On the Statistical Confidence of the Ozone recovery as Analyzed using Cohesive SBUV(/2) Ozone data

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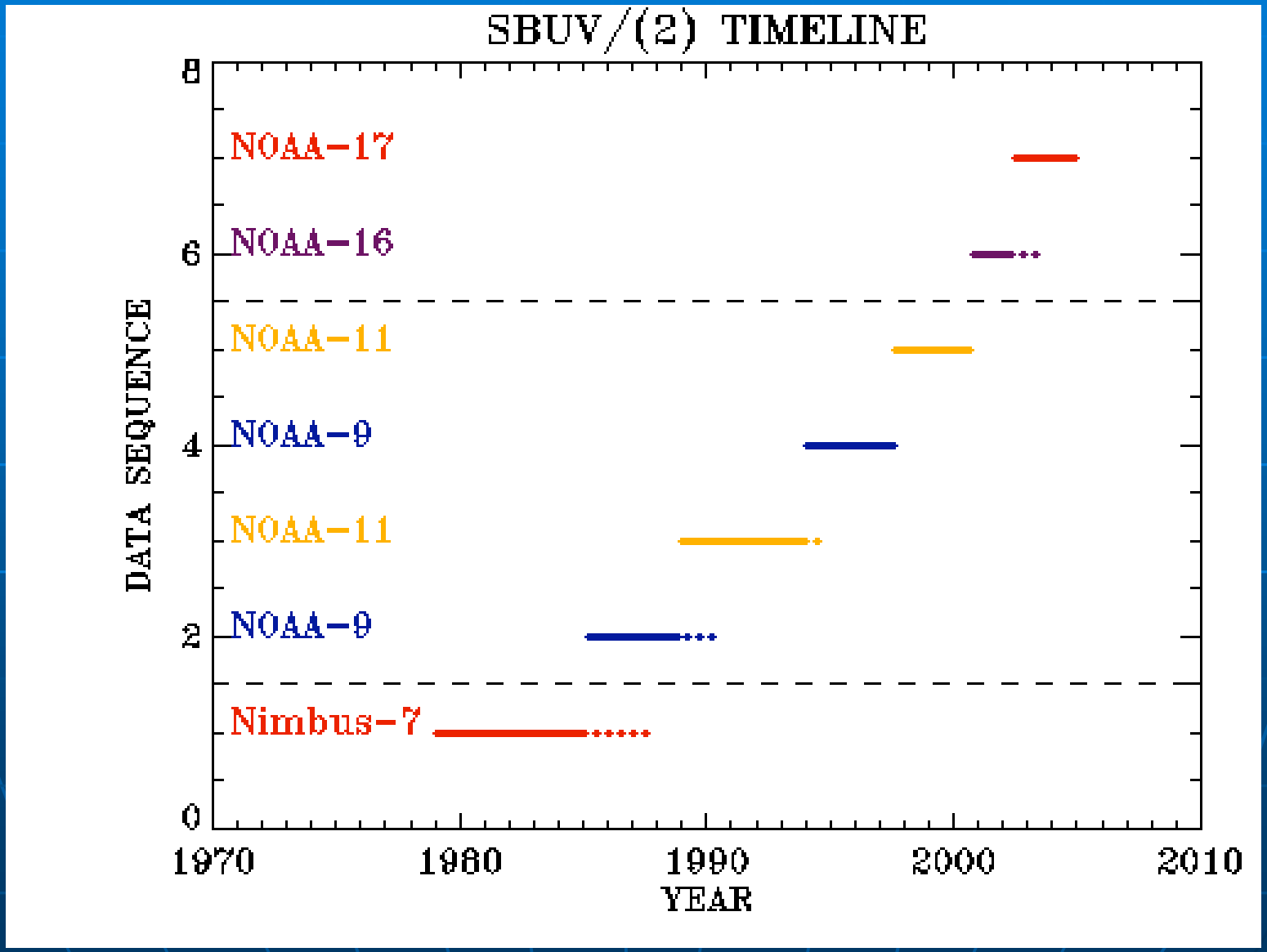
Objective

Assessing the total ozone "leveling-off" and/or "recovery" within the natural climate variations and changes using SBUV/2 Cohesive Data.

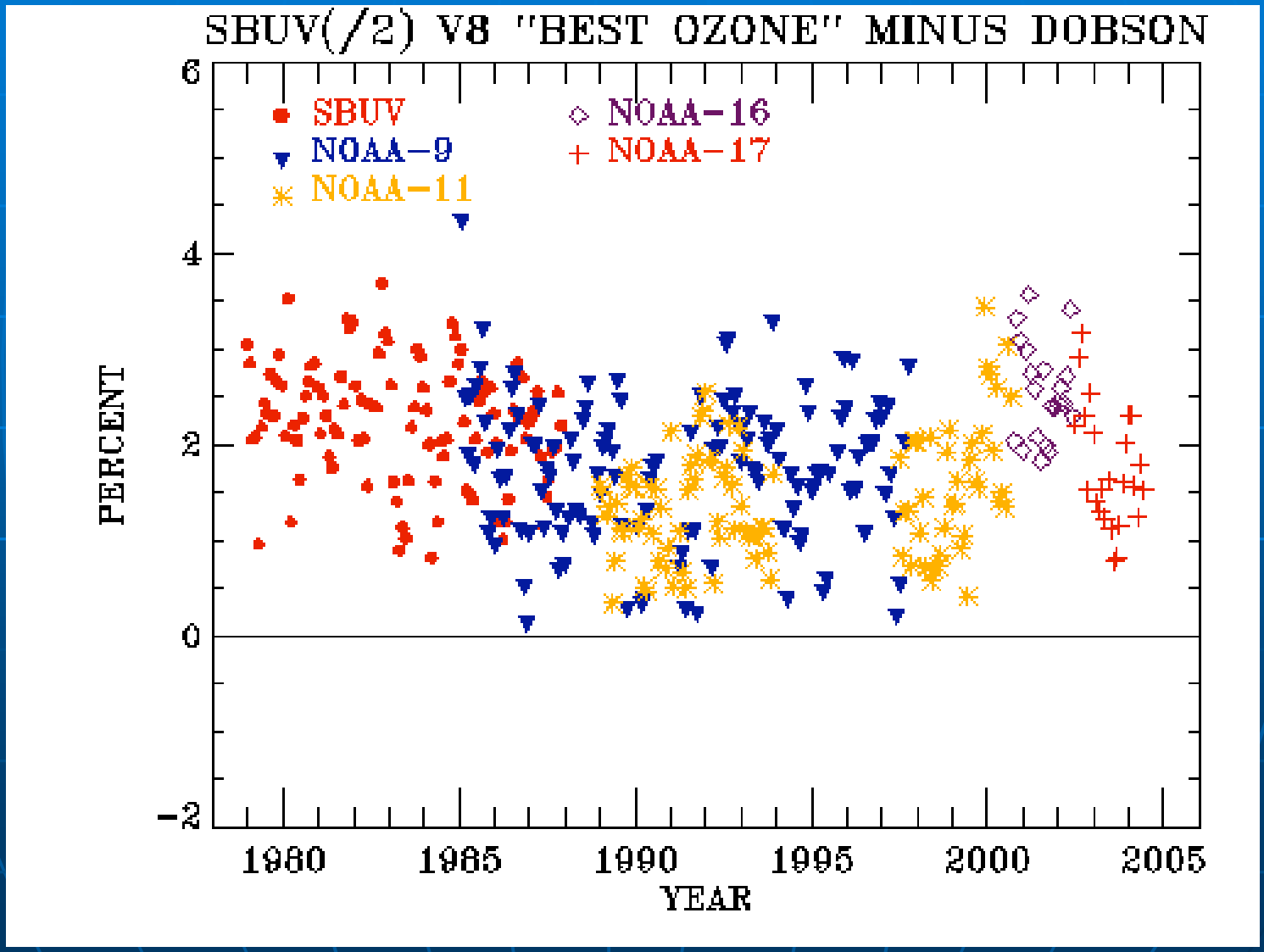
Outline

- Satellite Ozone Measurement and Trend Quality Total Ozone data: SBUV/(/2) 1979-2004
- Linear Trend and Change-in-Trend Statistical Model and Analyses
- Conclusion & Future Studies

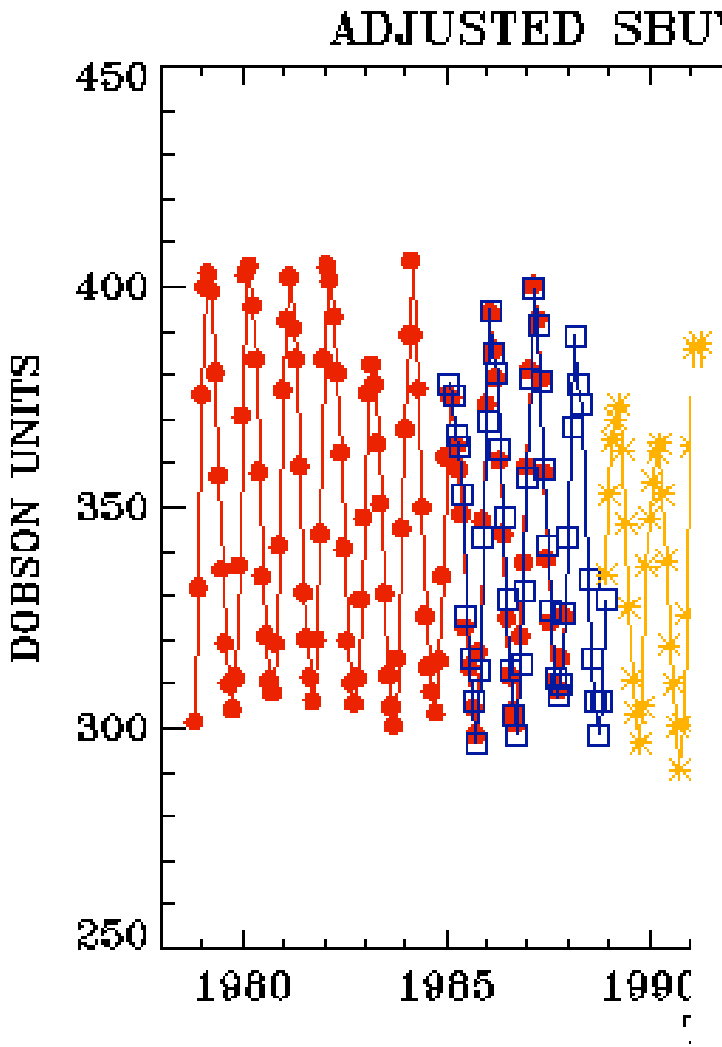
Satellite Ozone Measurement

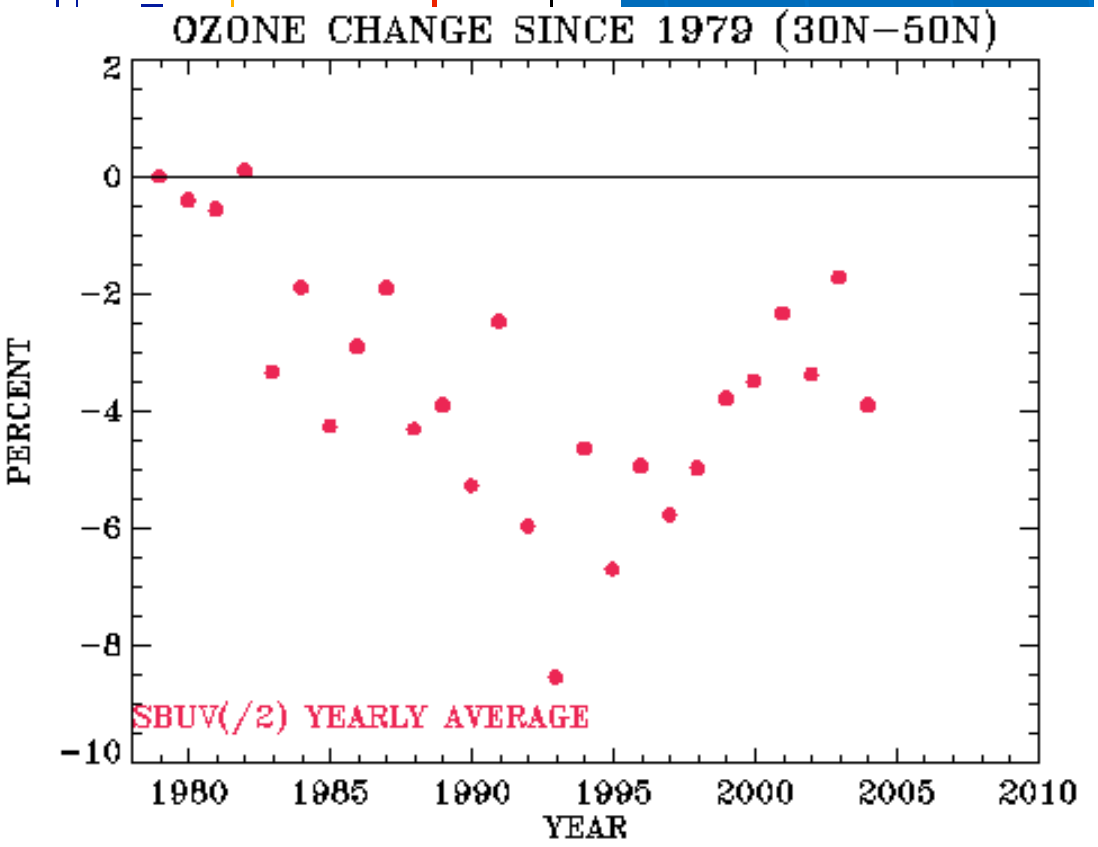


Comparison with ground measurements



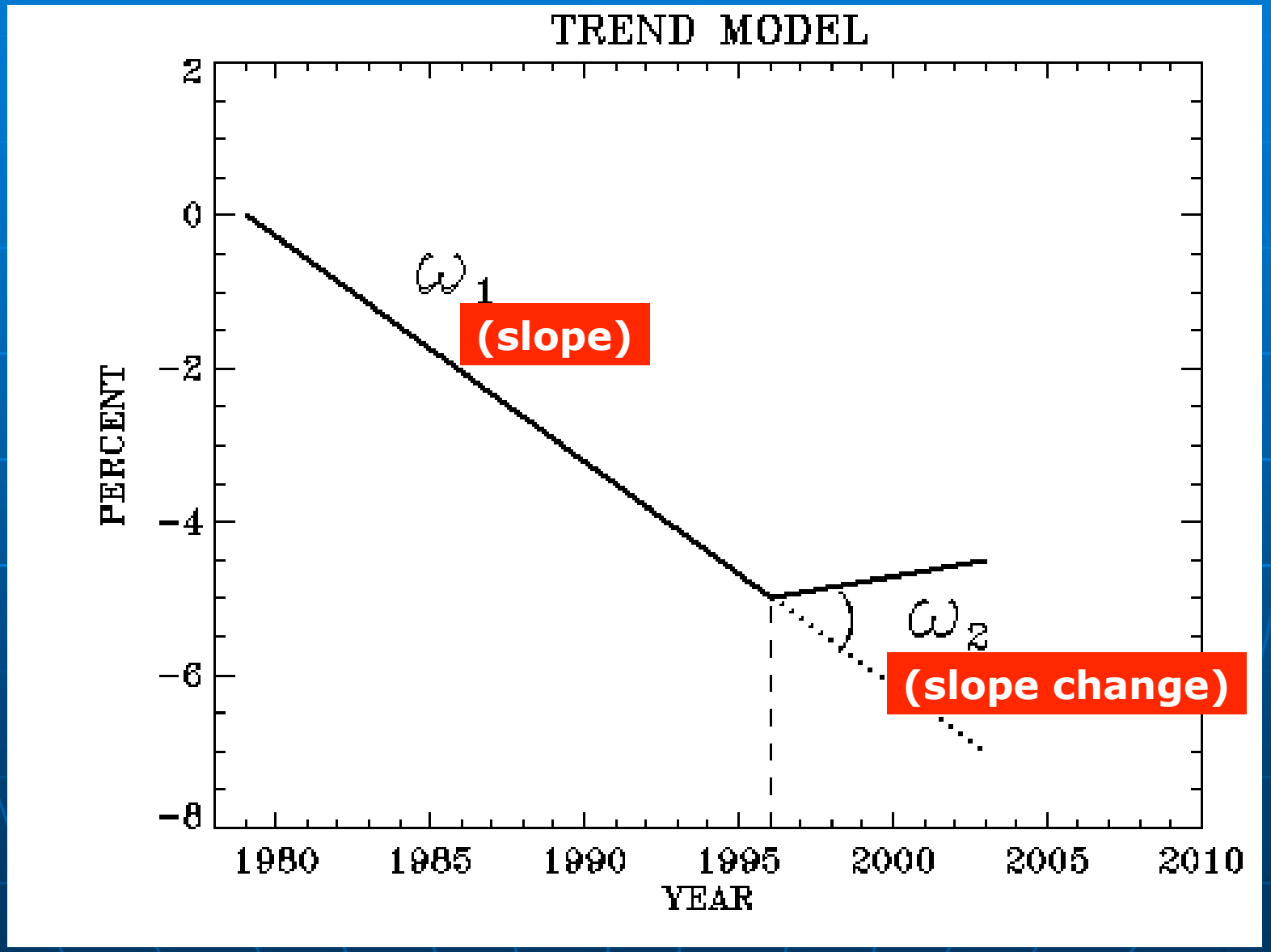
Cohesive Total Ozone Data





Linear Trend and Change-in-Trend Model

Reinsel et al., 2002 JGR

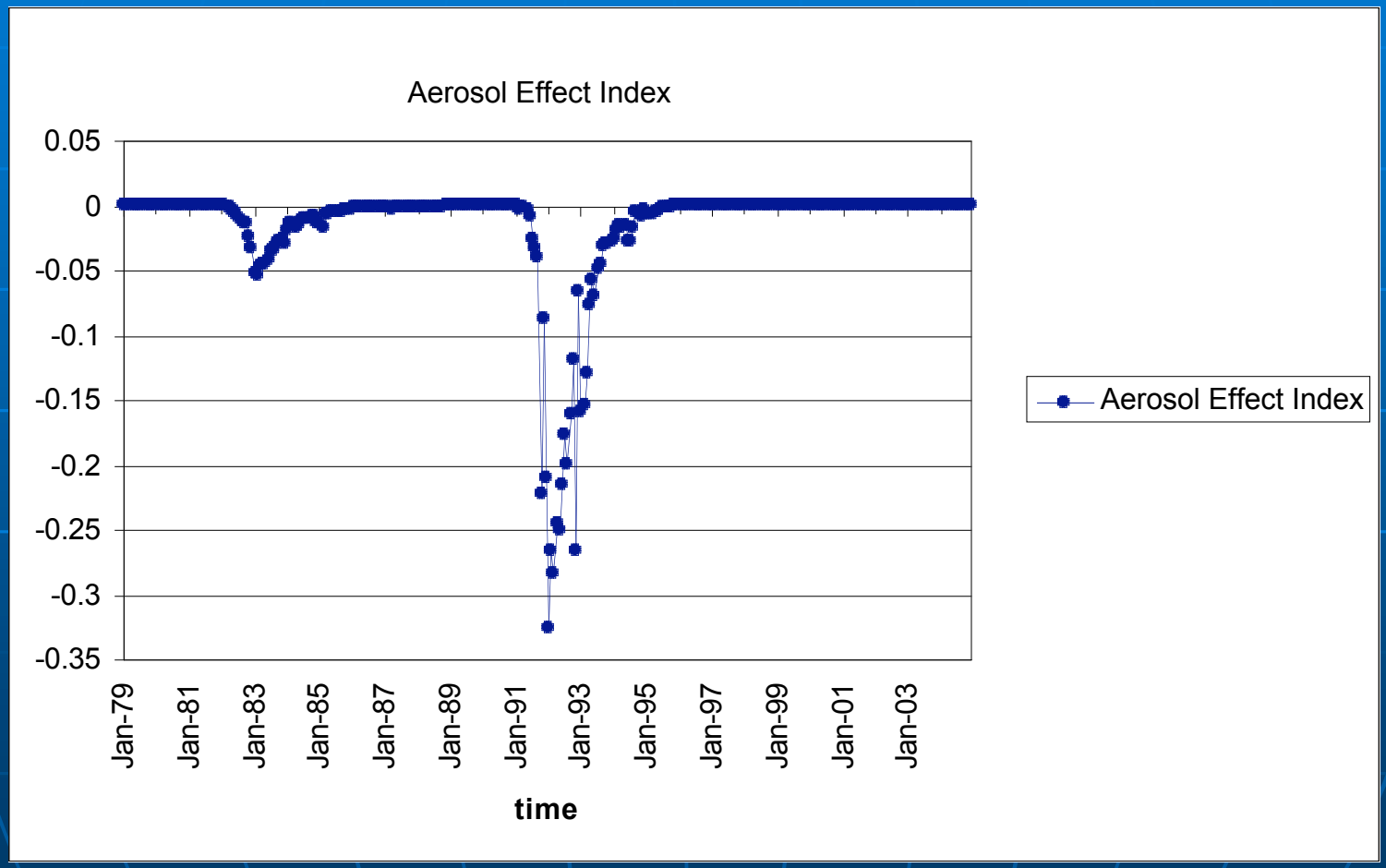


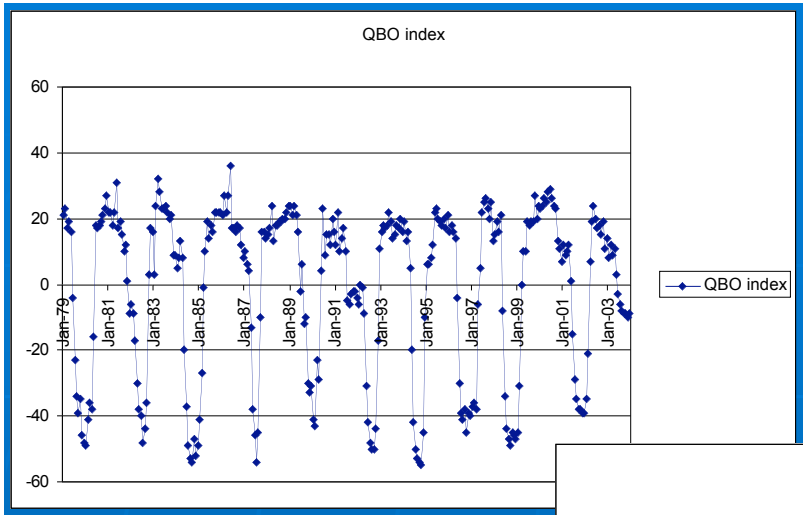
Linear Trend and Change-in-Trend Model

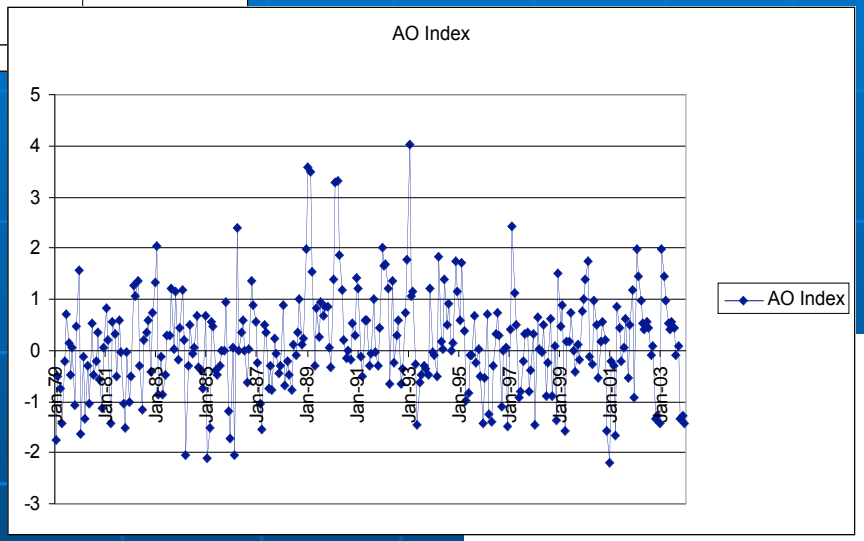
Questions

- Impact of Mt. Pinatubo eruption
  - ***a) remove impacted data?***
  - **b) aerosol parameter/timing?**
- ***Date of inflection point***

Pseudo Aerosol Effect Index




QBO index
60
40
20
0
-20
-40
-60
Jan-79
Jan-81
Jan-83
Jan-85
Jan-87
Jan-89
Jan-91
Jan-93
Jan-95
Jan-97
Jan-99
Jan-01
Jan-03
QBO index


AO Index
5
4
3
2
1
0
-1
-2
-3
Jan-79
Jan-81
Jan-83
Jan-85
Jan-87
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Jan-91
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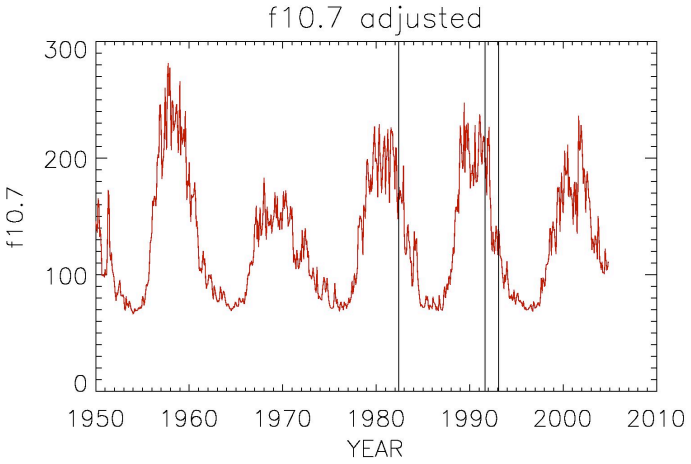
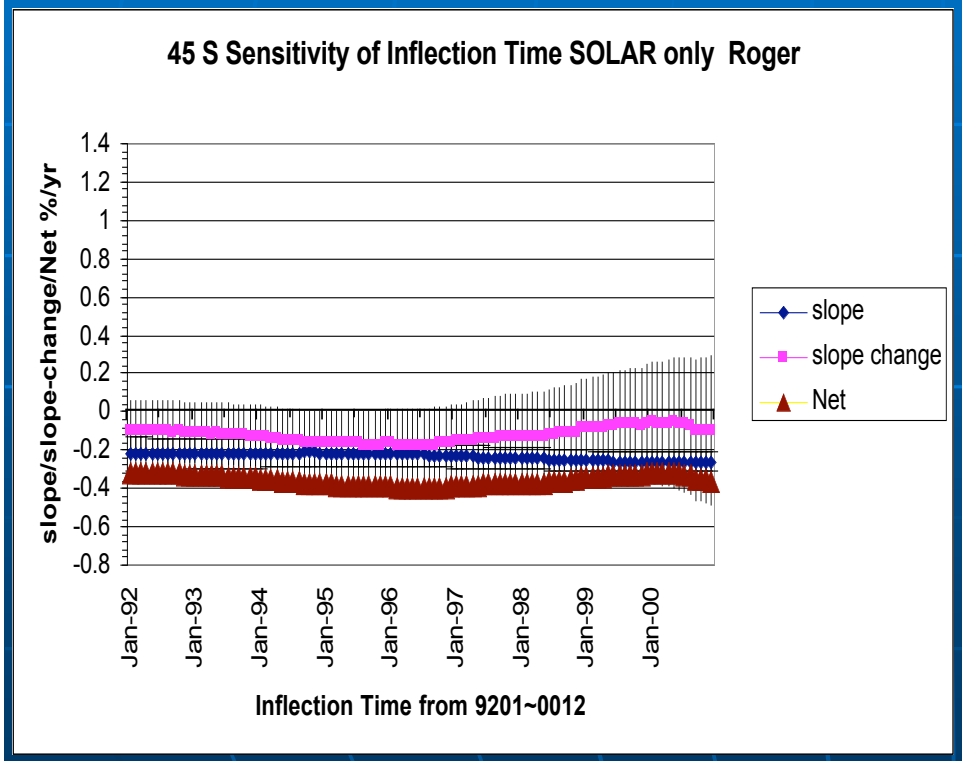
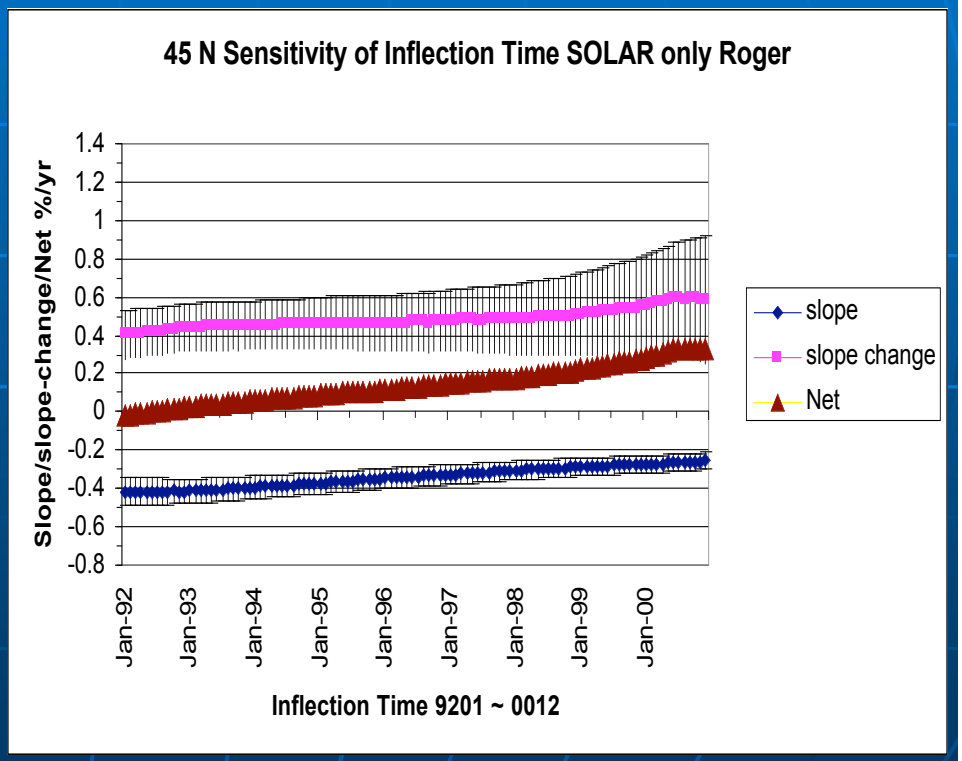
Jan-99
Jan-01
Jan-03
AO Index

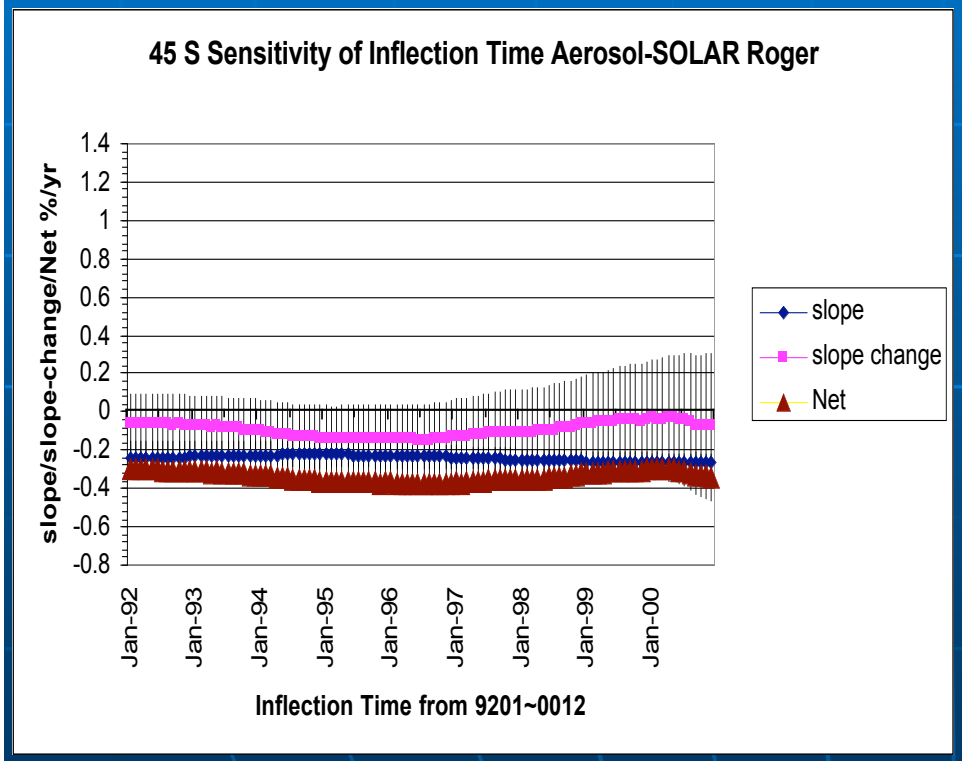

f10.7 adjusted
300
200
100
0
f10.7
1950
1960
1970
1980
1990
2000
2010
YEAR

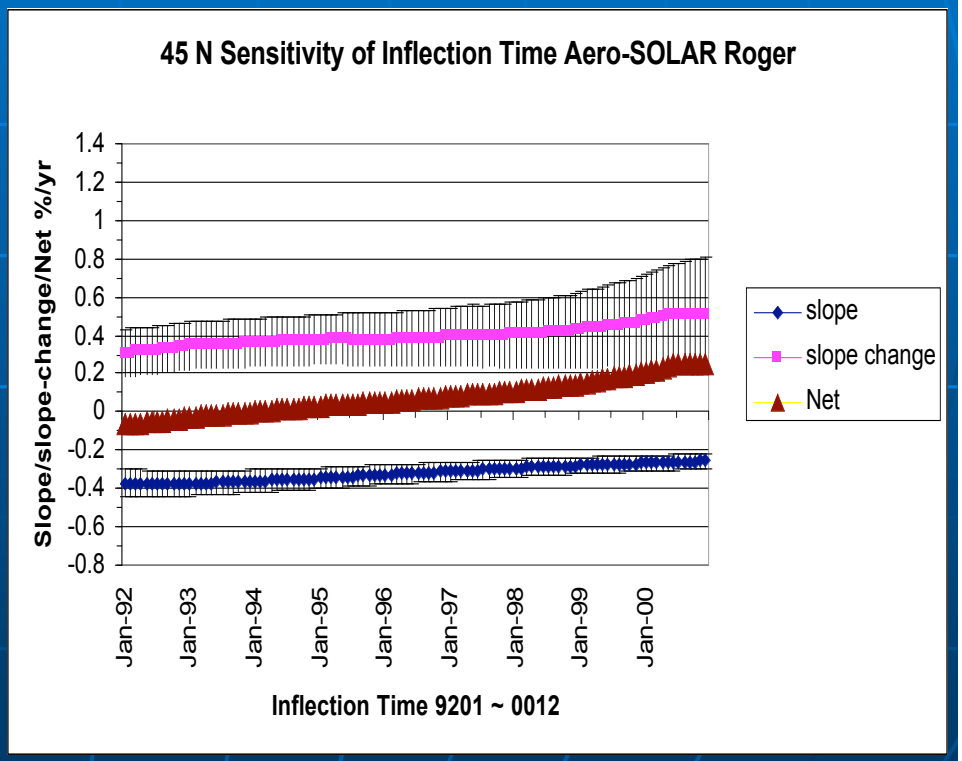
Sensitivities of Changing the Inflection Point



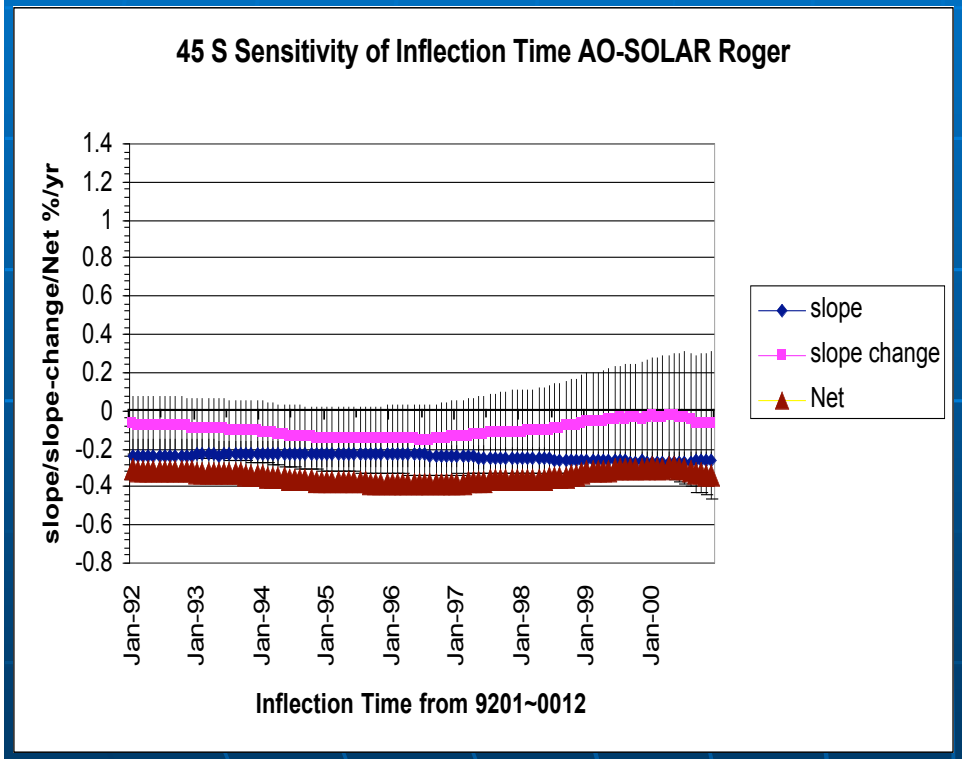


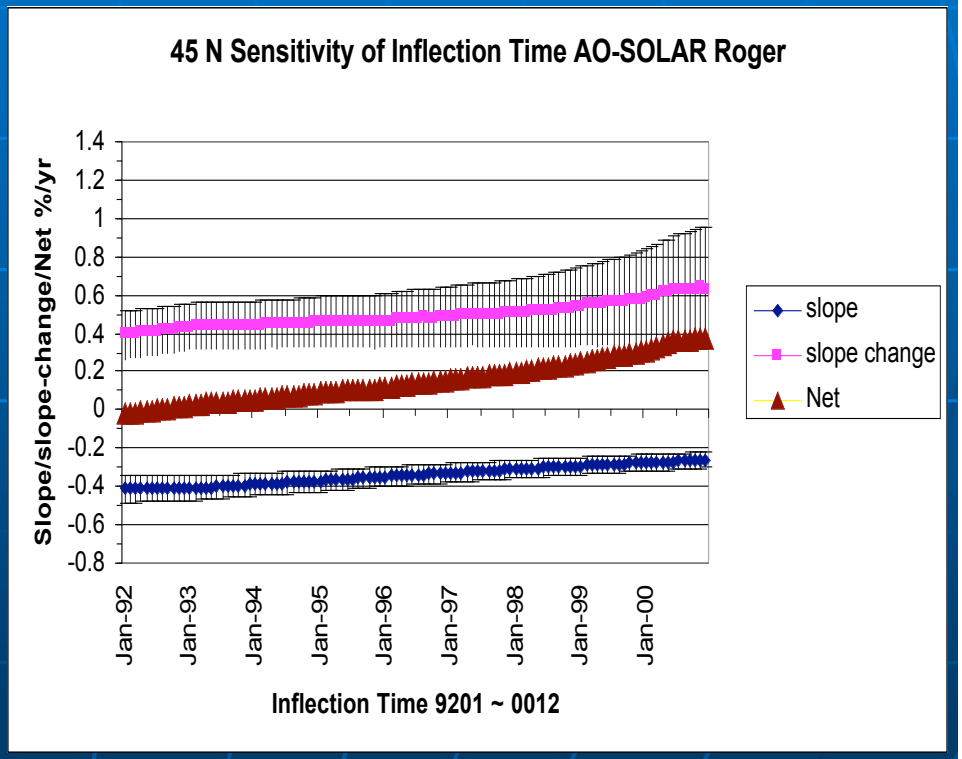
Sensitivities of Changing the Inflection Point



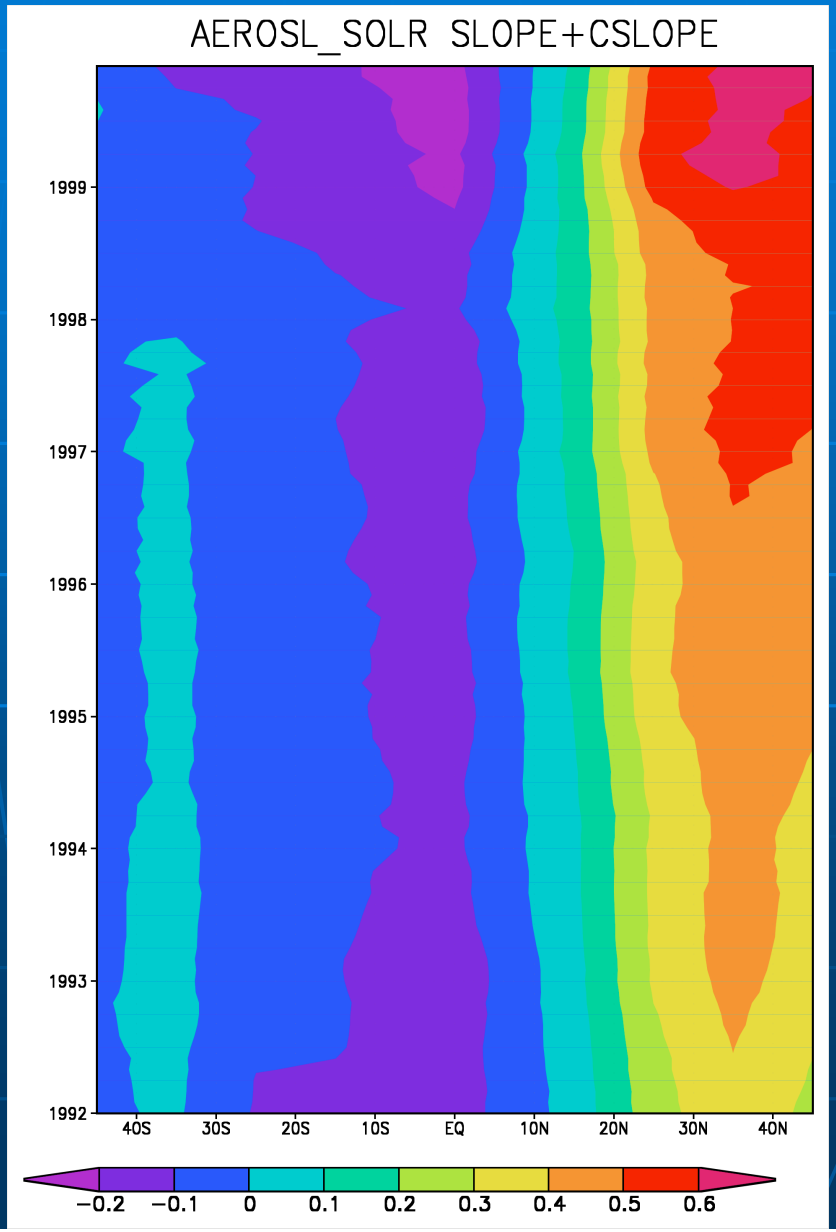


Sensitivities of Changing the Inflection Point





Net Slope


AEROSL_SOLR SLOPE+CSLOPE
1999
1998
1997
1996
1995
1994
1993
1992
40S
30S
20S
10S
EQ
10N
20N
30N
40N
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5
0.6

Conclusion

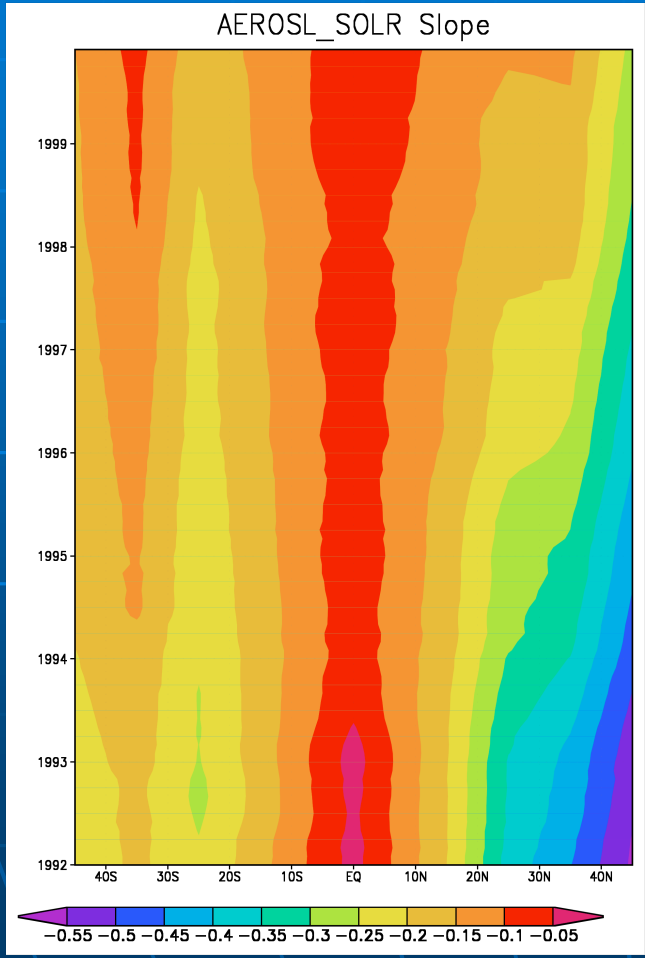
1. Altering the date of the inflection point does not alter the fundamental conclusion that there is a positive change in trend during the latter years in the NH.

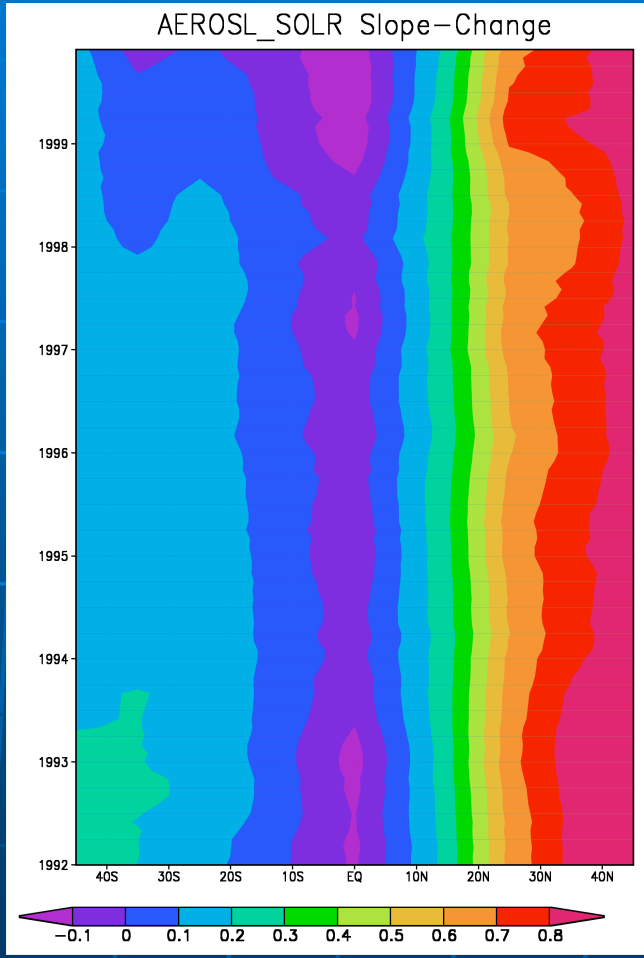
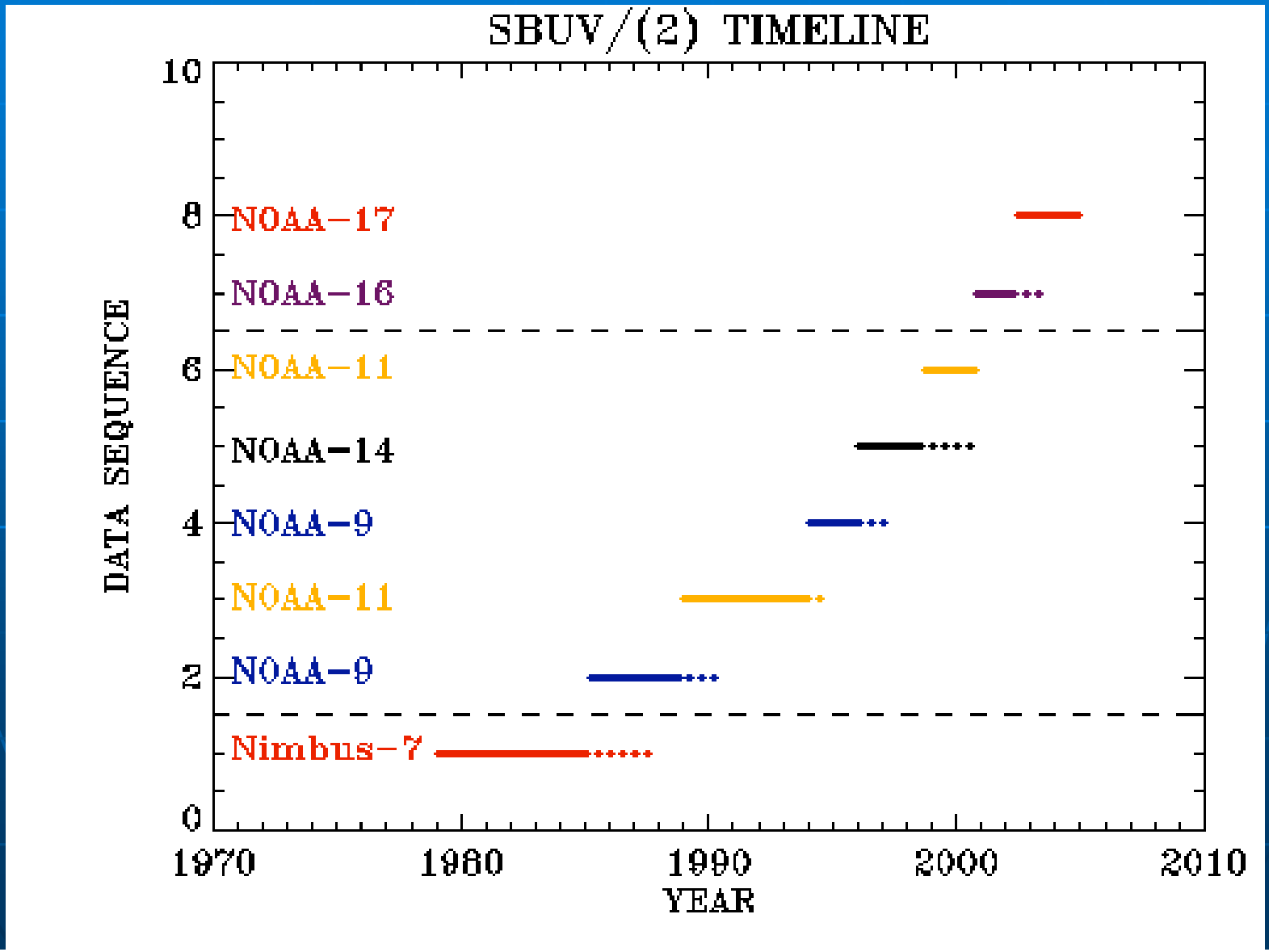
2. This positive change in trend suggests that the ozone change has flattened-out in the latter years, but only become positive for the mid-lat NH. Hence, we can not state that an "ozone recovery" has been initiated.

3. The negative change indicated in the tropical region is a new result that must be examined within a chemistry-climate change context.

4. We should be looking at the ozone and temperature within a combined system that accounts for the various long-term forcings in a deterministic way.

Aerosol+Solar





Satellite Ozone measurement