

Examining Performance of TOVS/ATOVS in CFSR

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An important measure of performance in reanalysis is continuity.

Use of satellites in reanalysis poses many potential discontinuities.

Steps were taken in CFSR to mitigate discontinuity, including:

- Four month bias correction spin ups for each satellite**
- Evolving CO2 specification over the 30 year period.**
- SSU cell pressure correction added to CRTM.**
- Recalibrated radiance for MSU1,2,3, N10-N14.**
- One year overlap at production stream boundaries**

The presentation looks at how discontinuities were resolved in a selected set of HIRS MSU SSU & AMSUA channels.

Selected TOVS/ATOVS Channel Weighting Function Peaks

hPa	HIRS	MSU	SSU	AMSUA
1.5			ch3	
2.5				ch14
5			ch2	ch13
12				ch12
15			ch1	
25				ch11
30	ch1			
50				ch10
60	ch2			
85		ch4		ch9
100	ch3			
150				ch8
250		ch3		ch7
400	ch4			ch6
600	ch5			
700		ch2		
800	ch6			ch5
900	ch7			
surface		ch1		

Bold channels' CFSR performance is examined in this presentation

Three charts are shown for each selected channel

- 1) **Time series monthly mean OB-ANL and BIASCR**
- 2) **Time series monthly mean CFSR Analysis**
- 3) **Time series monthly mean Analysis with OB value overlay**

Monthly mean 00z total (red) and accepted (green) ob counts are shown

Vertical black lines indicate the introduction of each TOVS/ATOVS platform

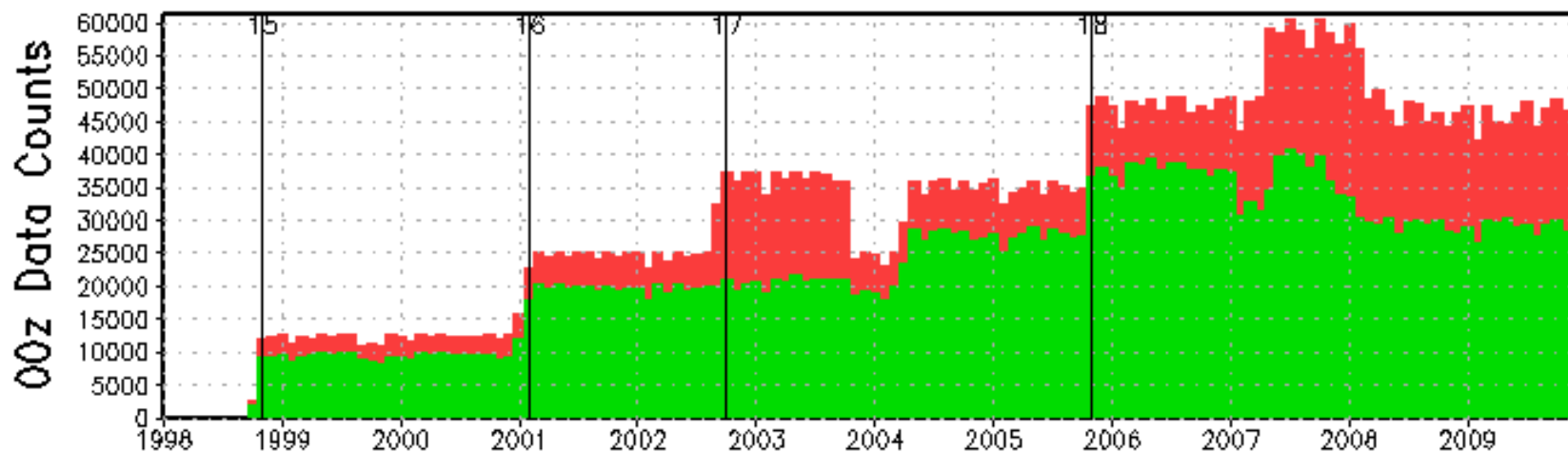
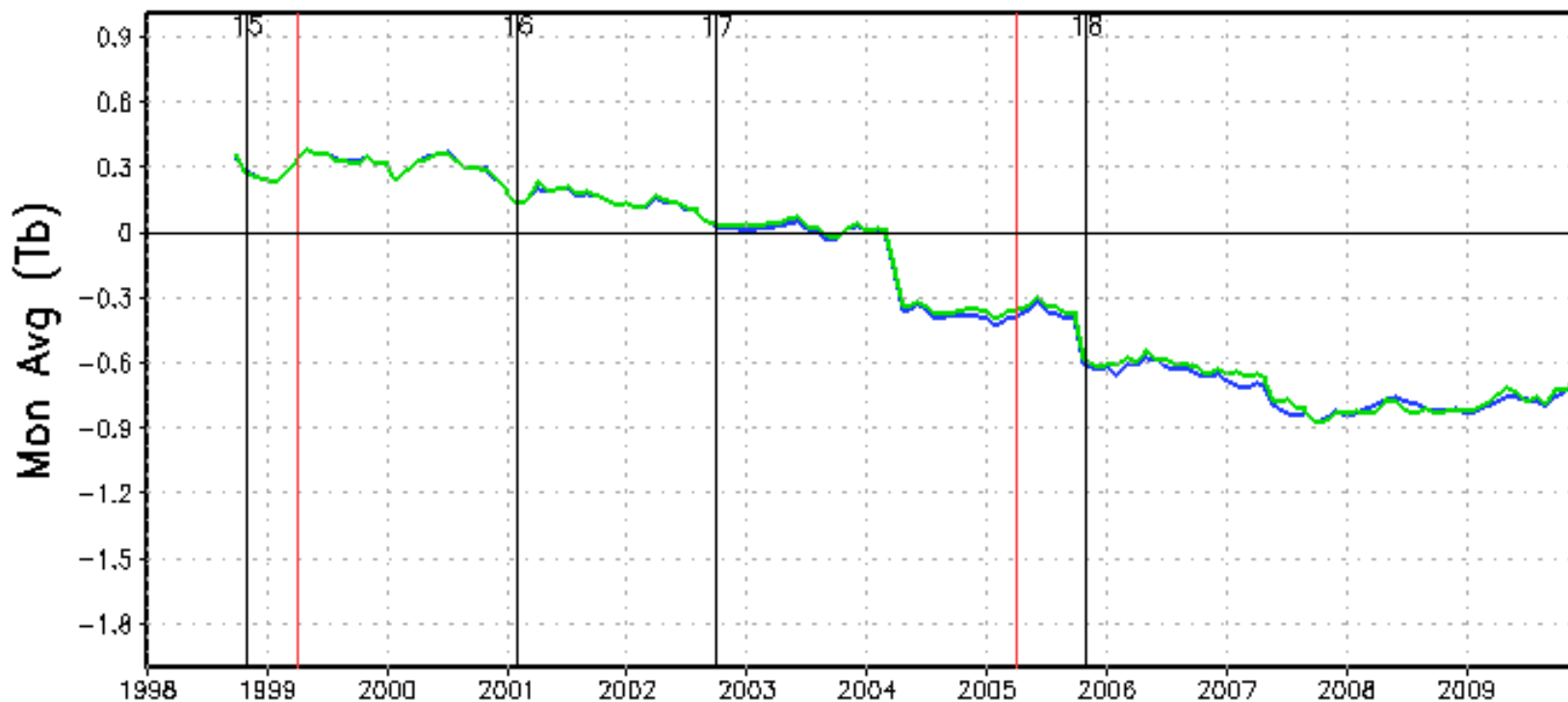
Vertical red lines indicate the beginning month of each production stream.

NOTE: HIRS/2/3/4 are combined in the HIRS charts.

OB-ANL

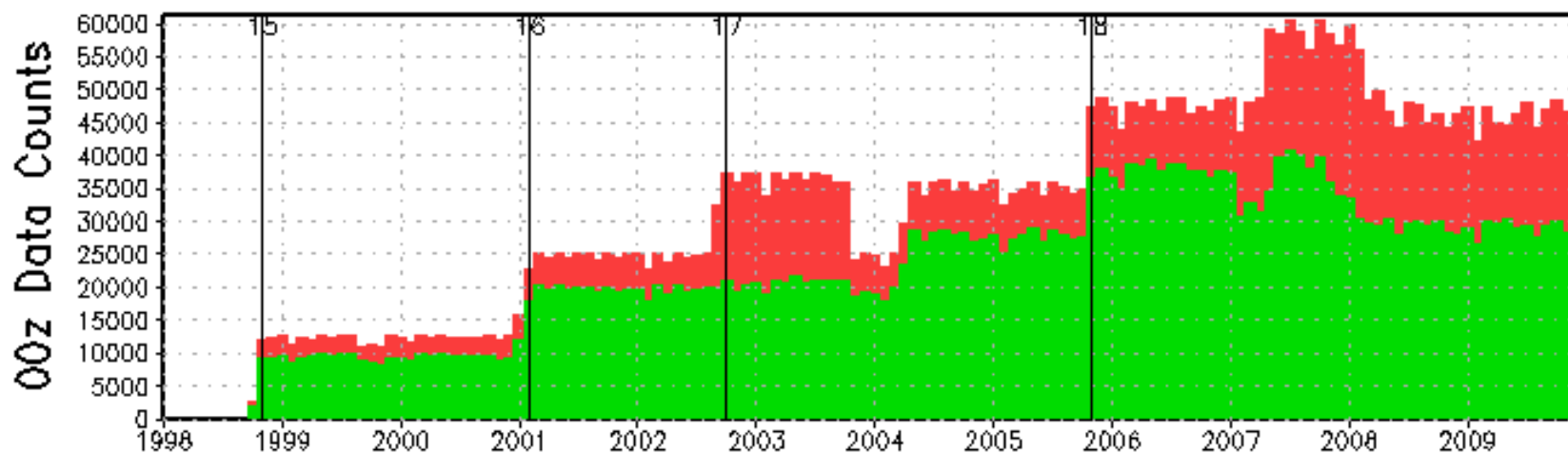
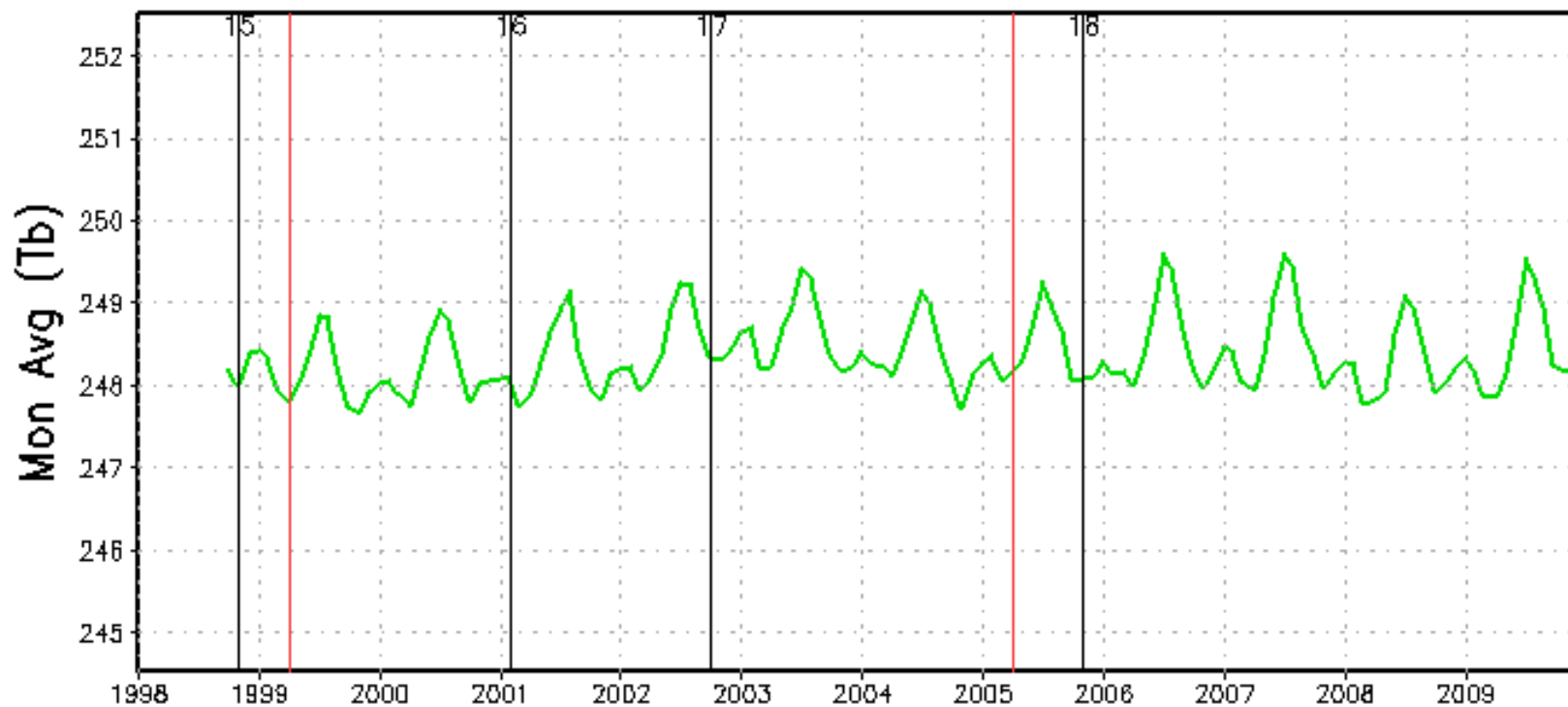
amsua.all Ch05 800hPa Global

BIASCR



CFSR

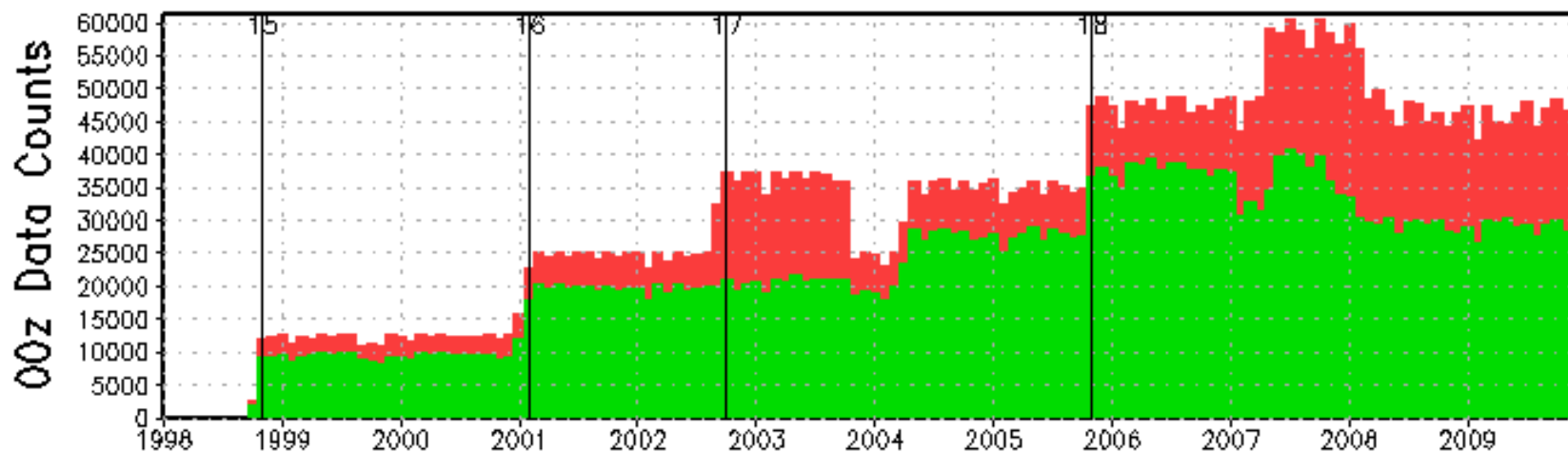
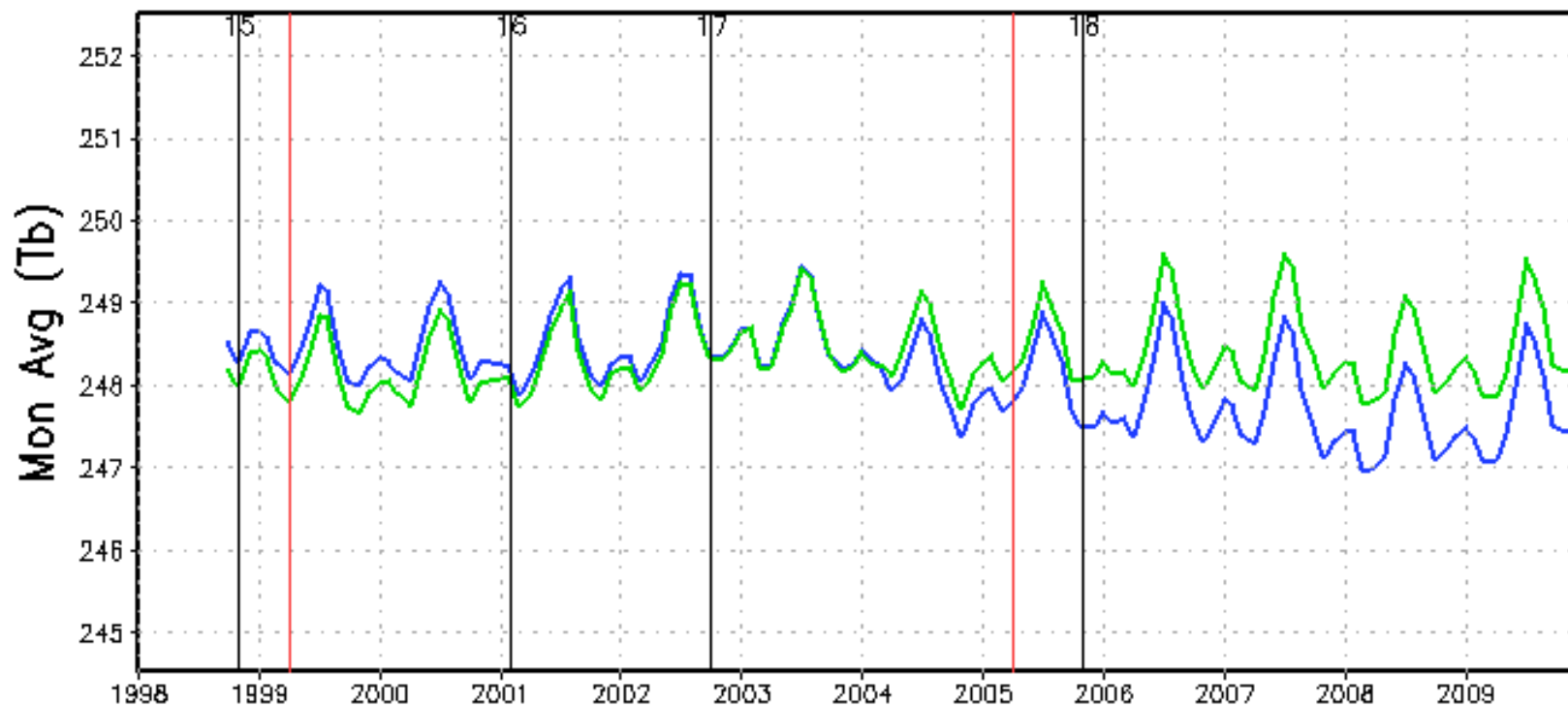
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CFSR

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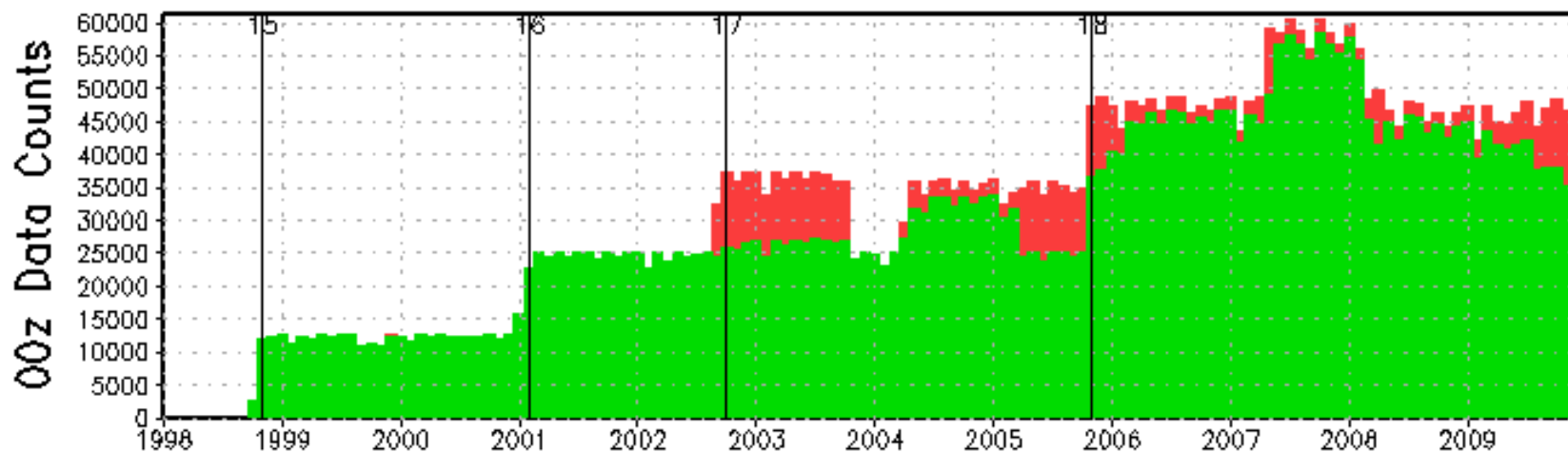
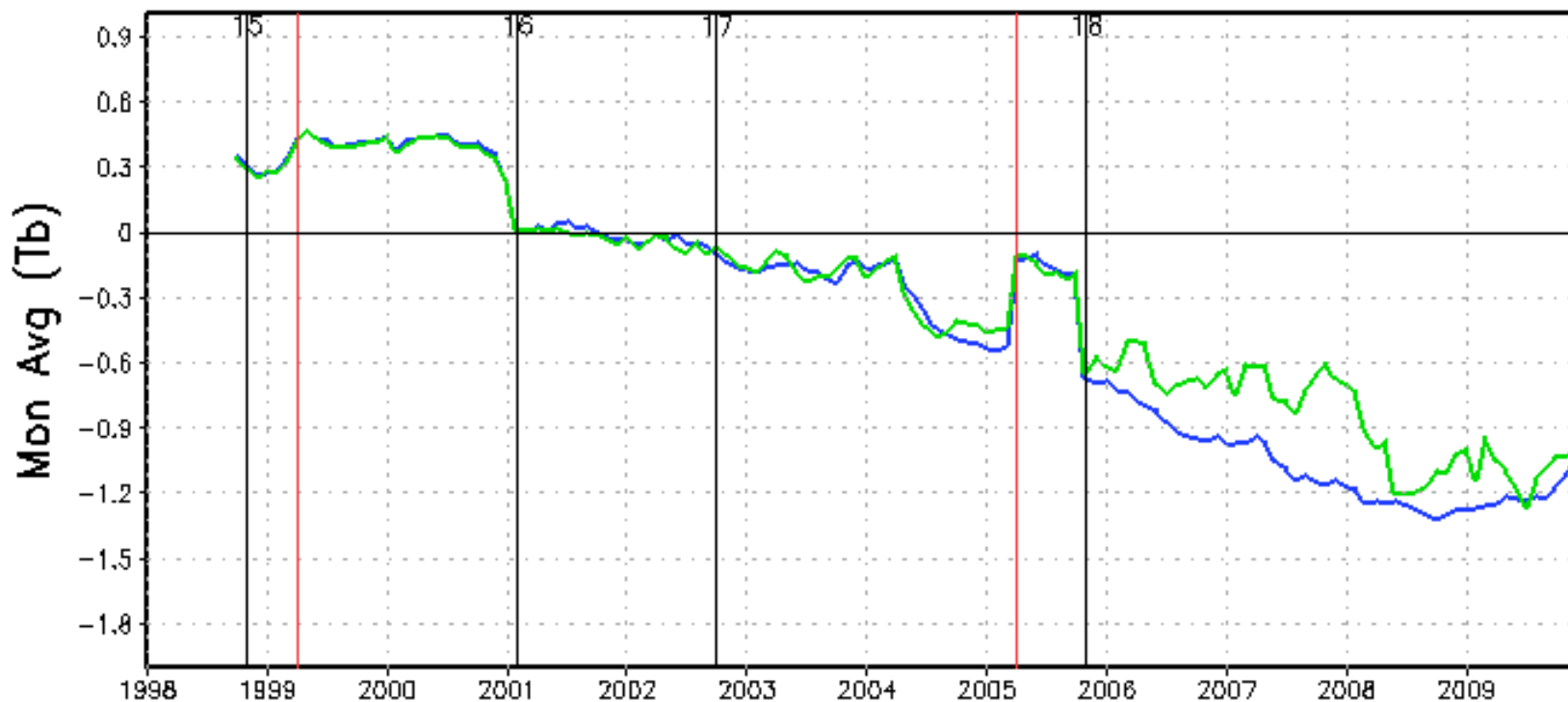
OBS



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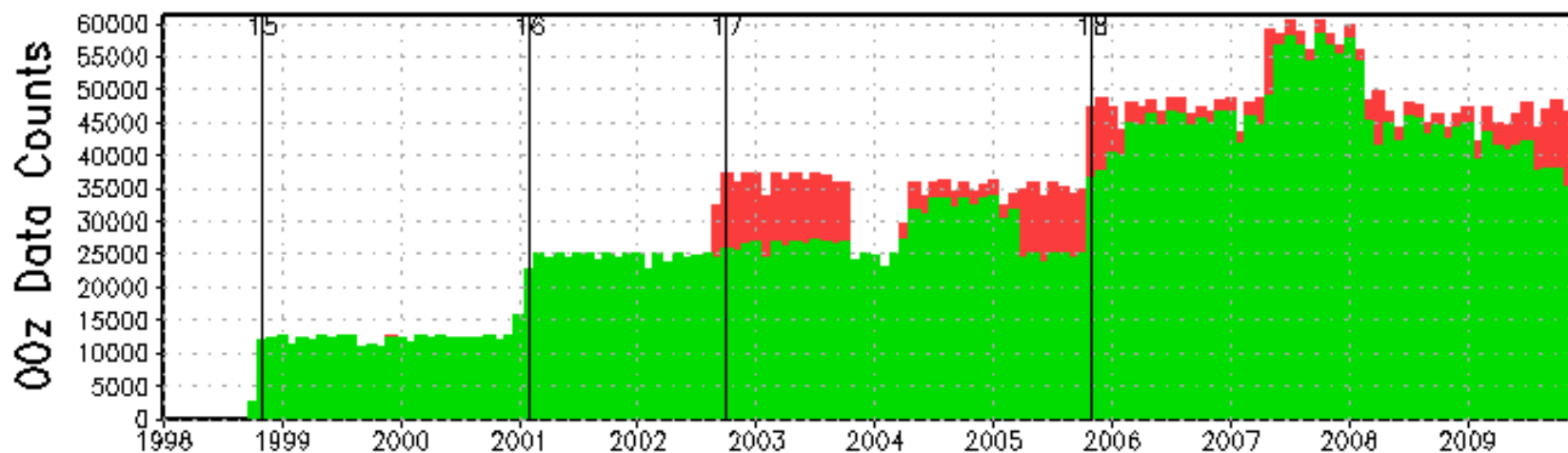
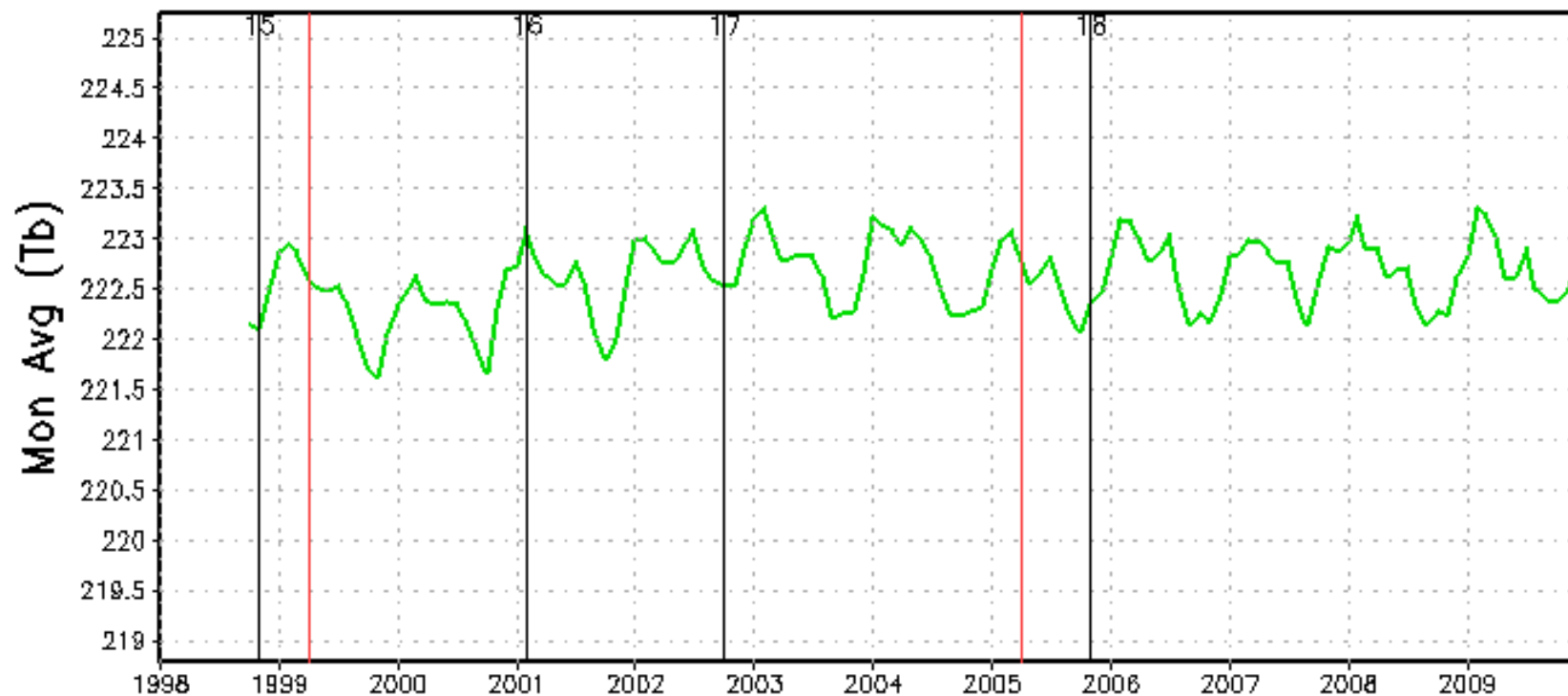
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BIASCR



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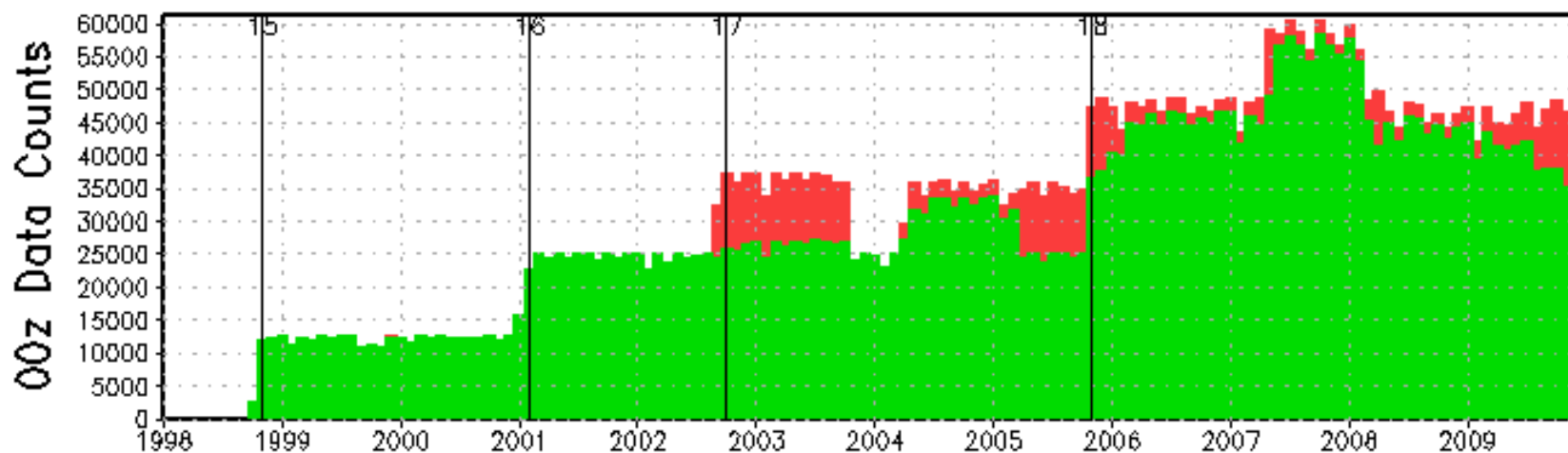
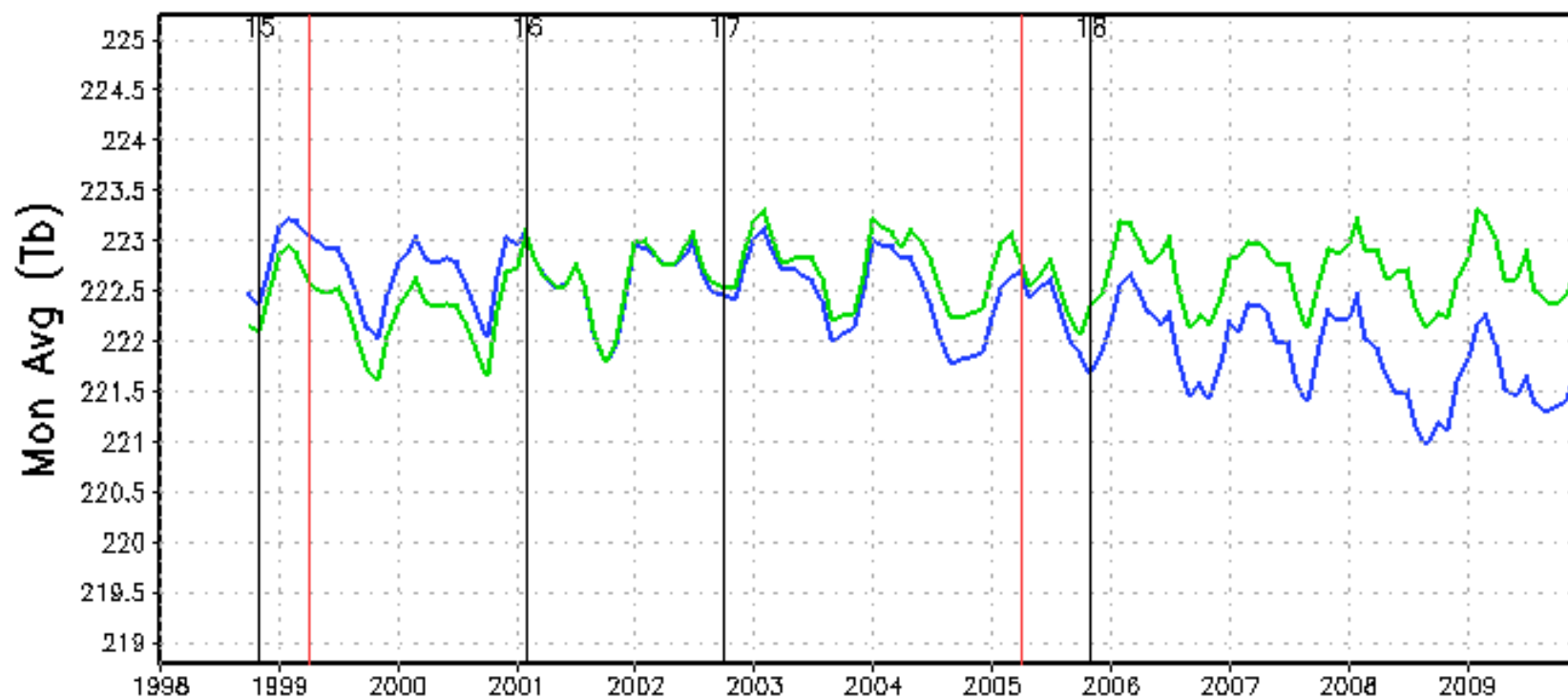
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CFSR

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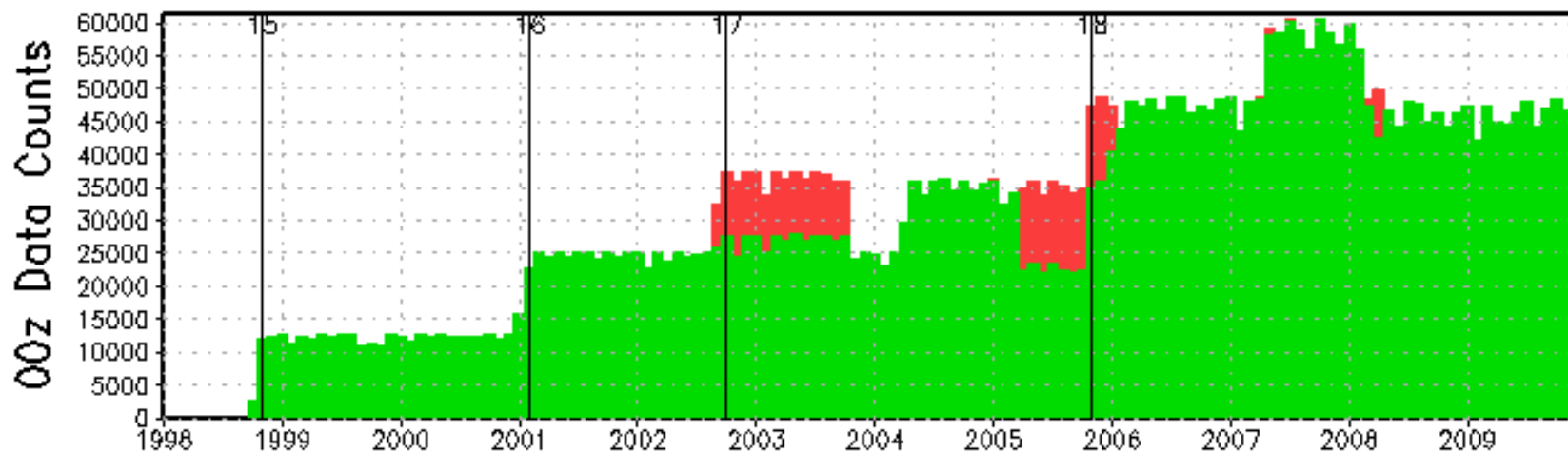
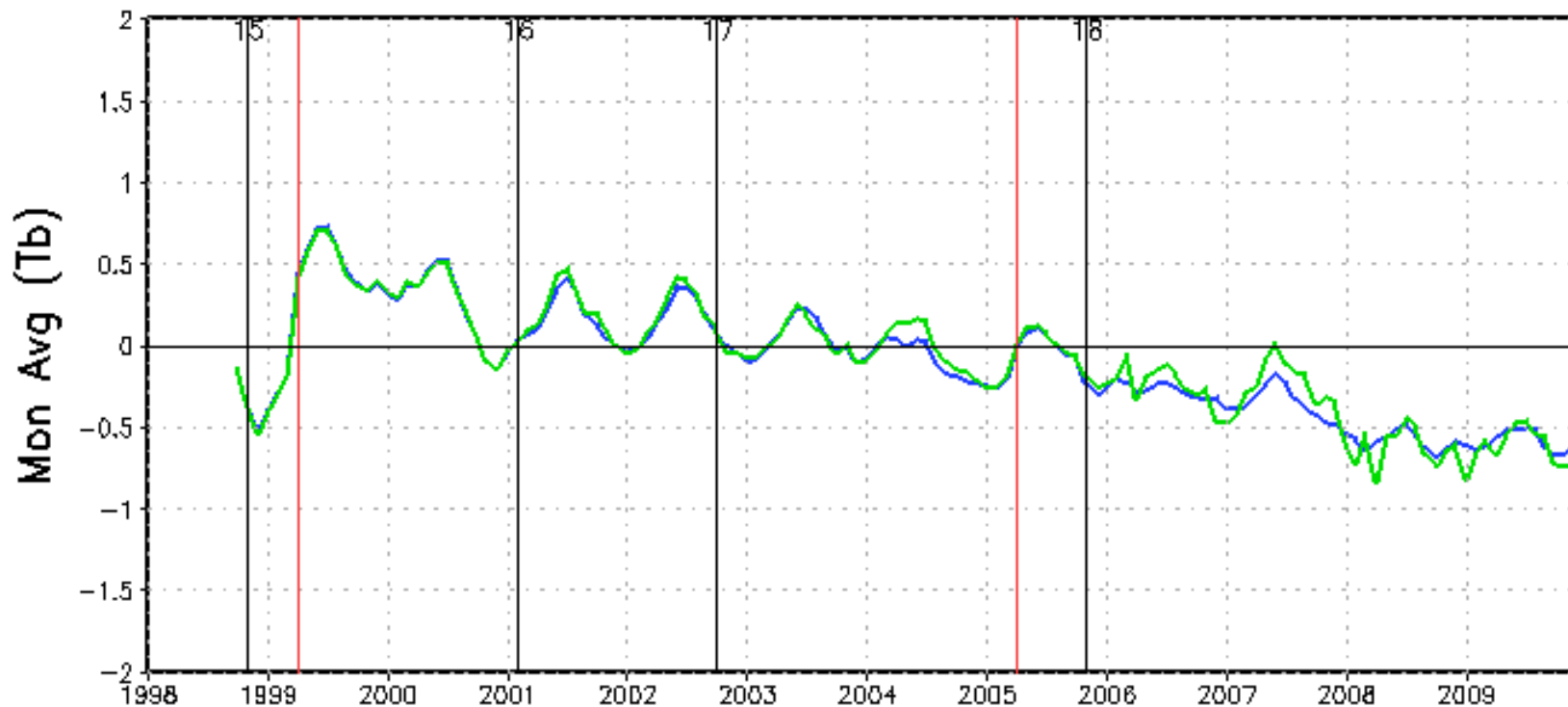
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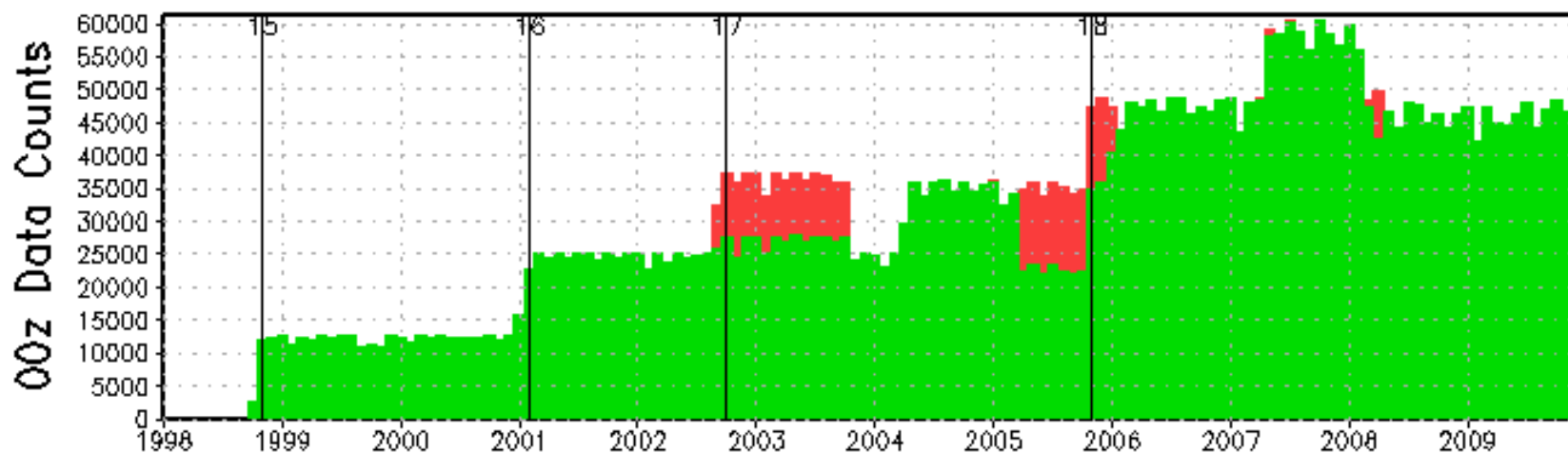
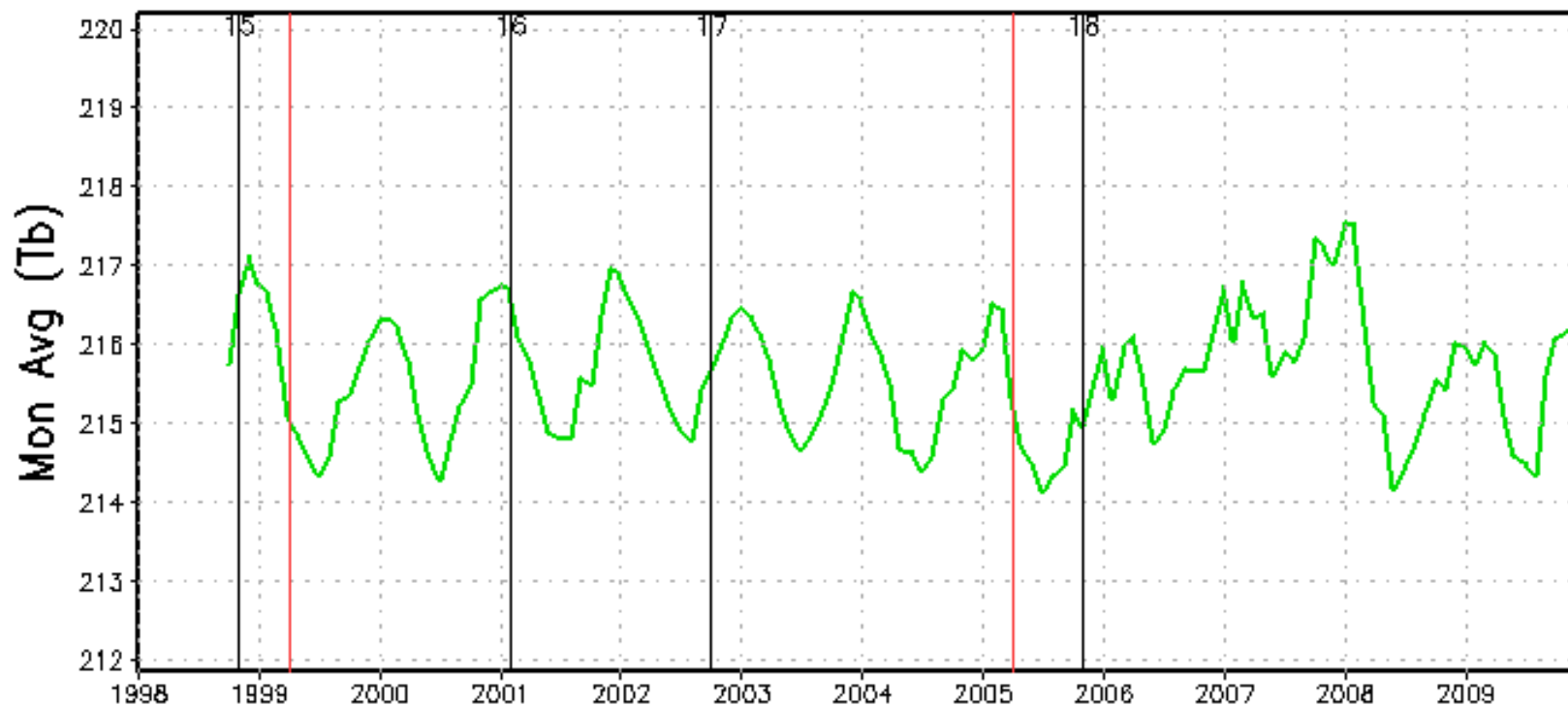
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BIASCR



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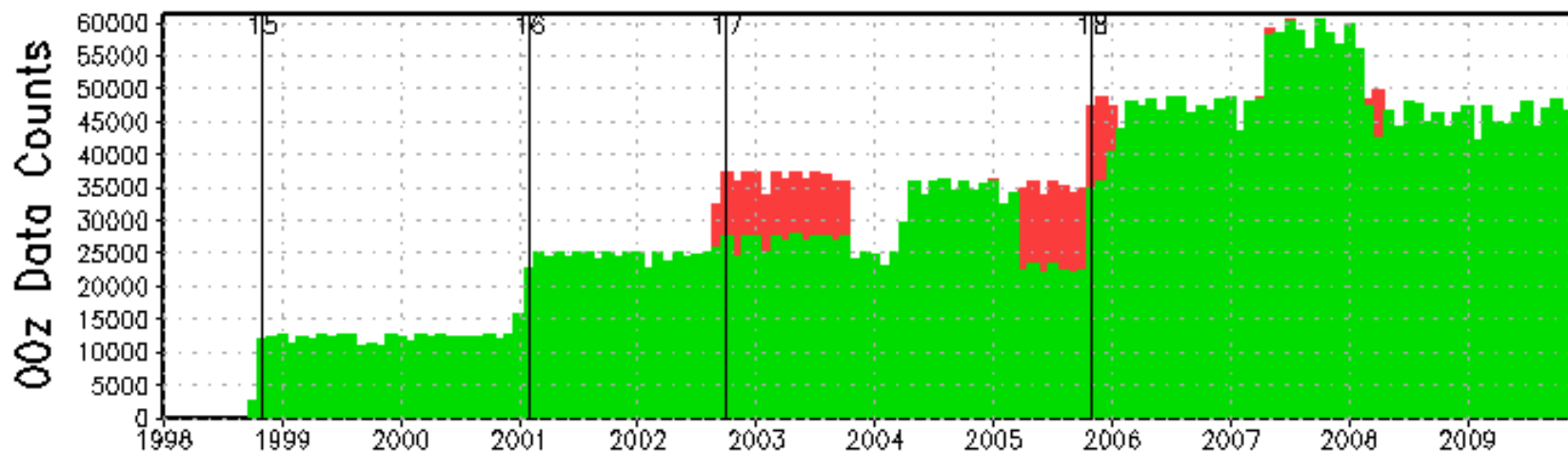
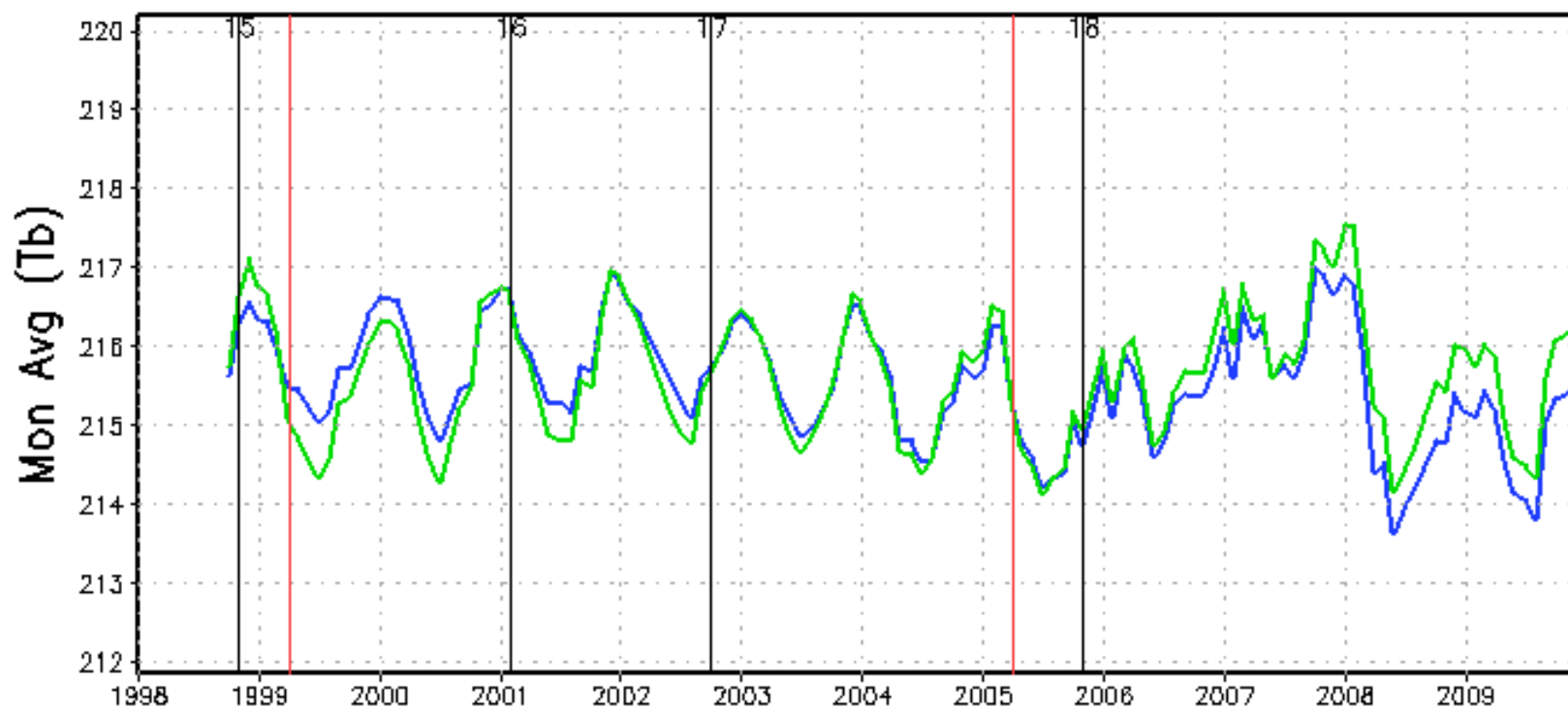
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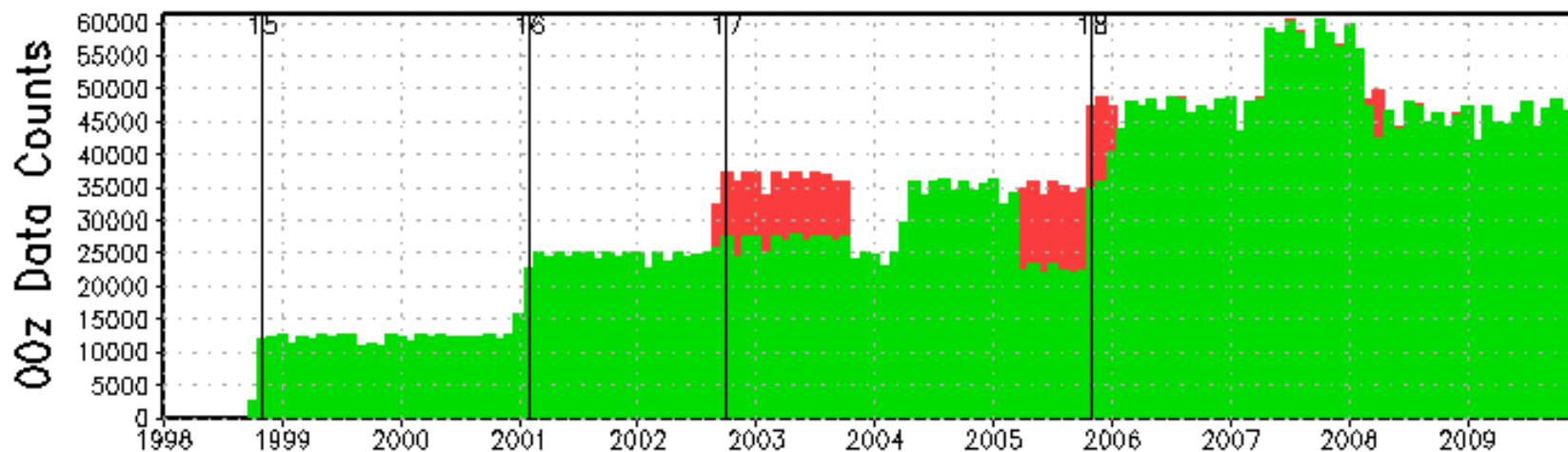
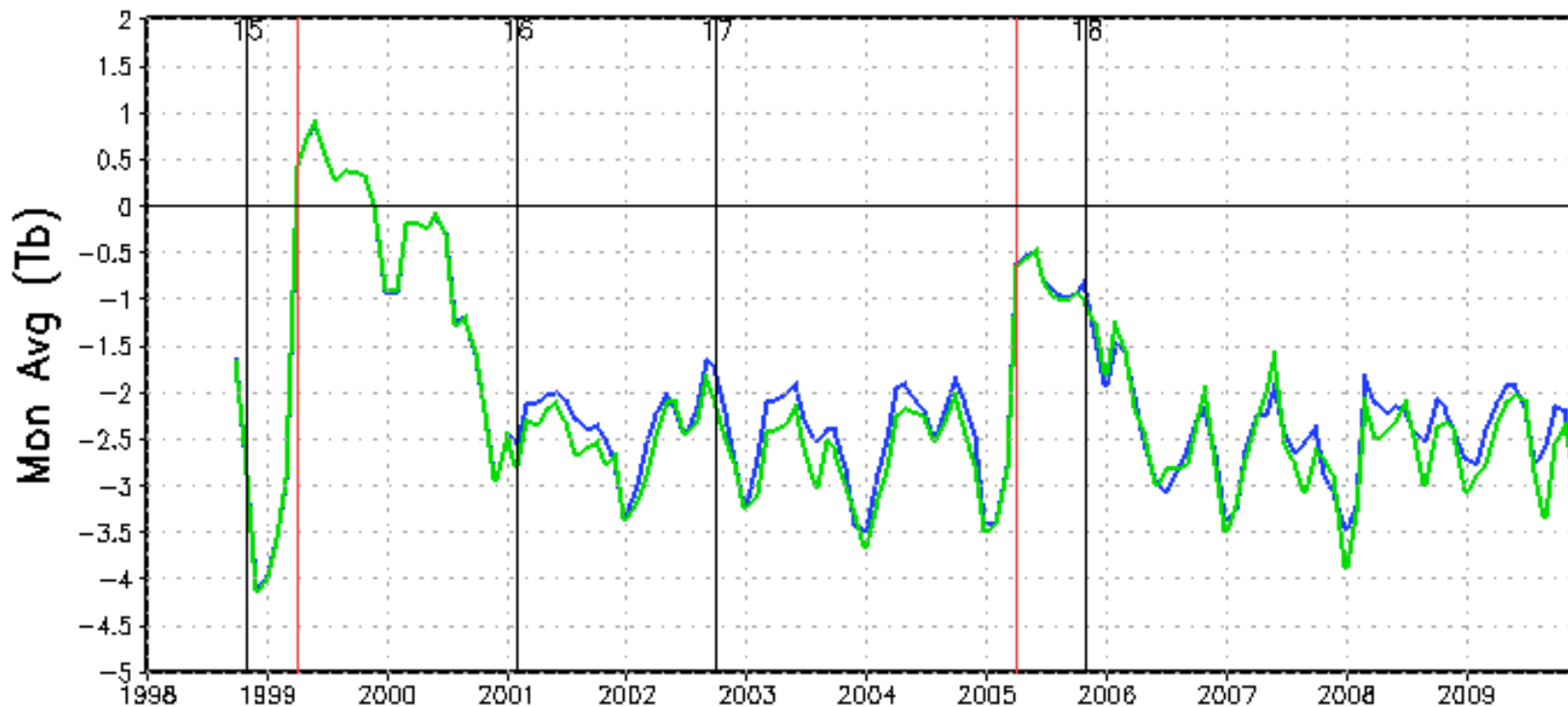
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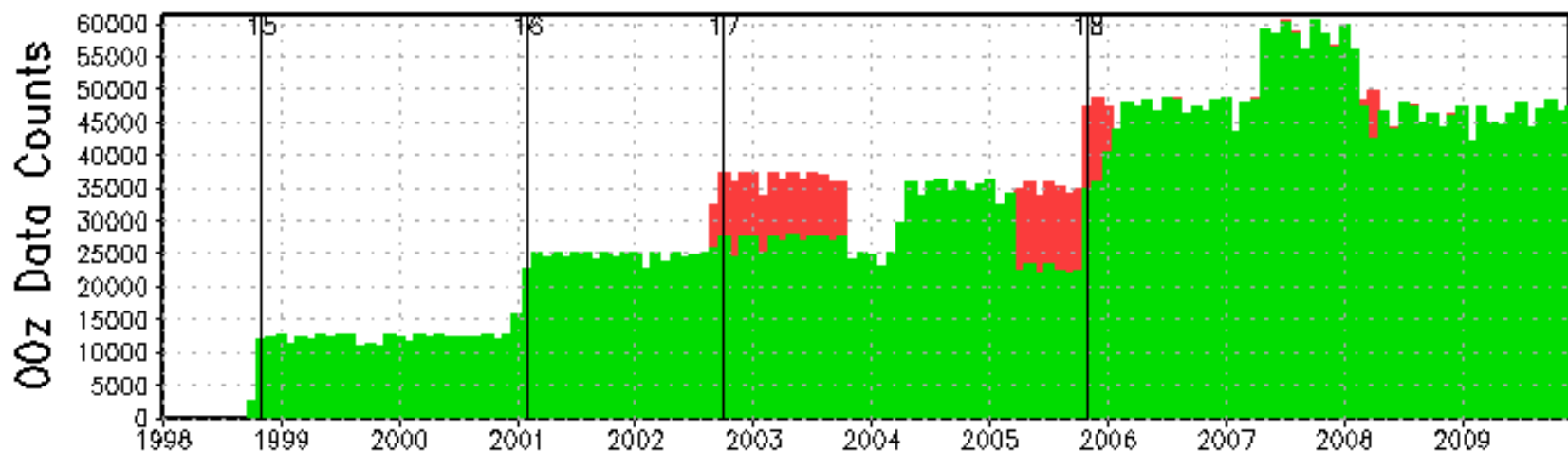
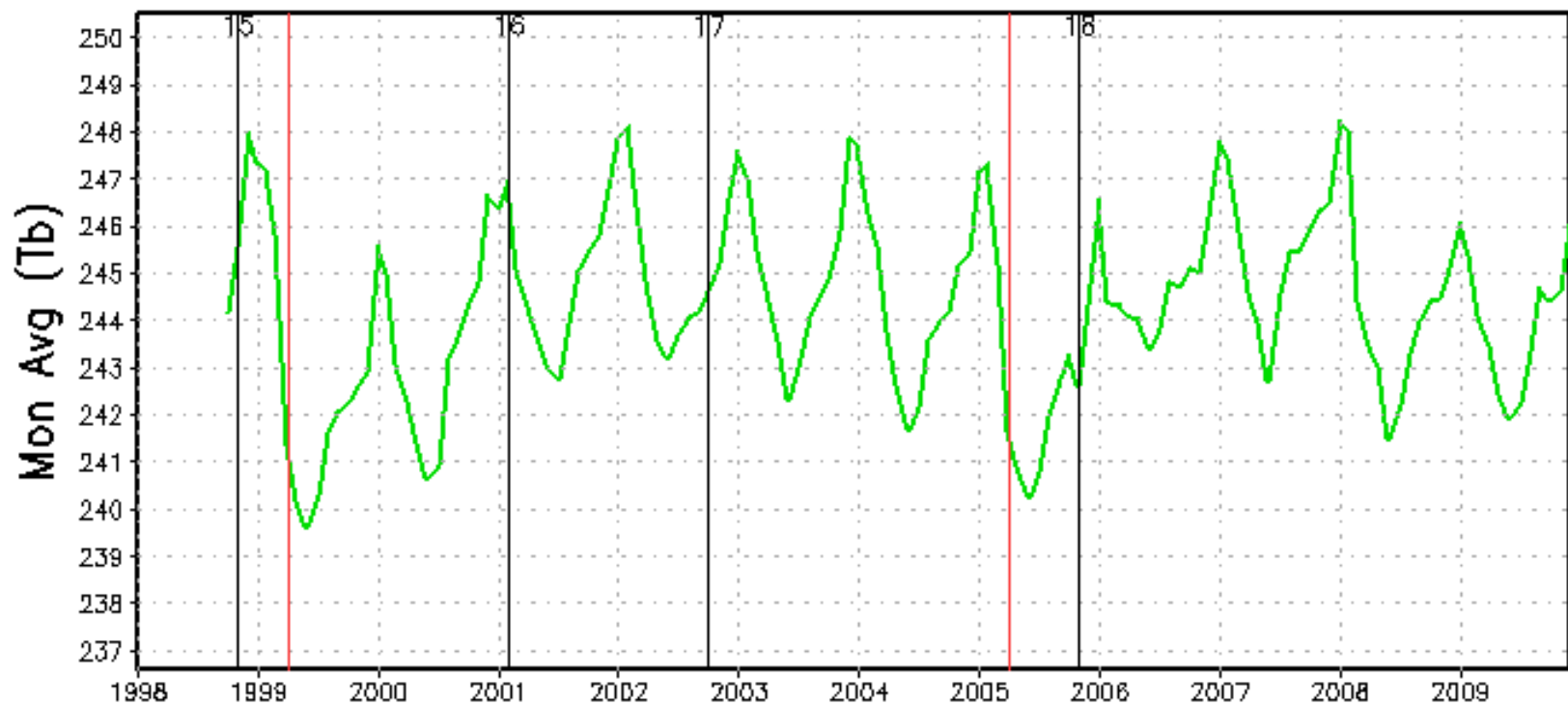
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BIASCR



CFSR

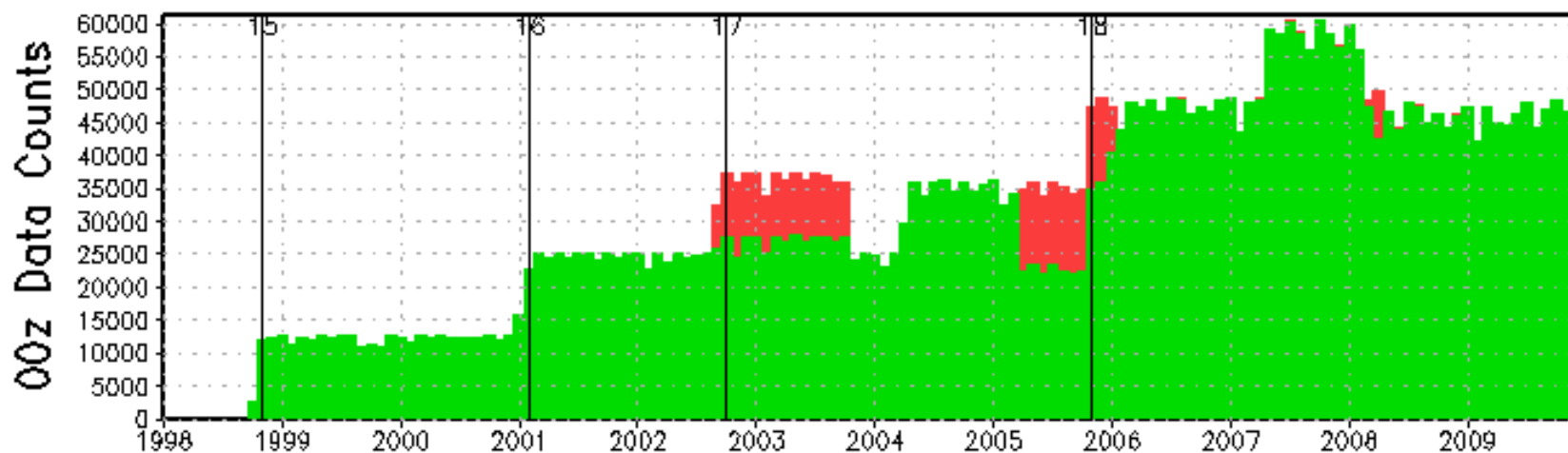
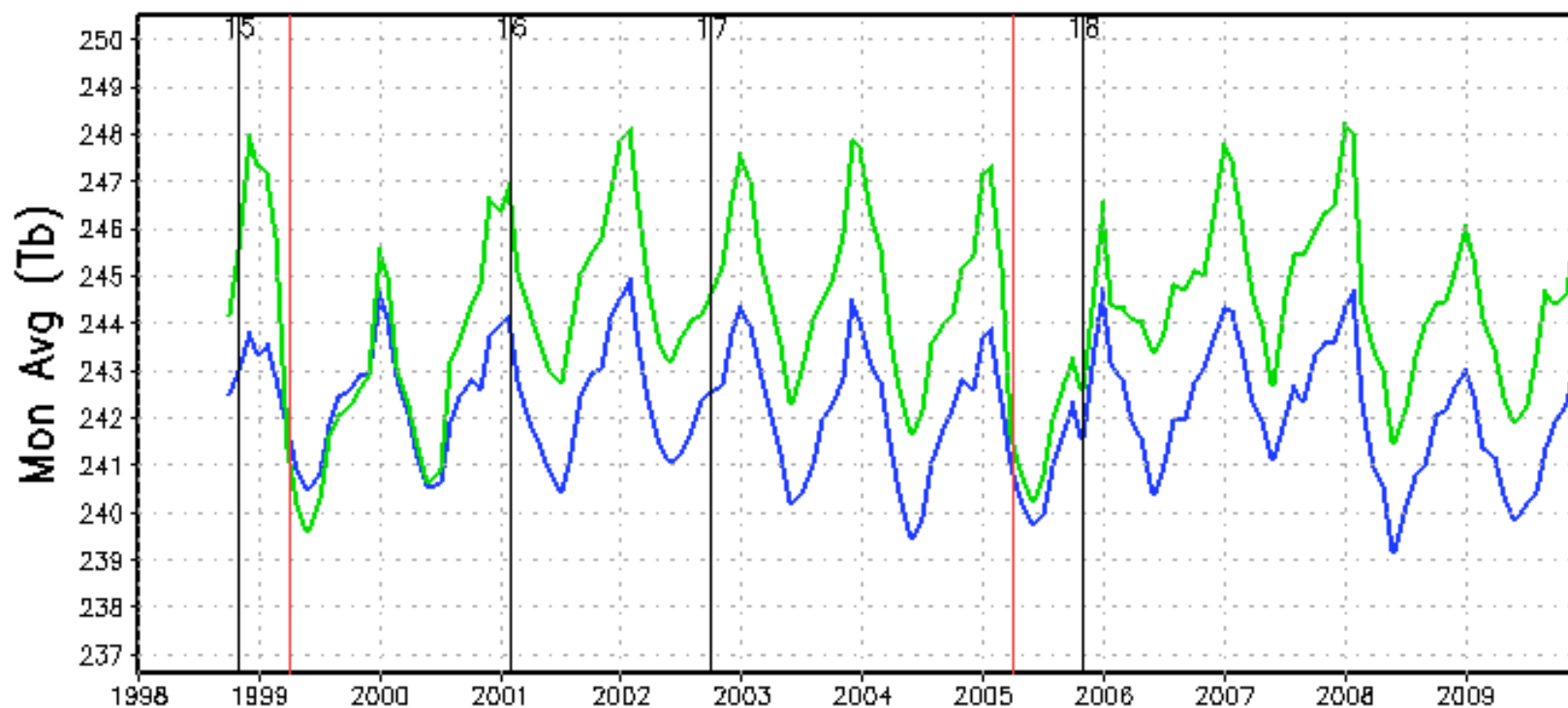
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CFSR

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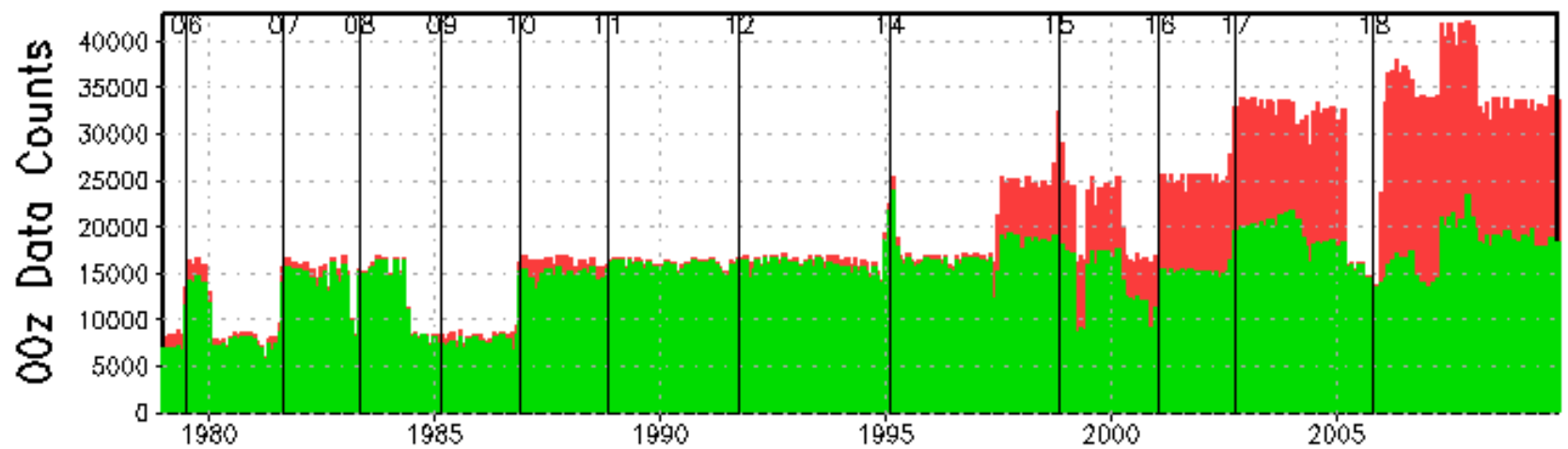
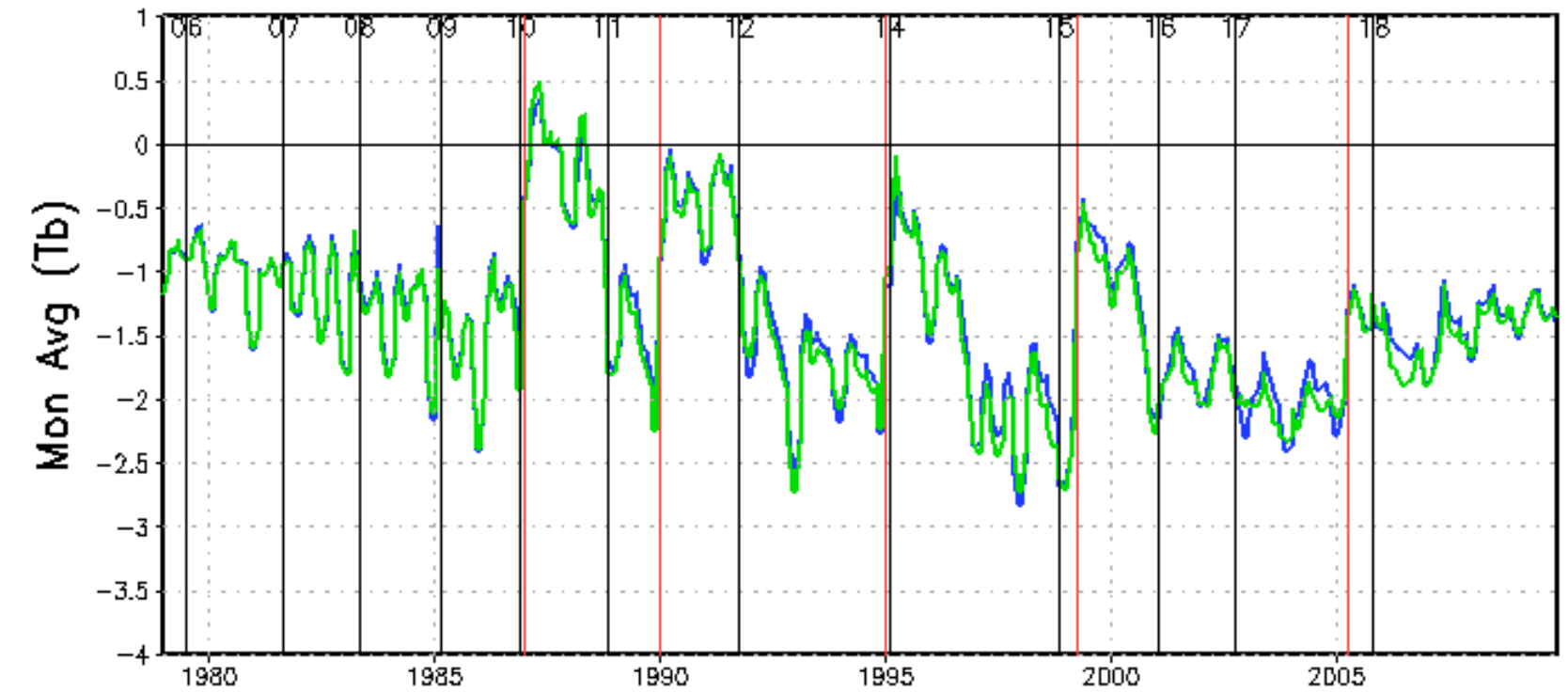
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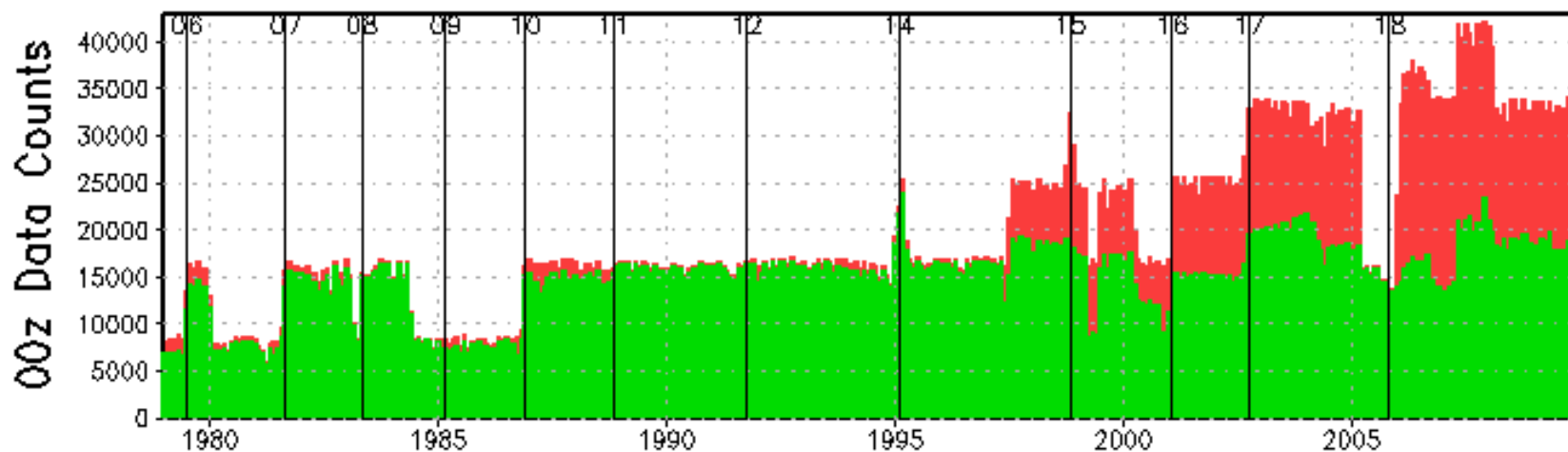
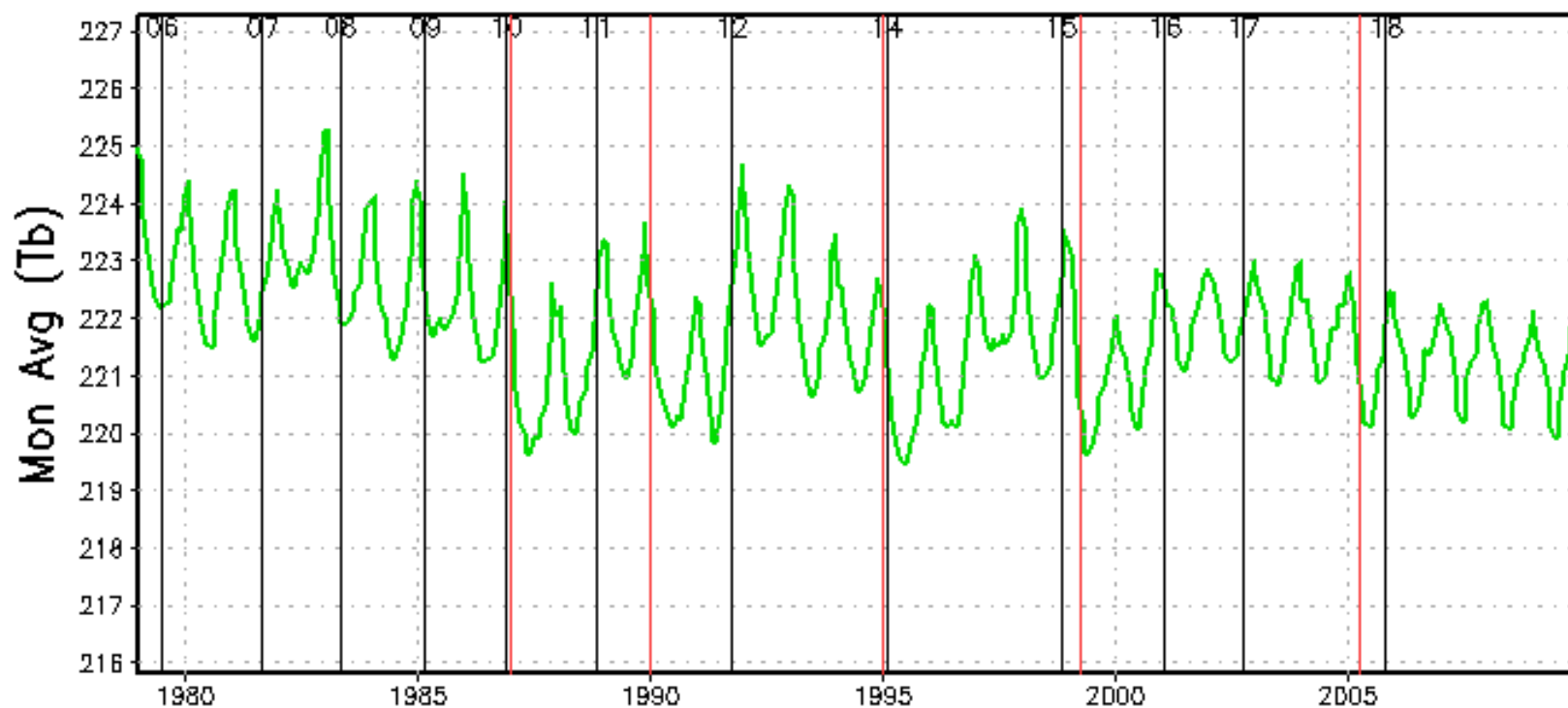
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BIASCR



CFSR

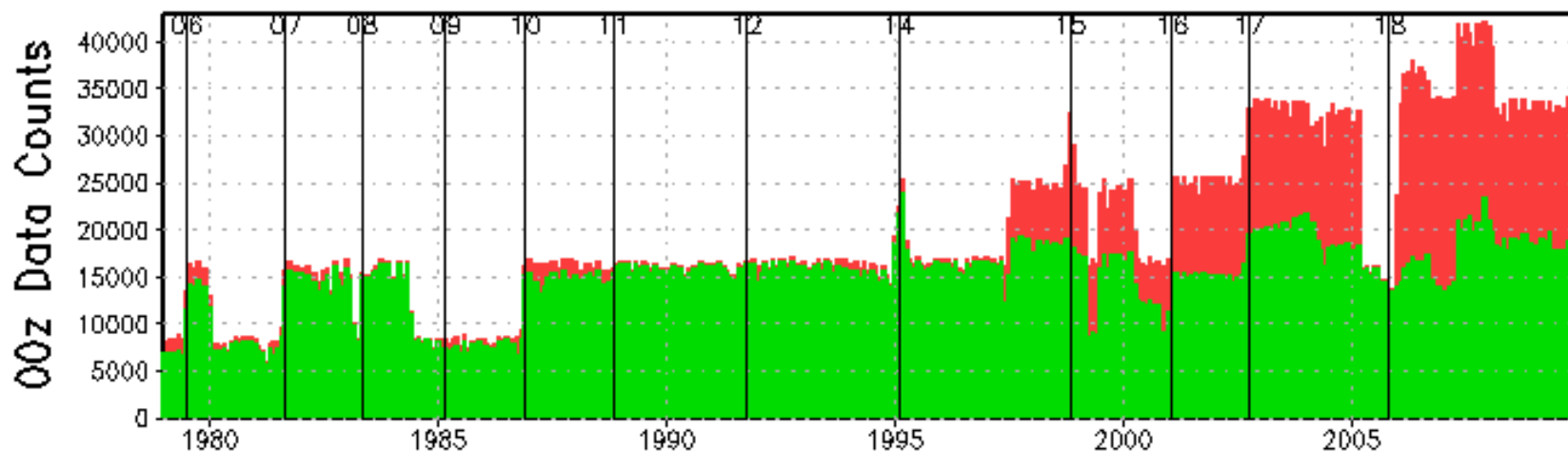
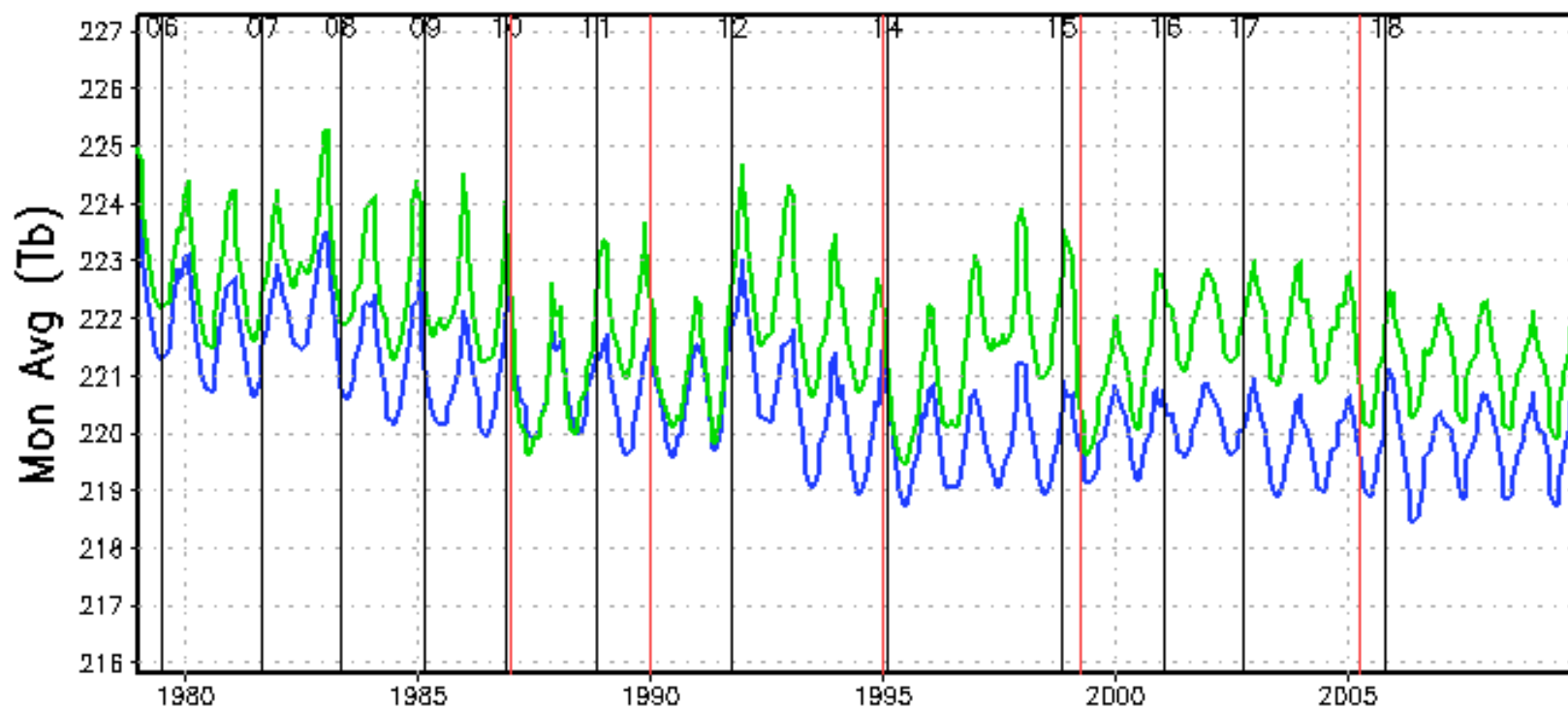
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CFSR

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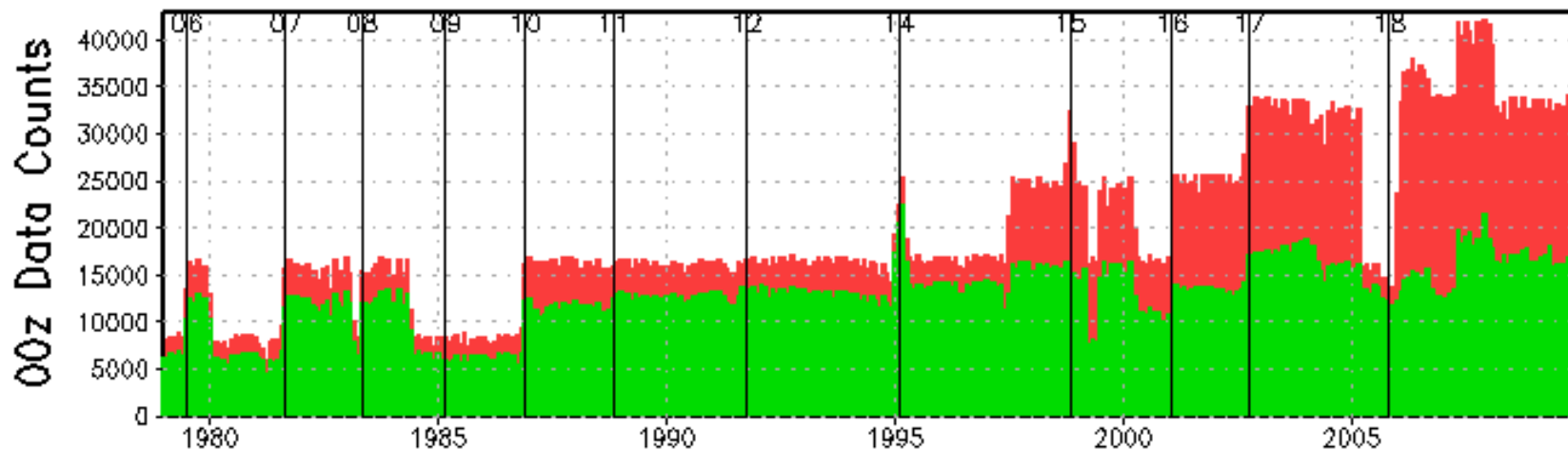
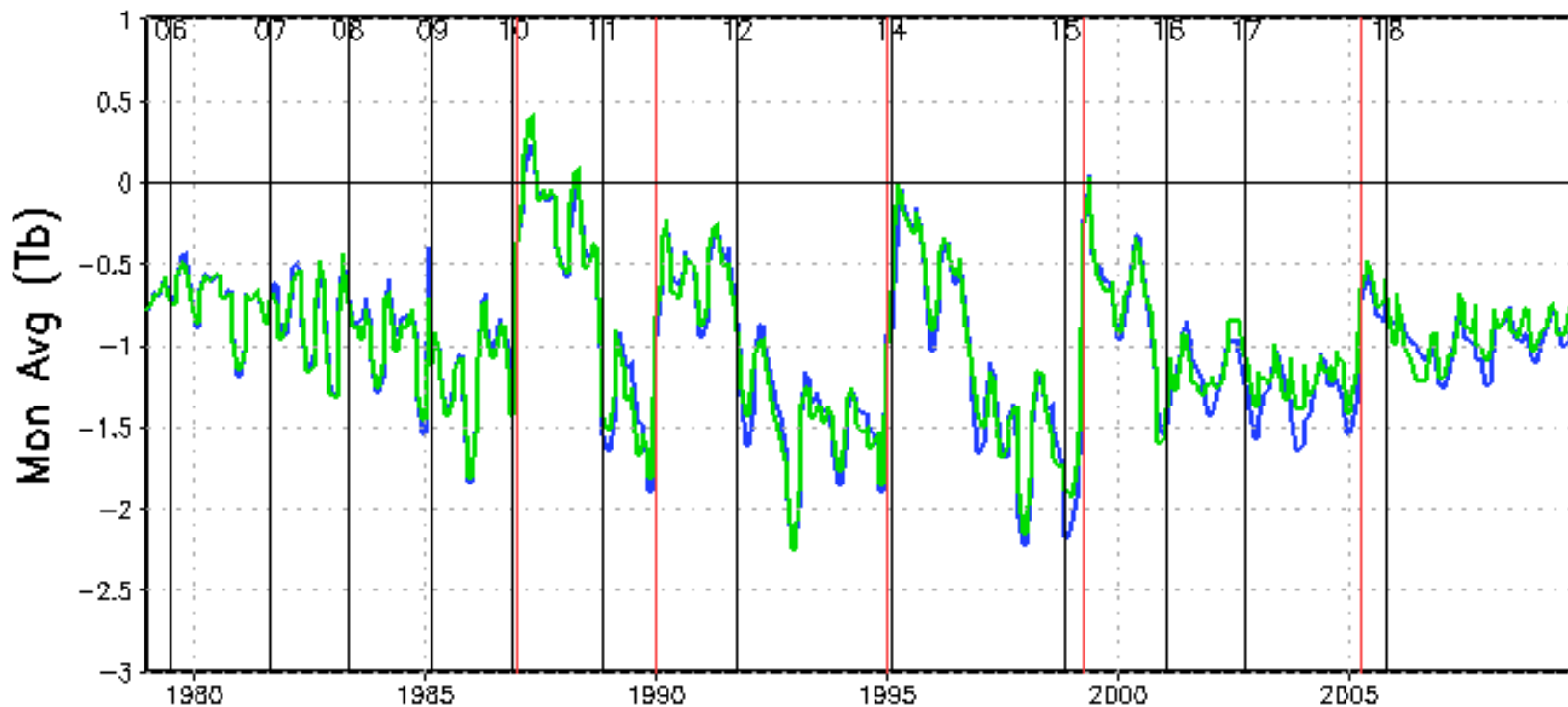
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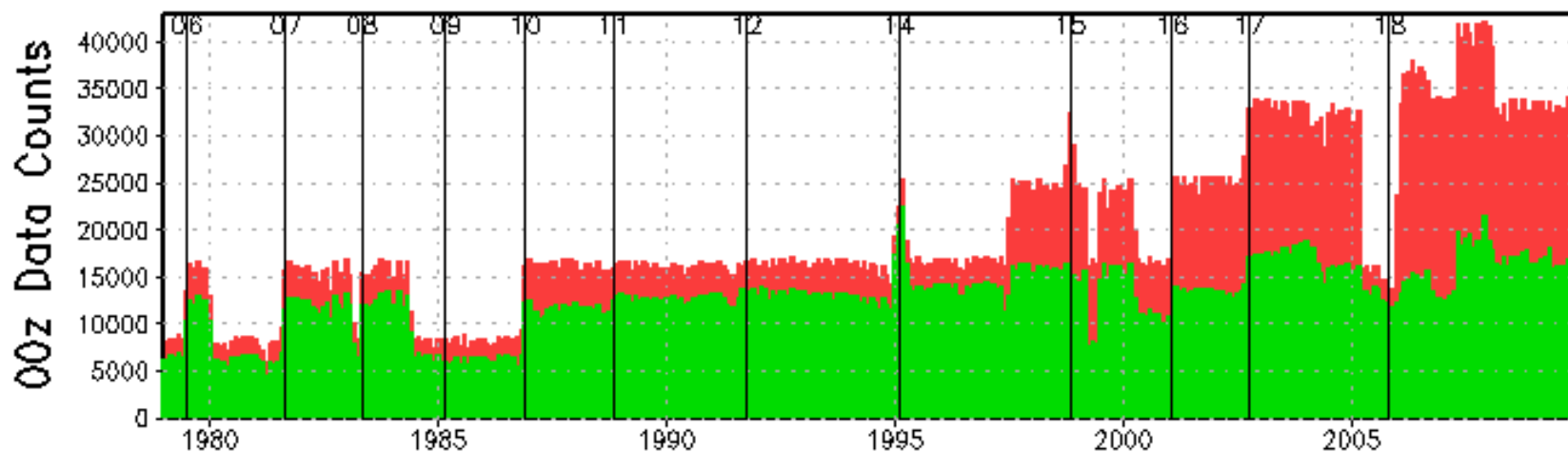
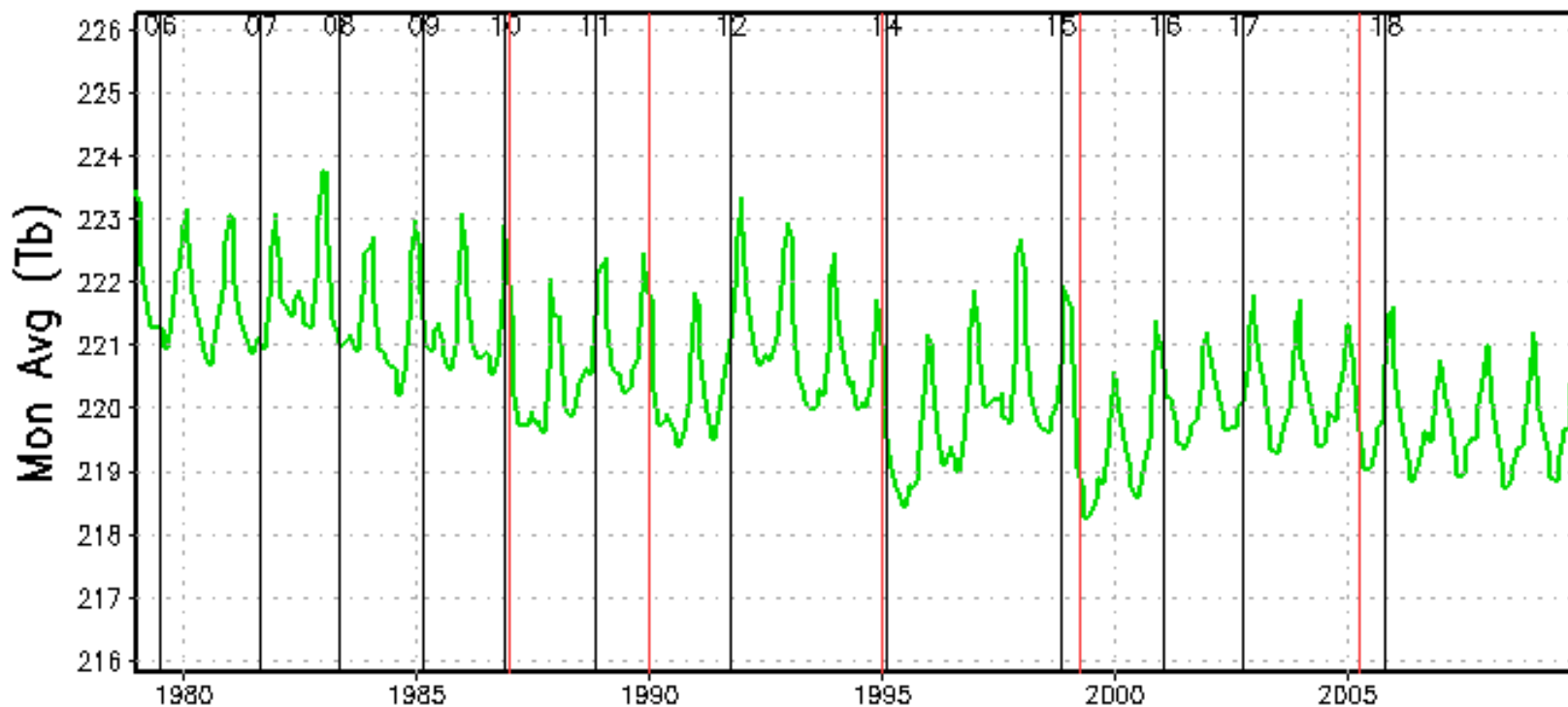
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BIASCR



CFSR

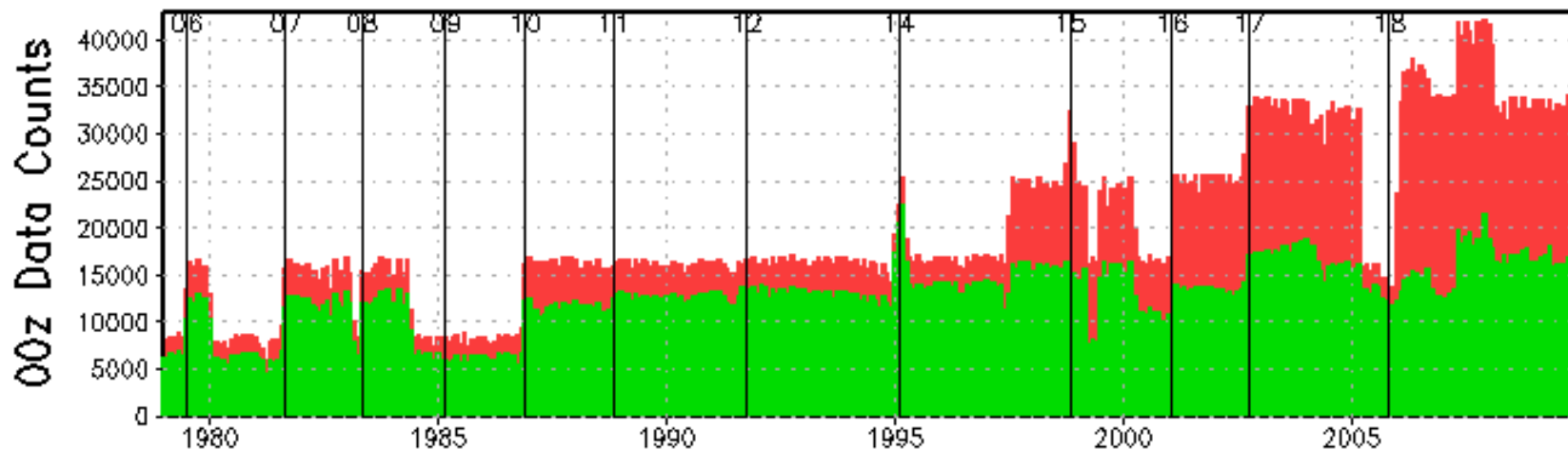
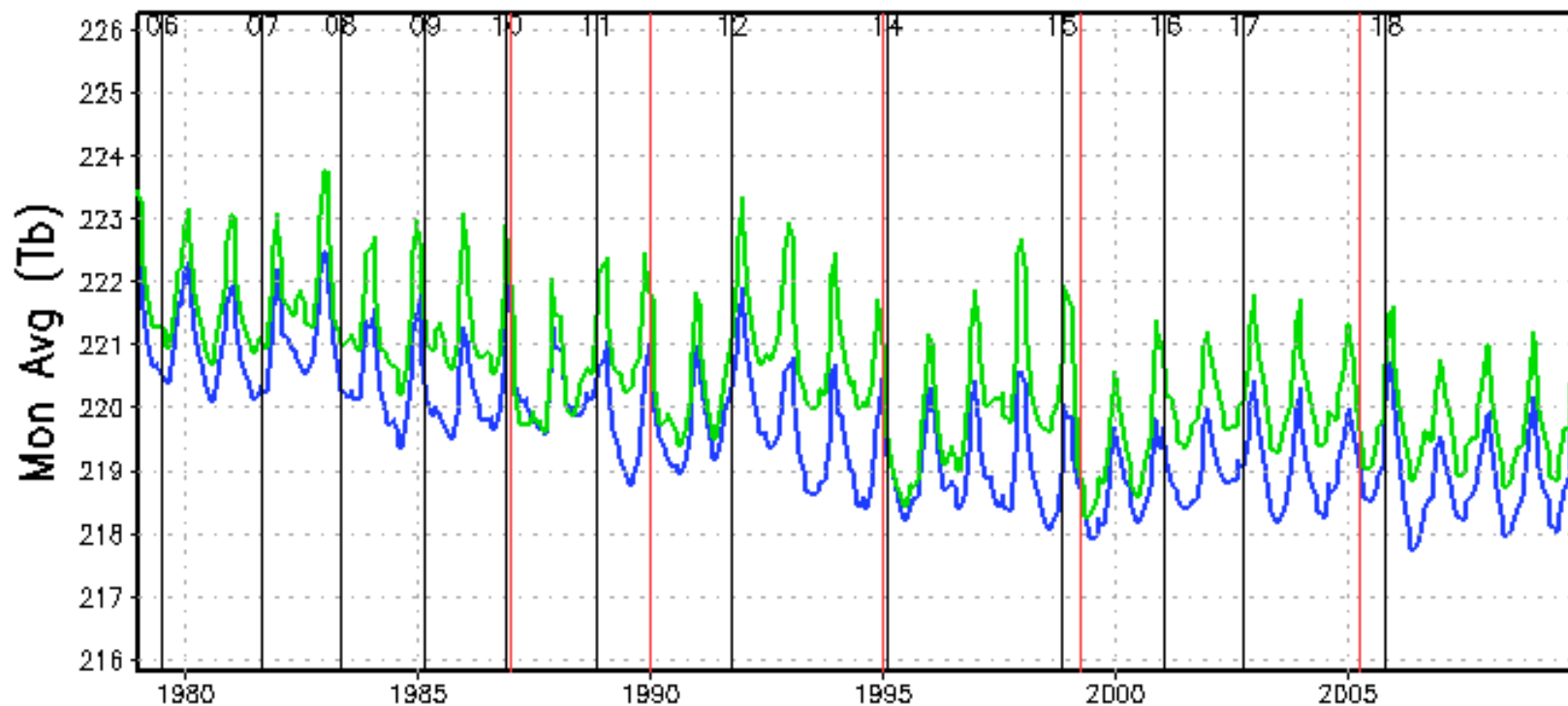
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CFSR

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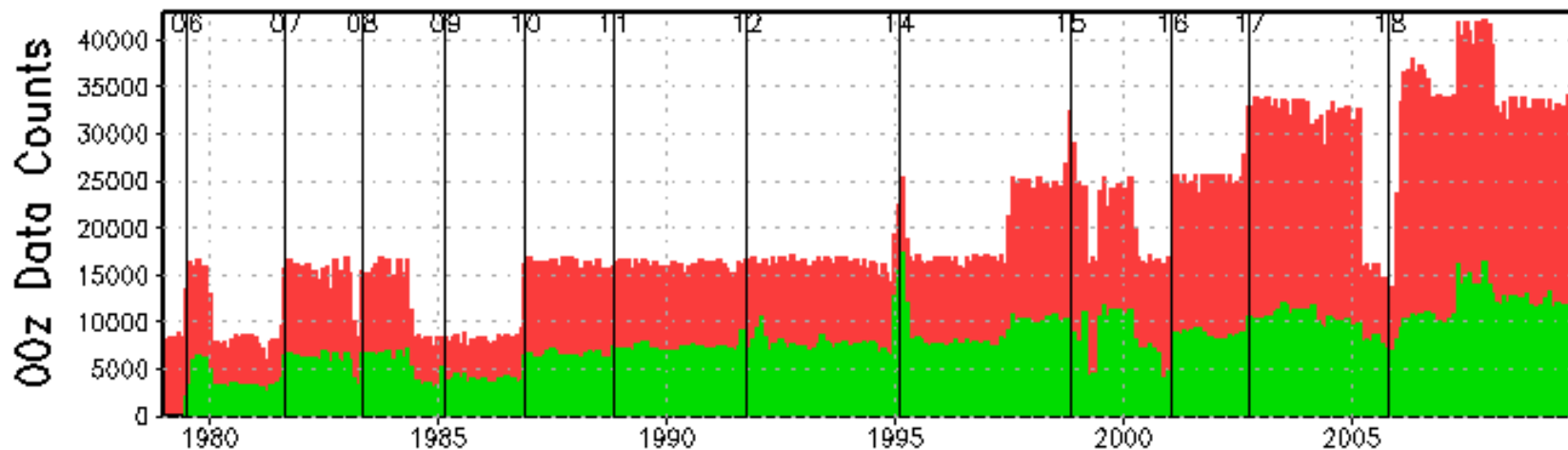
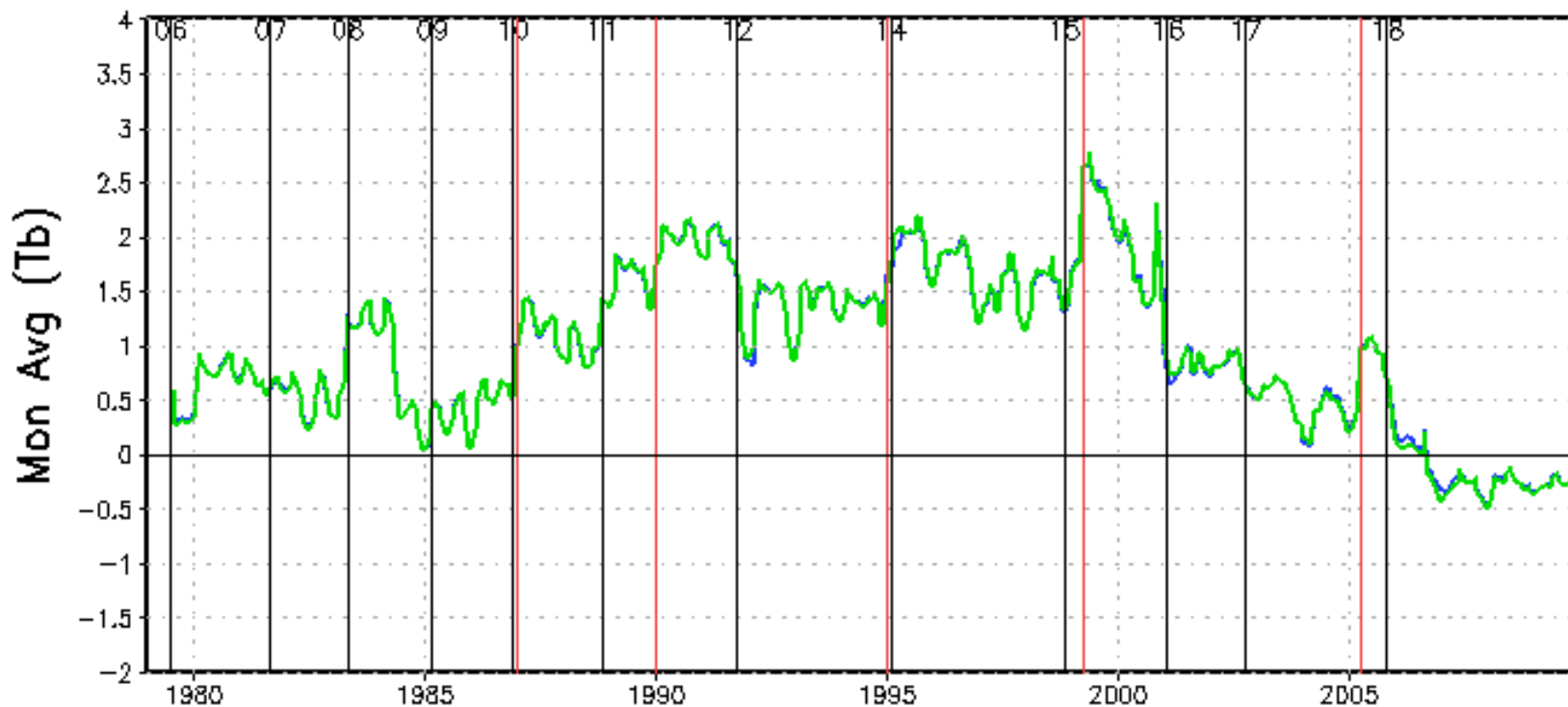
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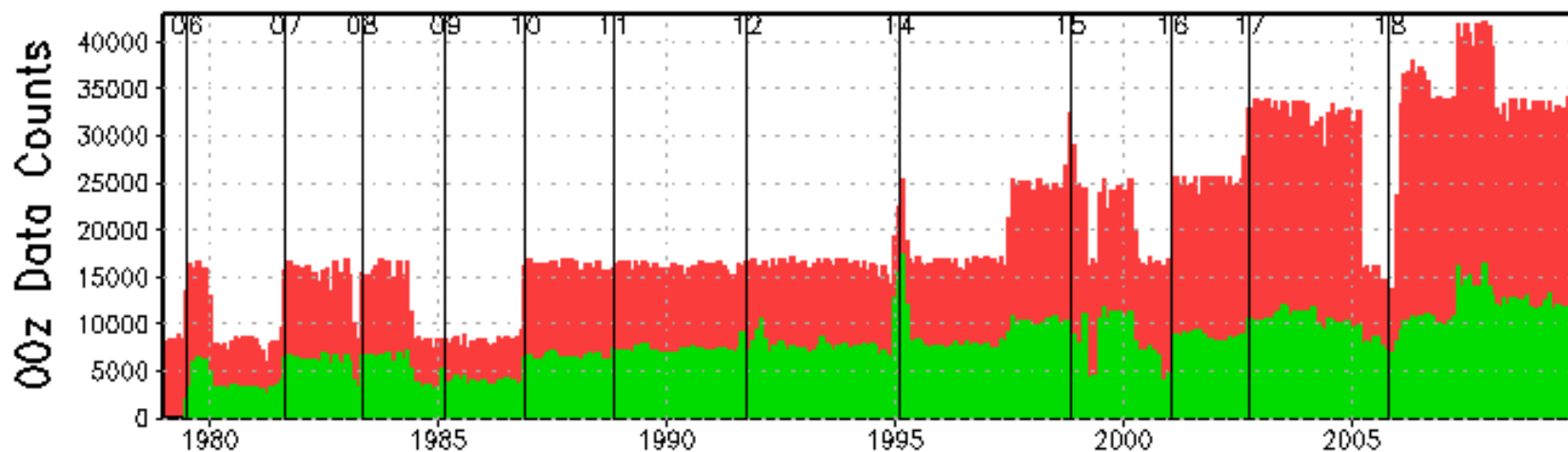
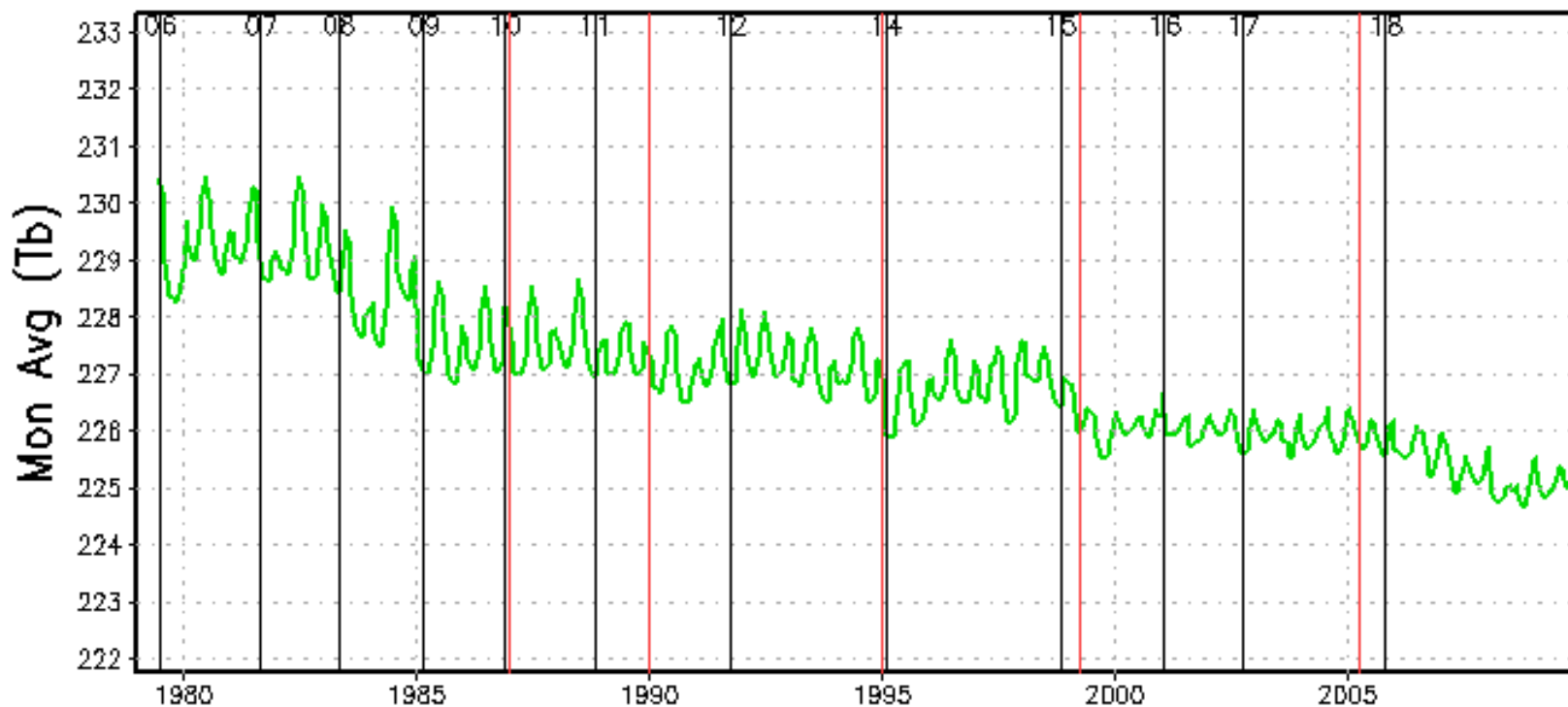
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BIASCR



CFSR

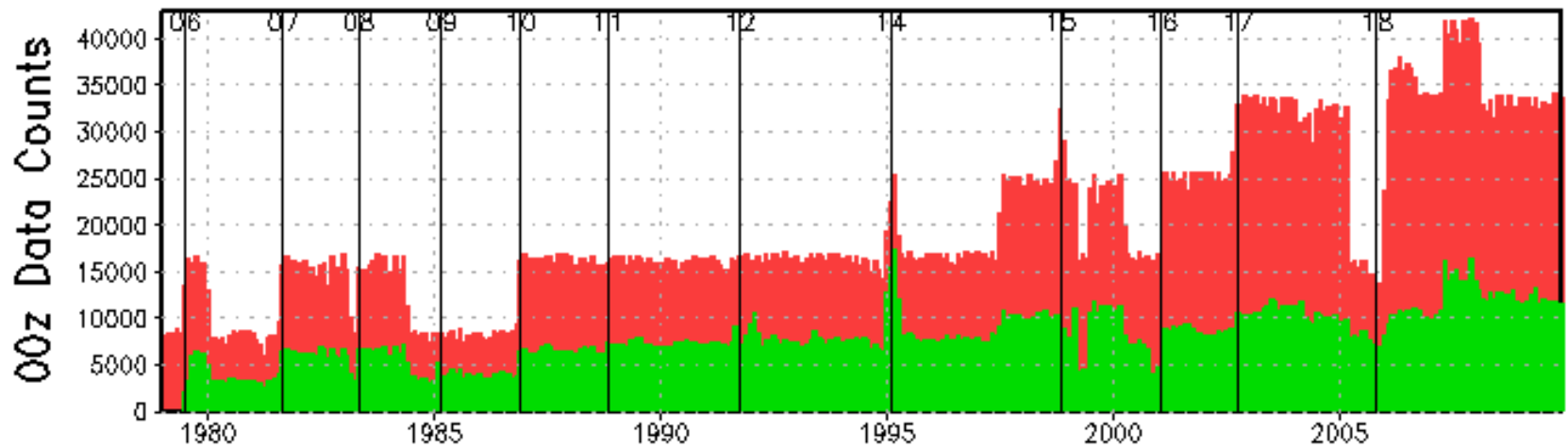
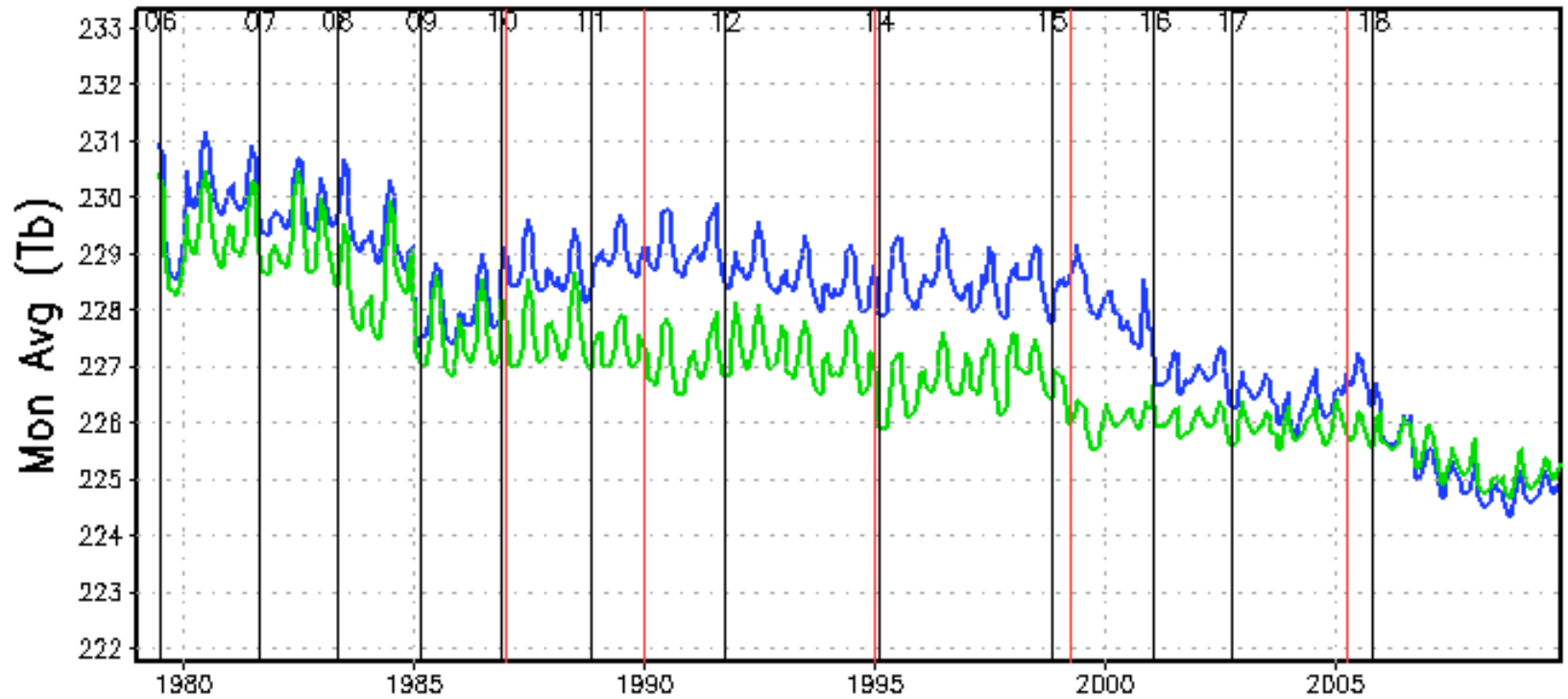
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CFSR

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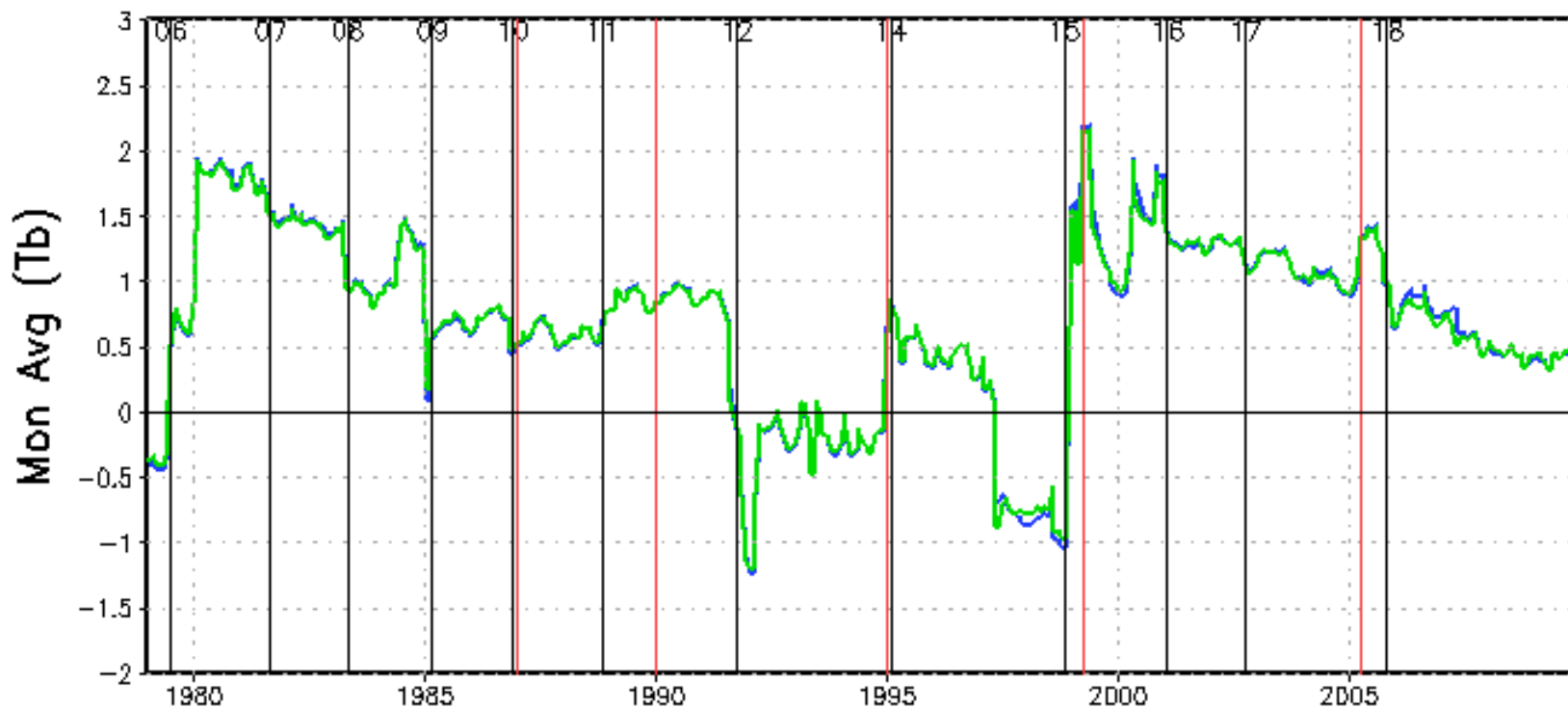
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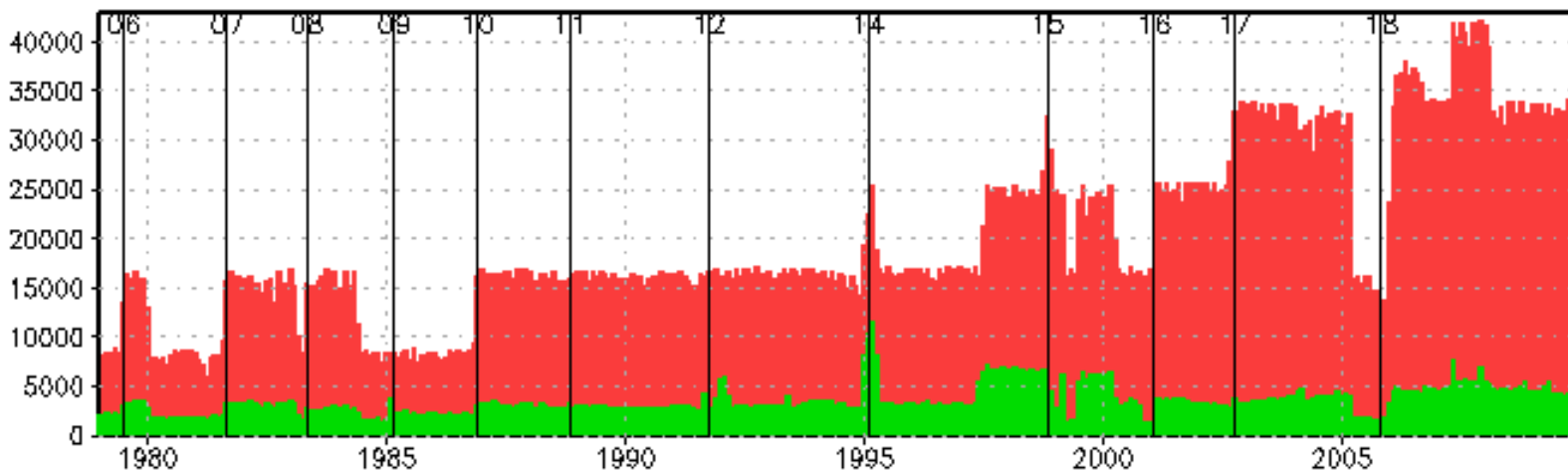
OB-ANL

hirs.all Ch07 900hPa Global

BIASCR

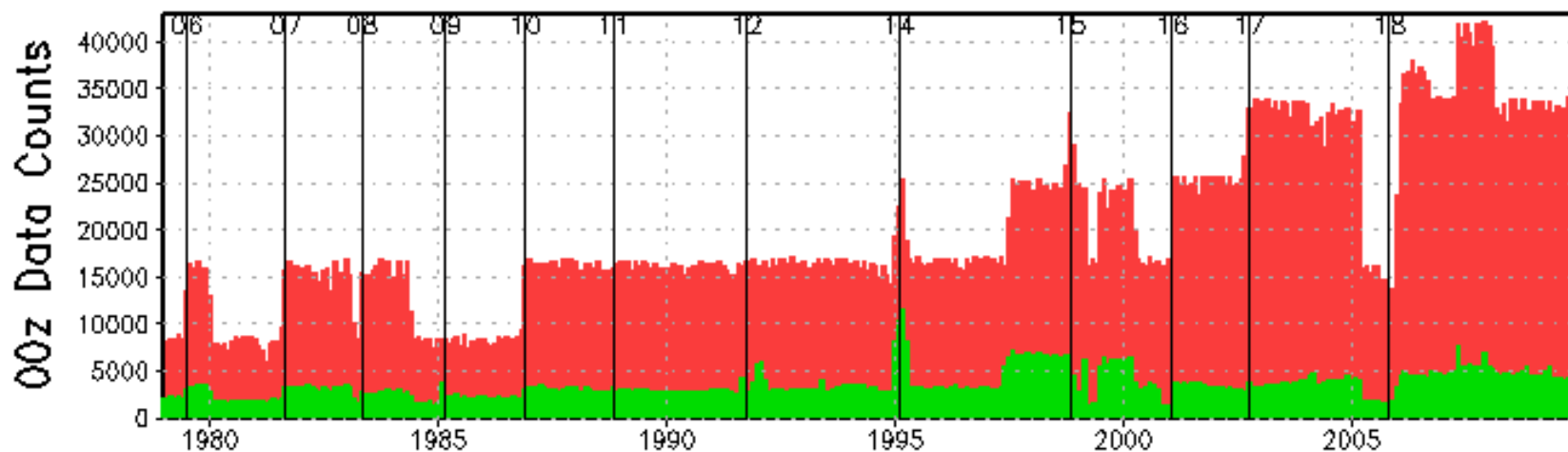
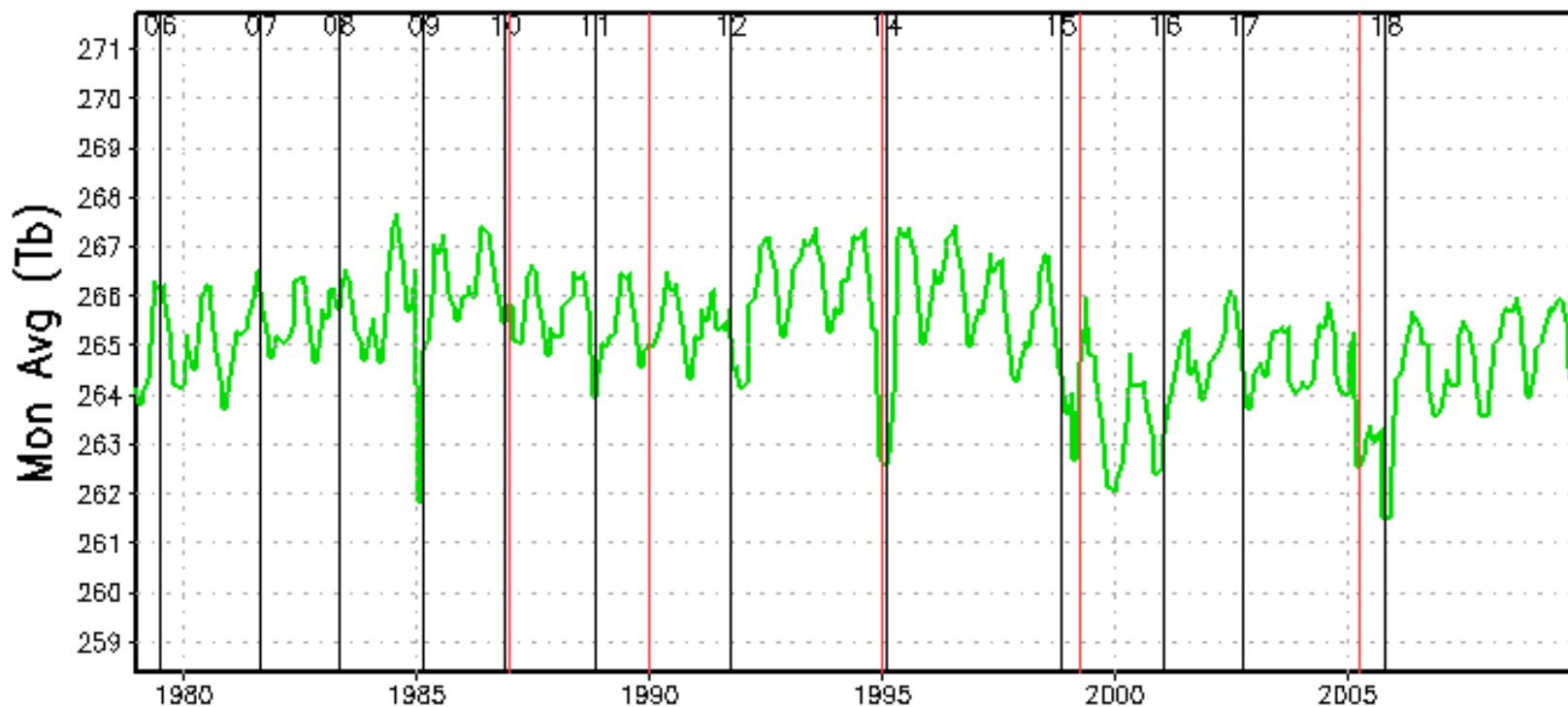


00z Data Counts



CFSR

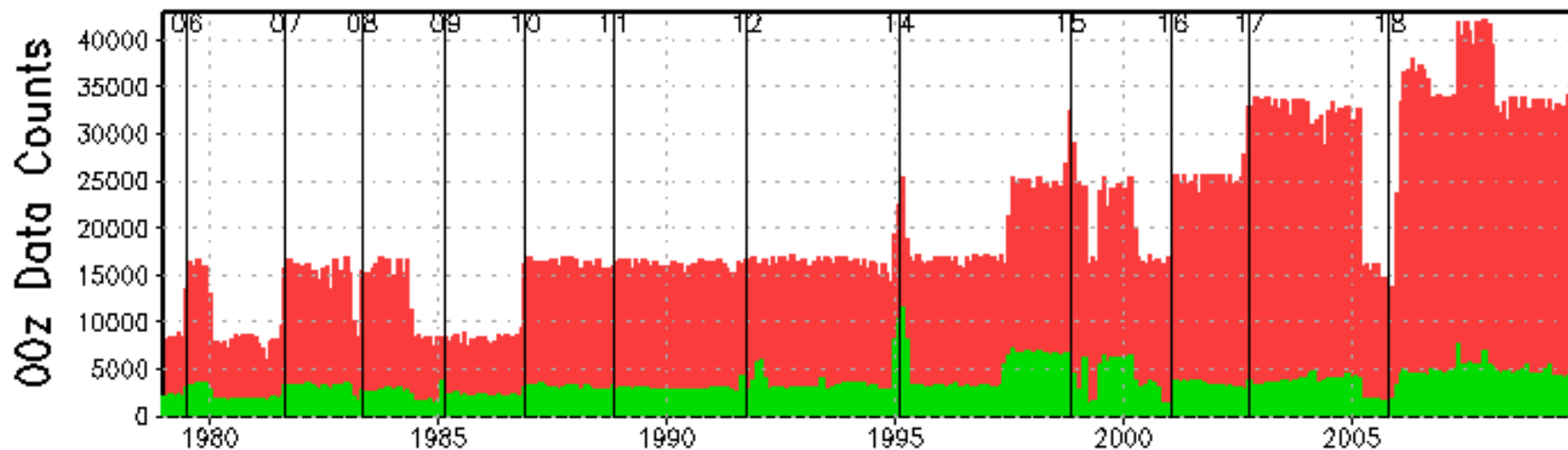
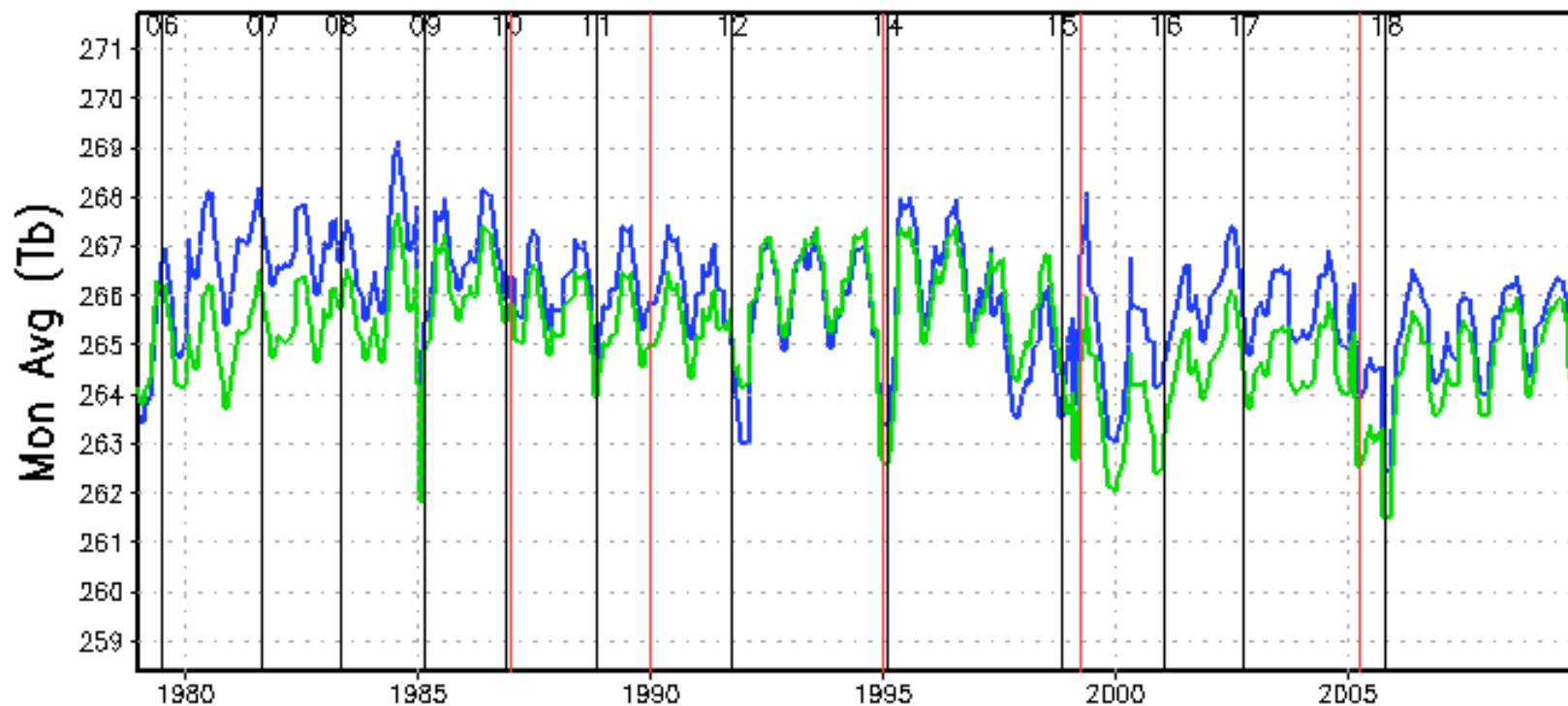
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CFSR

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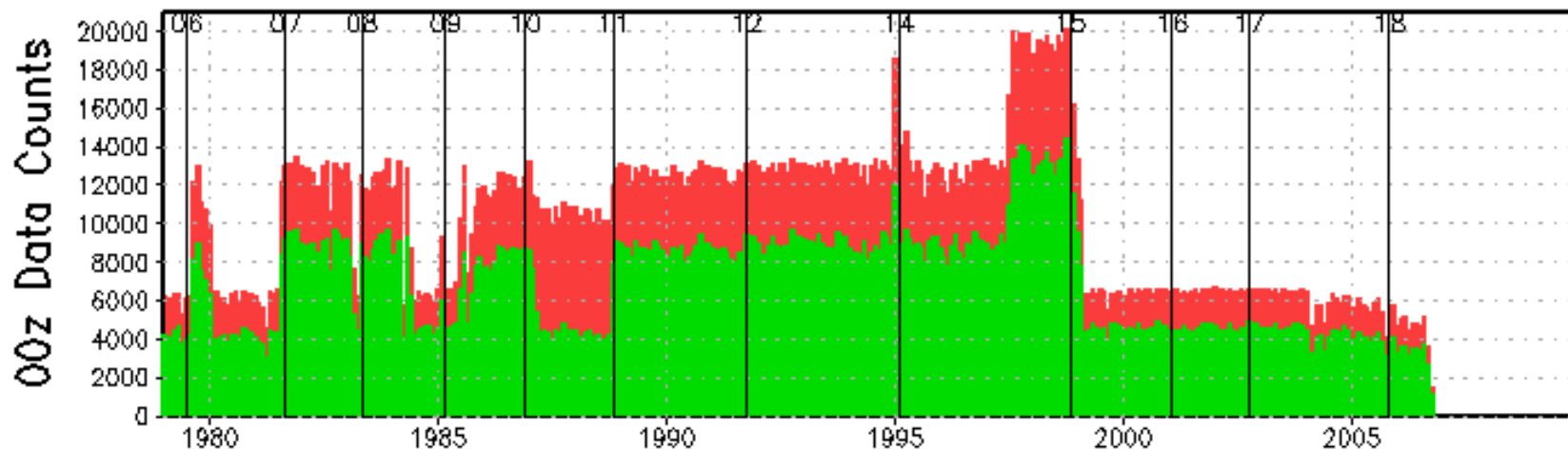
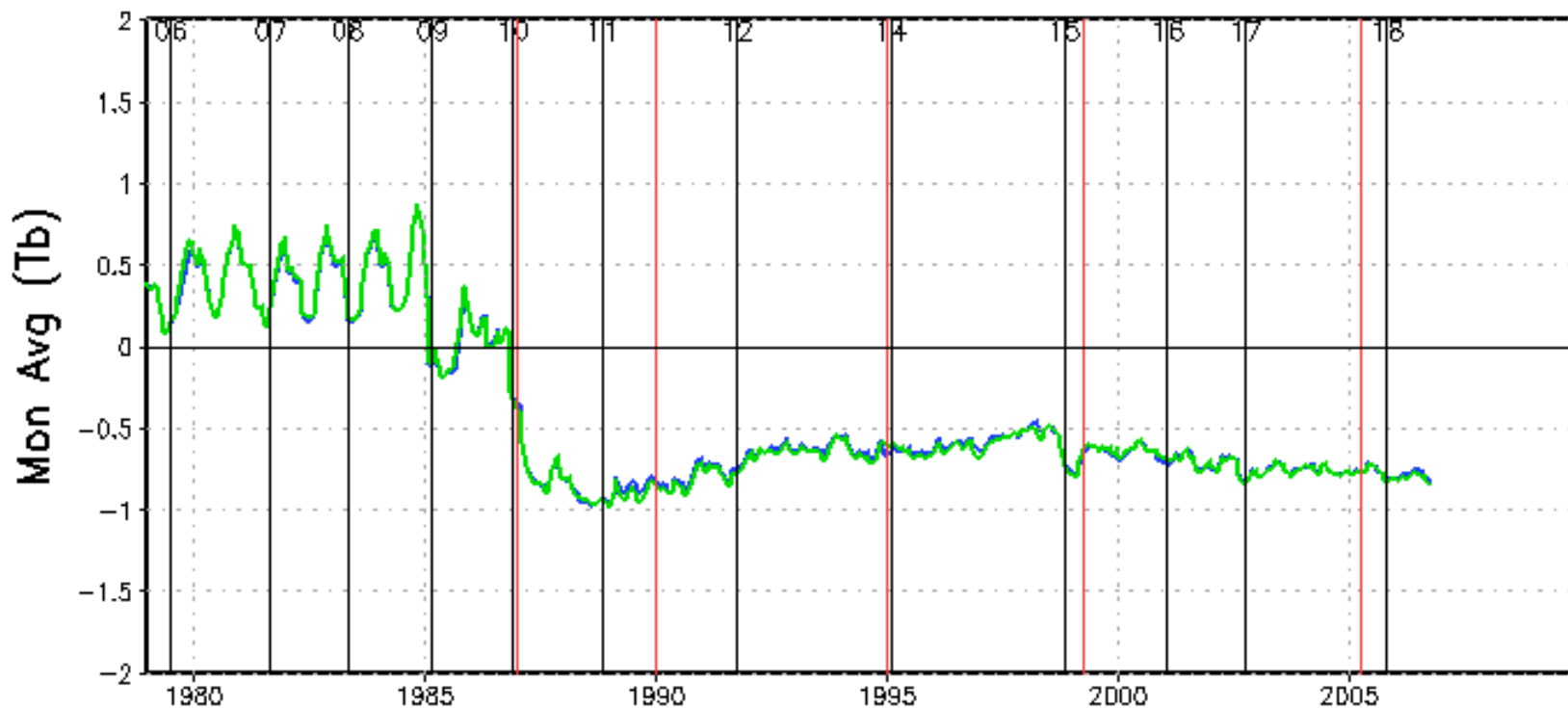
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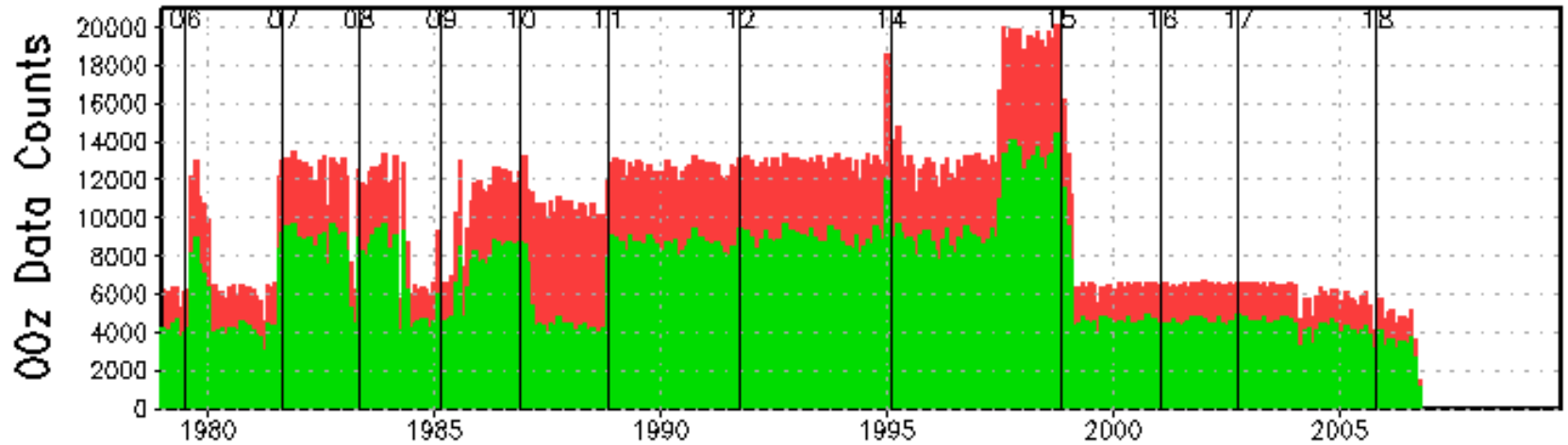
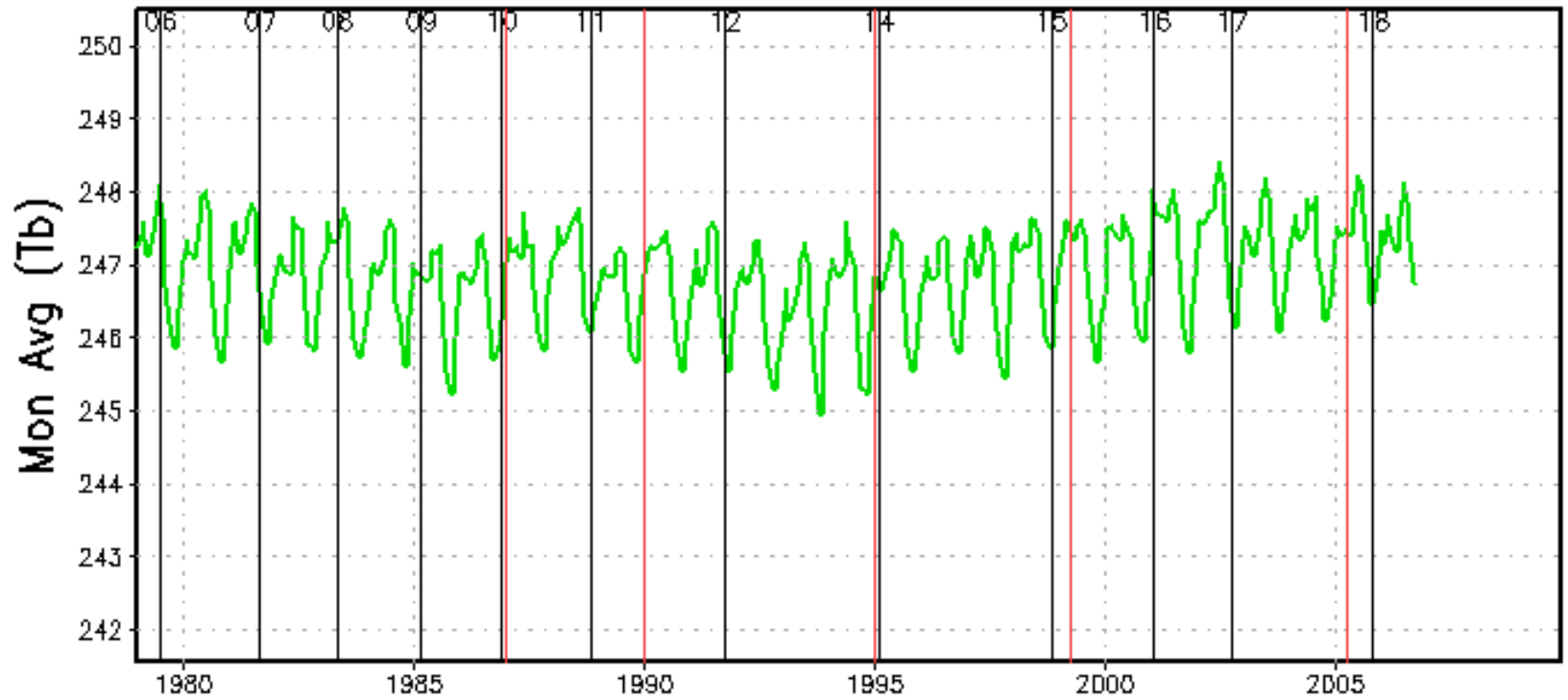
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BIASCR



CFSR

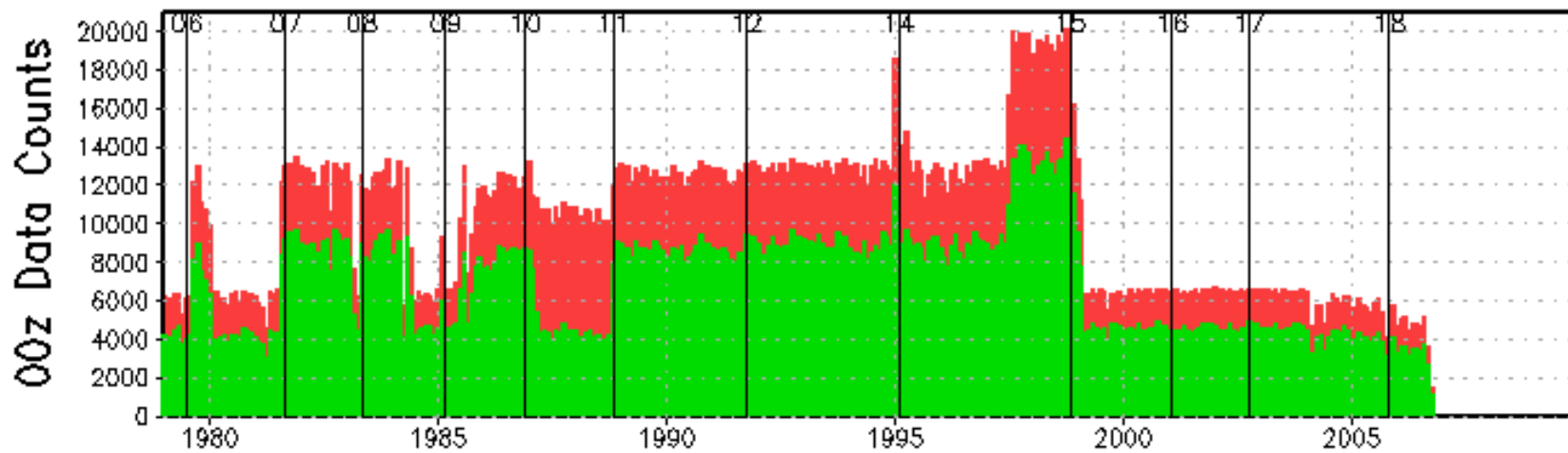
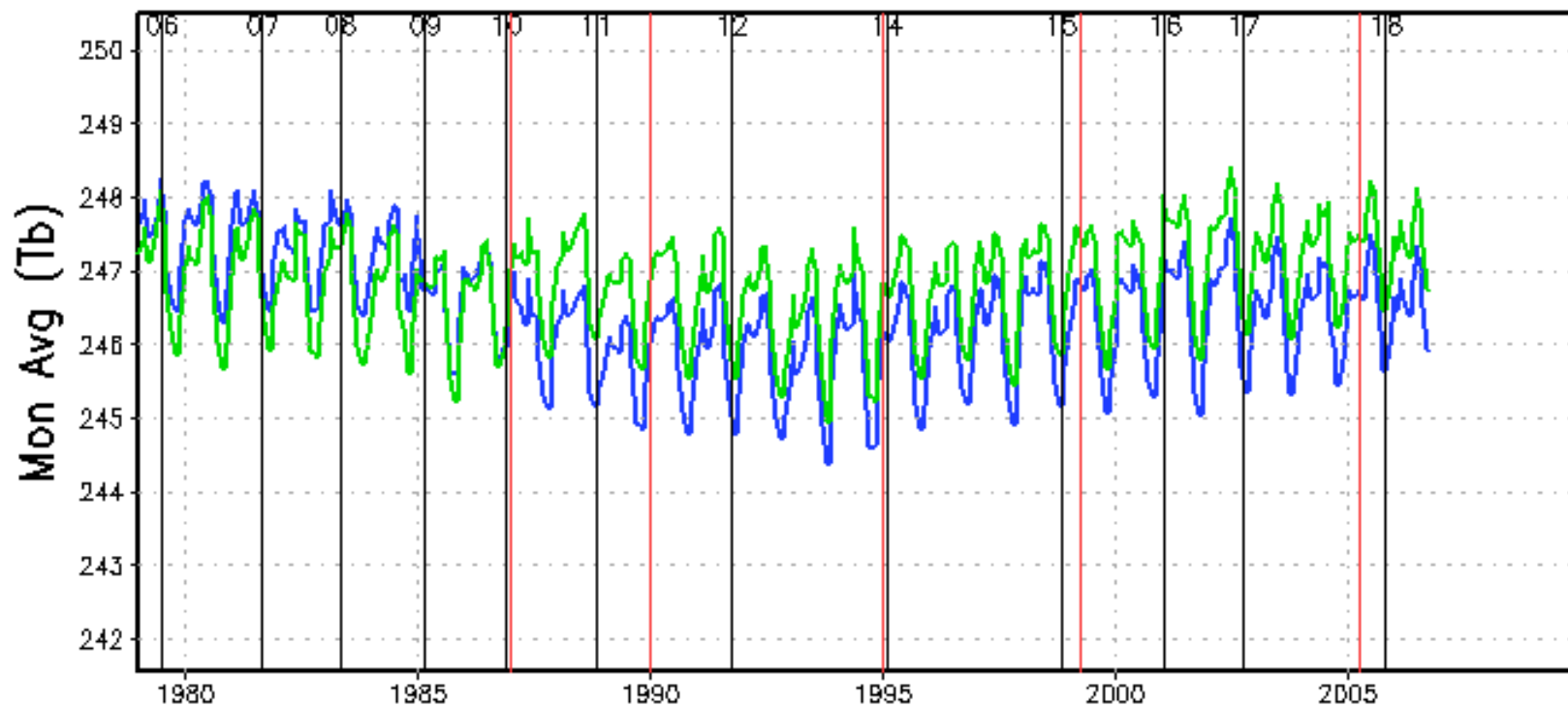
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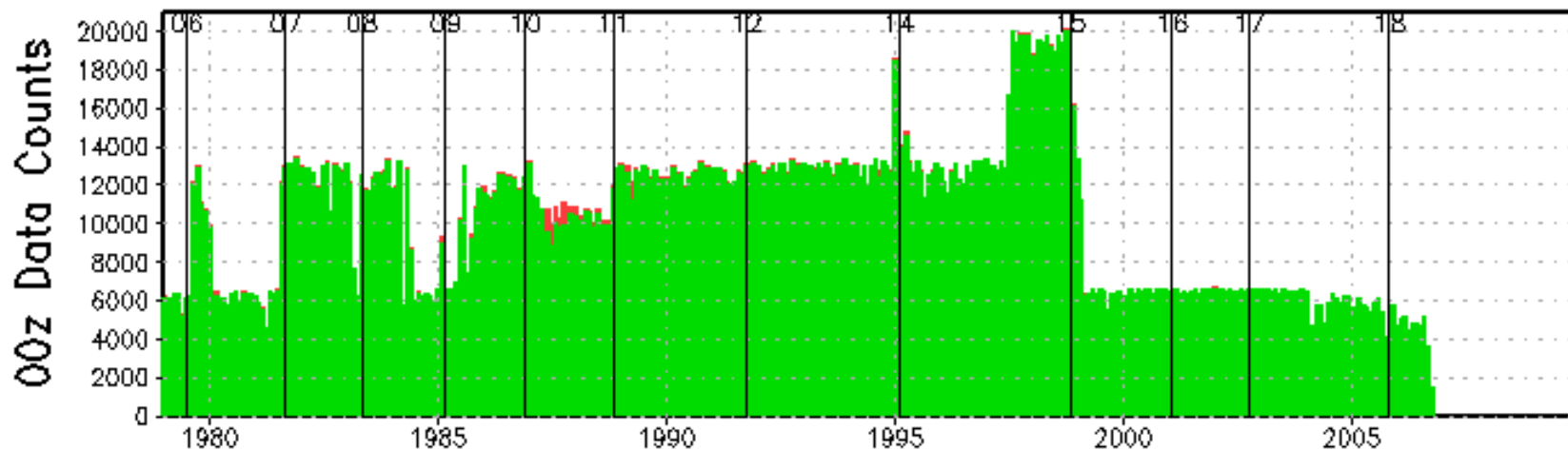
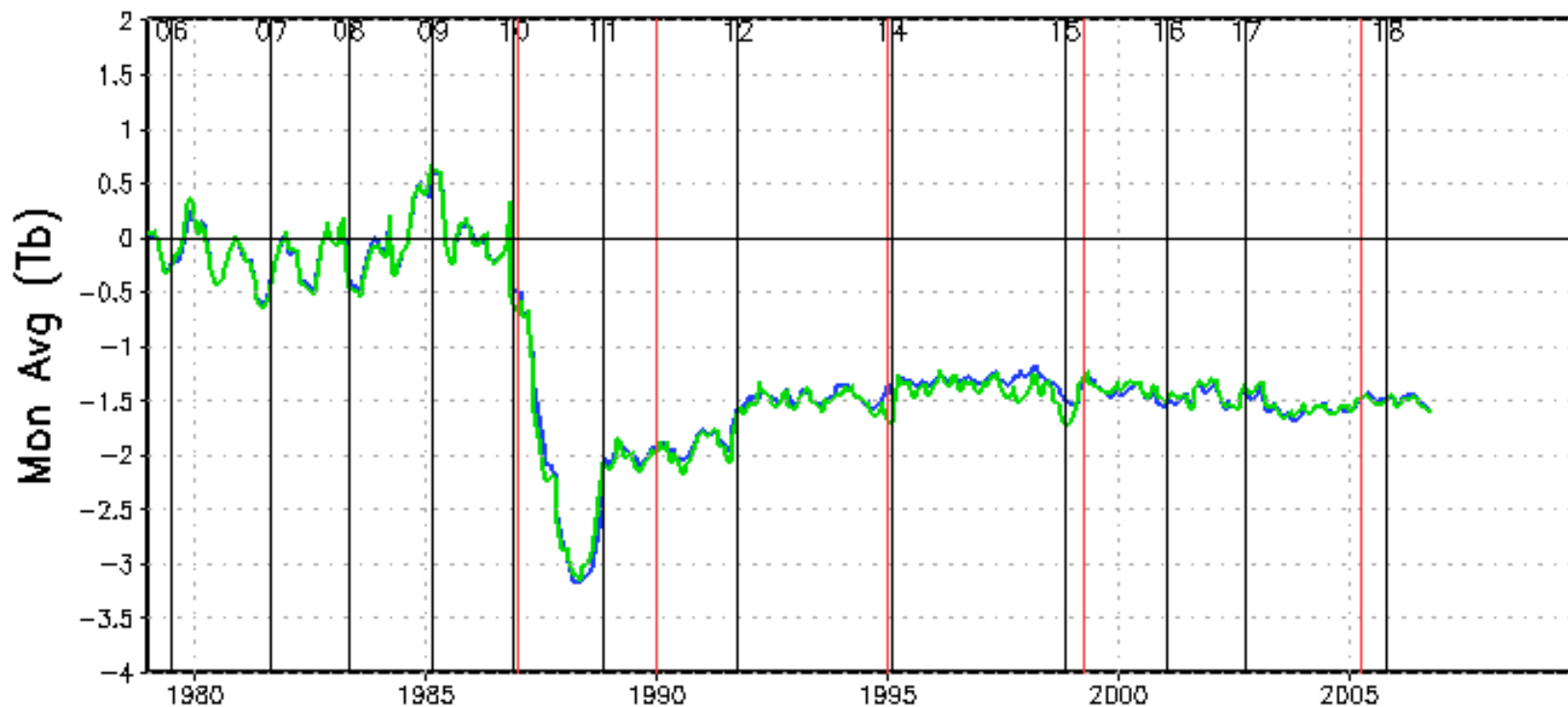
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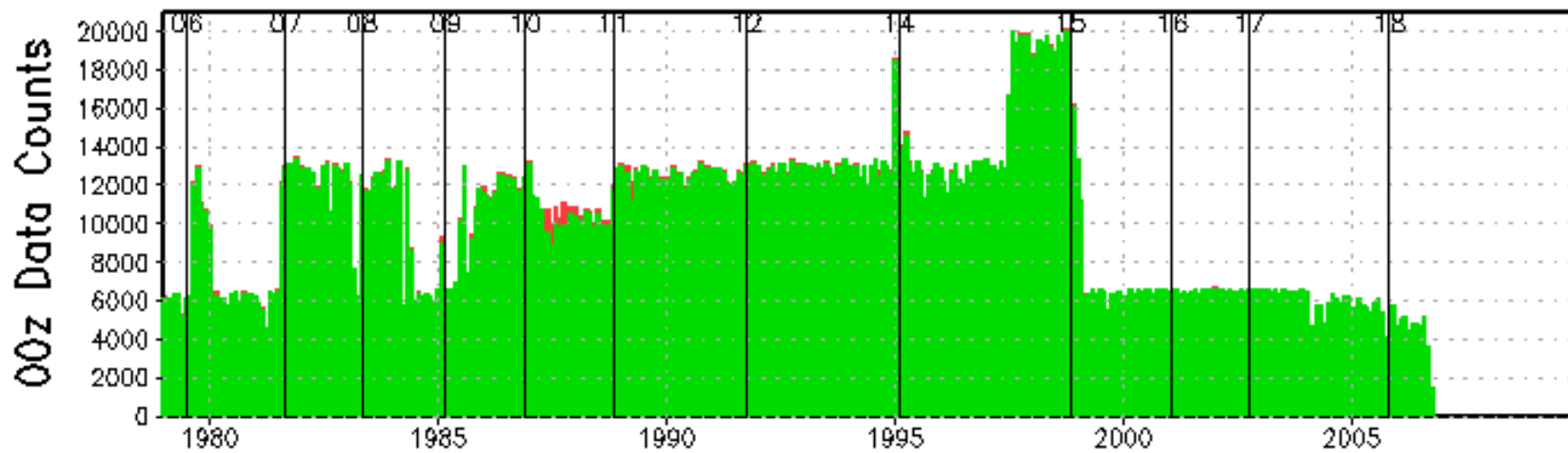
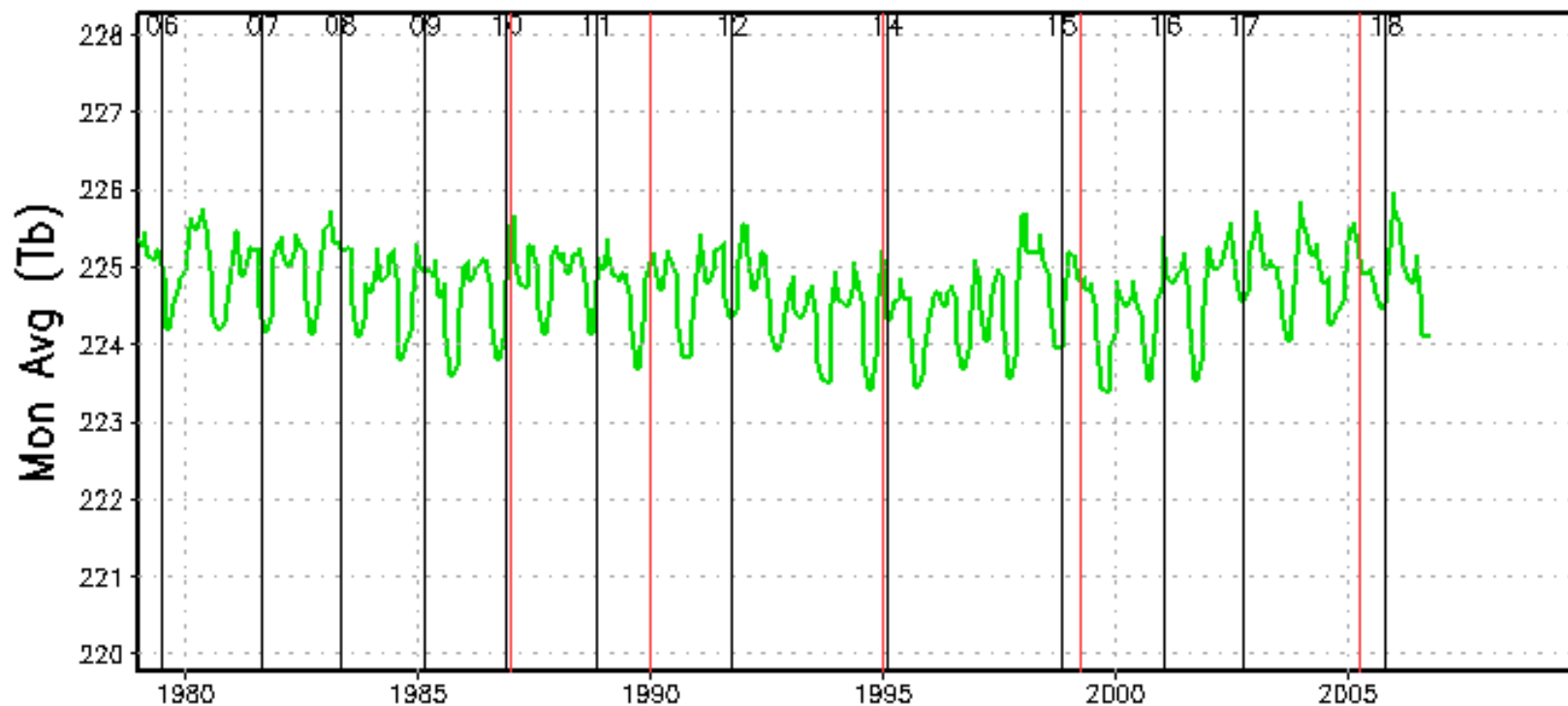
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BIASCR



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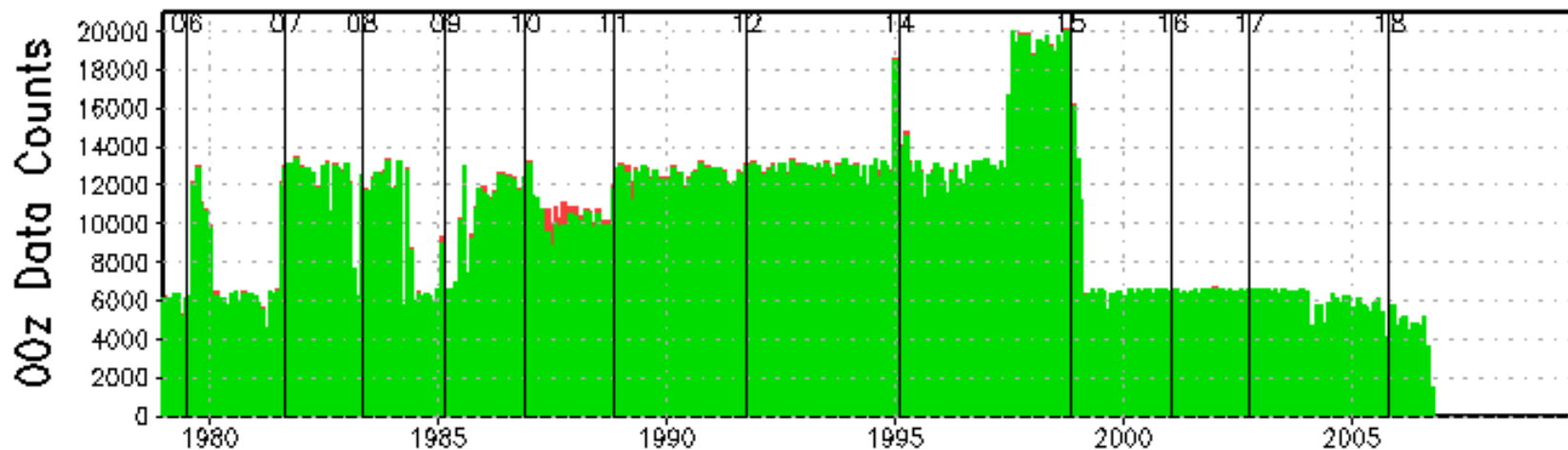
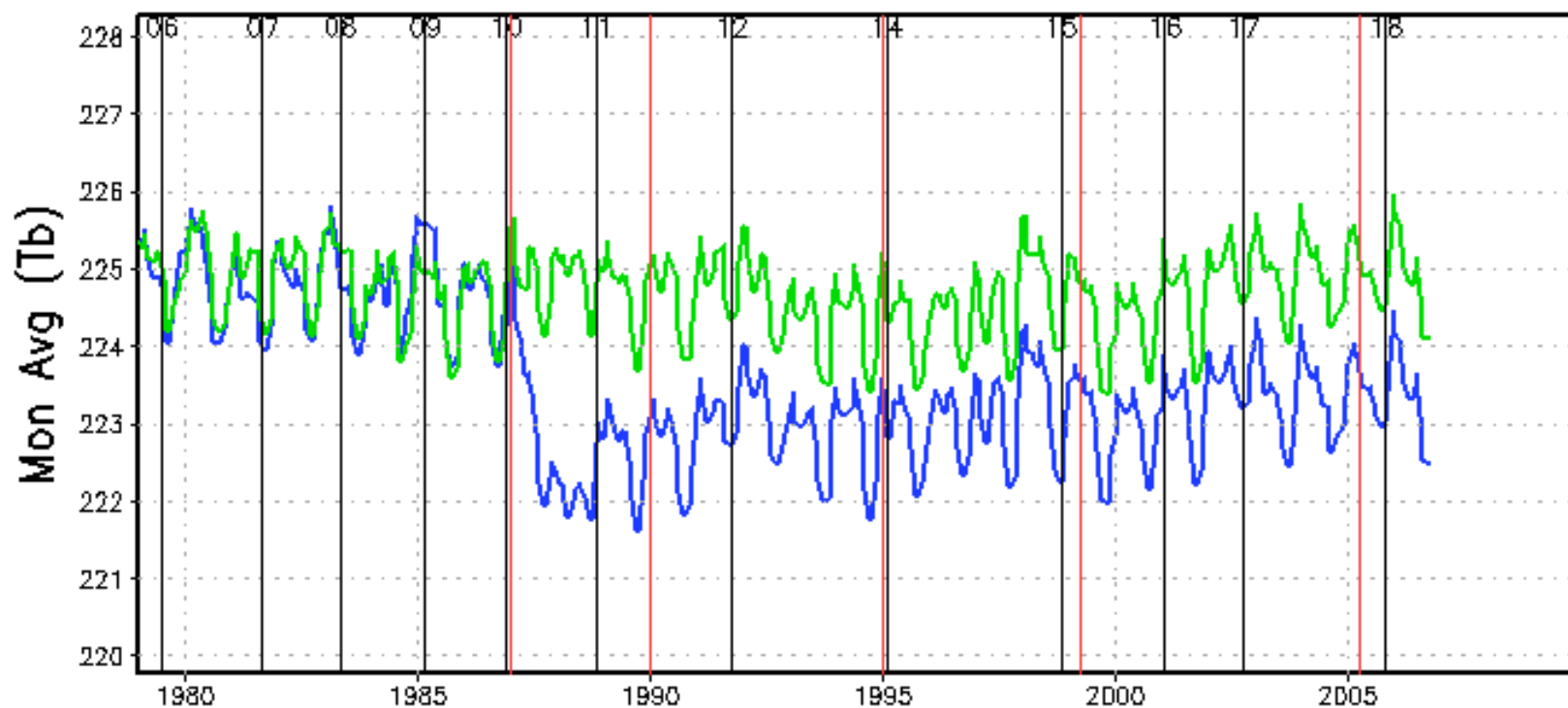
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CFSR

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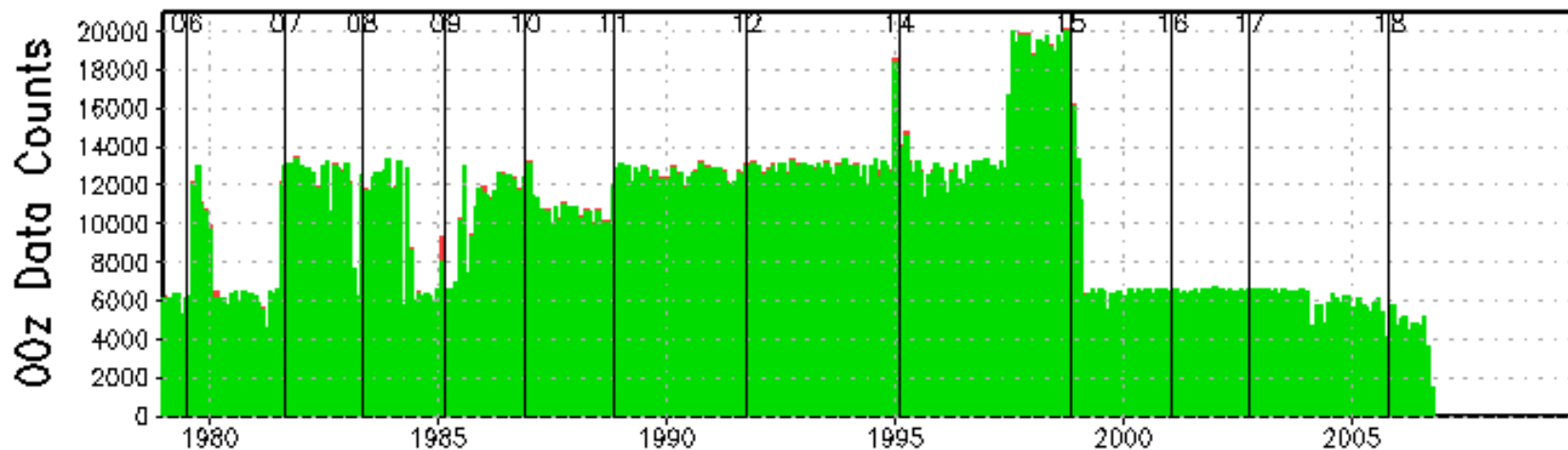
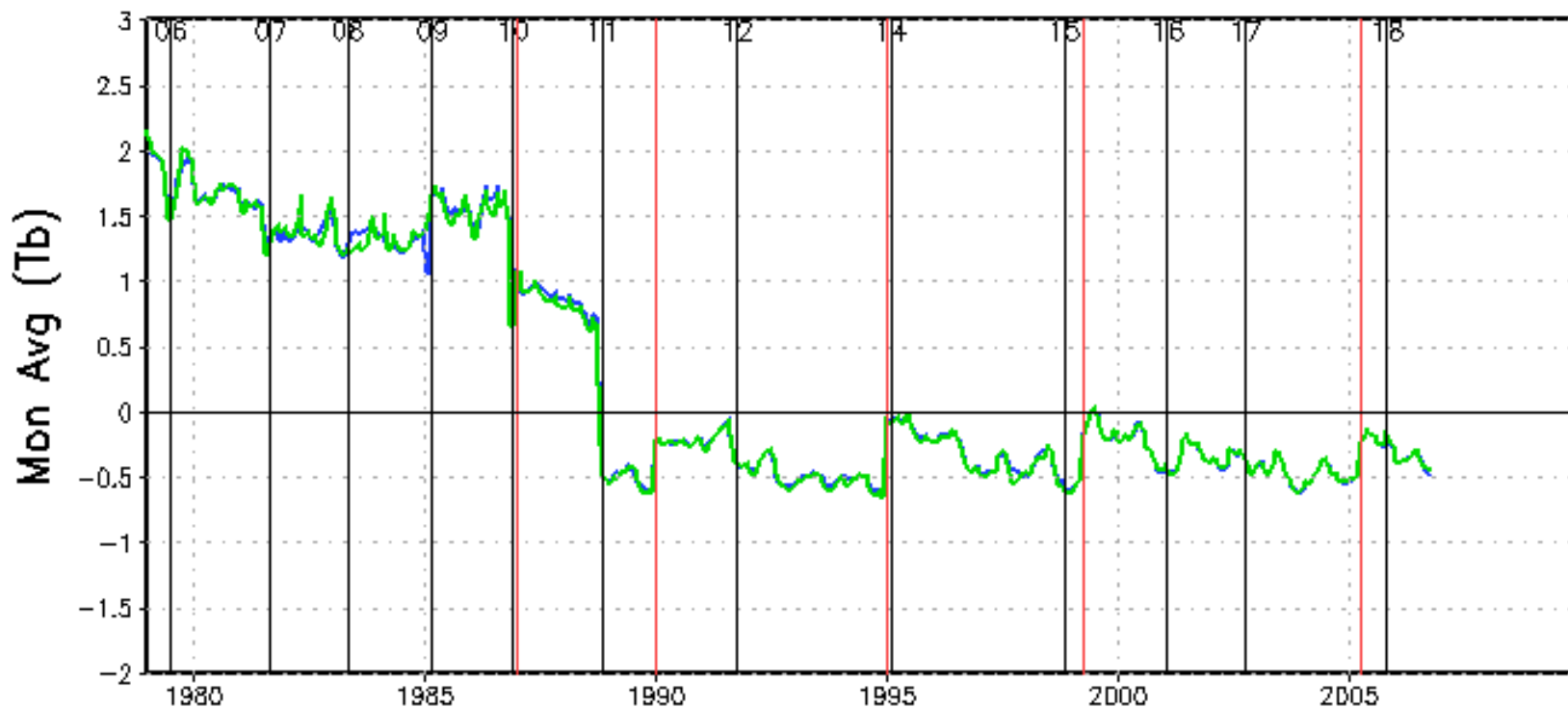
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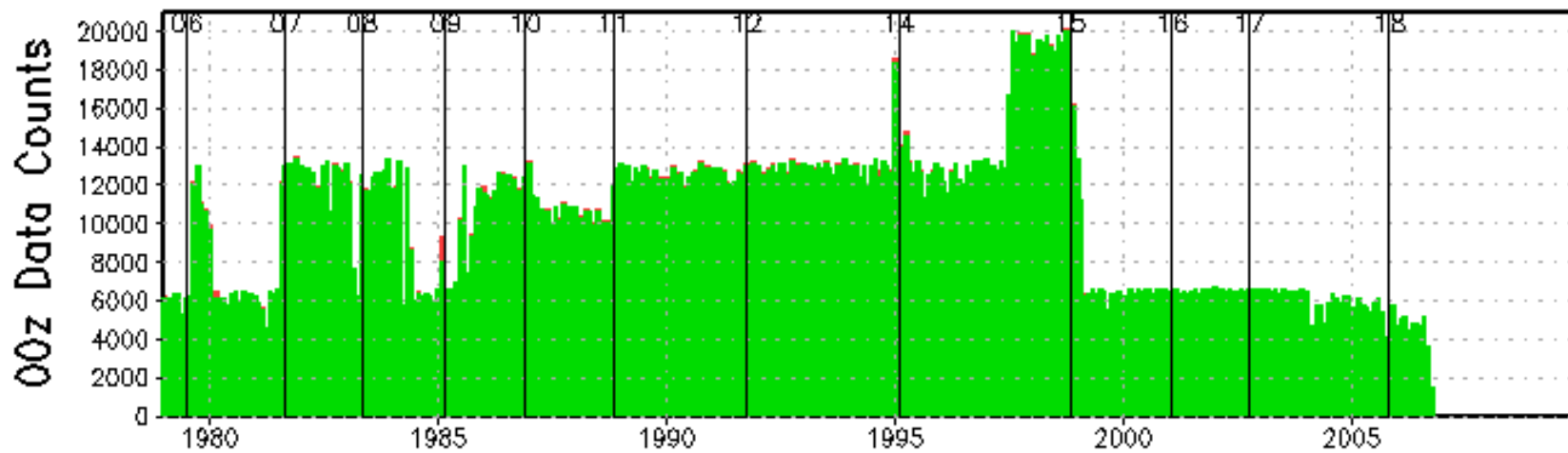
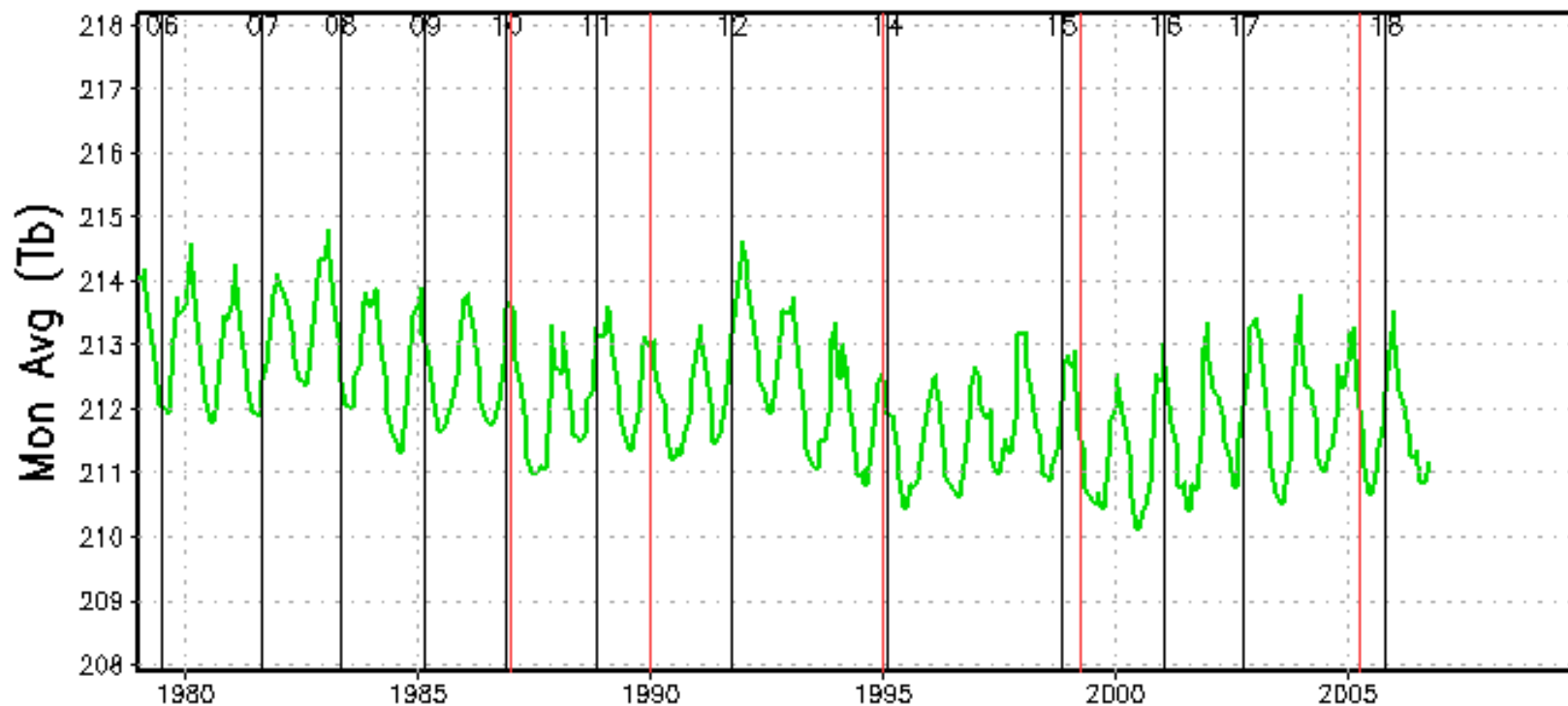
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BIASCR



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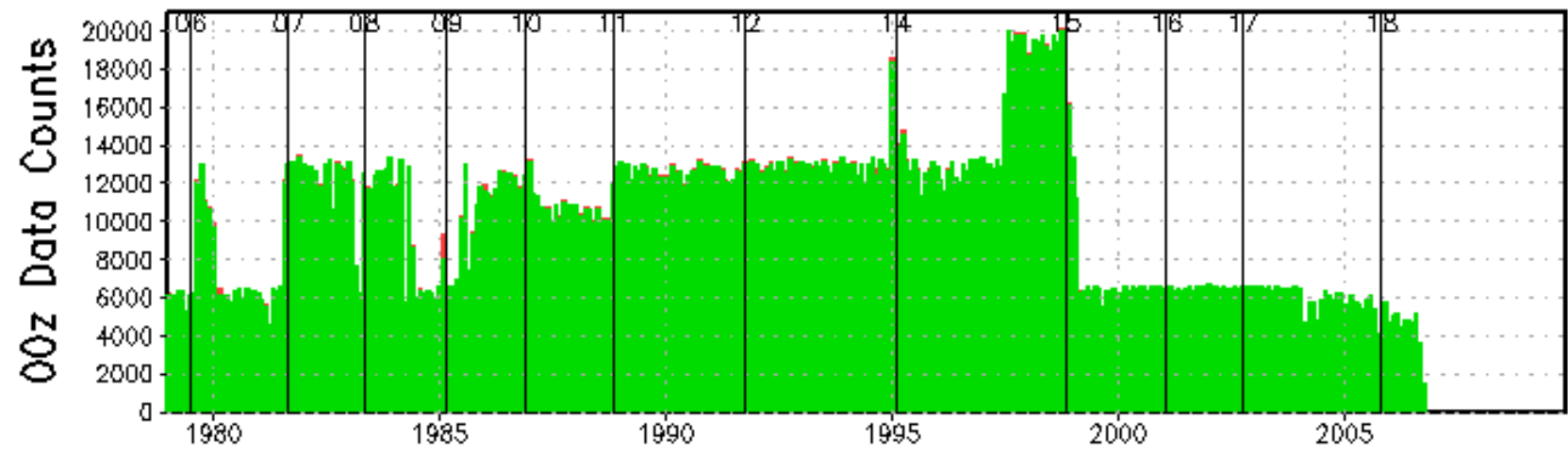
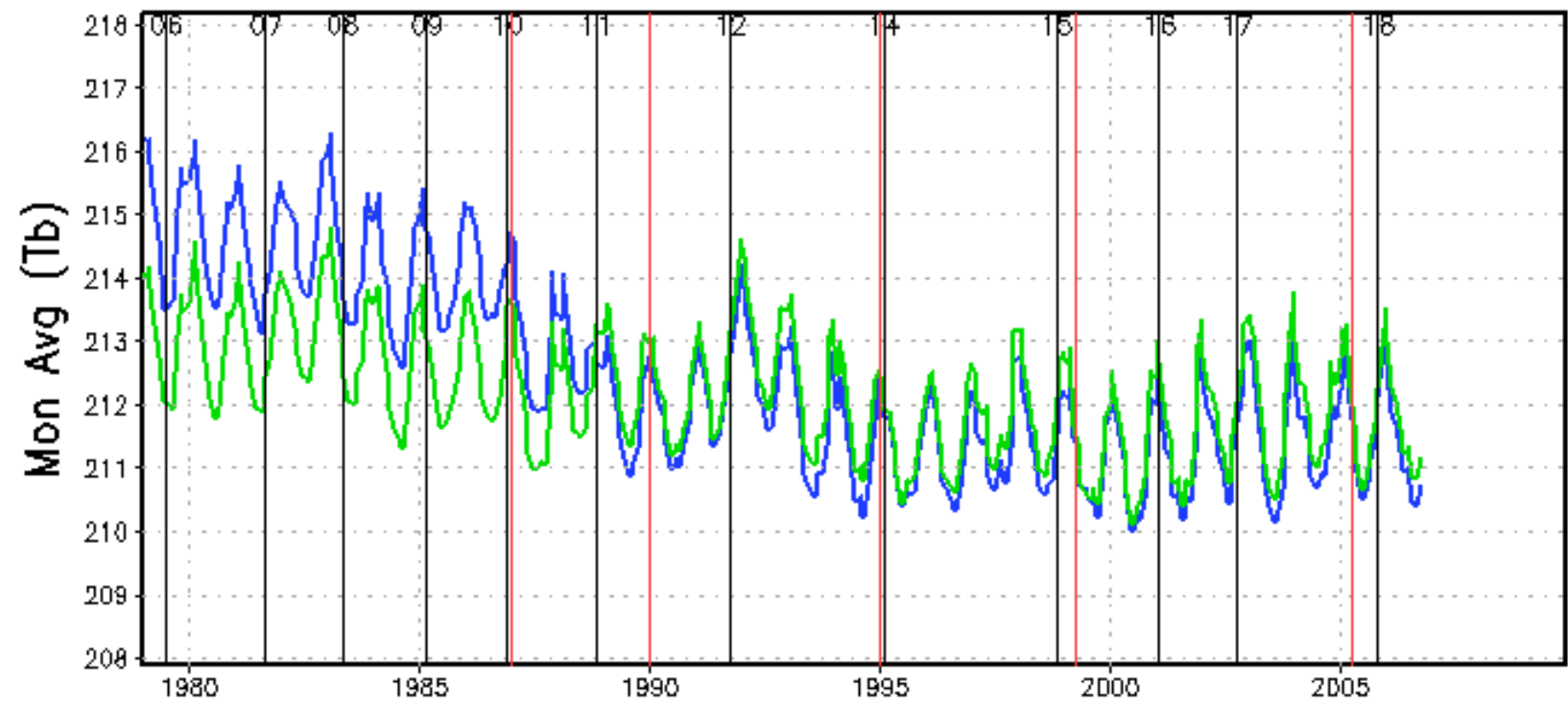
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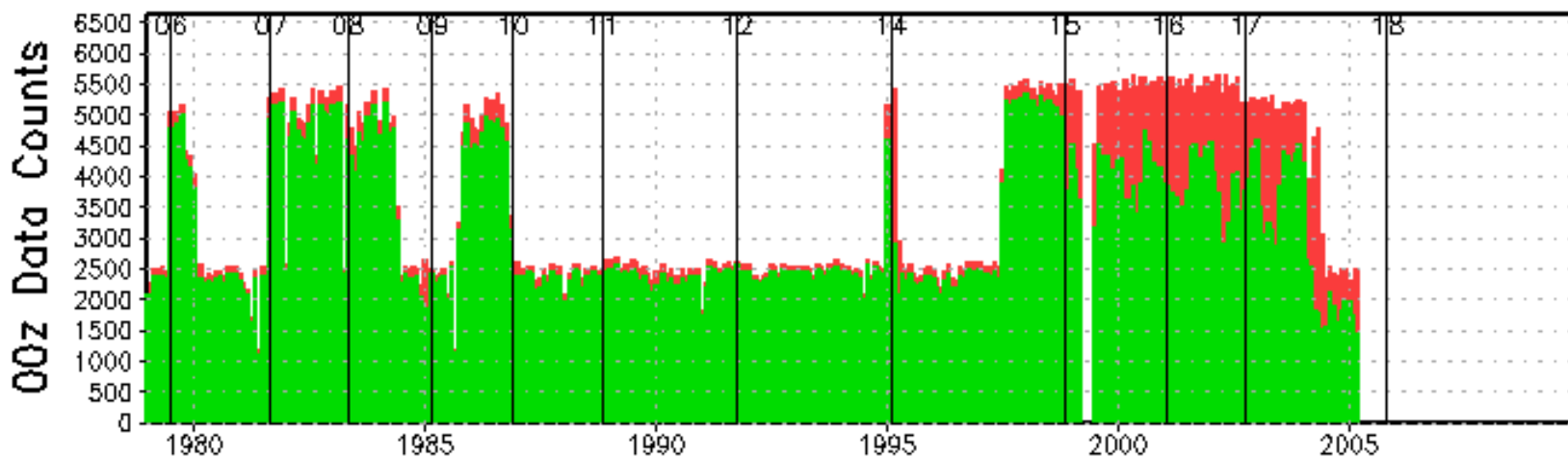
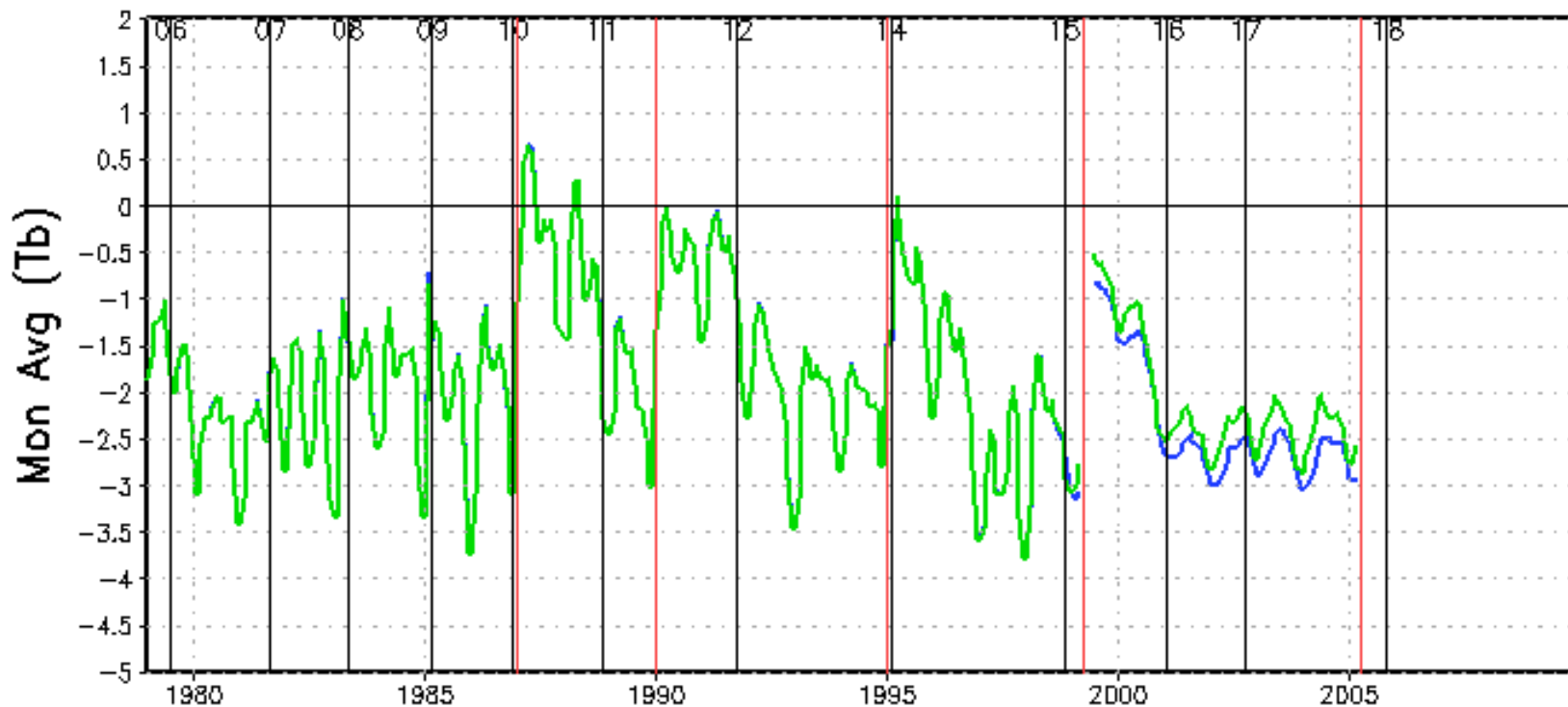
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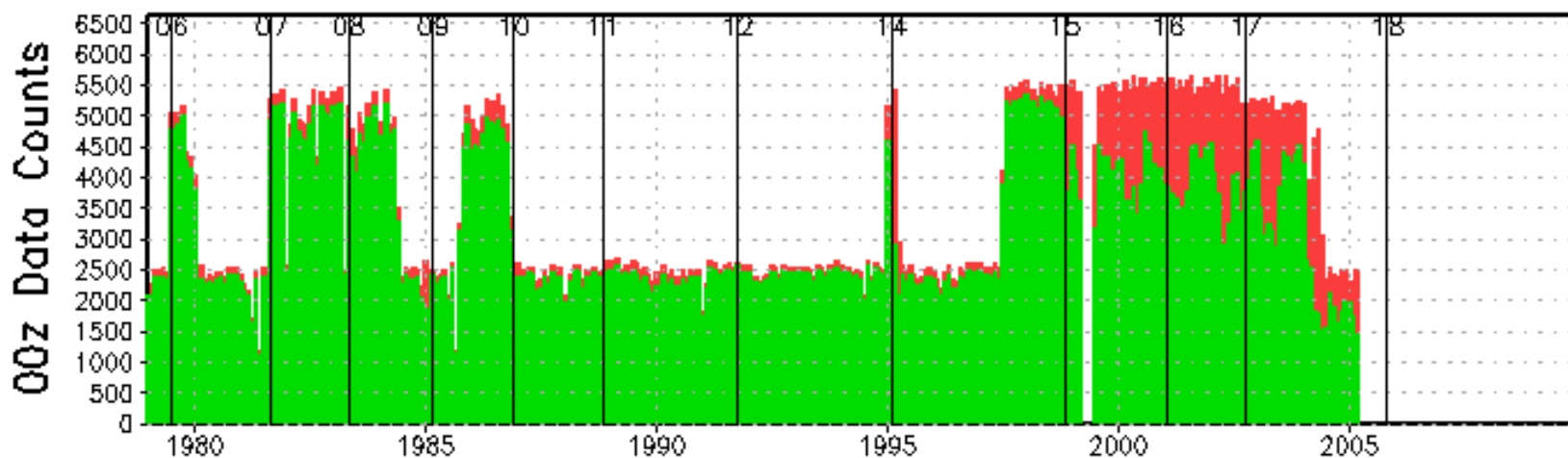
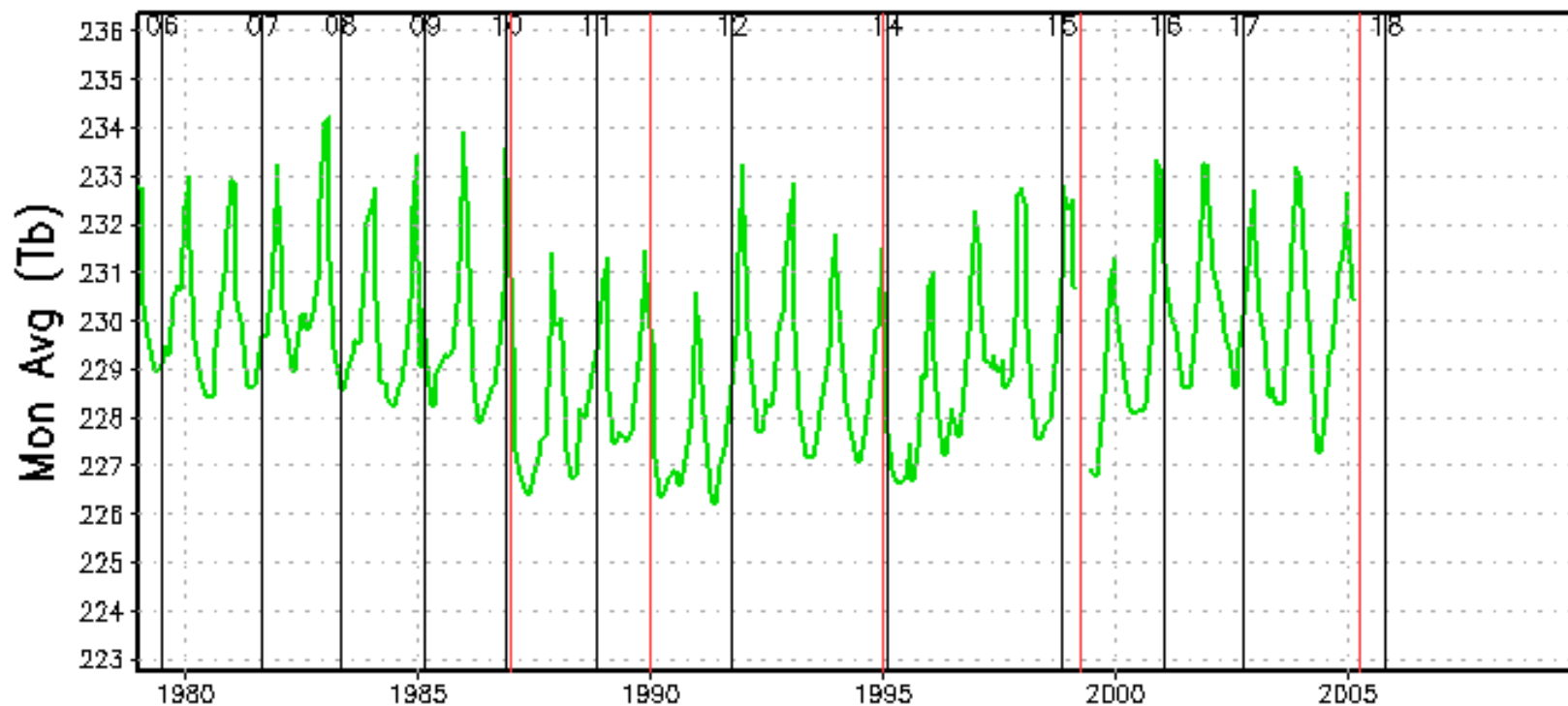
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BIASCR



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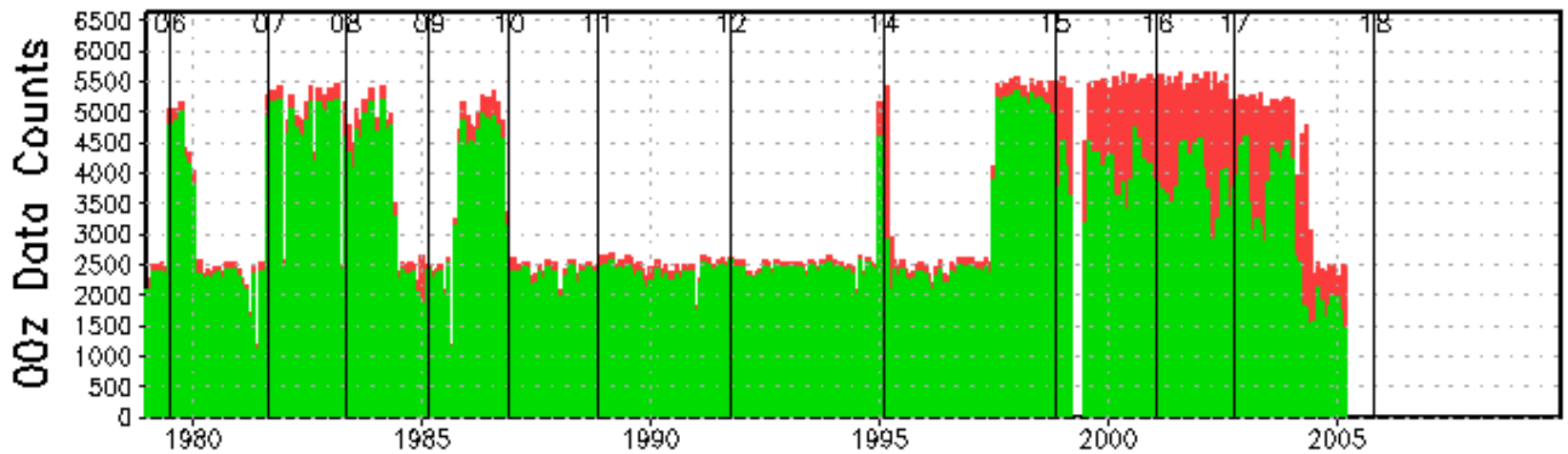
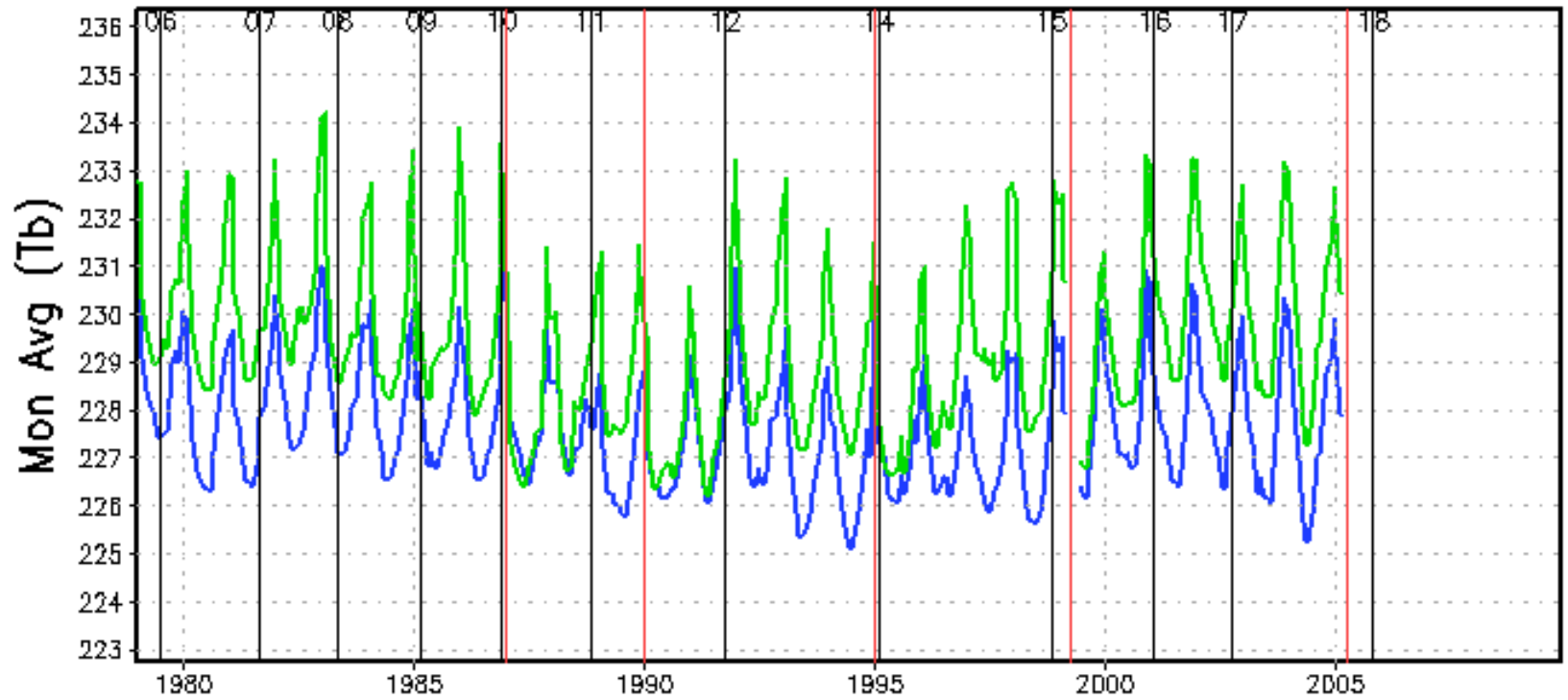
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CFSR

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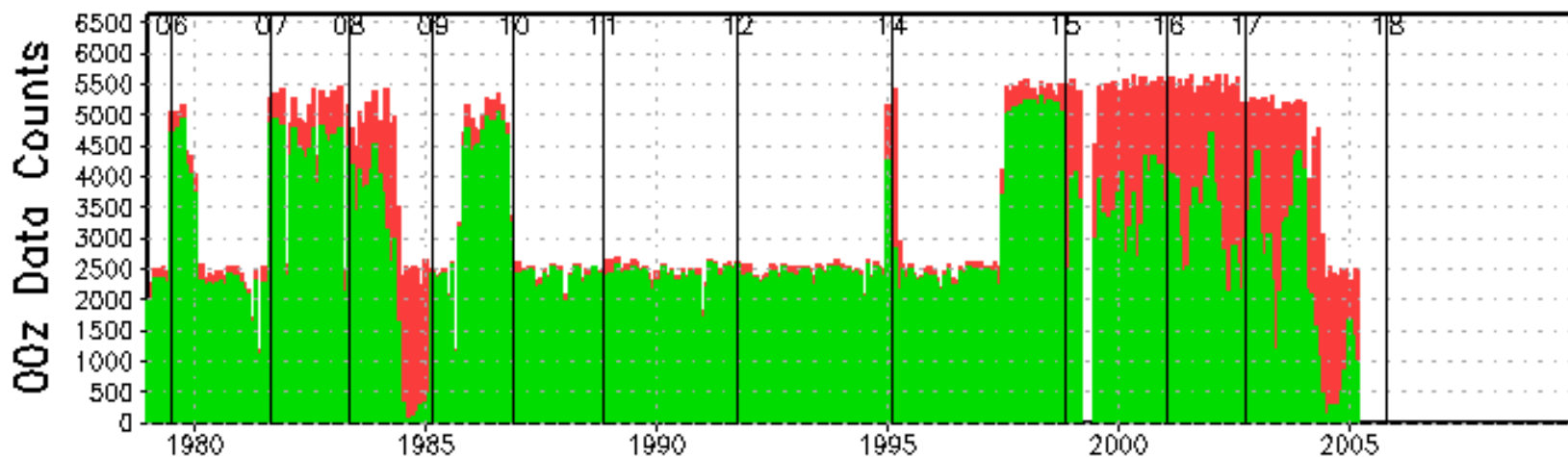
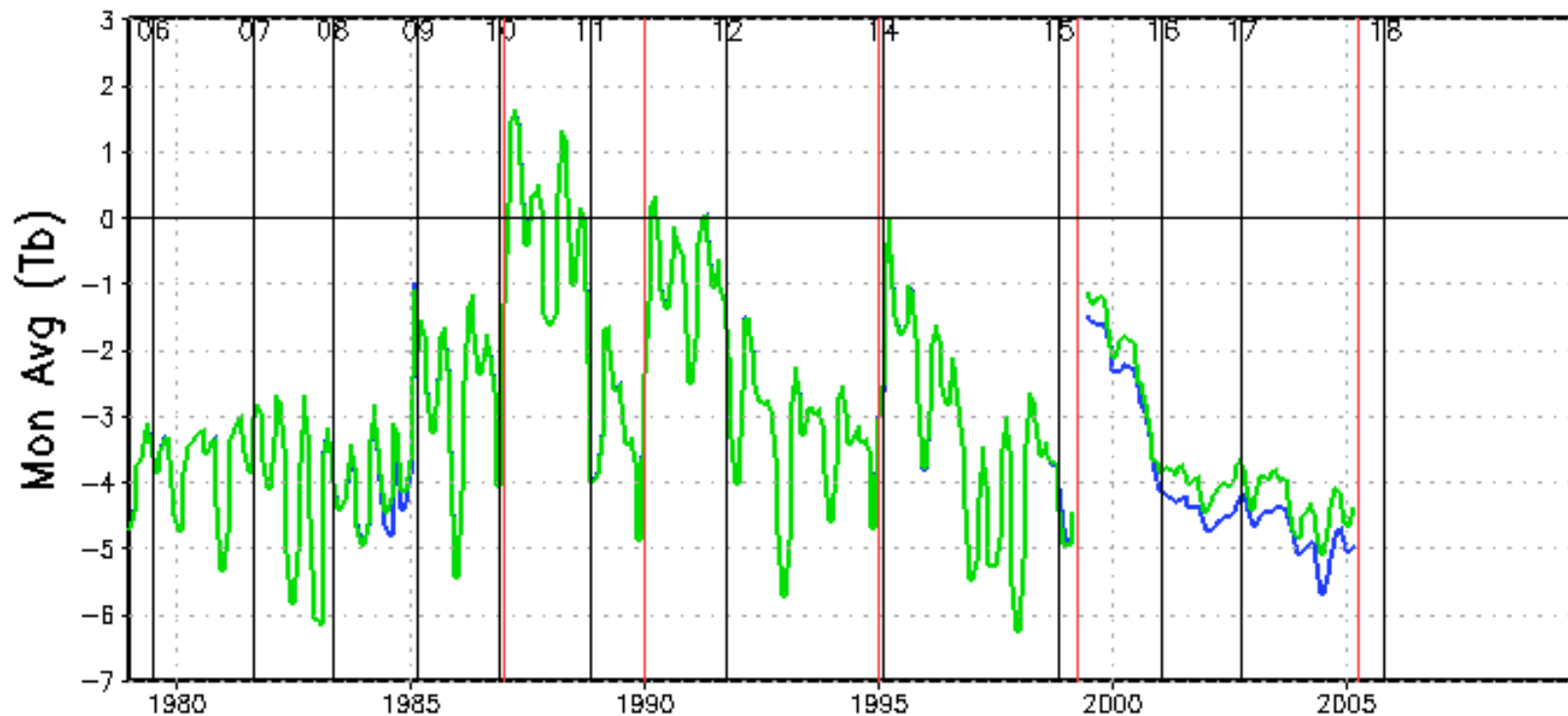
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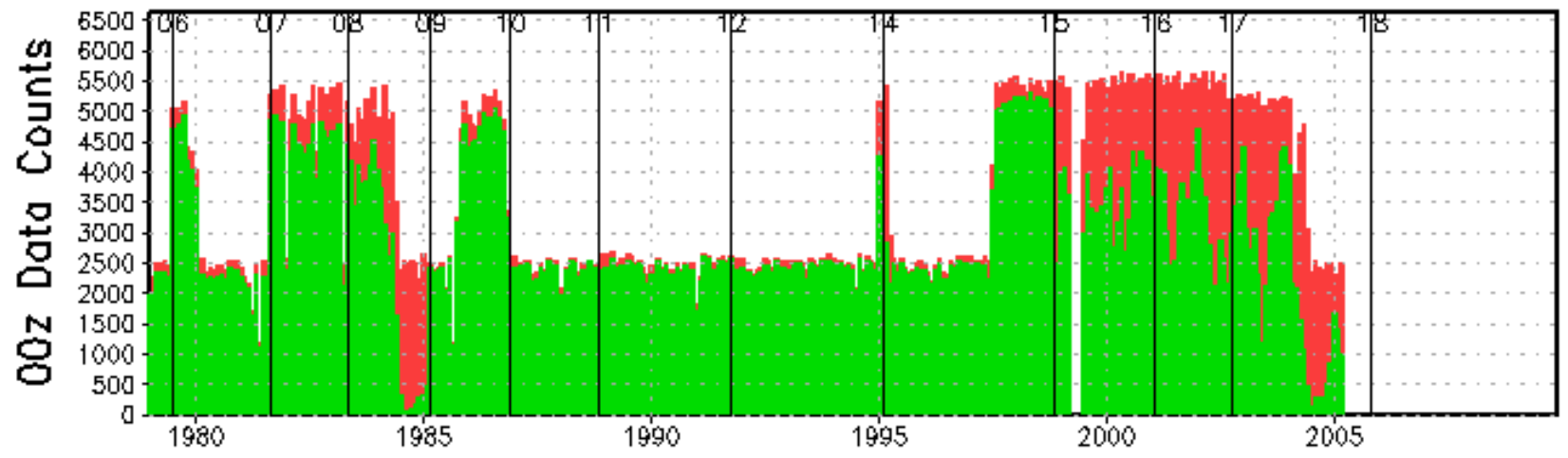
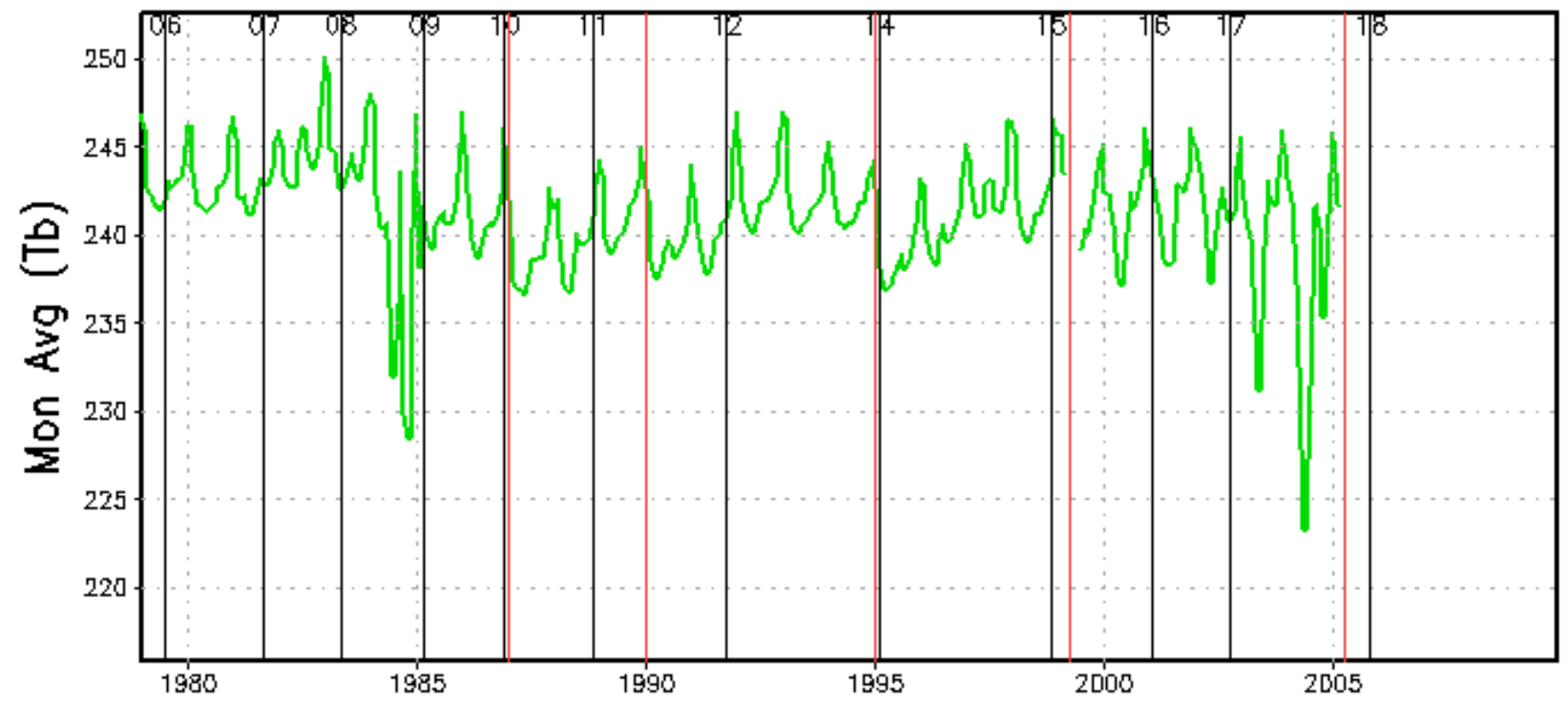
ssu.all Ch02 5hPa Global

BIASCR



CFSR

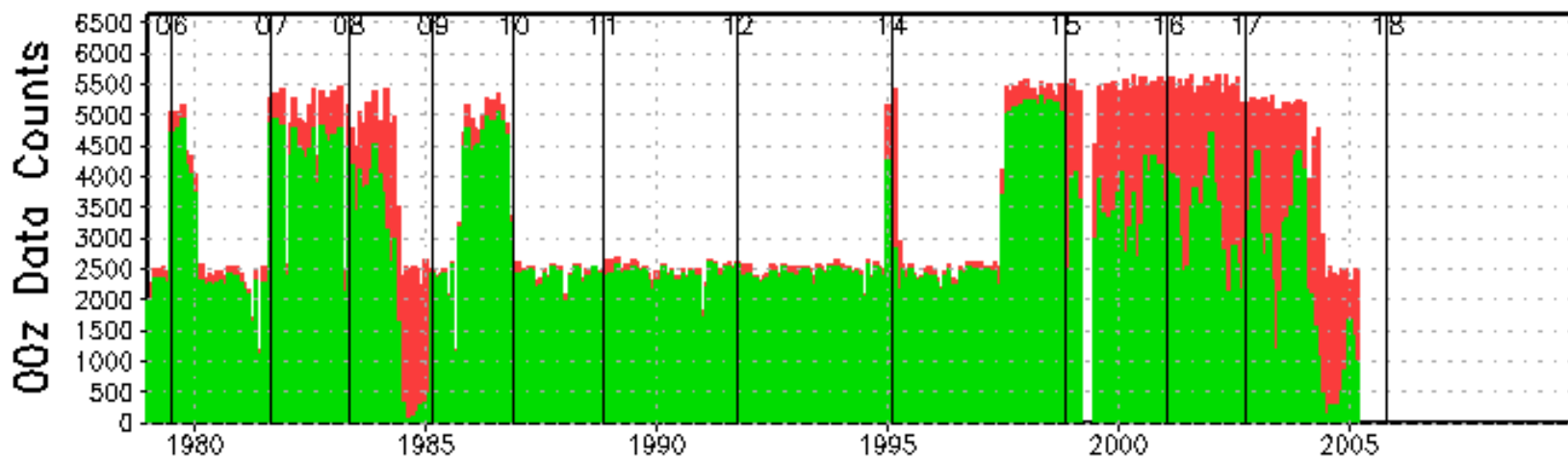
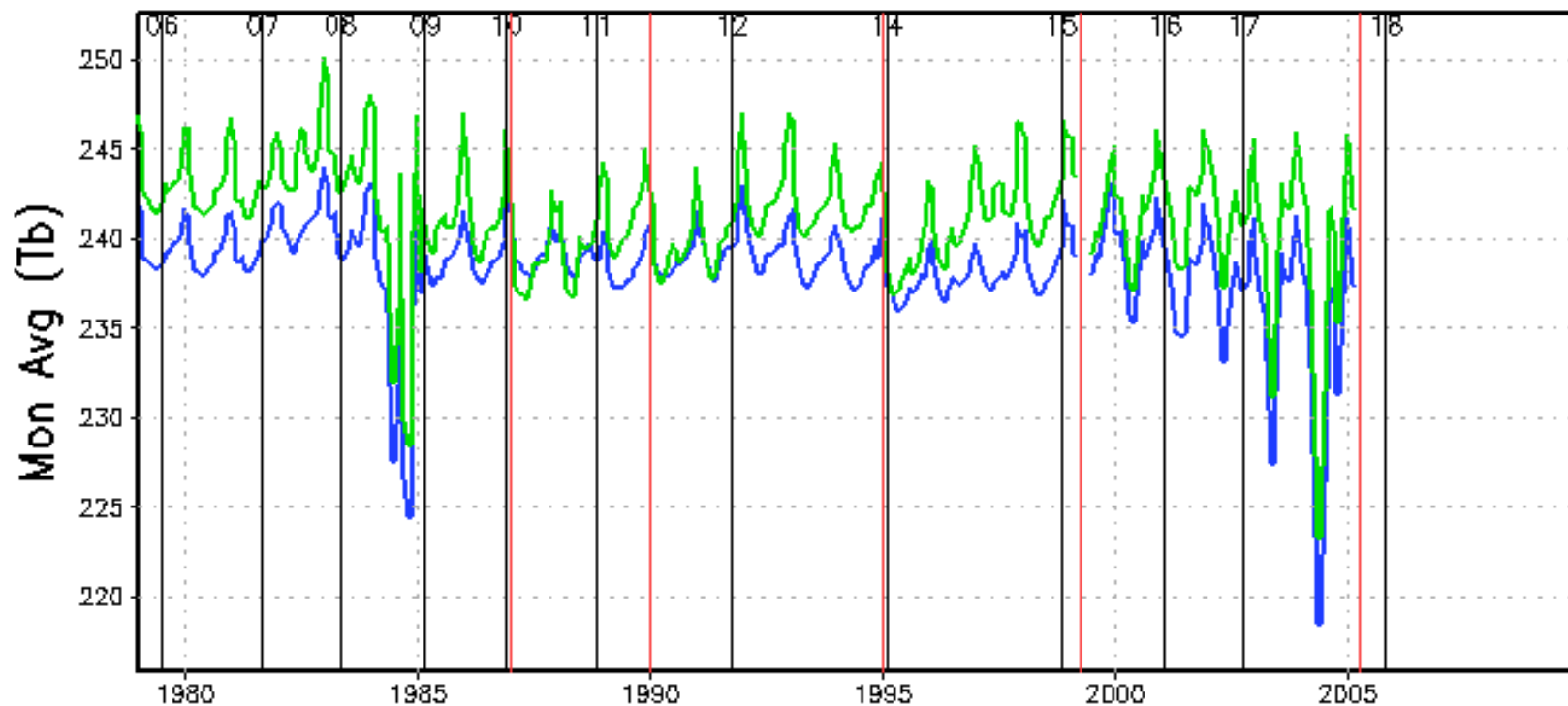
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CFSR

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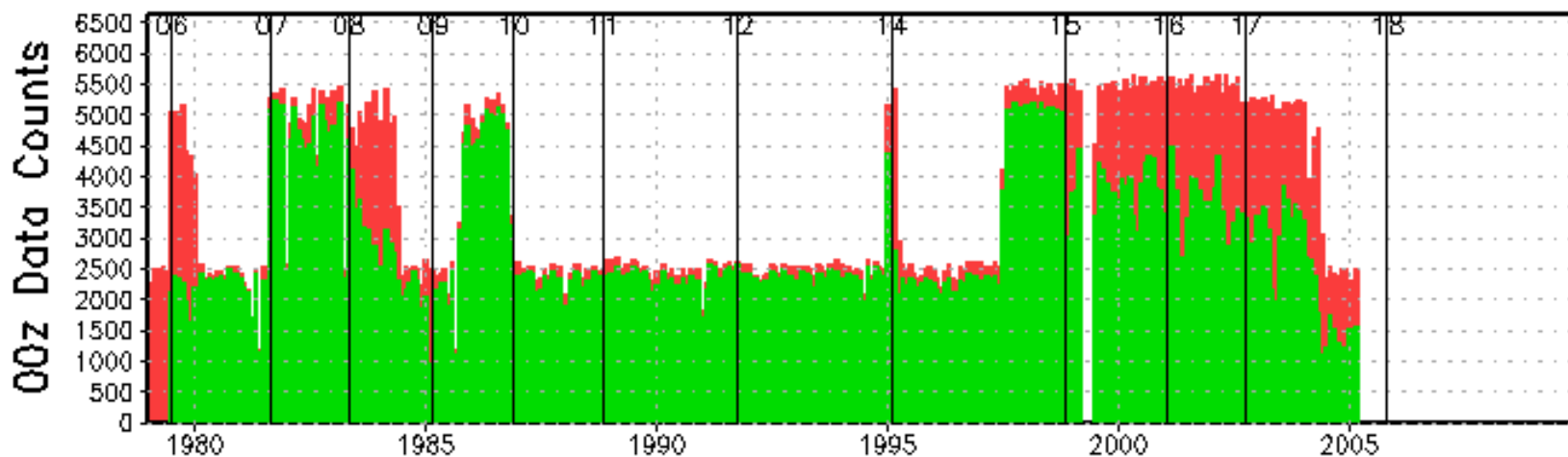
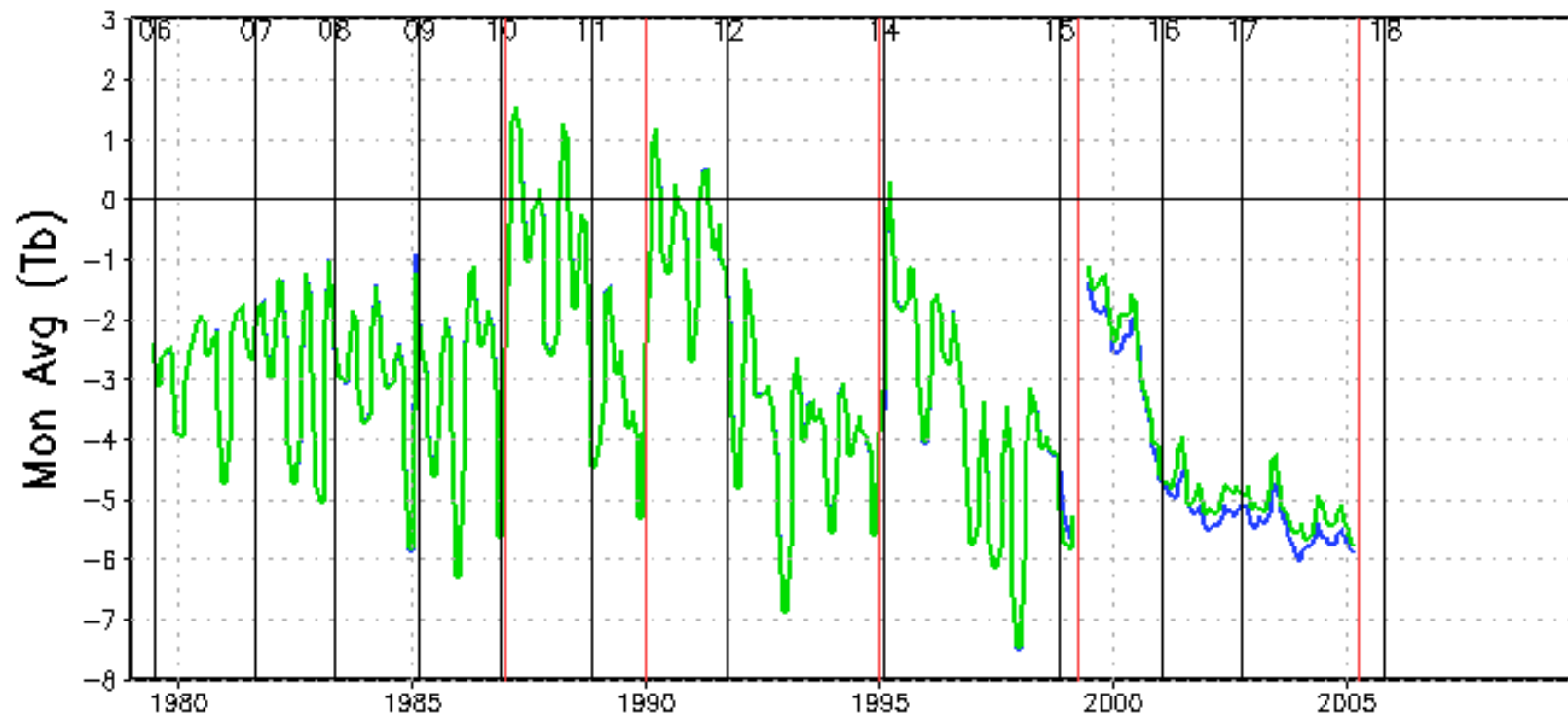
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OB-ANL

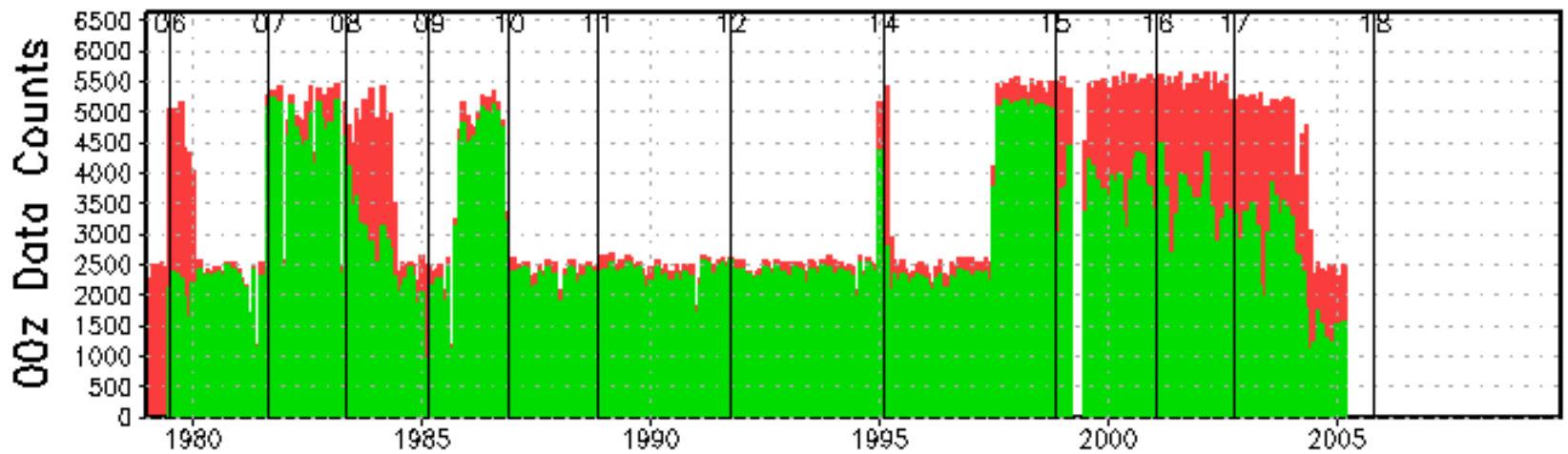
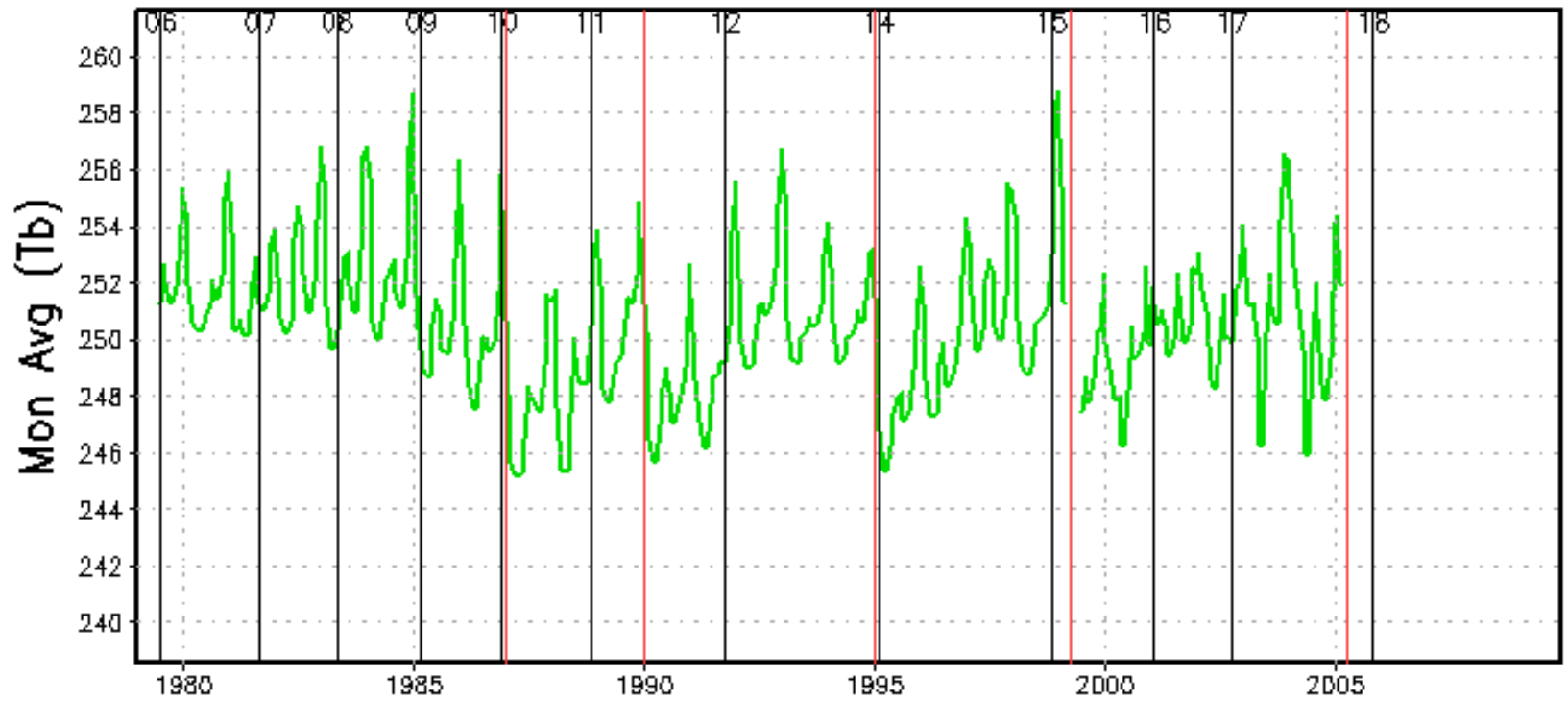
ssu.all Ch03 1.5hPa Global

BIASCR



CFSR

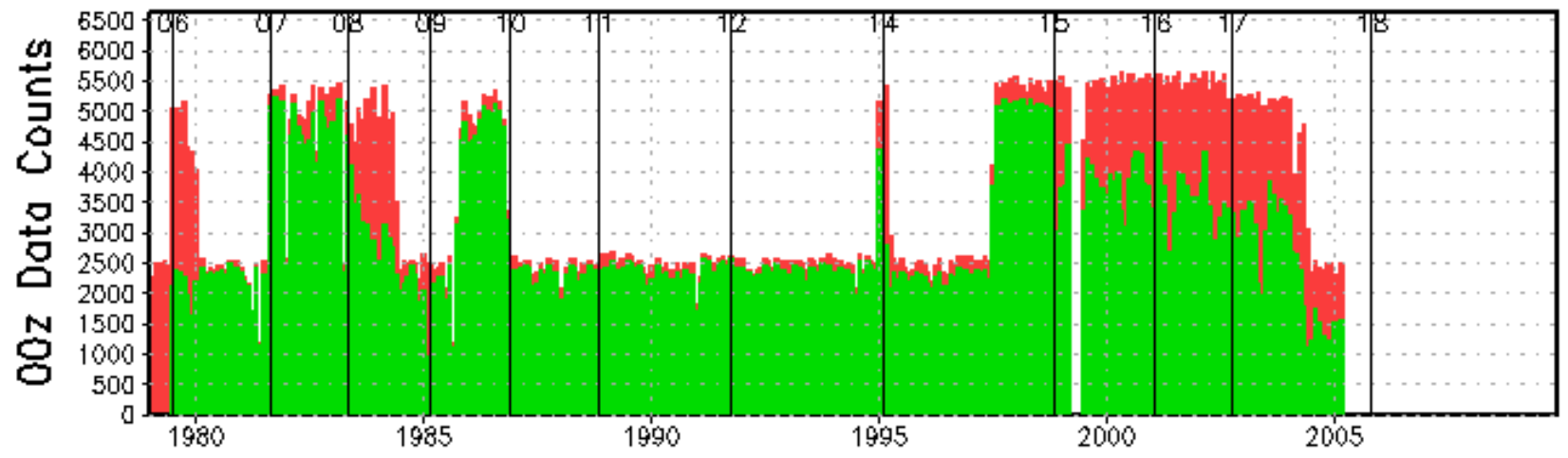
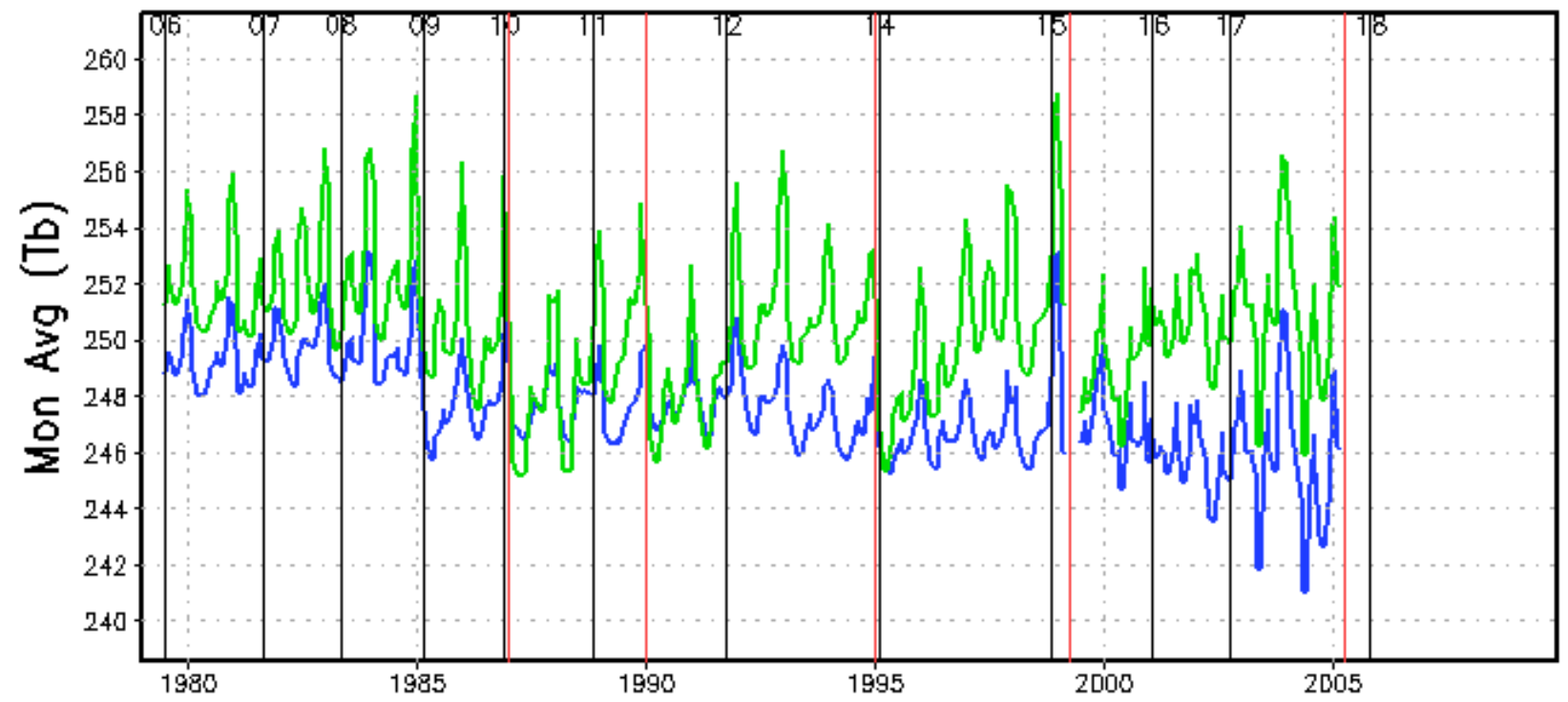
ssu.all Ch03 1.5hPa Global



CFSR

ssu.all Ch03 1.5hPa Global

OBS



Some General Observations/Conclusions:

- 1) Discontinuities in channels peaking below 100hPa were reduced or removed fairly well over the sat and stream boundaries in the CFSR.**
- 2) Steps in the bias correction, and the analysis, at the stream boundaries in the stratosphere, affected all the instruments, particularly SSU.**
- 3) The BC at stream boundaries in the stratosphere is often near zero.**
- 4) The BC spinup in the stratosphere (if correct) takes ~3 years.**
- 5) The recalibrated MSU CH4 data is consistent with CFSR background.**
- 6) Some noise is introduced in the HIRS ch7 (lower troposphere) record by some of the satellite changes (ie n09 n10 n14 n15 n18)**

Proposed Redo of CFSR >>> CFSRL

- **Single stream (1979-2010)**
- **low resolution (T126L64)**
- **Address 3 problem areas**
 - deep ocean, deep soil, stratosphere
 - Start with “spun-up” deep soil and neutral ocean
 - Use CFSRR “spun-up” sat bias’s as each instrument comes online
 - Use NOAA-14 SSU into the ATOVS period
 - Look at using AMSUa ch 14 (~SSU3)
- **Candidate to replace R1(1948-1978)**