Proposed smoothing scales:

Temperature: 15 deg (longitude) by 10 deg (latitude)
Precipitation: 10 deg (longitude) by 5 deg (latitude)

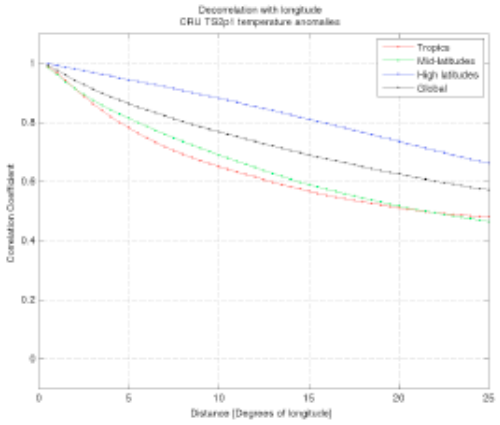
The following set of figures illustrates the proposed smoothing scale for the verification analysis. The idea was to have verification at the grid scale (defined by the observational dataset(s)), but also to have verification at a smoothed scale to emphasize potentially predictable signals, and to minimize small spatial errors in the models as well as local-scale climate noise.

A correlation analysis was carried out across all land grid points (i.e. those with data over the period 1960-present), comparing to grid points within a given radius. Certainly in some regions smaller or larger averaging radii might be desired. We were trying to determine an optimally sized smoothing region, but can consider that the size of the smoothing box might be different for different variables. Rather than extending to the full decorrelation scale, it was considered desirable to ensure that the grid boxes within a typical region retained a high correlation with the reference point. Thus, for the scales proposed, the correlation with the reference point typically only drops to about 0.7.

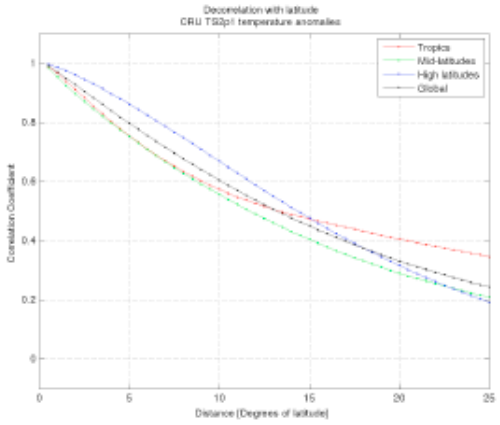
Results are shown for the total anomalies and detrended anomalies. The differences are small. Also shown at the end are some examples of what the smoothed fields look like for annual mean temperature and precipitation from 2 years (1988 and 1997). For comparison, even coarser smoothing is shown for both variables in both years. Similar patterns are retained, but are muted, thus diluting the signals.

Decorrelation of yearly anomalies - CRU TS2p1 temperature

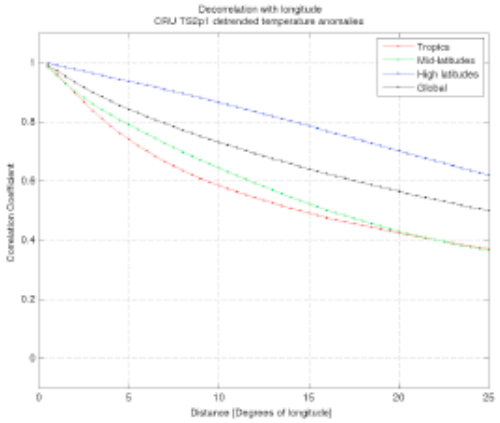
decorrelation with longitude – temperature anomalies



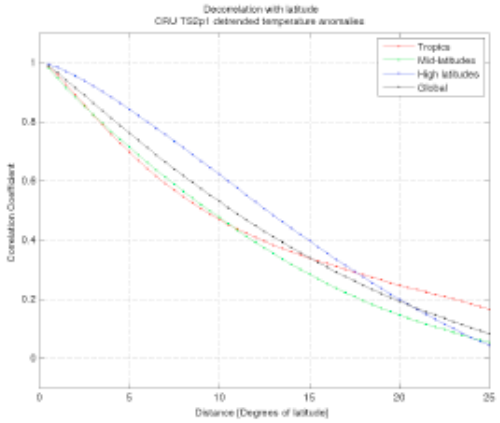
decorrelation with latitude – temperature anomalies



decorrelation with longitude – detrended temperature anomalies

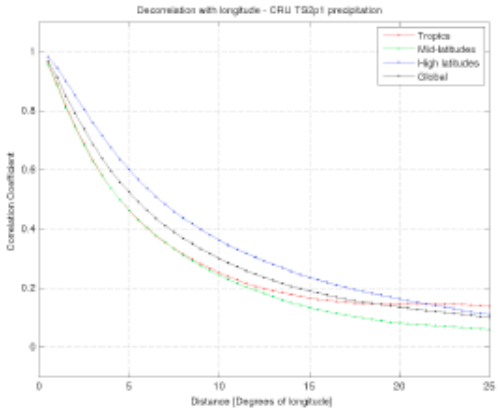


decorrelation with latitude – detrended temperature anomalies

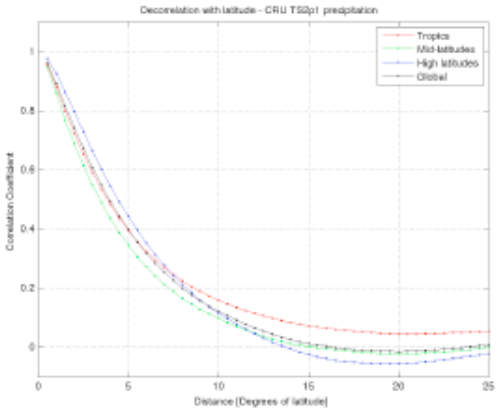


Decorrelation of yearly anomalies - CRU TS2p1 precipitation

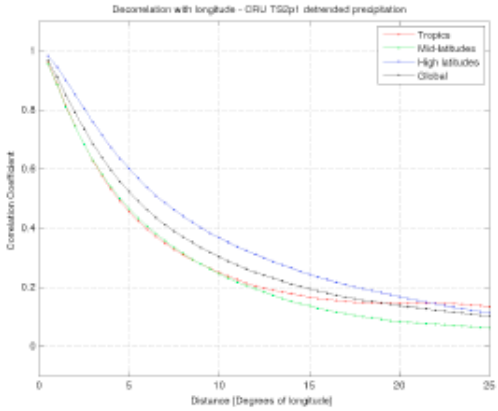
decorrelation with longitude – precipitation anomalies



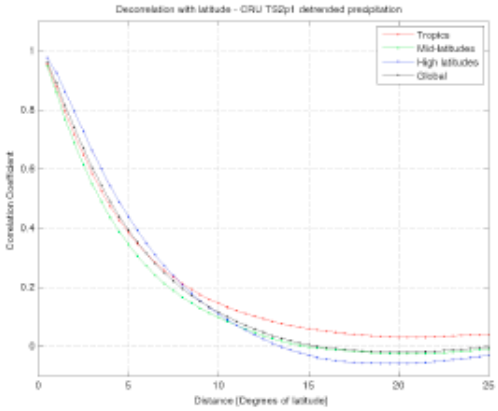
decorrelation with latitude – precipitation anomalies

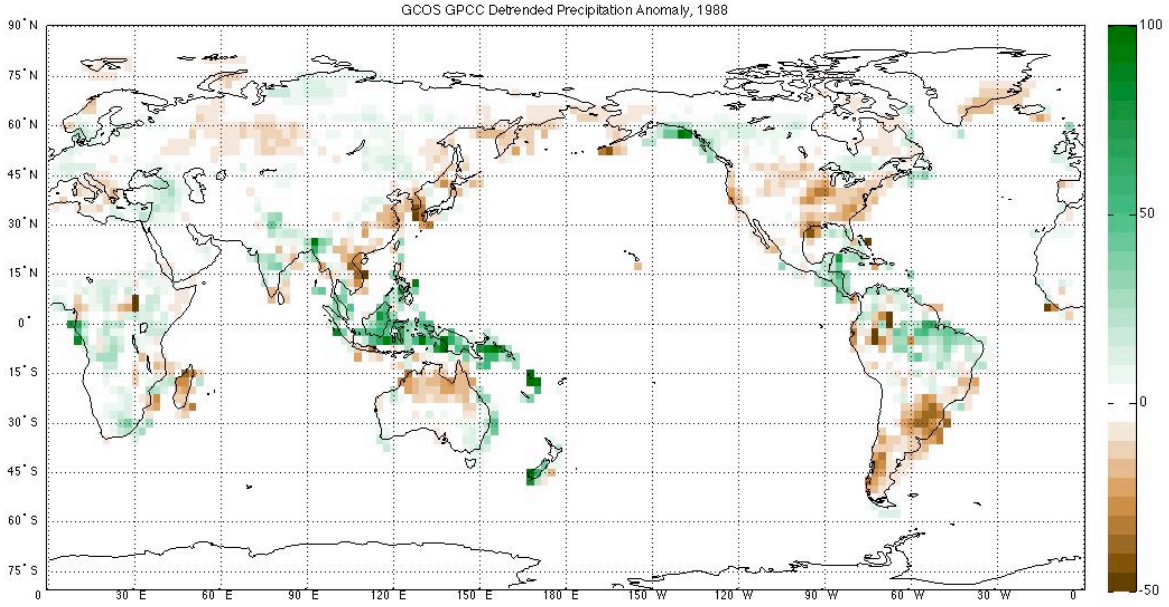


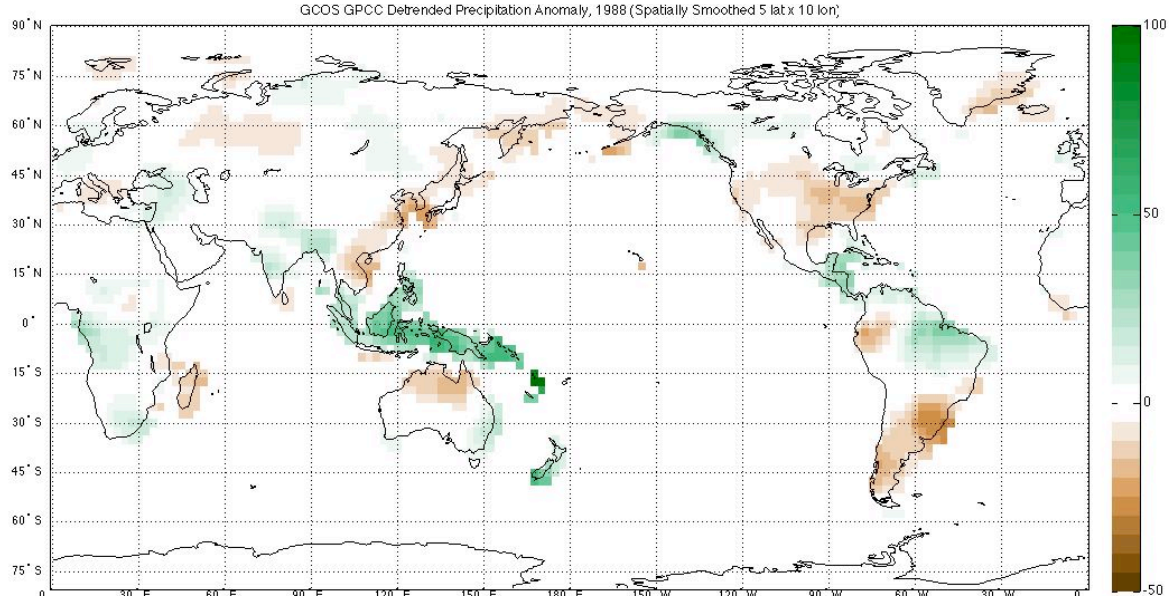
decorrelation with longitude – detrended precipitation anomalies

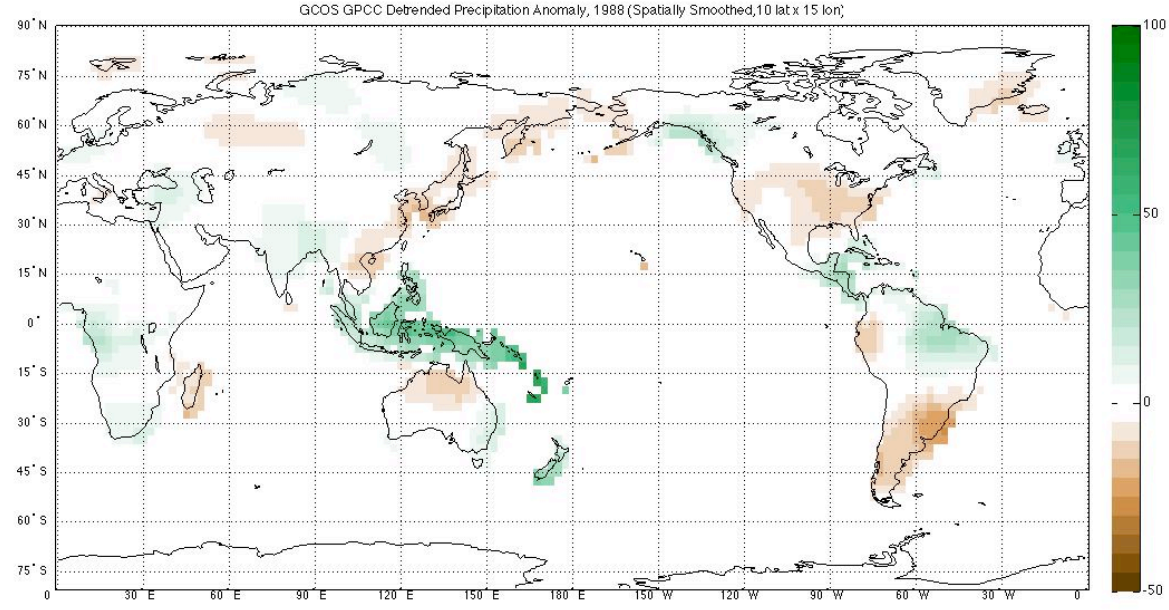


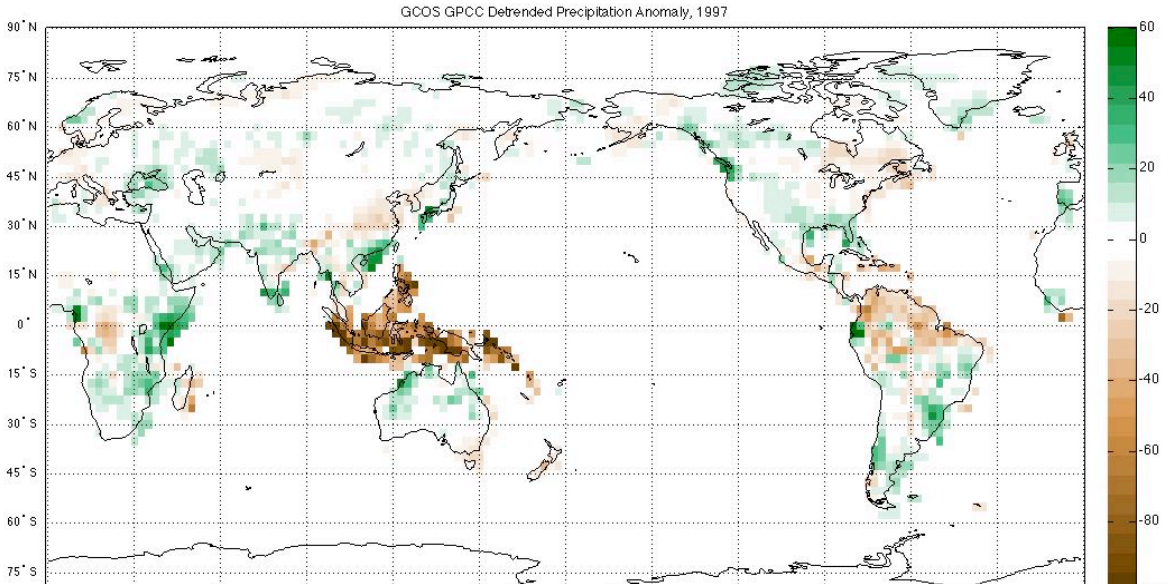
decorrelation with latitude – detrended precipitation anomalies

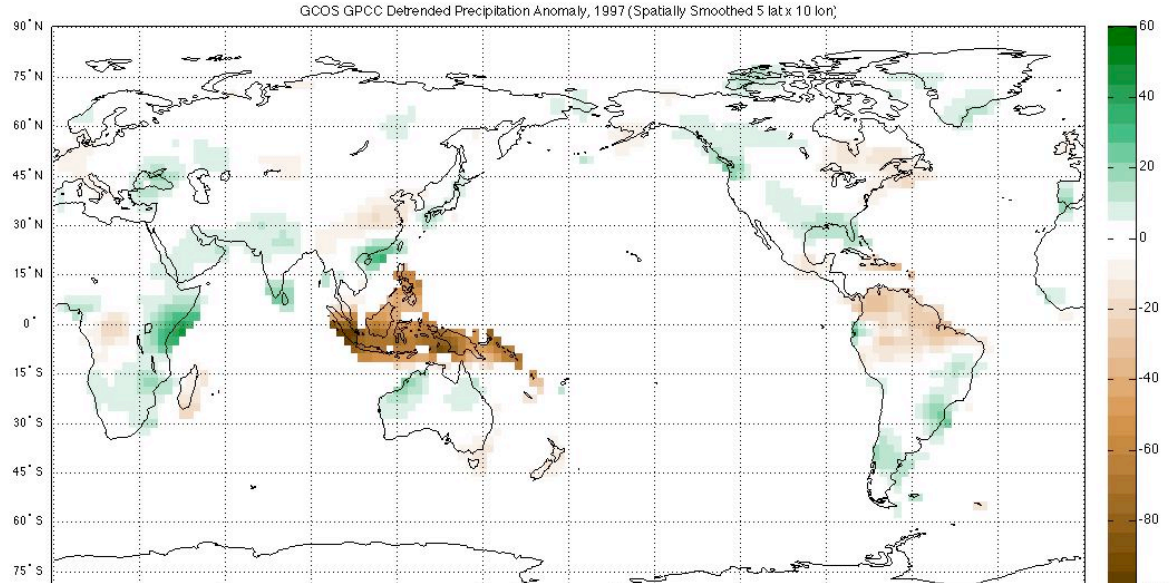


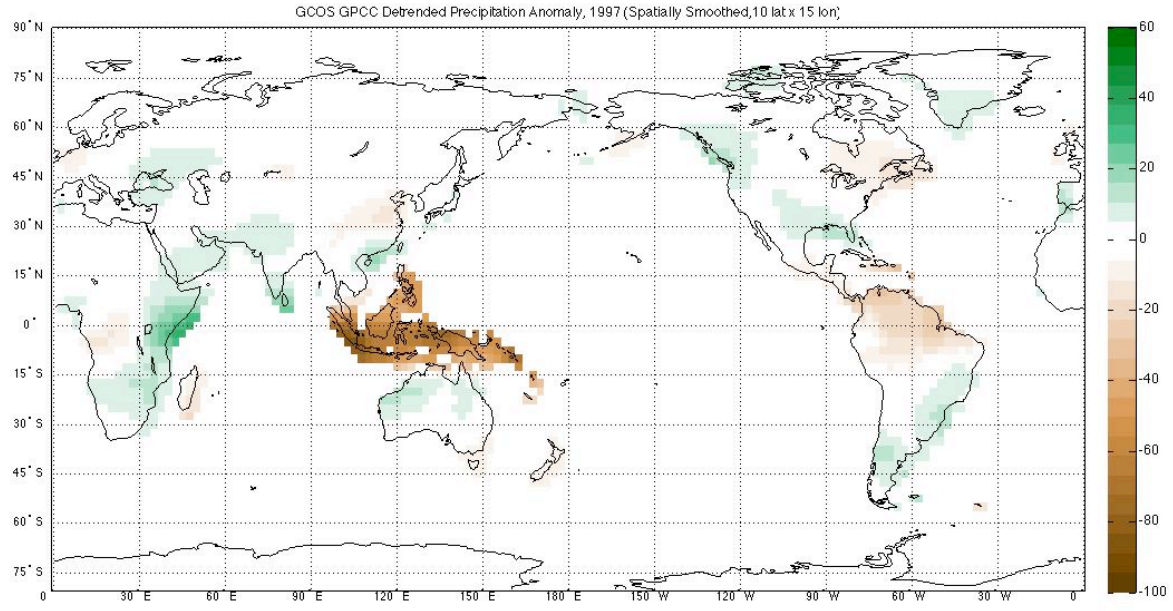

GCOS GPCC Detrended Precipitation Anomaly, 1988
90° N
75° N
60° N
45° N
30° N
15° N
0°
15° S
30° S
45° S
60° S
75° S
0
30° E
60° E
90° E
120° E
150° E
180° E
150° W
120° W
90° W
60° W
30° W
0
100
50
0
-50

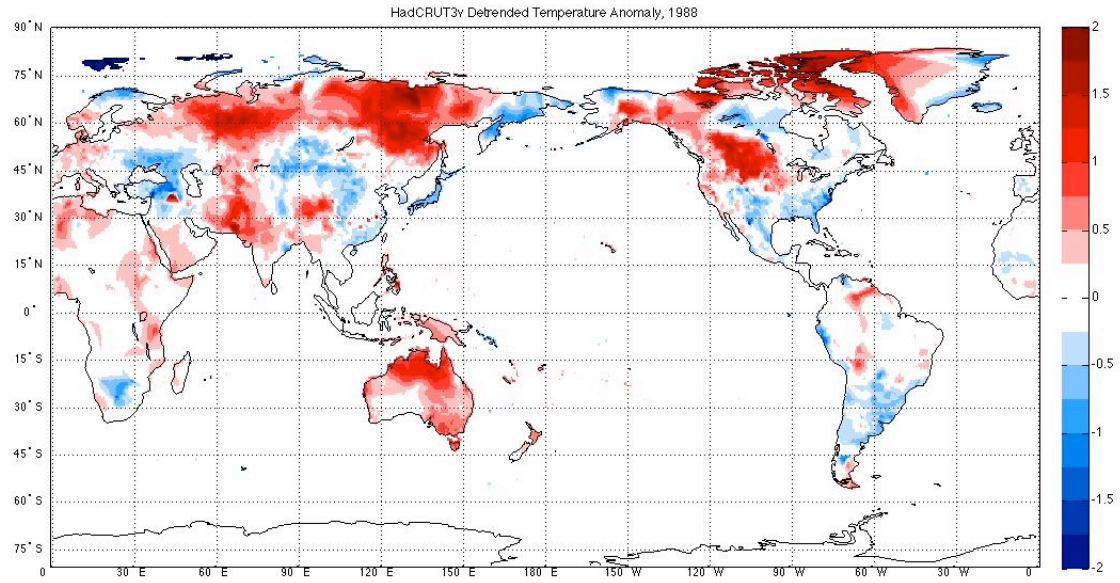

GCOS GPCC Detrended Precipitation Anomaly, 1988 (Spatially Smoothed 5 lat x 10 lon)
90° N
75° N
60° N
45° N
30° N
15° N
0°
15° S
30° S
45° S
60° S
75° S
100
50
0
-50

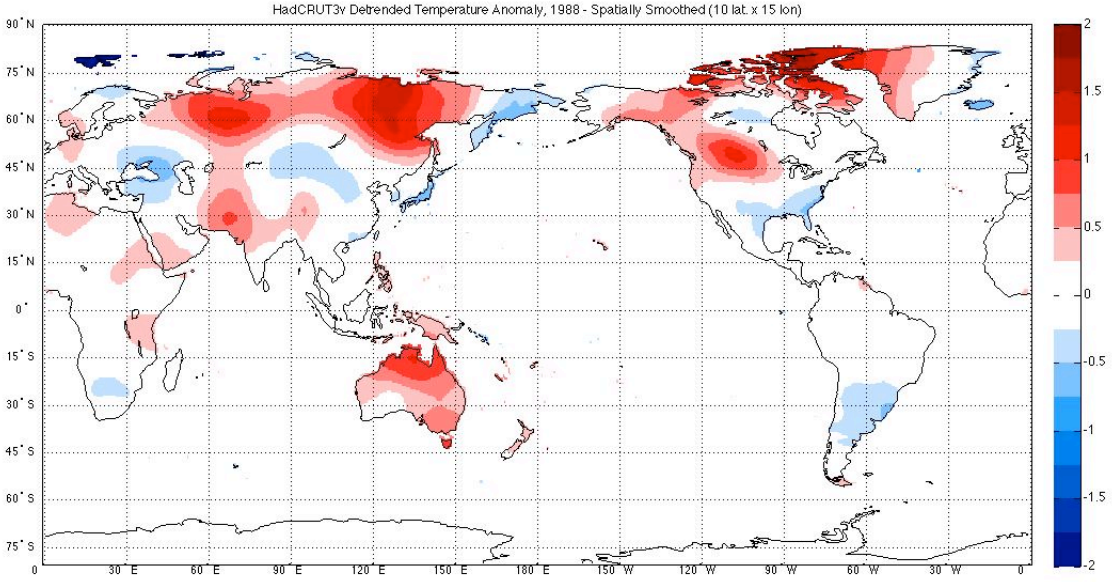

GCOS GPCC Detrended Precipitation Anomaly, 1988 (Spatially Smoothed,10 lat x 15 lon)
90° N
75° N
60° N
45° N
30° N
15° N
0°
15° S
30° S
45° S
60° S
75° S
0
30° E
60° E
90° E
120° E
150° E
180° E
150° W
120° W
90° W
60° W
30° W
0
100
50
0
-50

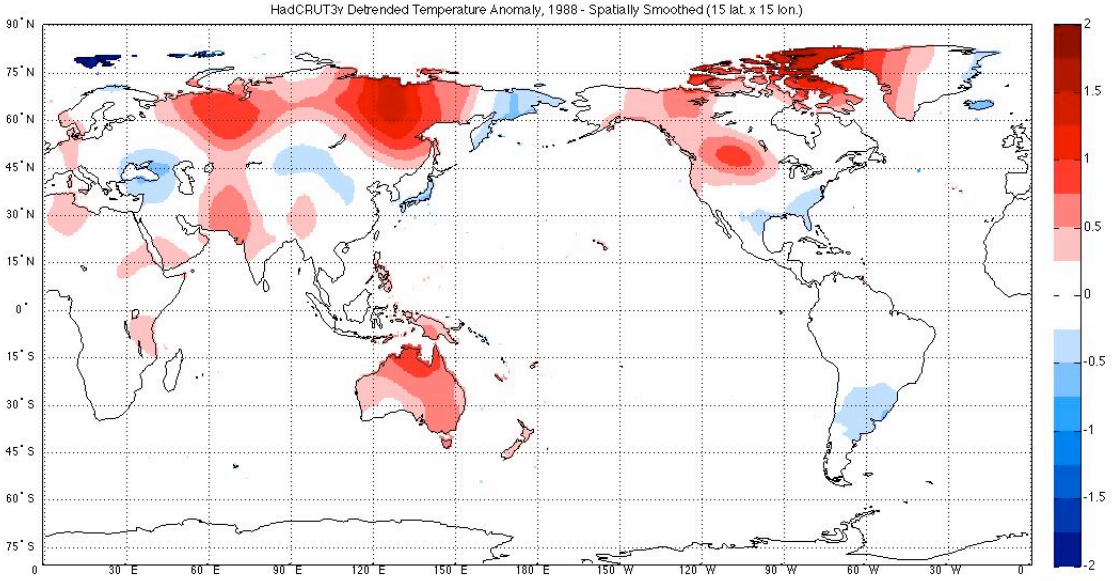

GCOS GPCC Detrended Precipitation Anomaly, 1997
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
60
40
20
0
-20
-40
-60
-80

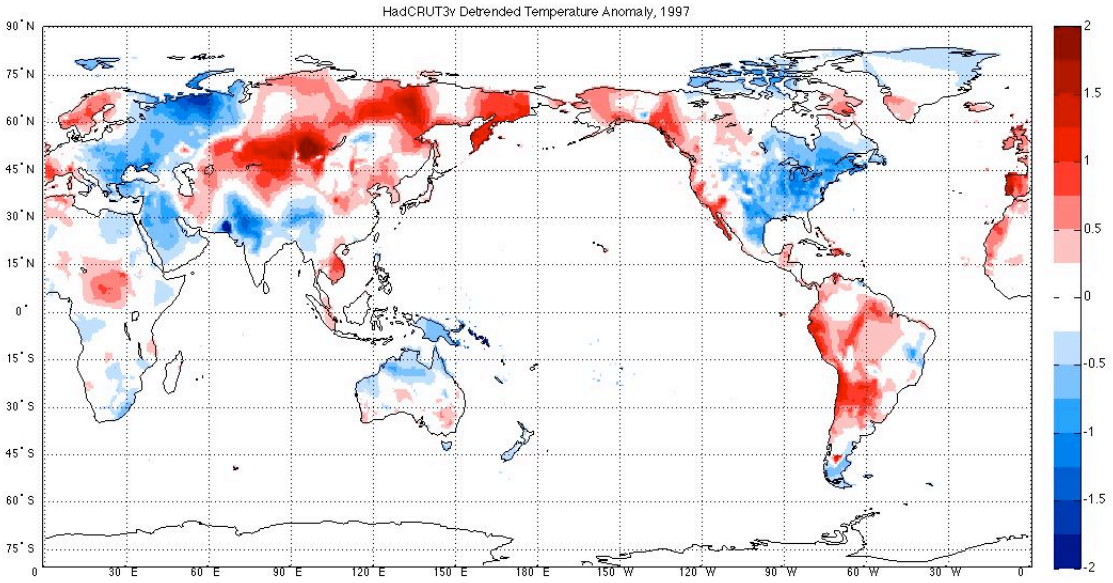

GCOS GPCC Detrended Precipitation Anomaly, 1997 (Spatially Smoothed 5 lat x 10 lon)
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
60
40
20
0
-20
-40
-60
-80

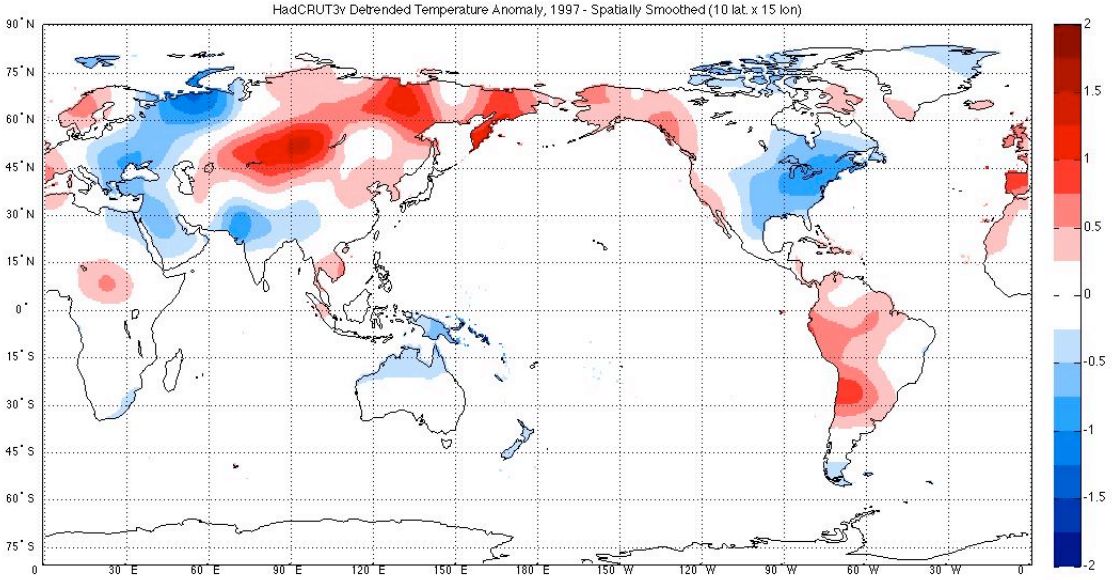

GCOS GPCC Detrended Precipitation Anomaly, 1997 (Spatially Smoothed,10 lat x 15 lon)
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
0
30°E
60°E
90°E
120°E
150°E
180°E
150°W
120°W
90°W
60°W
30°W
0
60
40
20
0
-20
-40
-60
-80
-100

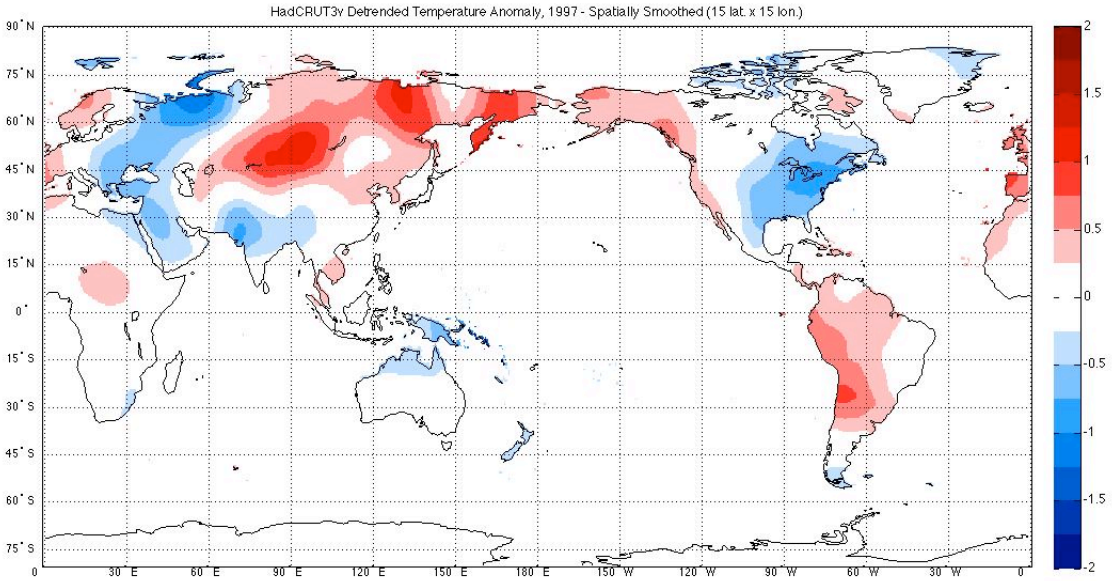

HadCRUT3v Detrended Temperature Anomaly, 1988
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
0
30°E
60°E
90°E
120°E
150°E
180°E
150°W
120°W
90°W
60°W
30°W
0
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2


HadCRUT3v Detrended Temperature Anomaly, 1988 - Spatially Smoothed (10 lat. x 15 lon)
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
0
30°E
60°E
90°E
120°E
150°E
180°E
150°W
120°W
90°W
60°W
30°W
0
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2


HadCRUT3v Detrended Temperature Anomaly, 1988 - Spatially Smoothed (15 lat. x 15 lon.)
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
0
30°E
60°E
90°E
120°E
150°E
180°E
150°W
120°W
90°W
60°W
30°W
0
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2


HadCRUT3v Detrended Temperature Anomaly, 1997
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
0
30°E
60°E
90°E
120°E
150°E
180°E
150°W
120°W
90°W
60°W
30°W
0
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2


HadCRUT3v Detrended Temperature Anomaly, 1997 - Spatially Smoothed (10 lat. x 15 lon)
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
0
30°E
60°E
90°E
120°E
150°E
180°E
150°W
120°W
90°W
60°W
30°W
0
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2


HadCRUT3v Detrended Temperature Anomaly, 1997 - Spatially Smoothed (15 lat. x 15 lon.)
90°N
75°N
60°N
45°N
30°N
15°N
0°
15°S
30°S
45°S
60°S
75°S
0
30°E
60°E
90°E
120°E
150°E
180°E
150°W
120°W
90°W
60°W
30°W
0
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2