NCEP Daily Climatological Mean and Stand Deviation

Version One

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NCEP/NWS/NOAA

November 1st 2005

Acknowledgement: Malaquias Pena

Input climate/forecast data

-- current available

- NCEP/NCAR reanalysis data
  - 4 cycles (00UTC, 06UTC, 12UTC and 18UTC) per day
  - 40 years (Jan. 1st 1959 – Dec. 31th 1998)
  - Need to consider the systematic difference between NCEP/NCAR reanalysis and current analysis (GDAS)
- Resolution and format
  - 2.5*2.5 (lat/lon) grid, GRIB-1 format
  - 1.0*1.0 (lat/lon) grid, GRIB-1 format (forecast only)
- Variables at levels (possible to add more)
  - Height: 1000hPa, 700hPa, 500hPa, 250hPa
  - Temperature: 2m, 850hPa, 500hPa, 250hPa
  - Wind: 10m, 850hPa, 500hPa, 250hPa
  - PRMSL, max/min temperature

Climatological mean (estimation)

- To use Fourier expansion from 40 years data and compare following four considerations
  - Considering first Fourier mode: a1 and b1
    - Fits to daily data to obtain annual cycle
  - Considering first two Fourier modes: a1,b1,a2 and b2
    - Fits to daily data to obtain annual and semi-annual cycle
  - Considering first three Fourier modes: a1,b1,a2,b2,a3 and b3
    - Fits to daily data to obtain annual, semi-annual and 4-month cycle
  - Considering first four Fourier modes: a1,b1,a2,b2,a3,b3,a4 and b4
    - Fits to daily data to obtain annual, semi-annual, 4-month and seasonal cycle

Higher moments (estimation)

- work on the anomalies from mean

- Standard deviations:
  - Based on 4 different daily means (previous slide)
  - To get 40 years average daily standard deviation first
  - To calculate monthly mean of standard deviation from daily
  - To generate a slope from month to month
  - To project to daily standard deviation from month mean

NCEP Daily Climatological Mean and Stand Deviation

Version Two

Bo Yang
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NCEP/NWS/NOAA

May 2nd 2012

Acknowledgement: Malaquias Pena, Dave Unger and Dan Collins

Input climate/forecast data

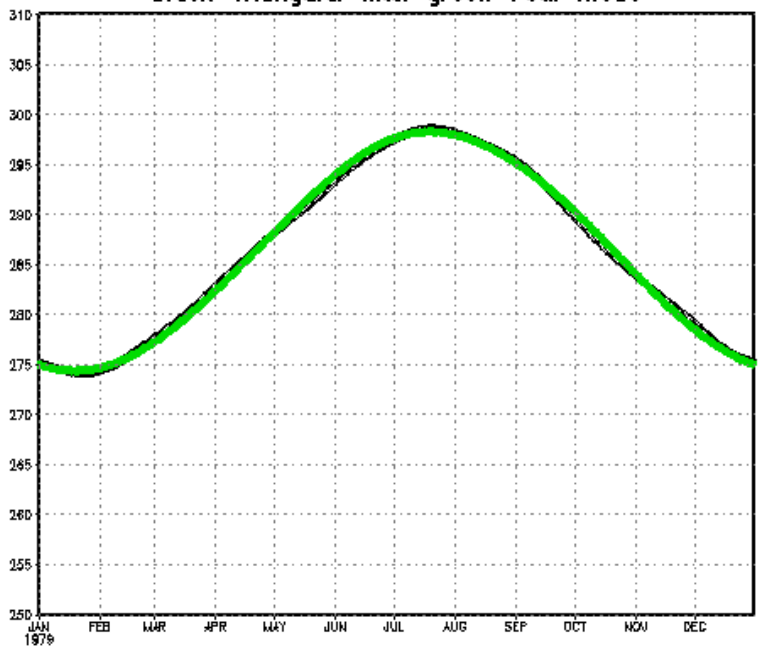
-- Current available

- CFS reanalysis (CFSR) data
  - 4 cycles (00UTC, 06UTC, 12UTC and 18UTC) per day
  - 31 years (Jan. 1st 1979 – Dec. 31th 2009)
  - Need to consider the systematic difference between CFSR and current analysis (GDAS)
- Resolution and format
  - 0.5*0.5 (lat/lon) or T382, GRIB-2 format → 1.0*1.0 (lat/lon) grid, GRIB-1 format
  - 0.5*0.5 (lat/lon) or T382, GRIB-2 format →1.0*1.0 (lat/lon) grid, GRIB-1 format (forecast only)
- Variables at levels (possible to add more)
  - Height: 1000hPa, 700hPa, 500hPa, 250hPa
  - Temperature: 2m, 850hPa, 500hPa, 250hPa
  - Wind: 10m, 850hPa, 500hPa, 250hPa
  - PRMSL, PWAT, max/min temperature

Climatological mean and higher moments

-Discussion

- Daily climatological mean (MEAN)
  - First four Fourier modes
  - 45-day triangular mean
  - Comparison
- Daily climatological standard deviation (STDV)
  - Daily climatological STDV with respect to the daily climatological MEAN reconstructed with four-mode method → monthly mean STDV → month-to-month slope → daily STDV interpolated linearly from monthly mean STDV and month-to-month slope
  - 61-day triangular mean
  - Comparison
- Summary
  - Overall consideration


T2m mean at T00Z 37.5N, 77.5W
black-Triangular filter green-Four mode
310
305
300
295
290
285
280
275
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265
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JAN 1979
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OCT
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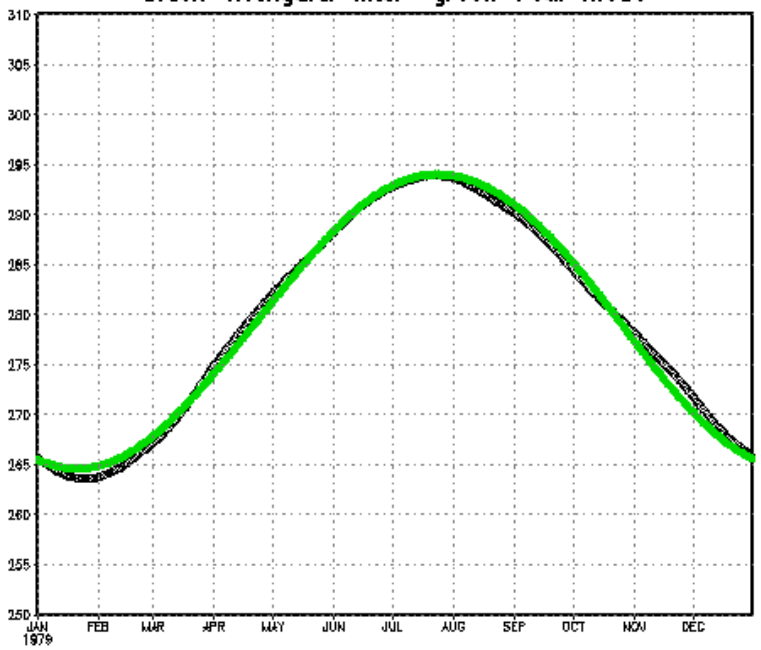
T2m mean at T00Z 45.0W 75.0W
black-Triangular filter green-Four mode
310
305
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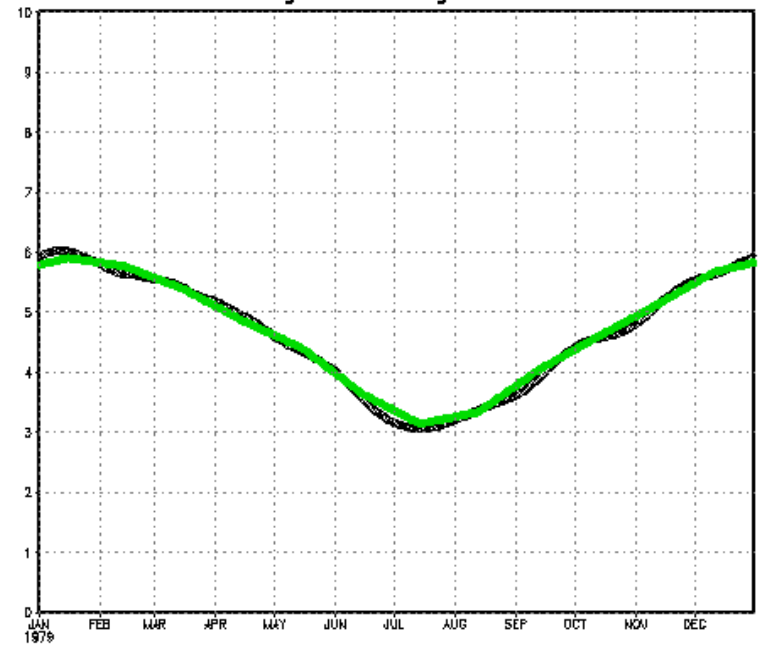
T2m stdv at T00Z 37.5N, 77.5W
black-Triangular filter green-Four mode
10
9
8
7
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JAN 1979
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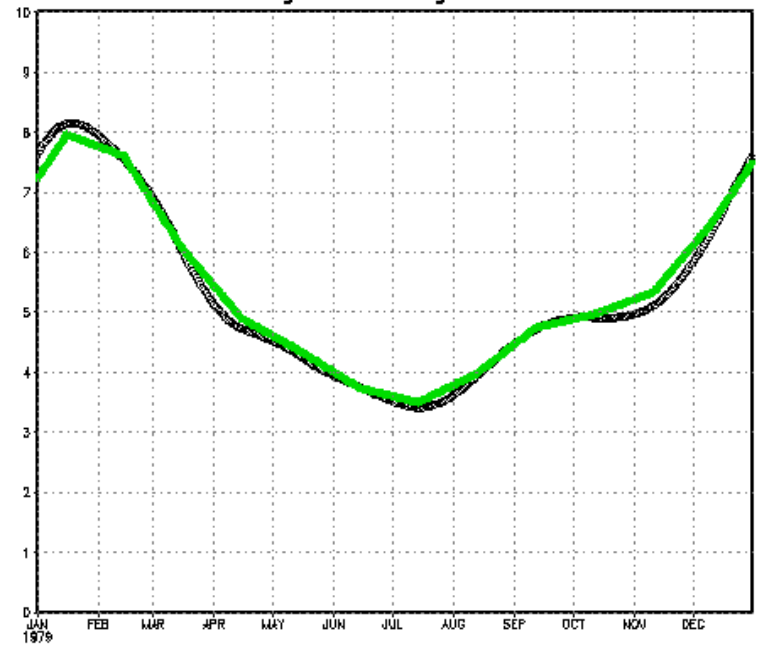
T2m stdv at T00Z 45.0W 75.0W
black-Triangular filter green-Four mode
10
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JAN 1979
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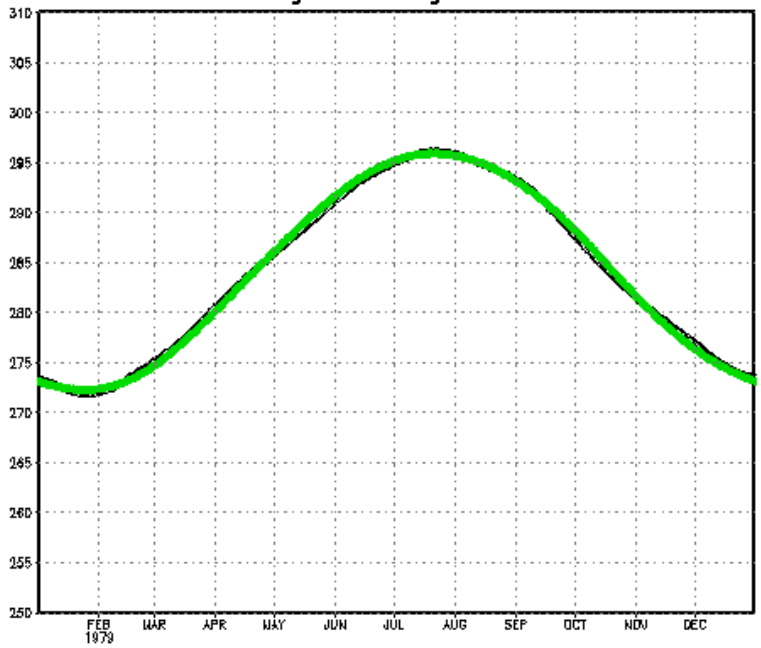
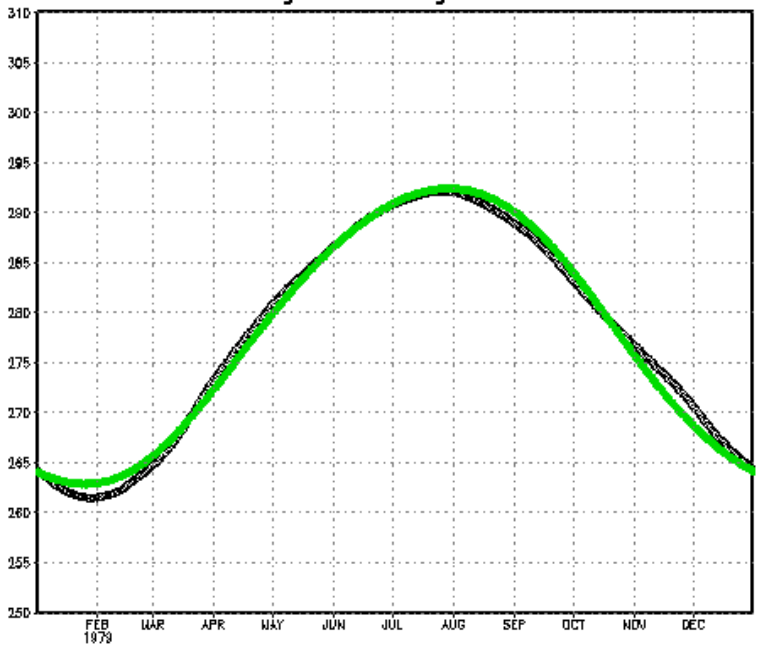
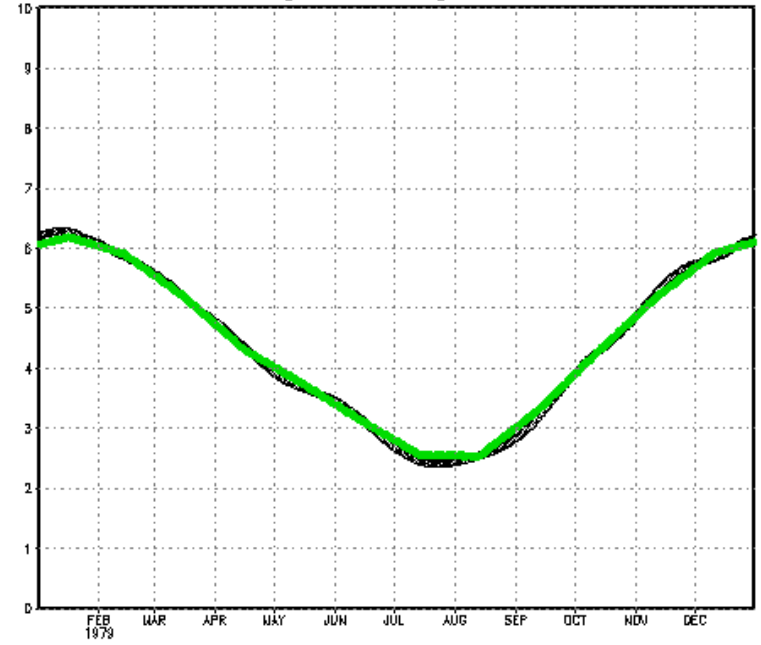
T2m mean at T12z 37.5N, 77.5W
black-Triangular filter green-Four mode



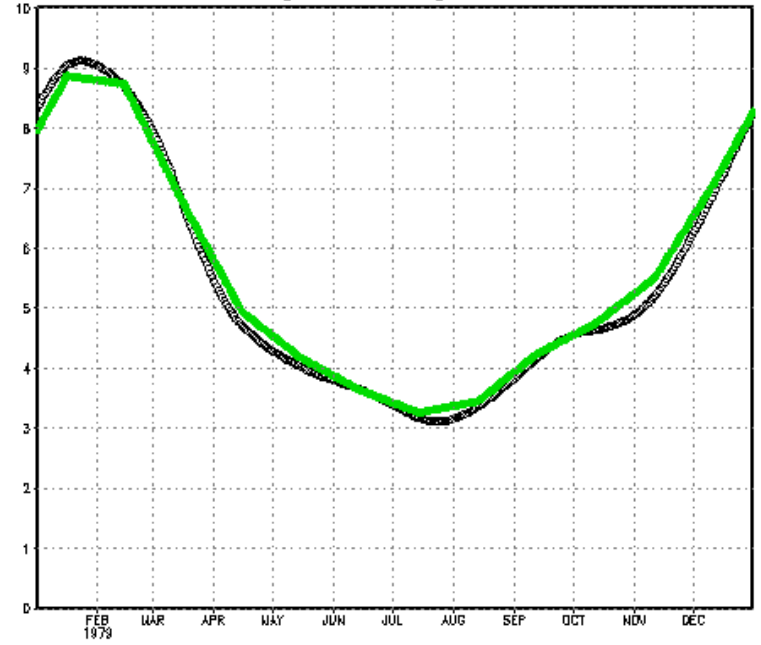
T2m mean at T12z 45.0W 75.0W
black-Triangular filter green-Four mode

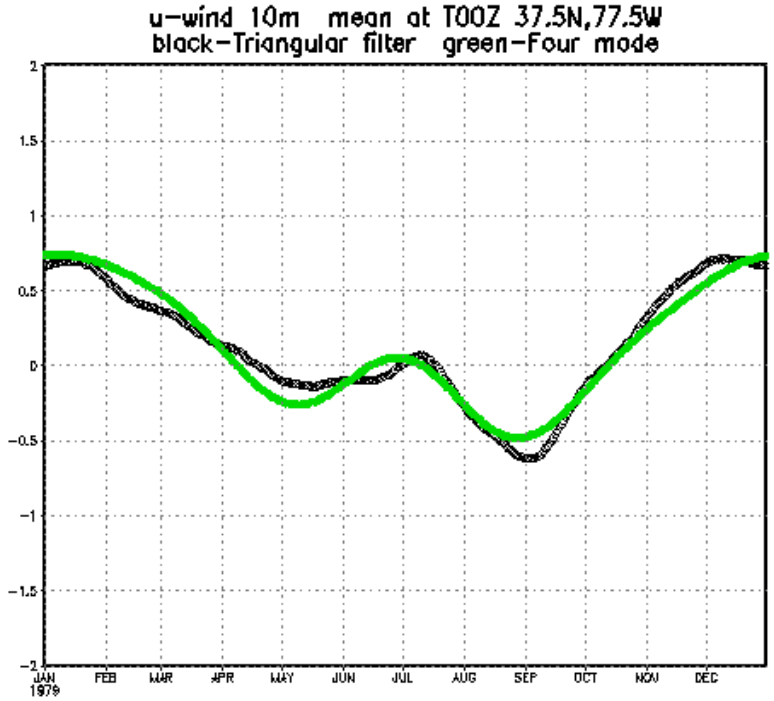


T2m stdv at T12z 37.5N, 77.5W
black-Triangular filter green-Four mode



T2m stdv at T12z 45.0W 75.0W
black-Triangular filter green-Four mode

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black-Triangular filter green-Four mode
2
1.5
1
0.5
0
-0.5
-1
-1.5
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JAN 1979
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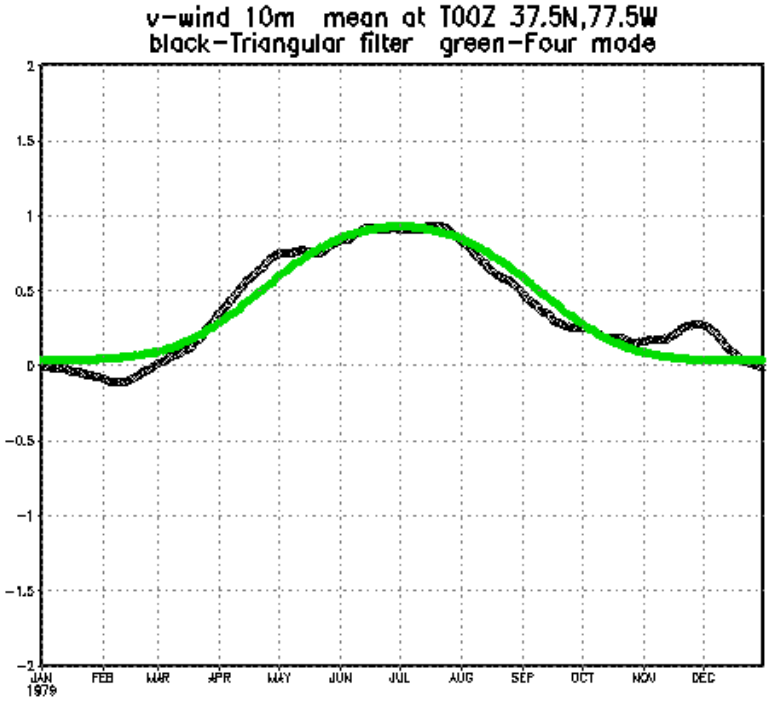
v-wind 10m mean at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
JAN 1979
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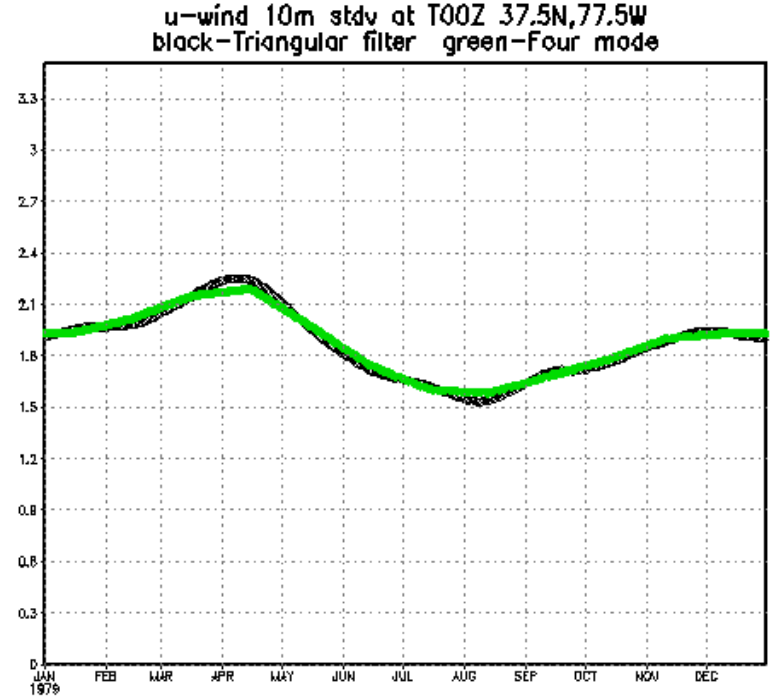
u-wind 10m stdv at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode
3.3
3
2.7
2.4
2.1
1.8
1.5
1.2
0.8
0.6
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JAN 1979
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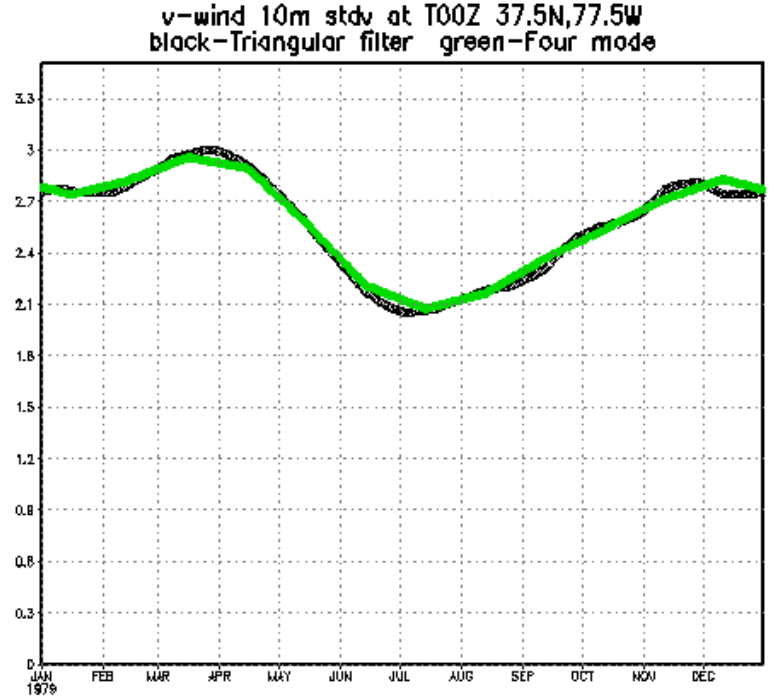
v-wind 10m stdv at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode
3.3
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2.7
2.4
2.1
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0
JAN 1979
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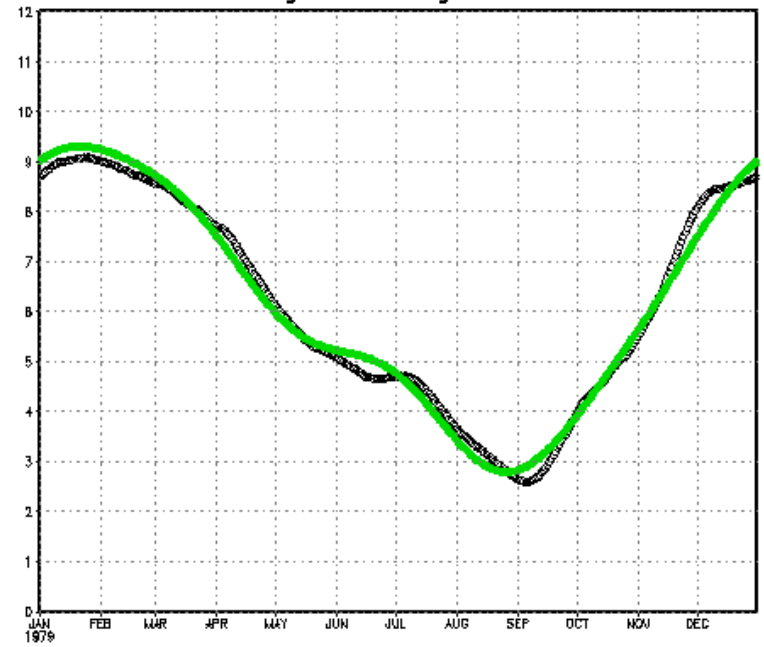
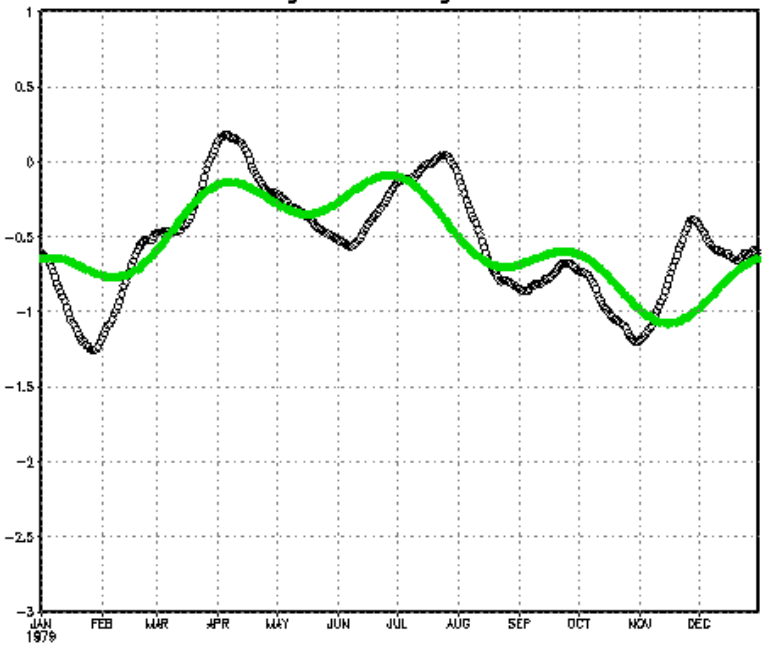
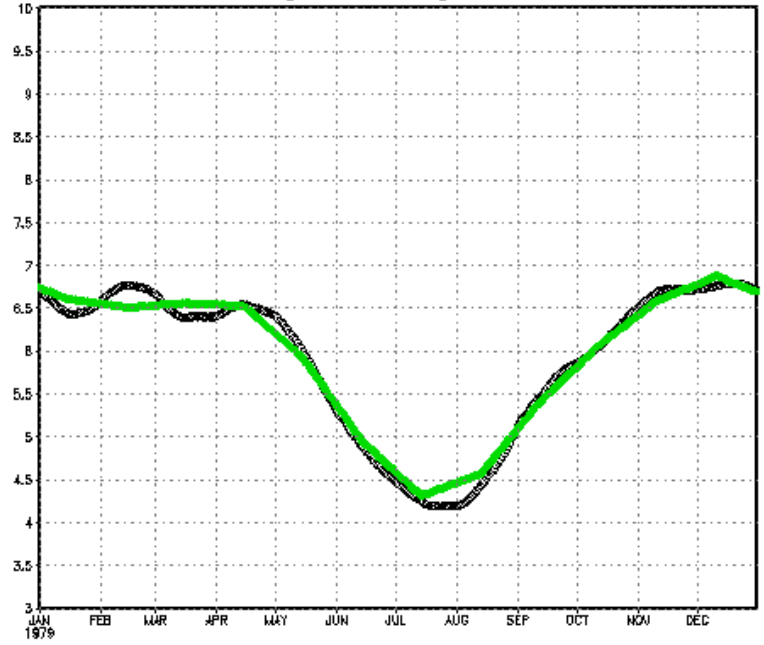
u-wind 850mb mean at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode



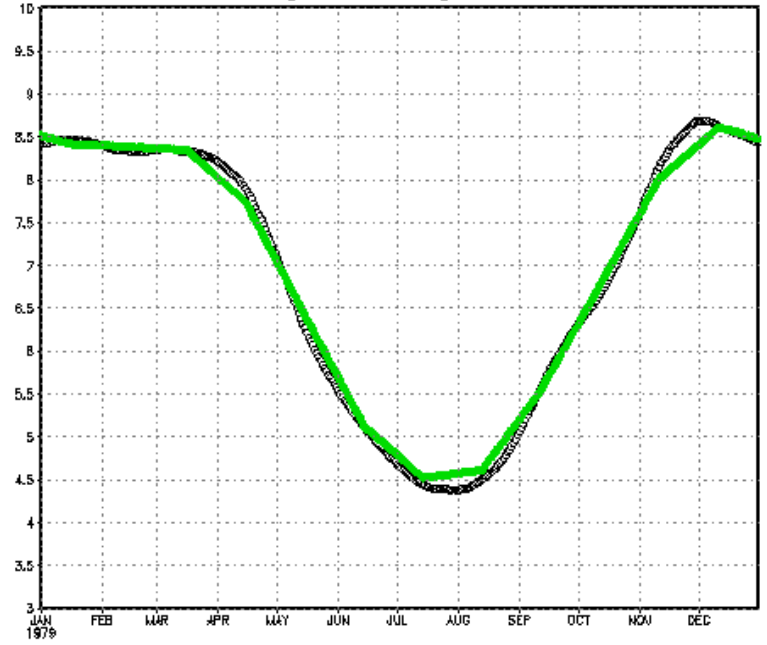
v-wind 850mb mean at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode

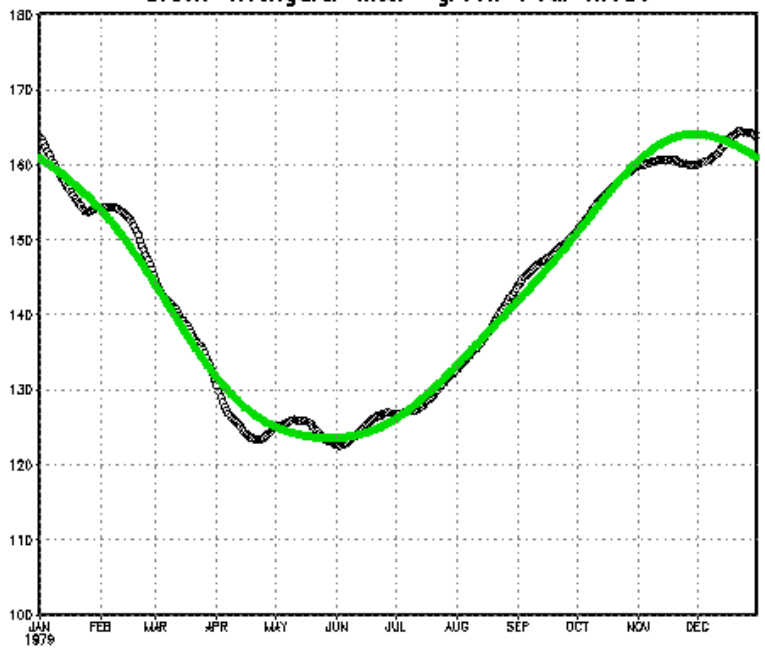


u-wind 850mb stdv at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode



v-wind 850mb stdv at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode




z1000 mean at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode
180
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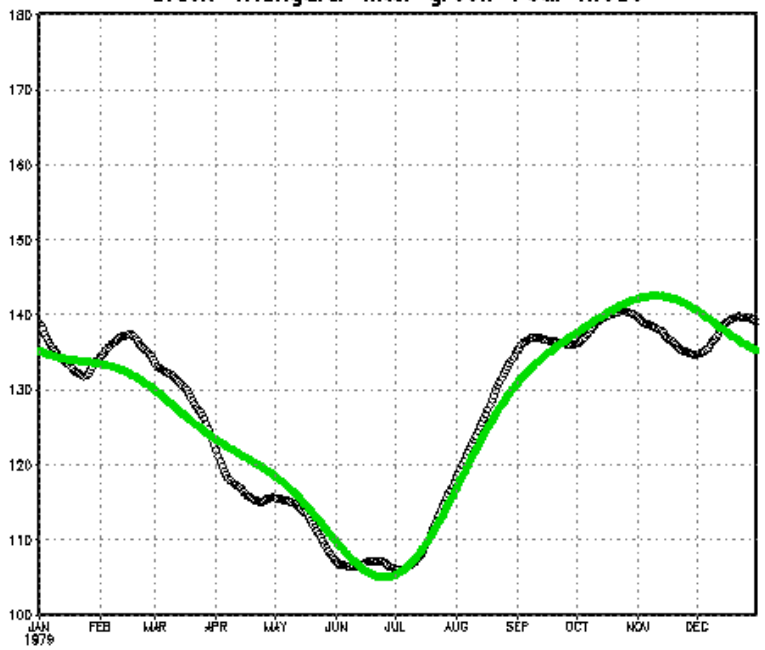
z1000 mean at T00Z 45N,75W
black-Triangular filter green-Four mode
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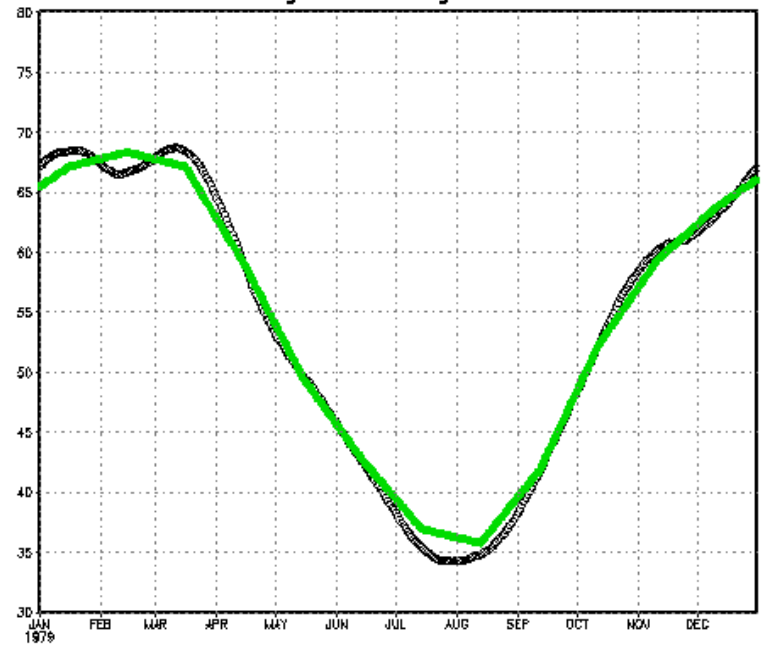
z1000 stdv at T00Z 37.5N,77.5W
black-Triangular filter green-Four mode
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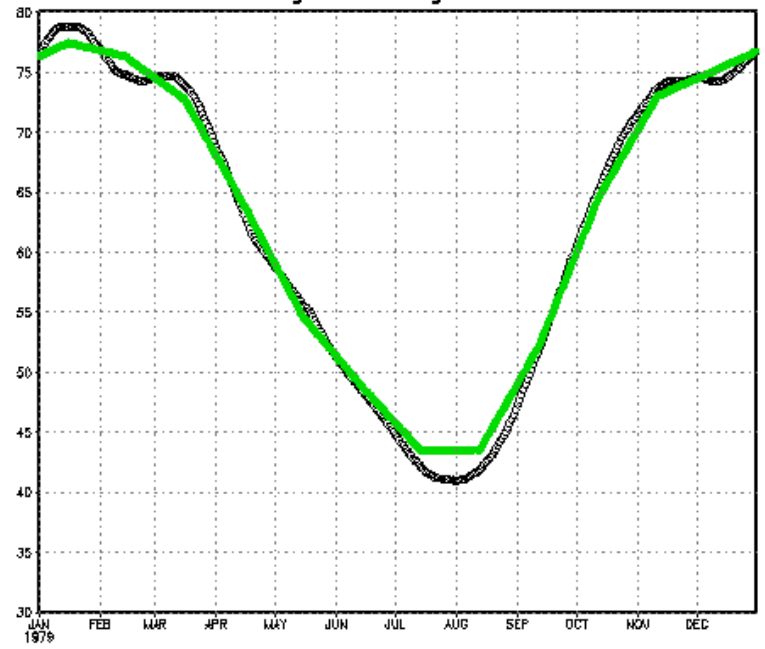
z1000 stdv at T00Z 45N,75W
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