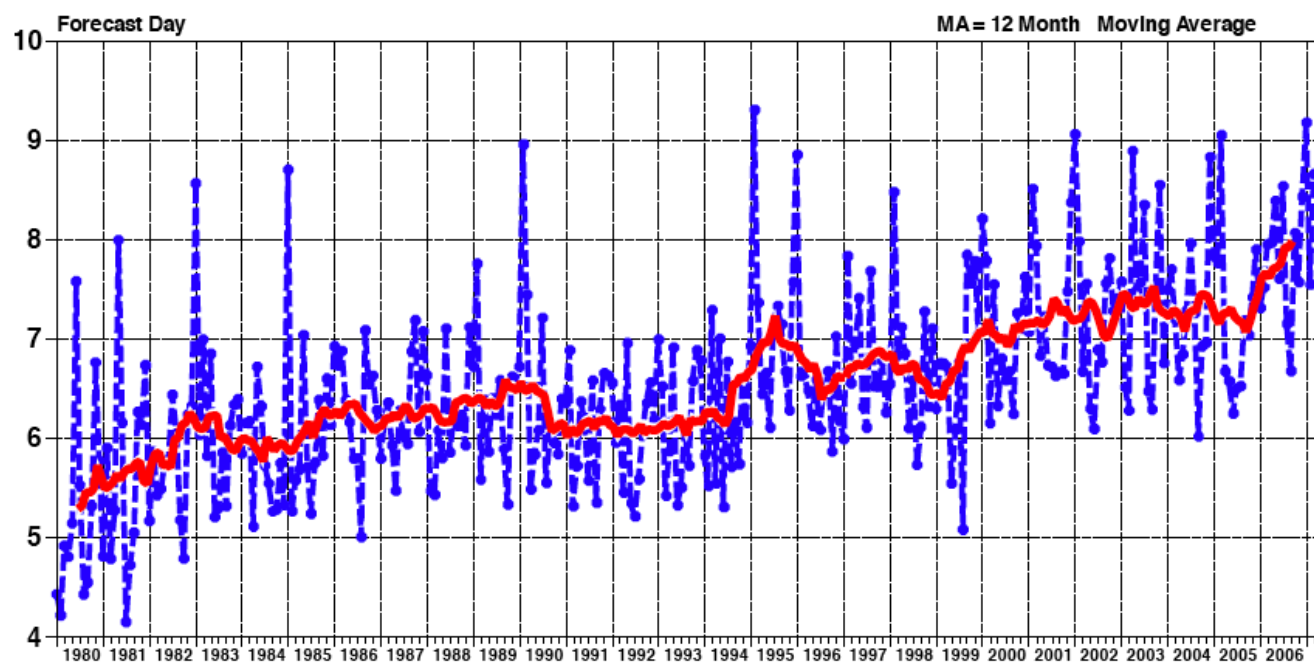ECMWF FORECAST VERIFICATION 12UTC

500hPa   GEOPOTENTIAL

ANOMALY CORRELATION   FORECAST
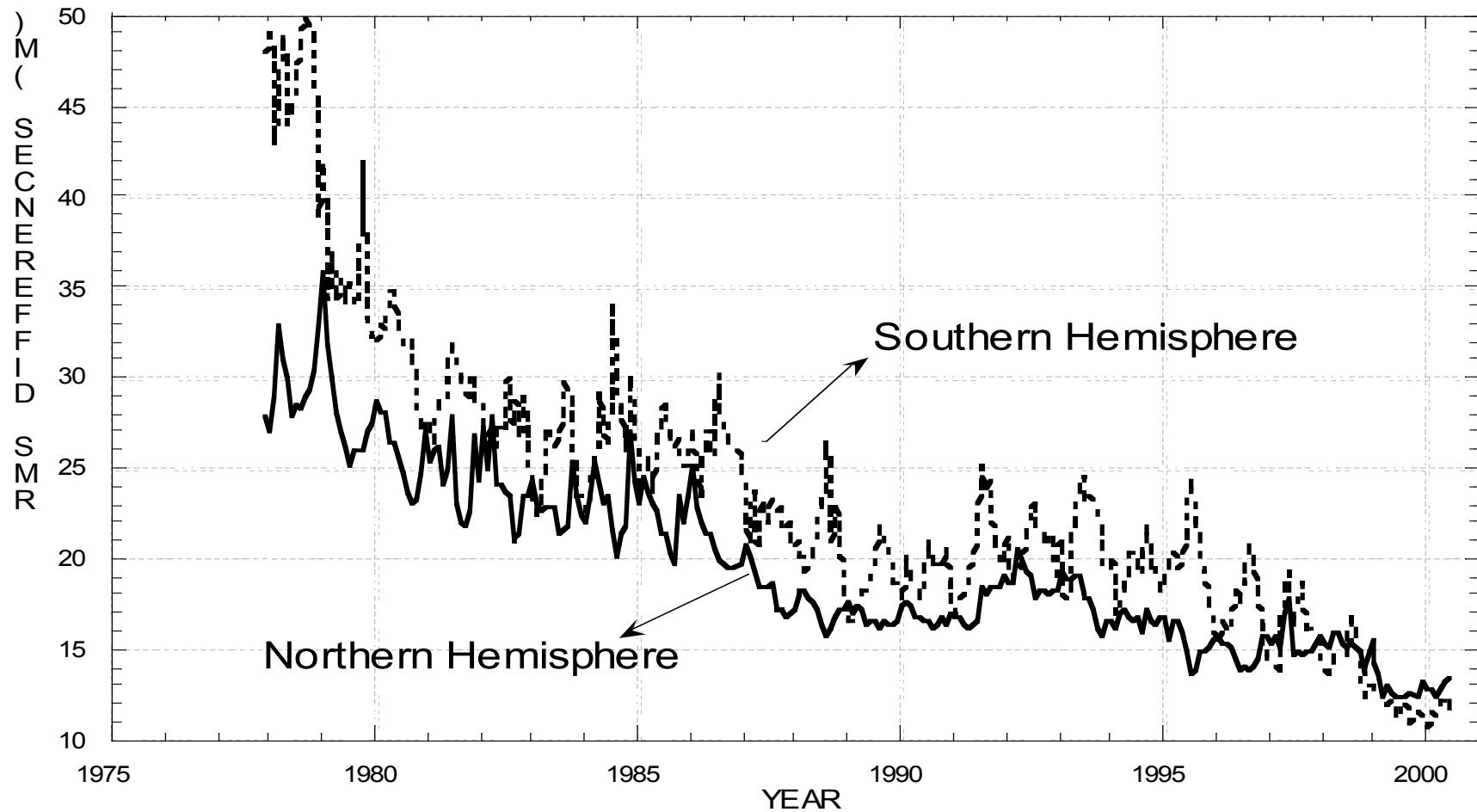
EUROPE   LAT 35.000 TO 75.000 LON -12.500 TO 42.500
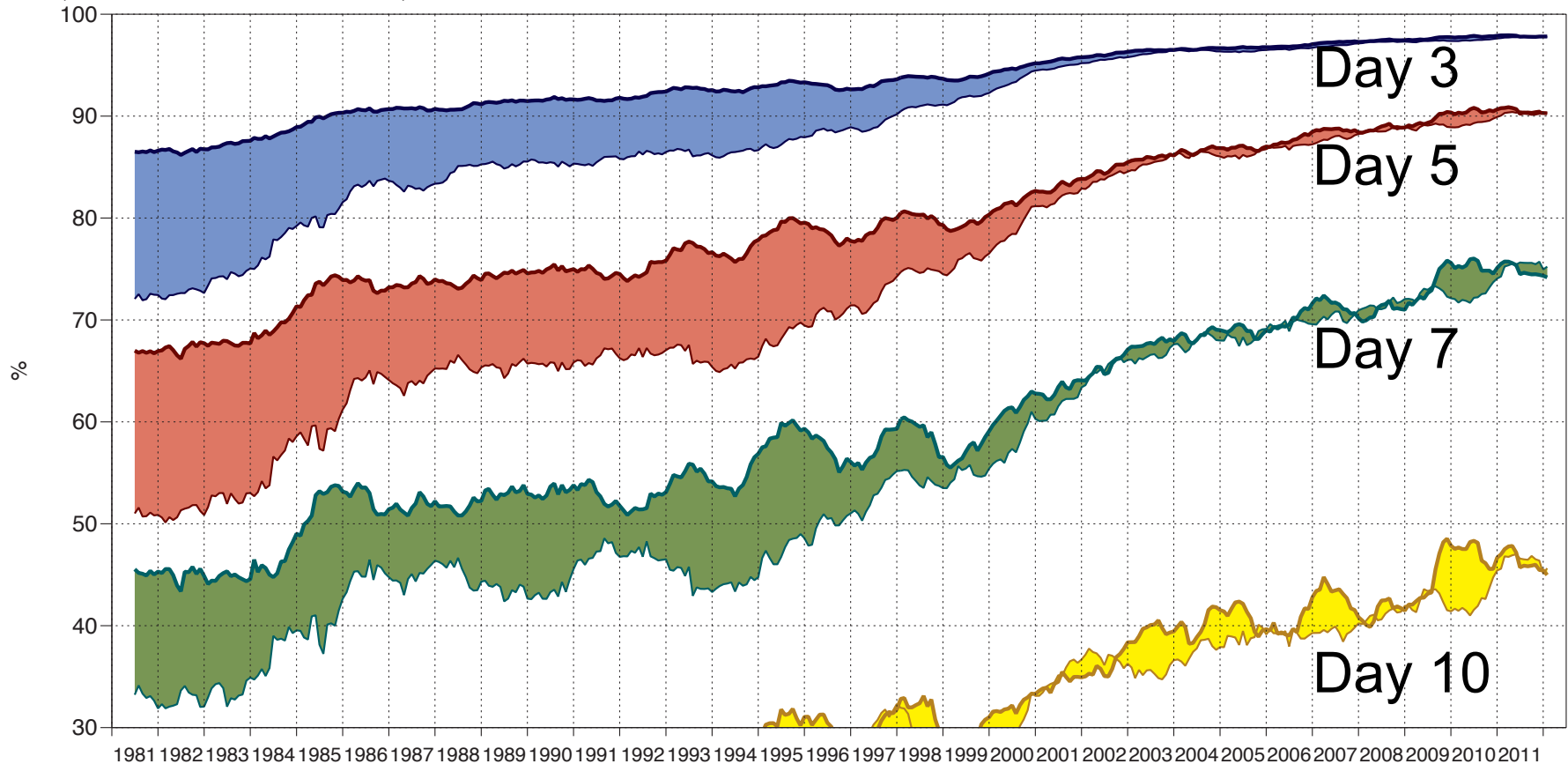
- - ■ SCORE REACHES 60.00
— SCORE REACHES 60.00 MA

Forecast Day   MA= 12 Month Moving Average

NCEP observational increments

500MB RMS FITS TO RAWINSONDES
6 HR FORECASTS

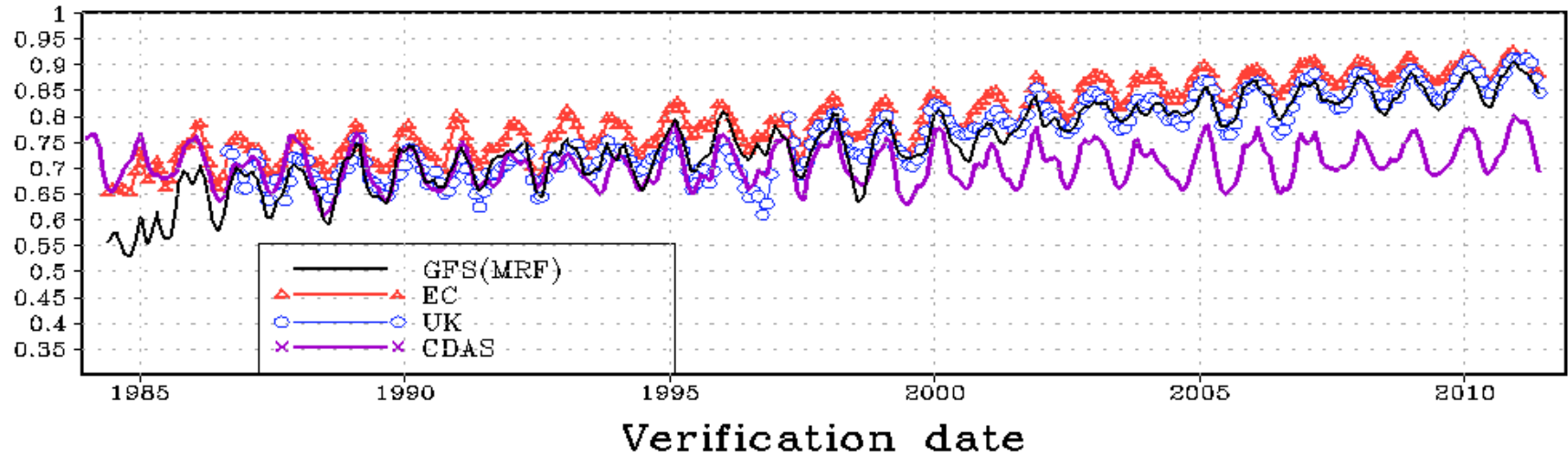Southern Hemisphere

Northern Hemisphere

Comparisons of Northern and Southern Hemispheres

500hPa geopotential height
Anomaly correlation
12-month running mean
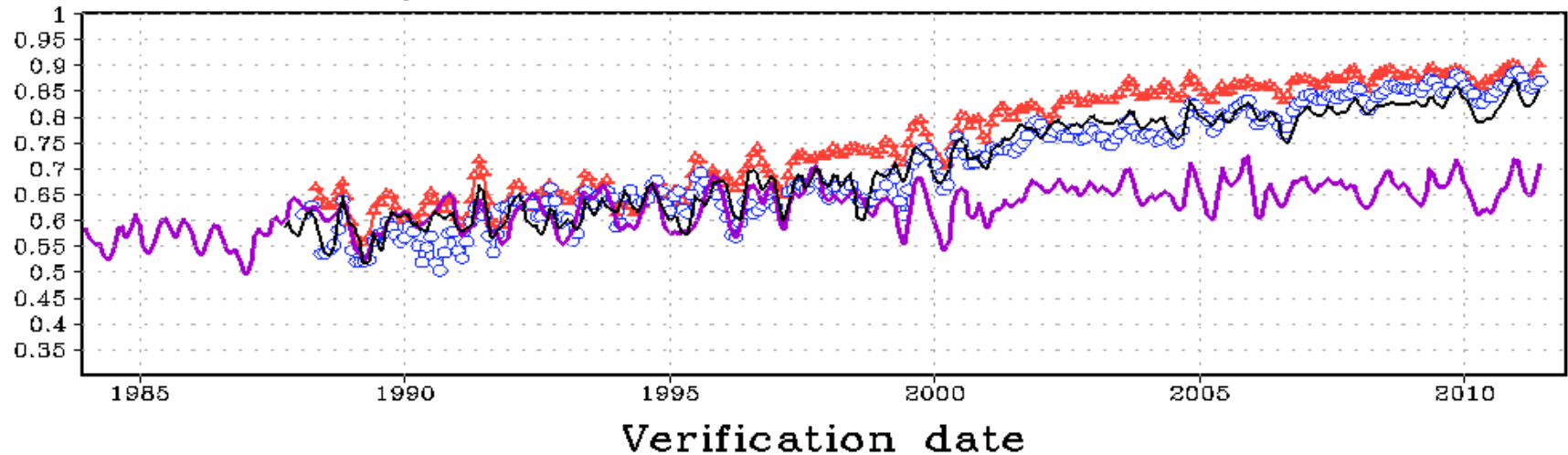(centered on the middle of the window)

Day 7 NHem	Day 3 NHem
Day 7 SHem	Day 3 SHem
Day 10 NHem	Day 5 NHem
Day 10 SHem	Day 5 SHem

Day 3

Day 5

Day 7

Day 10

%

1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011

Anom Corr dy 5 Z 500mb   1:2:1 smooth   lat 20-80N

Verification date

Anom Corr dy 5 Z 500mb   1:2:1 smooth   lat 20-80S

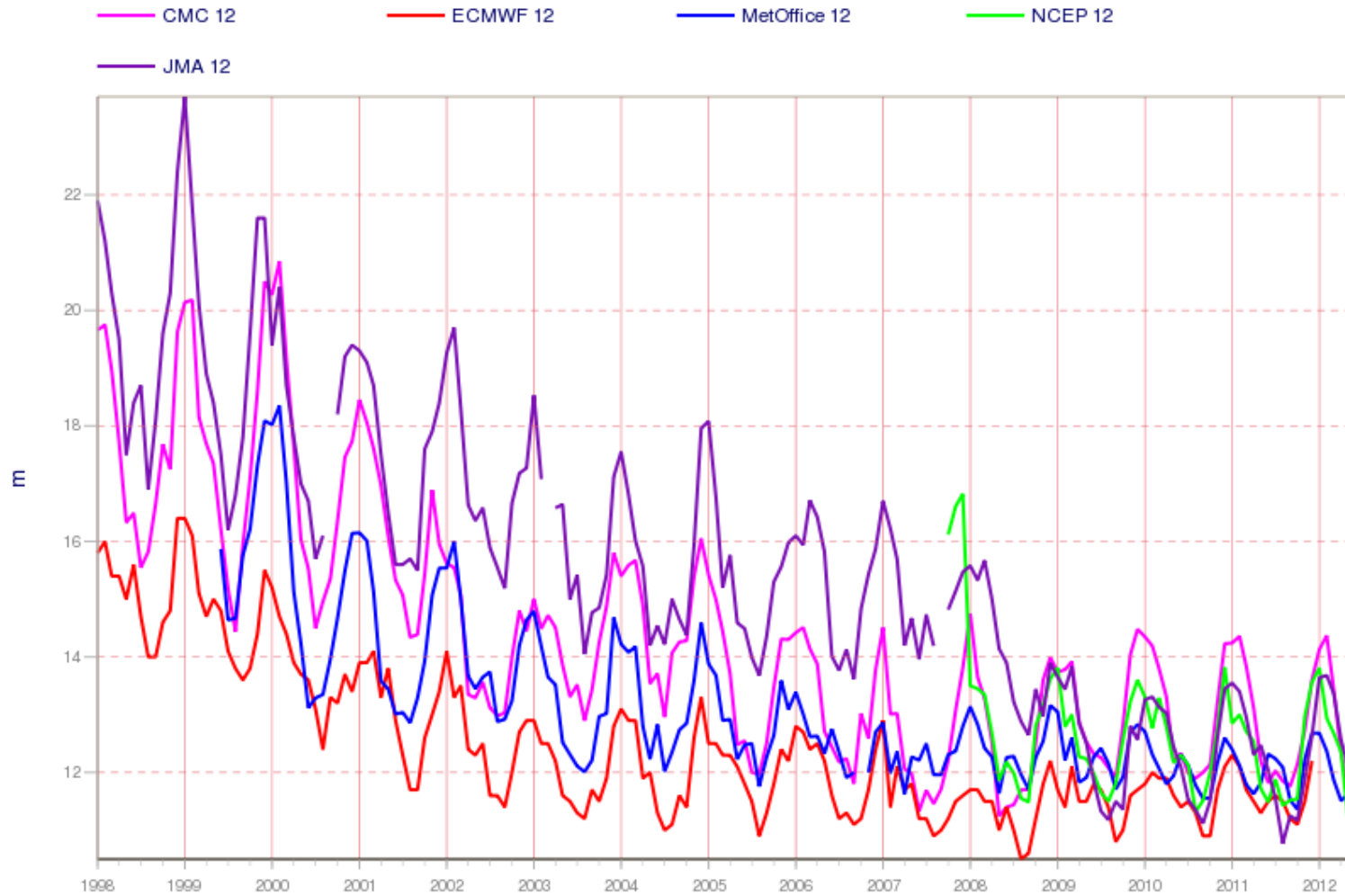Verification date

Comparisons verifying
forecasts against observations
1-day forecasts, 850hPa, NH, verification of wind
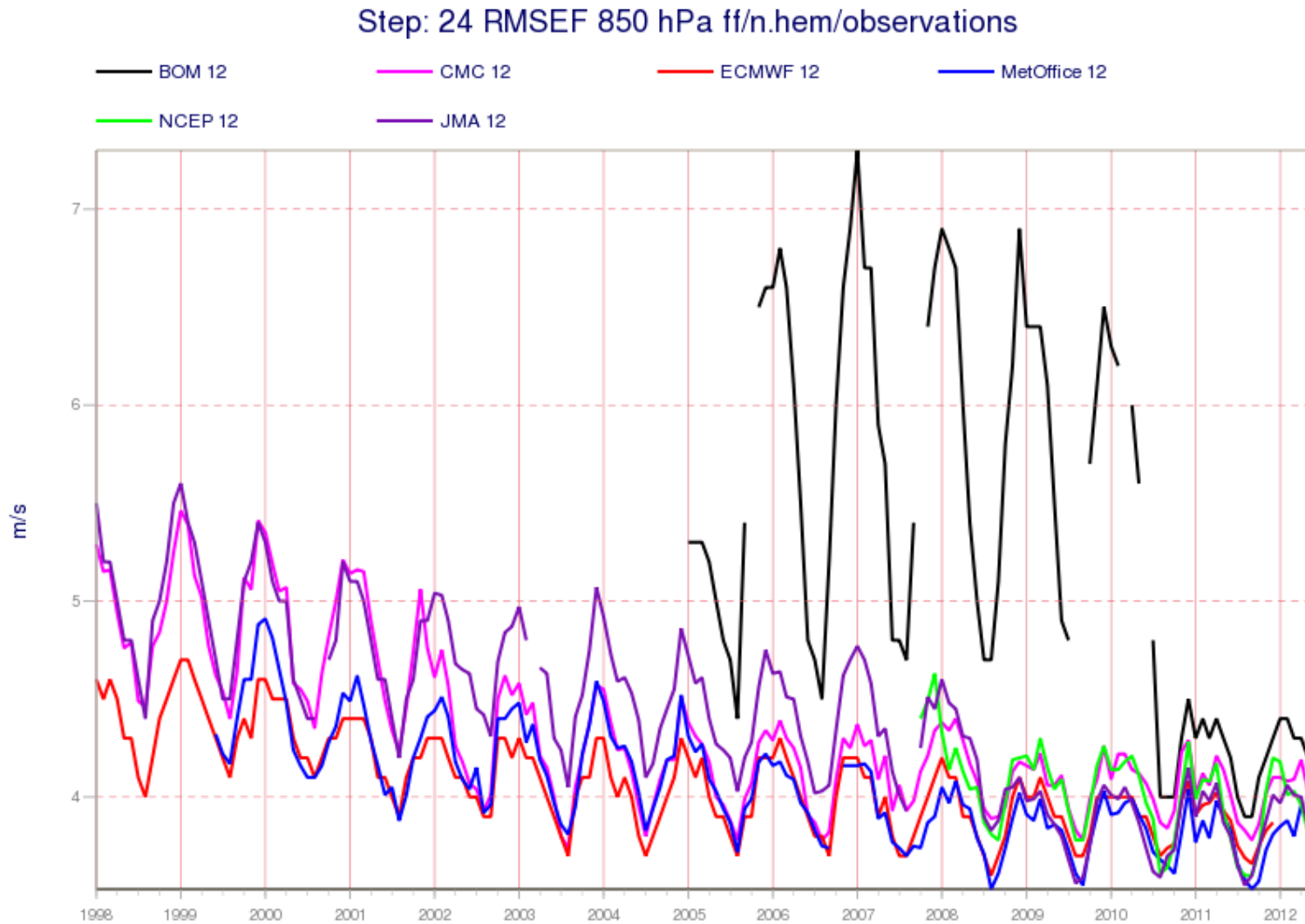
1-day forecast 500hPa Z, NH

Step: 24 RMSEF 500 hPa z/n.hem/observations

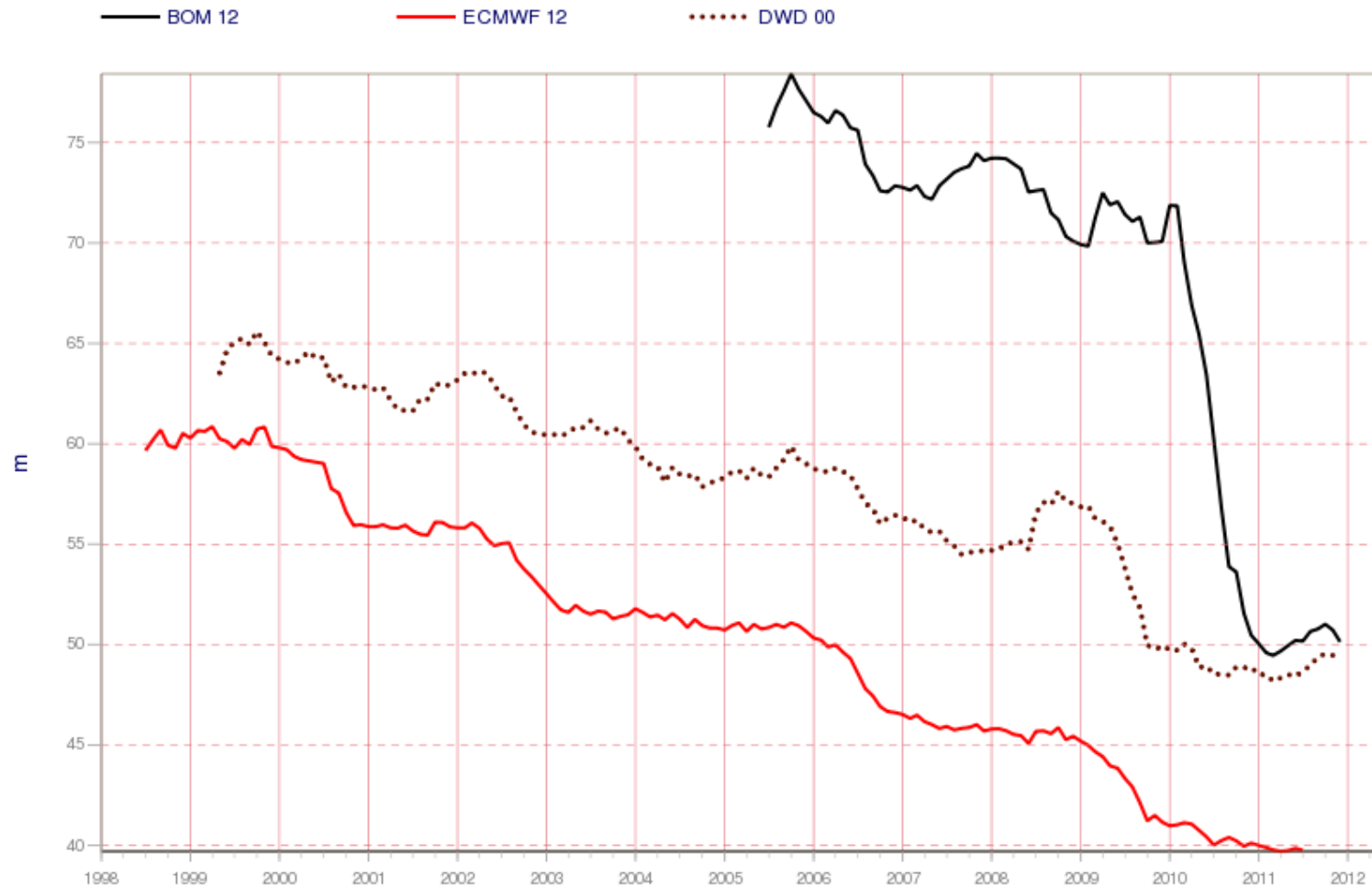CMC 12   ECMWF 12   MetOffice 12   NCEP 12
JMA 12

3-day forecast, 500hPa, NH against observations

Step: 72 RMSEF 500 hPa z/n.hem/observations
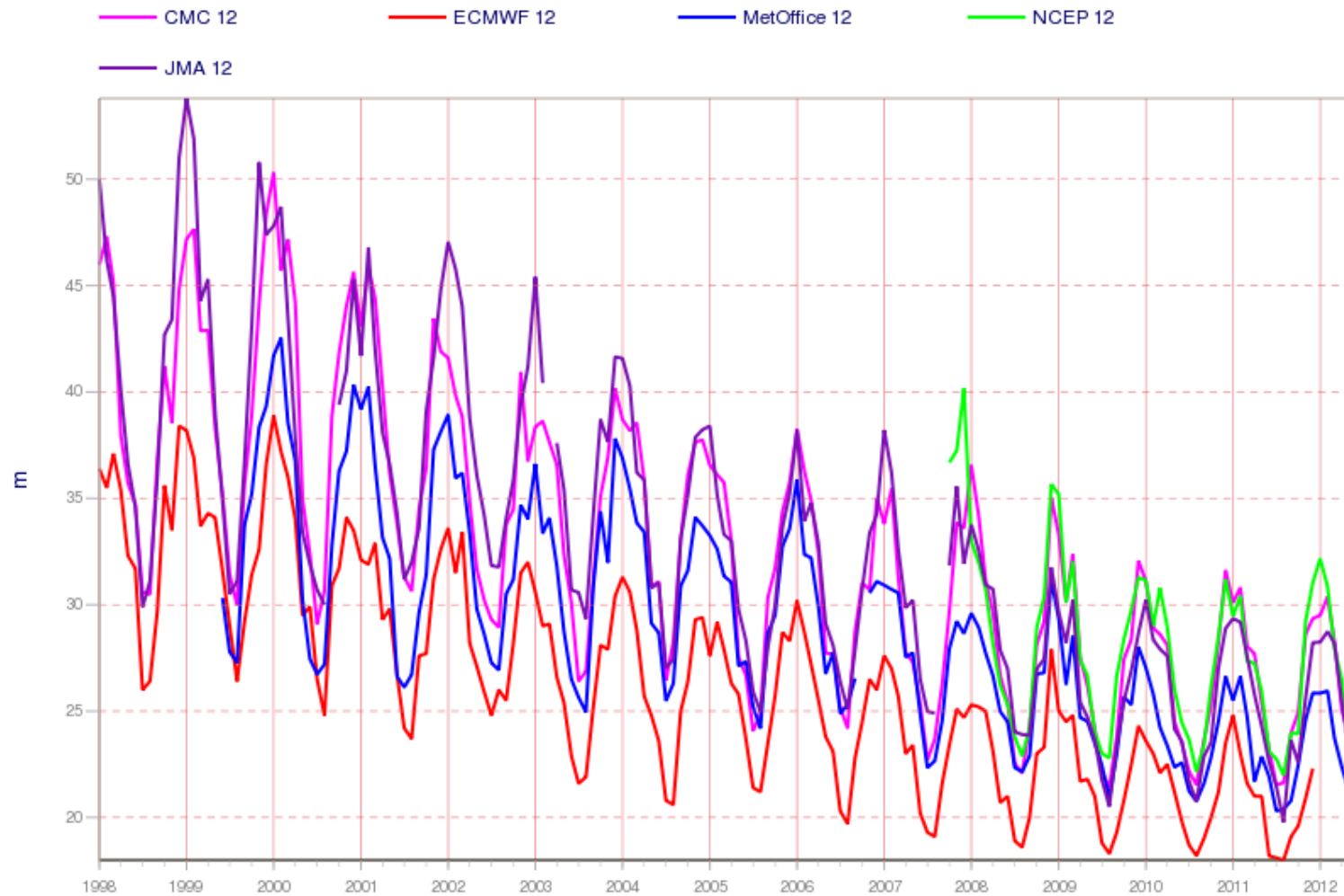
5-day forecast, 500hPa, NH, 12 month average

Step: 120 RMSEF 500 hPa z/n.hem/observations

BOM 12   ECMWF 12   DWD 00

Satellite radiances are essential in the SH