

Sensitivity studies with new ozone data sets in CAM

Paul Young

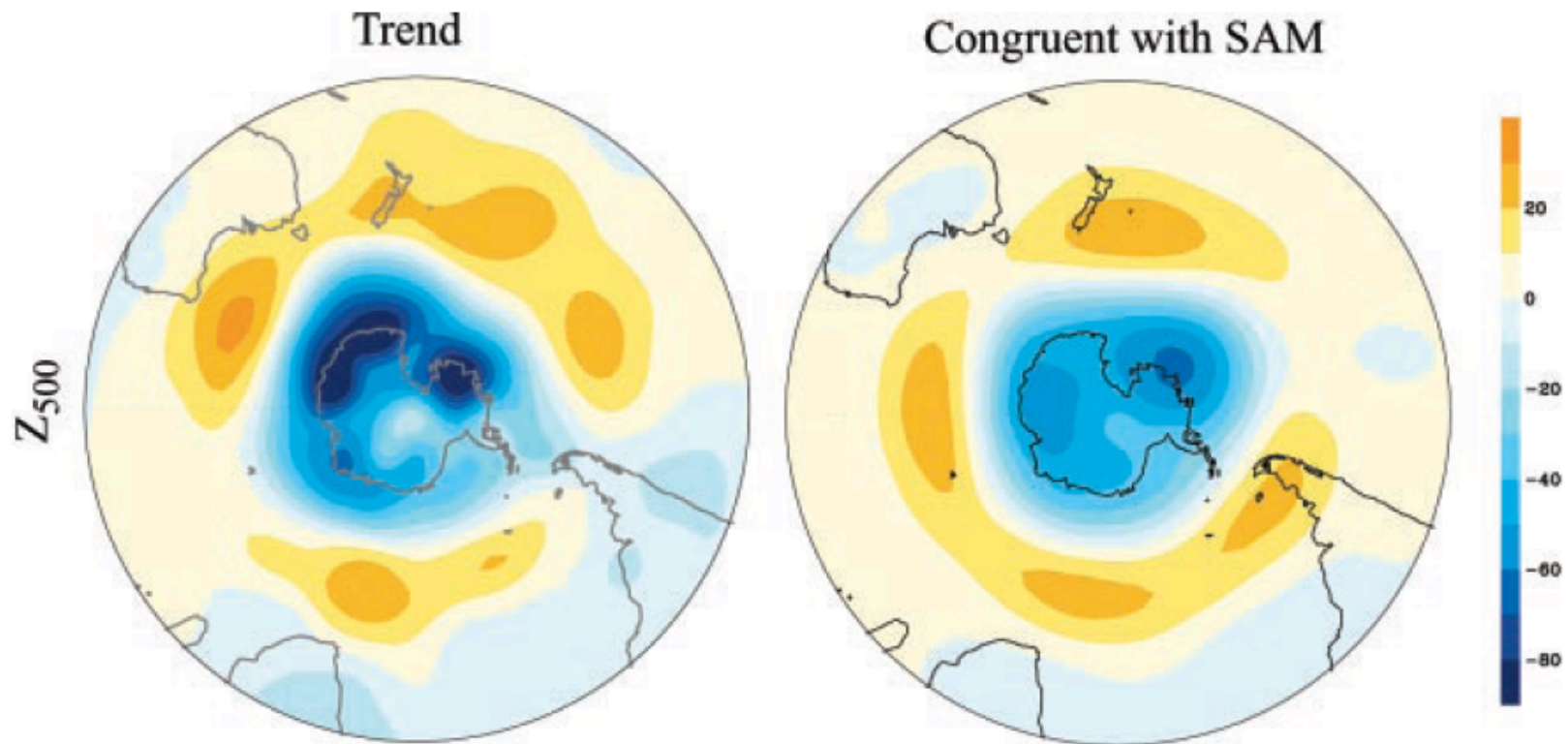
NOAA-ESRL, Chemistry & Climate Processes

Background

- Want to have improved/consistent ozone data set for AR5
- New data sets include more observational data than (e.g.) Randel & Wu [2005]
- Data sets still being worked on....
- Starting to look at new data via sensitivity studies in CAM – i.e. not much to report yet!

Motivation

E.g. ozone-climate links and Antarctic trends?



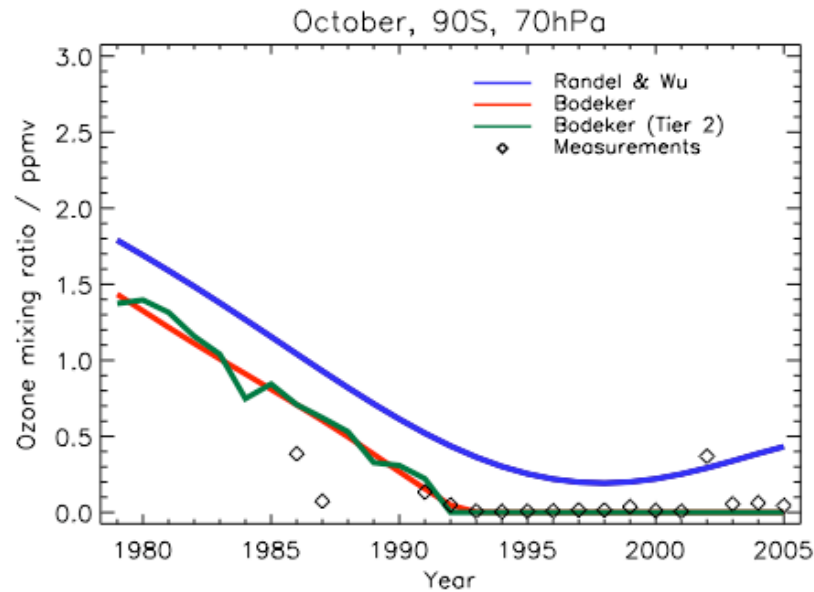
30 yr geopotential height trends [Thompson & Solomon, 2002]

Model set up

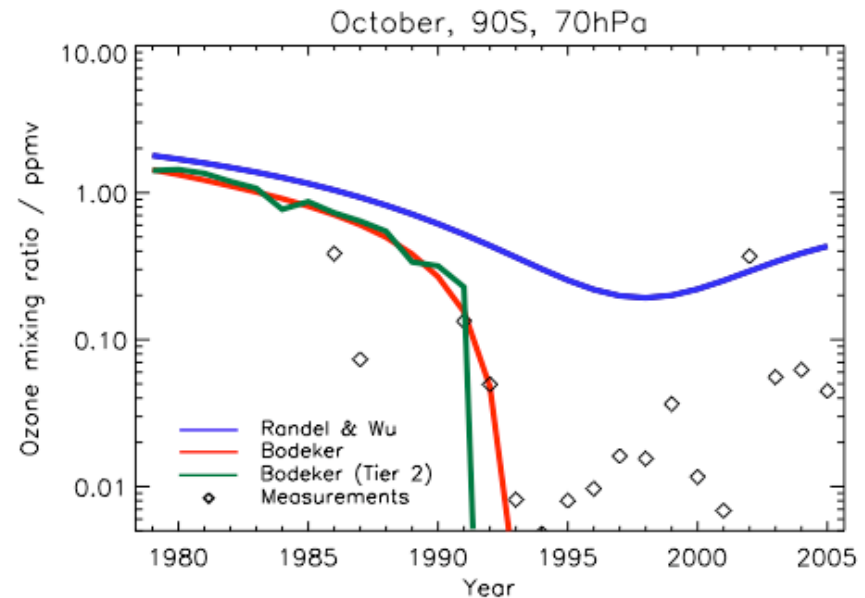
- CAM v3.1 (running at NOAA)
- Climatological sea-ice/SSTs and fixed GHGs (~2000 levels)
- 20 member ensemble (years) for each ozone climatology
- Ozone data only change between simulations
 - **Bodeker versus Randel & Wu**

Data sets versus obs

Time series of 70hPa October ozone at 90S



Linear scale

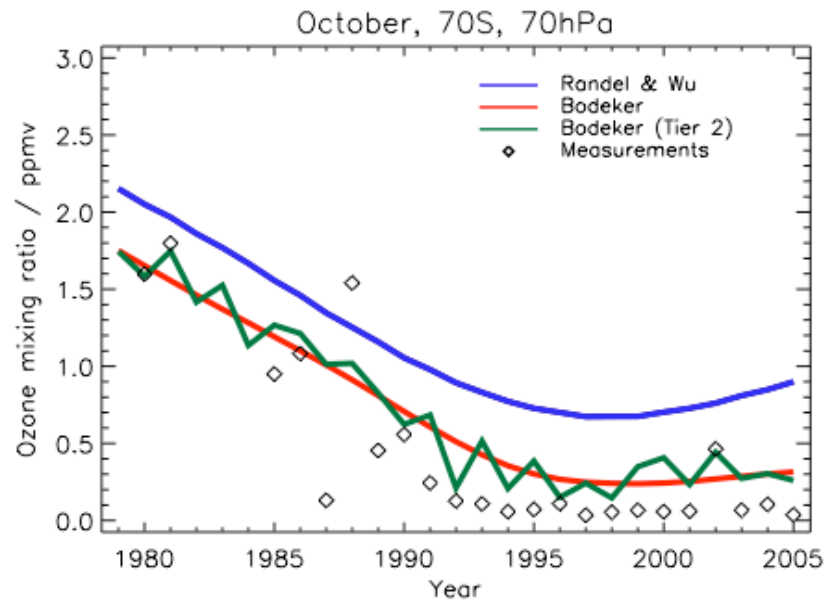


Log scale

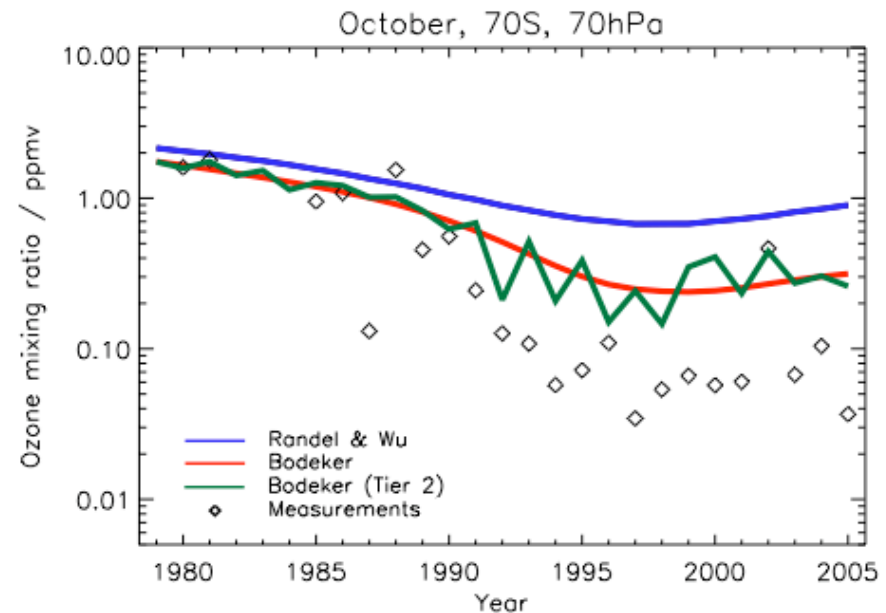
NOTE This is an early version of the Bodeker ozone

Data sets versus obs

Time series of 70hPa October ozone at 70S



Linear scale



Log scale

NOTE This is an early version of the Bodeker ozone

Simulations – Time periods chosen

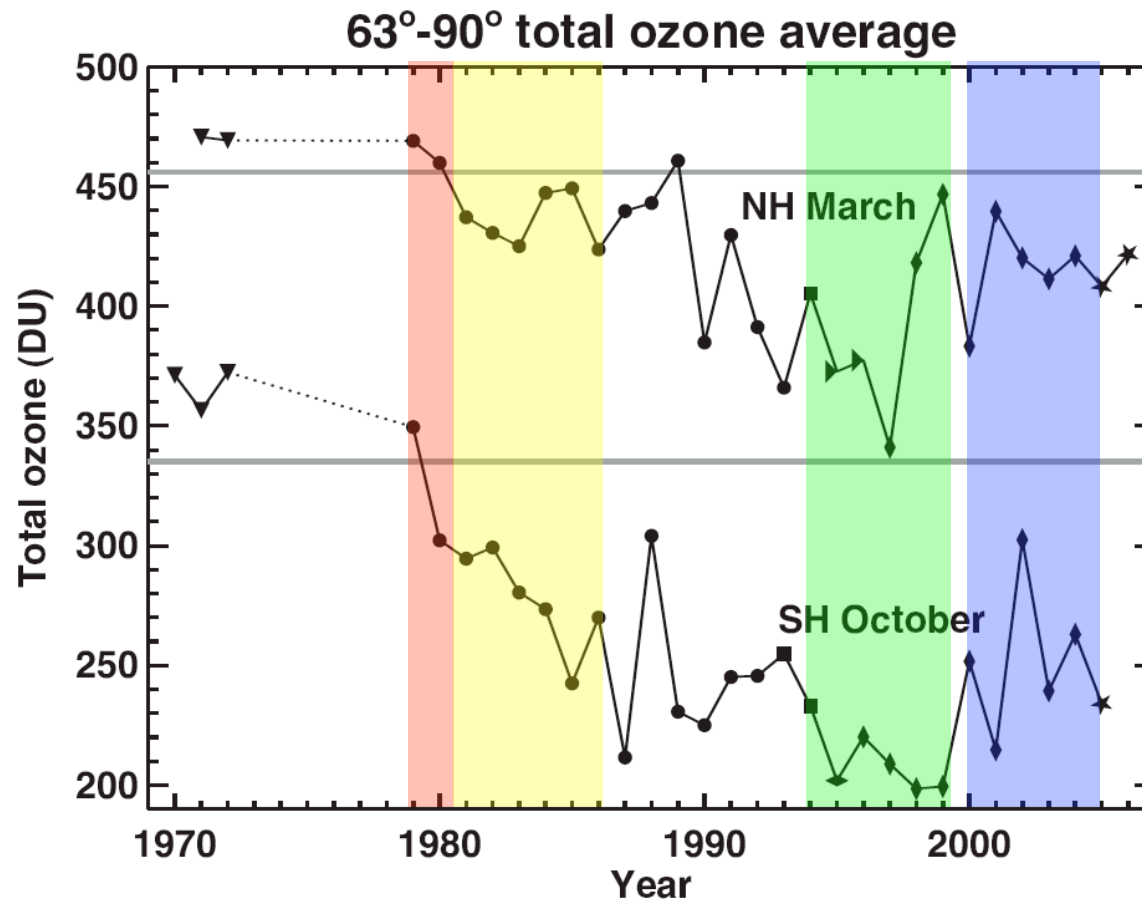


Fig 4-7, WMO [2006]

Simulations – Time periods chosen

1979-1980

BASE

1981-1986

Early ozone hole

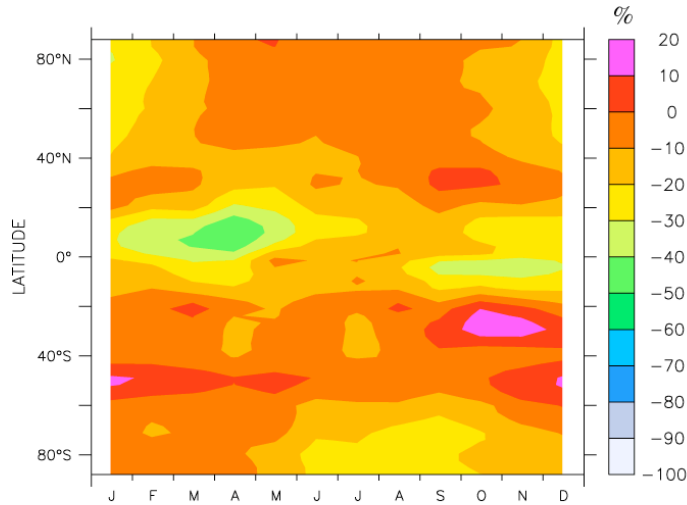
1995-1999

Large ozone losses

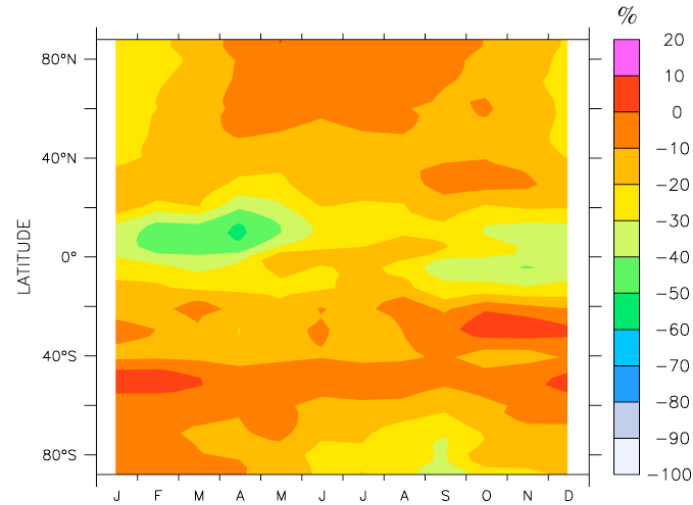
2000-2005

Stabilization??

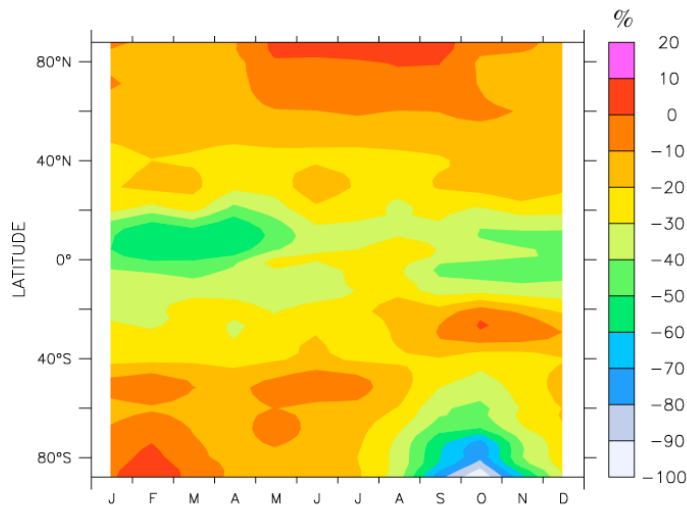
Bodeker – Randel & Wu at 70 hPa



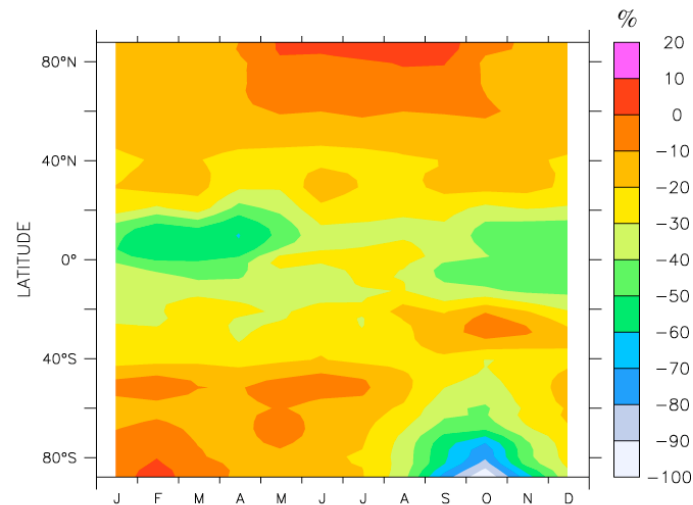
1979-1980 avg



1981-1986 avg

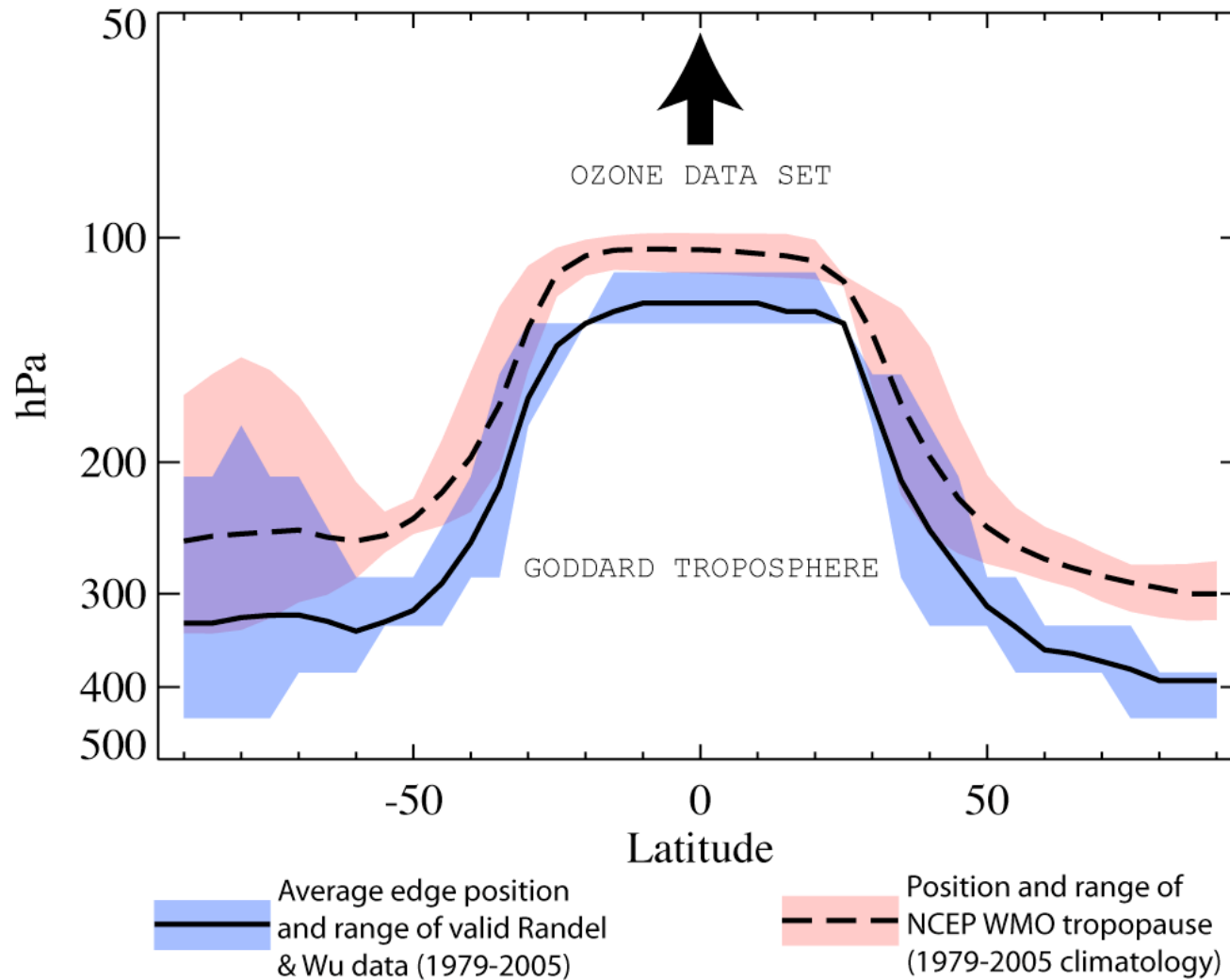


1995-1999 avg



2000-2005 avg

Input data preparation

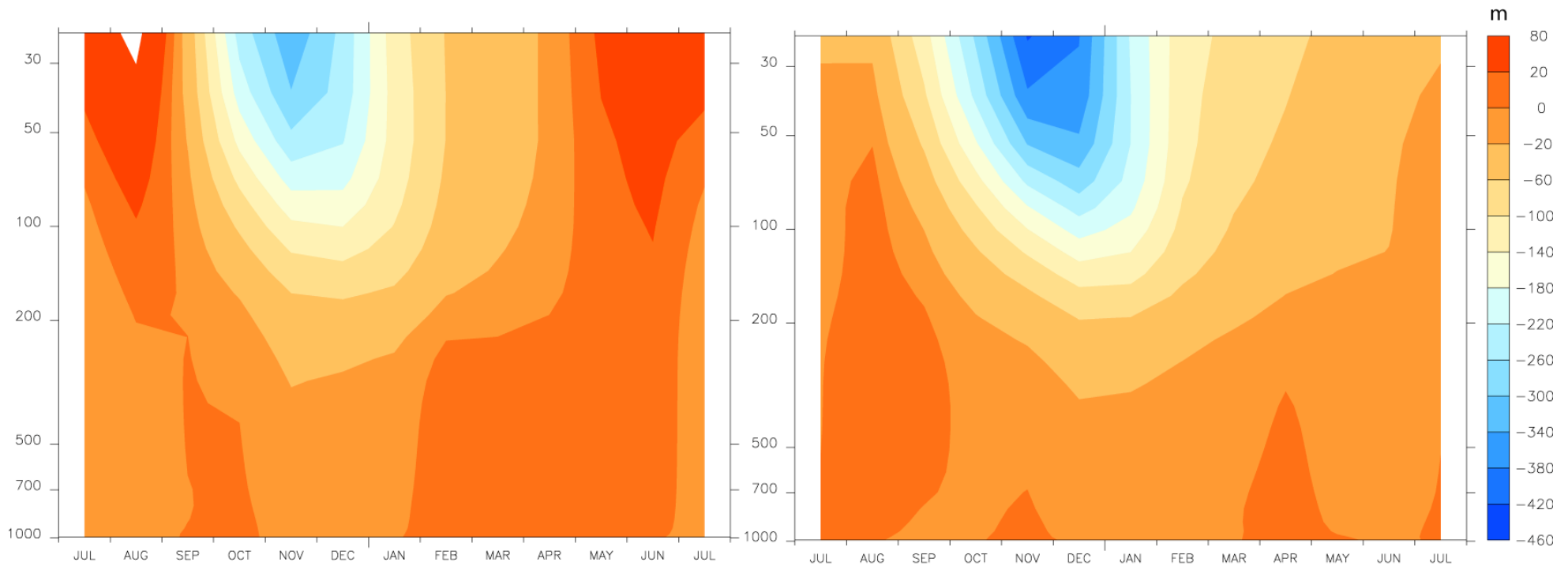


Some results

ΔZ 60-90S: Stabilized - BASE

2000-2005 avg

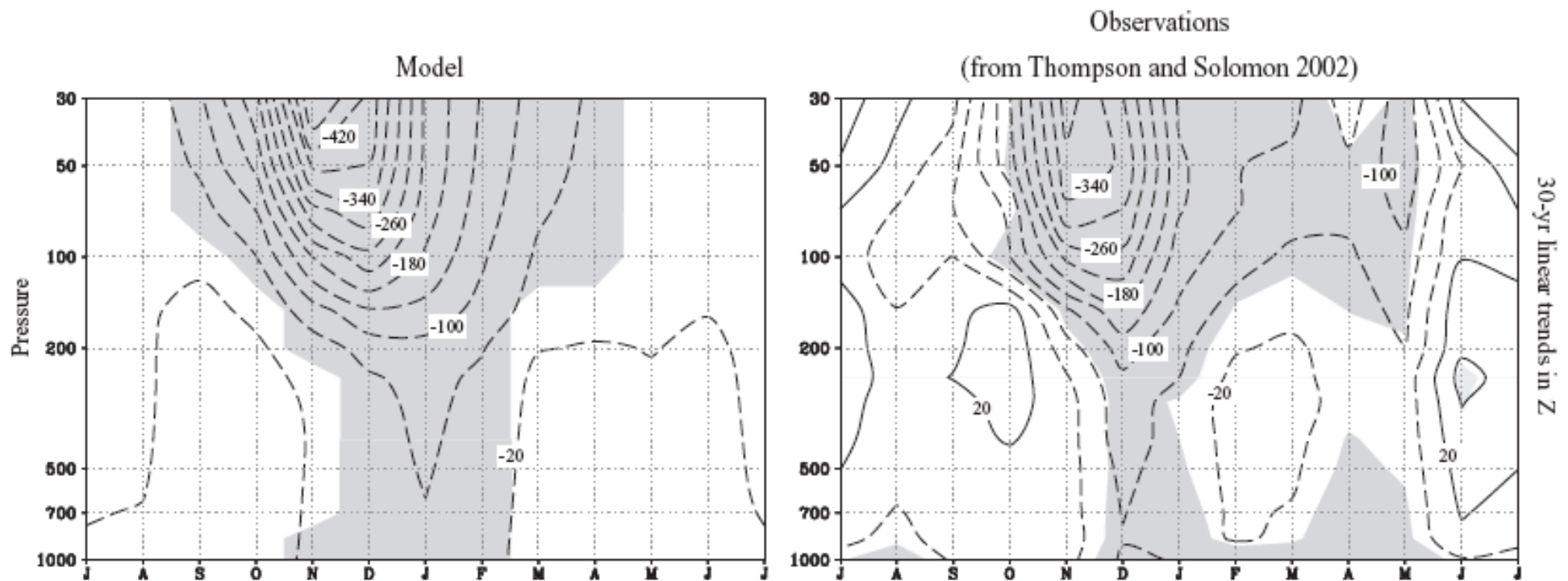
1979-1980 avg



RW: 2000-2005 - 1979-1980

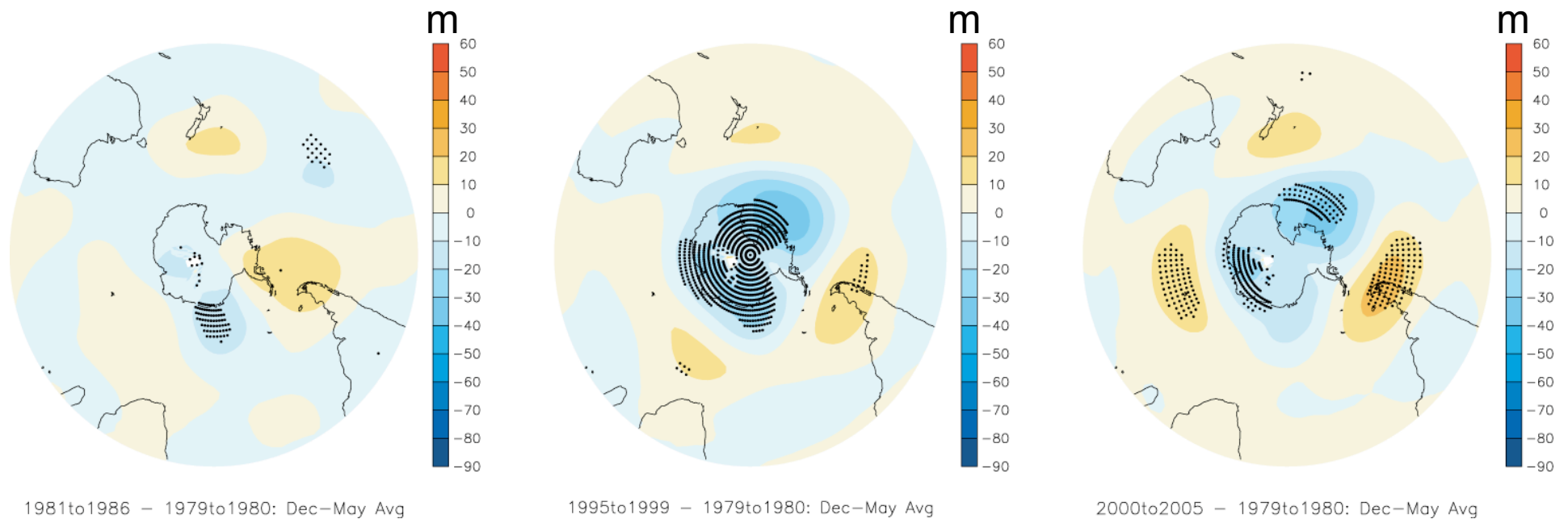
Bod: 2000-2005 - 1979-1980

ΔZ SH – cf trends in model & obs...



30 yr geopotential height trends (m)

ΔZ_{500} : Dec-May avg, SH



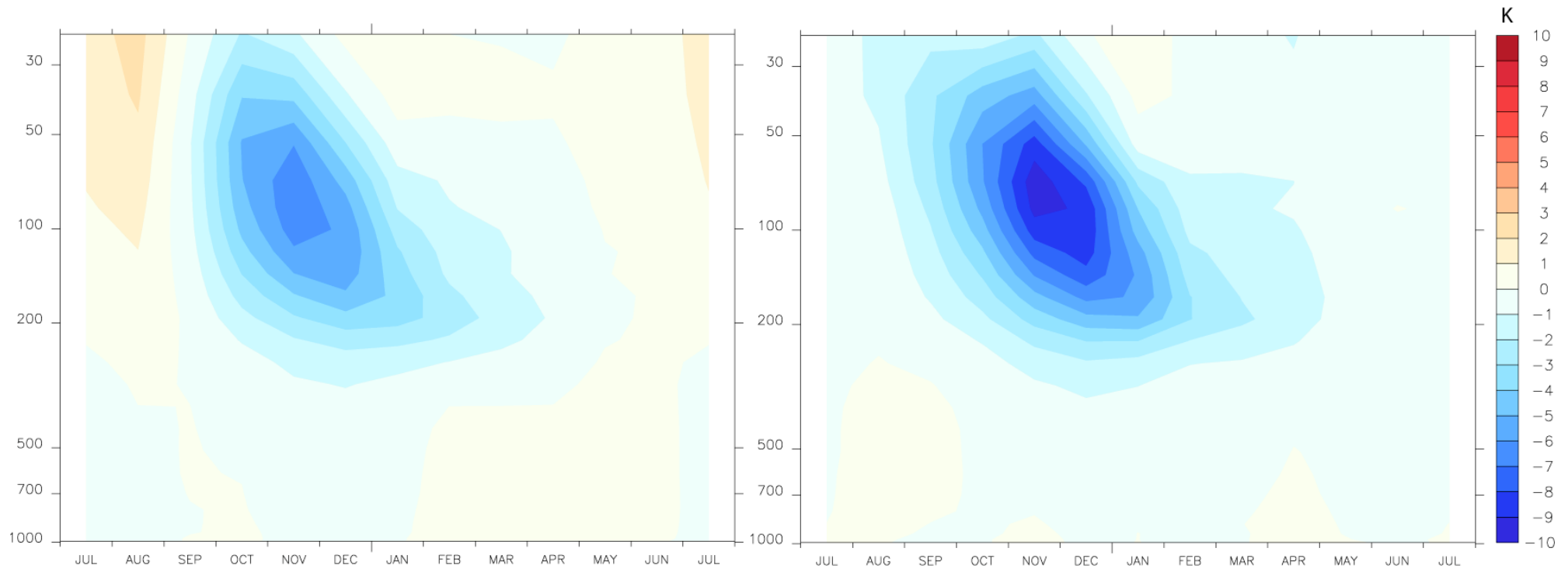
Bodeker ozone simulations – +ve phase of SAM

Shading indicates where difference is greater than 1 SD of perturbed run

ΔT 60-90S: Stabilized - BASE

2000-2005 avg

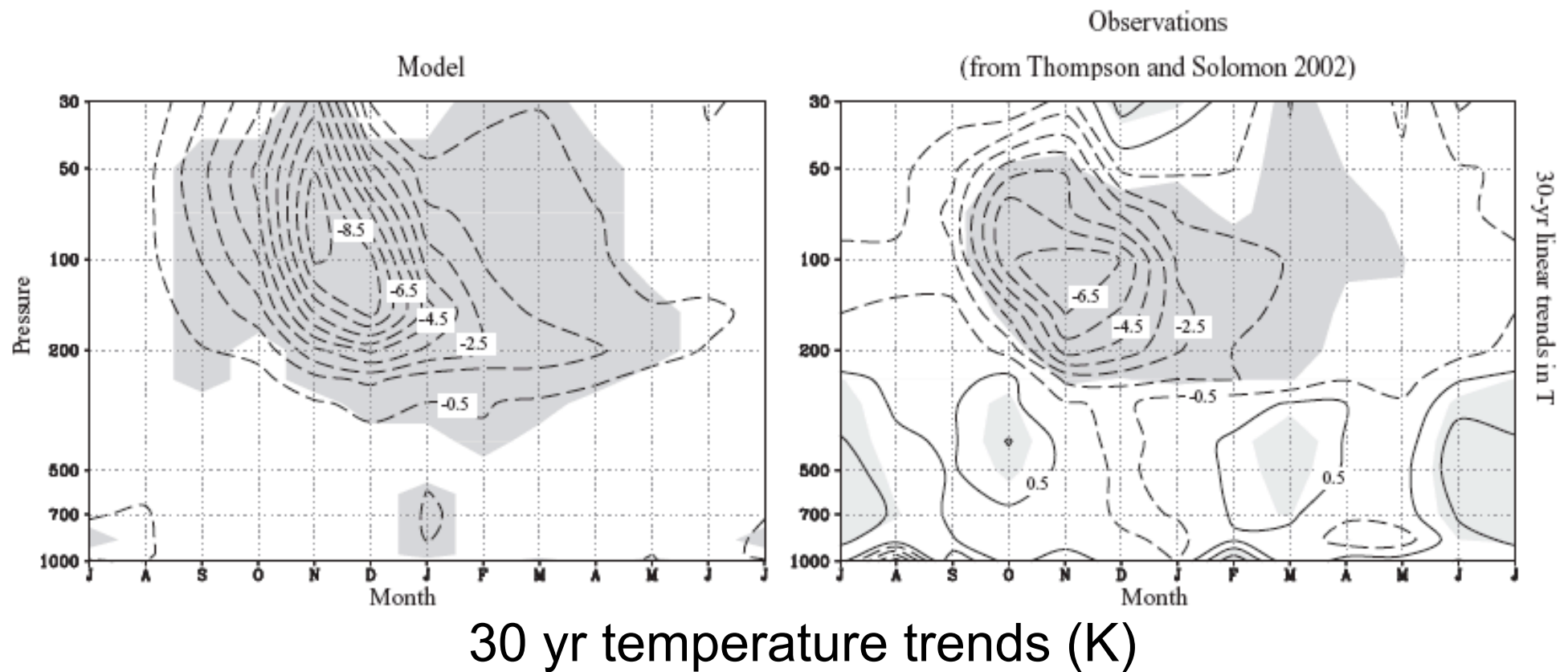
1979-1980 avg



RW: 2000-2005 - 1979-1980

Bod: 2000-2005 - 1979-1980

ΔT SH – cf trends in model & obs...



Still to do...

- Run in with slab ocean model
 - see tropospheric/near surface changes
- New data
 - Latest Bodeker data
 - Data set from NOAA-ESRL (K. Rosenlof)
- Time-slice runs and comparison with obs and chem/clim CAM
- Couple with improved strat water vapor data