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A study of the pointing and deflection data with GMRT

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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Certificate

This is to certify that Mr. Jayanta Dutta has done this project entitled **"A study of the pointing and deflection data with GMRT"** under the guidance of Dr. C. H. Ishwara Chandra. This is his original work and has not been submitted elsewhere to the best of my knowledge.

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Date: (Dr. C. H. Ishwara Chandra)

Acknowledgments:

I, Jayanta Dutta, a project student of Giant Metrewave Radio Telescope (GMRT, NCRA-TIFR), Khodad, am to present hereby the report on my project work done at GMRT. In this regard I would like to convey my hearty gratitude to my supervisor Dr. C. H. Ishwara Chandra for giving me an opportunity to work with him. I am highly grateful to my guide for his constant help, encouragement and precious guidance without which it would have been impossible for me to complete the project. I also express my gratitude to Prof. Rajaram Nityananda for much encouragement, many help and opportunity to do this work.

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Jayanta Dutta

Abstract

At GMRT, regular measurements are archived for both pointing offest and sensitivity. This is an useful database to find out whether any antenna has a systematic variation in its performance. Here we have developed programs to study the above data base on pointing and deflection in order to bring out the anomalies in the long term performance of antennas. The programs are developed with the aim that the technical details of the database like format, non-workinng antennas, frequency, etc is hidden from the end user. The execution of the program produces a plot indicating the antenna's performance with time for each frequency in each catagory by appropriately flagging the non-working antennas, which can be further analysed by the techincal team concerned for its behaviour.

Contents

Chapter 1

Introduction

The Giant Metrewave Radio Telescope (GMRT) is the world's largest radio telescope operating at metre-wavelengths, built and operated by National Centre for Radio Astrophysics of the Tata Institute of Fundamental Research. GMRT operates in five separate frequency bands beetween 150 and 1450 MHz centred at 150, 235, 325, 610 and 1000 - 1450 MHz. The antennas are mounted in alt-az mount. The maximum slew rate for Azimuth is 30 deg/min and for Elevation is 20 deg/min. The tracking and pointing accuracy are 1 arcmin r.m.s at wind speeds of less than 20kmph. The Feed Support is Quadripod.

Ideally all the telescope should have zero pointing offset and best sensivity. If there is any significant pointing offset, then the sensitivity will go down and there will be secondary effect on the data quality. Good pointing leads to better images. For single dish operation, pointing errors less than HPBW/10 are sufficient for reasonable results. For interferometry, since the signals from different antennas are combined, higher degree of pointing accuracy is required.

The sensitivity of an antenna depends on the antenna gain and system temparature. Assuming the system temparature to be similar for all antennas, the sensivity will then depends on the Feed system (Front End). It is important to measure the sensitivity of all antennas at each observing frequencies at regular intervals to detect any degradation in the sensitivity of the antenna.

1.1 What is Pointing offset

Pointing offset is defined as the offset between the encoder (or target) position and the actual pointing position. At GMRT, pointing offsets are generally obtained by taking a scan across a strong unresolved source. Consider a strong, unresolved radio source whose position (R.A and Dec) is known. If an antenna is moved across the source at a constant scan rate then maximum power will be observed when the beam centre accesses the source. If the antenna has zero pointing offset, then the maximum power will occur at the expected time, however, if there is a pointing offset, the maximum power may occur before or after the expected time. Knowing the rate of scanning and the difference between the expected and observed peaktime, it is thus possible to determine the offsets in the pointing. The general equation is

$$offset = (Expected\ time\ for\ peak - Observed\ time\ for\ peak) \times Scan\ rate \tag{1.1}$$

At GMRT, the convention is to attribute a positive pointing offset if the peak leads the expected time and a negetive offset if it lags the expected time. Or we can also say that the offsets are positive if the encoder values are larger than the actual values and negetive if the encoder values are less than the actual pointer center.

Why do pointing offsets change with time

The pointing offsets often vary with time due to various reasons, majority of which are instrumental effects which need to be taken seriously into account in a pointing model. These errors are mainly in the feed positioning system (FPS) errors, the feed is not focused to the source properly, encoder alignment offsets for both elevation and azimuth encoders and gravitational deformation. Due to these errors, most of which change as a function of elevation and azimuth as the source moves in the sky, the pointing offset vary with time.

If the pointing offsets are fixed in time, it can be incorporated at the servo computer at the antenna base to remove the fixed offset. The aim of this work is to find out antennas with fixed offsets as well as with varying offsets.

1.2 Signal to Noise Ratio

An antenna absorbs power from the radio waves that fall on it. If a power P (per unit frequency) is available at an antenna's terminals, the antena is defined to have an antenna temperature of

$$T_A = P/k \tag{1.2}$$

where k is boltzmann constant.
The total power available at a radio telescope terminals, referred to the receiver (or RF amplifier), while converted to temperature using the above equation is defined as the system temperature. The system temparature while looing at blank sky is a measure of the total random noise coming from sky, ground spillover noise, lossy element in the reciever chain and the noise from the receiver in the system.

$$T_{sys} = \frac{Total\ Power\ referred\ to\ receiver\ inputs}{k}$$

The ratio of the Antenna temperature and System Temperature is called Signal to Noise ratio which compares the level of a desired signal to the level of the background noise. Signal to Noise ratio can also be defined as the ratio of a Signal power to the Noise power corresponding the signal. The higher the ratio, the less obstrusive the background noise is.

$$SNR = \frac{T_A}{T_{sys}} = \frac{P_{signal}}{P_{noise}} = (\frac{A_{signal}}{A_{noise}})^2, \tag{1.3}$$

where P is the average power and A is the RMS amplitude. Both the signal and noise power (or amplitude) must be measured at the same or equivalent points in a system and within the same system bandwidth.

SNR are usually expressed in terms of the logarithmic decibel scale. In decibel, the SNR is, by defination, 10 times the logarithm of the power ratio. If the signal and the noise is measured across the same impedence then the SNR can be obtained by calculating 20 times the base - 10 logarithm of the amplitude ratio.

$$SNR(in\ dB) = 10\ log\frac{P_{signal}}{P_{noise}} = 20\ log\frac{A_{signal}}{A_{noise}}, \tag{1.4}$$

1.3 What is Deflection

Deflection is defined as the ratio of the power due to the source to the noise power (towards blank sky). We can also say the ratio of the difference between the onsource power and offsource power to the offsource power. Mathematically,

$$Deflection(dB) = \frac{onsource\ power\ -\ offsource\ power}{offsource\ power} \tag{1.5}$$

where

$$onsource\ power = T_A + T_{sys}$$

$$offsource\ power = T_{sys}$$

1.4 Deflection less by (dB)

The deflection expected for an antenna depends on the strength of the source. Since several sources used for measuring the deflection have different strengths, the value of the observed deflection will be different for different source at different frequencies. sources are given below.

In order to normalise the measurements in a source independent manner, we have taken the difference between the expected deflection and observed defection for each of the sources. This difference is, therefore, independent of the sources. For example, if the antenna is working satifactorily, the difference will be 0 dB and if the sensitivity is half, the difference is 3 dB.

Therefore any variation in the sensitivity of an antenna can be studied by plotting the difference between the expected and observed deflection ("deflection less by") with time.

Chapter 2

Program

2.1 Algorithm of the program

The program has been developed in such a way that the user has to run only one shell script. It will automatically look for files from archive, separate azimuth and elevation, group in frequency, flag dead antennas and create text and ps files showing the variation of the offset value for 130 and 175 polarization with time and also calculate the mean and standard Deviation. The user will get to know the pointing behaviour of any antenna at any frequency from the PS file. If further clarifications are required about specific date or time range, the text file can be used.

The program meant to study the deflection has been developed very similar to the above program, i.e, it will read the archive files, sort in frequency and plot the performance of the antenna as a function of time, which can be used by the concerned engineers.

2.1.1 Steps of the program for Pointing offset

The logic of the program is as follows.

1. Shell script will search a pre-defined directory where all the pointing offset files are kept.

2. Send the list of files into the program.

3. Separate the files into AZ and EL catagory for all frequencies.

4. In each catagory, separate the files for 325, 610 and 1280MHz.

5. Take the date from the file name and converted it into year

6. Open the file.

7. Read the offset for each antenna (for both polarization). It has been observed that almost always the antenna which is not working has a wrong FWHM. Check the condition for the FWHM for each frequency for both 130 and 175 channel. The measured offsets will be considered only if the FWHM is between

   - 80-90 arc-minute for 325 MHz
   - 41-50 arc-minute for 610 MHz
   - 22-30 arc-minute for 1280 MHz

   Otherwise put 999.9 so as to keep the dimension of the matrix same for all.

8. Create separate text files for each frequency and AZ and EL catagory with 61 columns with date in the first column and the rest of the 60 columns giving the offset values for 130 and 175 polarization for 30 antennas. At the end of the files there are mean and standard deviation for each of the antenna's offset.

   The shell script will call `gnuplot` and plot pointing offsets as a function of time for each antenna at each frequency and catagory (AZ and EL). For example, at 325 MHz, the AZ as a function of time for 30 antennas will be plotted in the ps file 'az325.ps'.

   - Azimuth 325 (text and ps)
   - Azimuth 610 (text and ps)
   - Azimuth 1280 (text and ps)
   - Elevation 325 (text and ps)

- Elevation 610 (text and ps)
- Elevation 1280 (text and ps)

2.1.2 Steps of the program for 'Deflection less by'

The logic of the program is as follows.

1. Shell script will search a pre-defined directory where all the deflection files are kept.
2. Send the list of files into the program.
3. Separate the files for 235, 325, 610 and 1280MHz.
4. Take the date from the file name and converted it into year
5. Open the file and read the deflection less by (difference between the expected and observed value) for each antenna Calculate the average of USB and LSB for both 130 and 175 polarization
6. If any antenna is not included for measurement on a particular day, it puts 999.9 so as to keep the dimension of the matrix same for all days.
7. Create separate text files for each frequency with 61 columns with date in the first column and the rest of the 60 columns giving the offset values for 130 and 175 polarization for 30 antennas. At the end of the files there are mean and standard deviation for each of the antenna's deflection less.

   The shell script will call `gnuplot`, plot 'Deflection less by' as a function of time for each antenna at each frequency. For example, at 235 MHz, the 'Deflection less by (dB)'as a function of time for 30 antennas will be plotted in the ps file 'def235.ps'.

   - Deflection 235 (text and ps)
   - Deflection 325 (text and ps)
   - Deflection 610 (text and ps)
   - Deflection 1280 (text and ps)

Chapter 3

Result for Pointing offset

For the pointing offset, fixed mean with lower rms fluctuation is acceptable, because the fixed offset can be incorporatd at the antenna base computer as its reference level. Larger rms means the reference level can not be predicted or fixed. Such antennas needs detailed investigation by concerned as to find out why the antenna offset is fluctuating significantly. For example, for antenna C02, the mean azimuth offset was about -30' till the end of 2006, but changed to +10'. Here the rms before and after the change is low, but the mean offset was signicant. Some of the antennas with significant rms are as follows:

Fixed/significant mean with lower rms fluctuation

Some of the antennas with fixed mean with lower rms fluctuation are as follows:

azimuth 1280 MHz

C02, C05, C06, E04, S04

elevation 1280 MHz

E02, E03, W01, W04

azimuth 610 MHz

C02, C05, C06, E04, S04

elevation 610 MHz

S01, W04

azimuth 325 MHz

C02, C05, C06, E04, S04

elevation 325 MHz

S01, W01

Fixed/significant mean with Larger rms fluctuation

Some of the antennas with fixed mean with Larger rms fluctuation are as follows:

azimuth 1280 MHz

E02, W01

elevation 1280 MHz

C06, C09, S01, S04

azimuth 610 MHz

E02

elevation 610 MHz

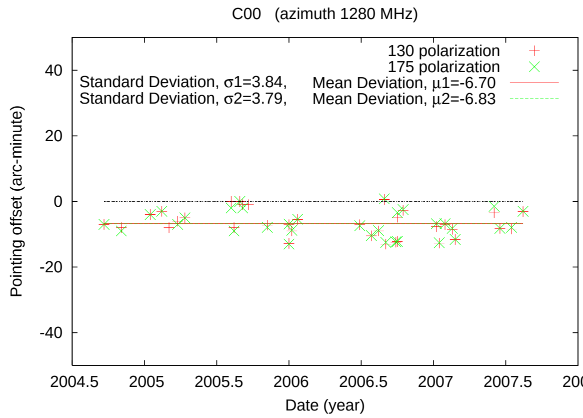
C01, C06, E02, S04, W01

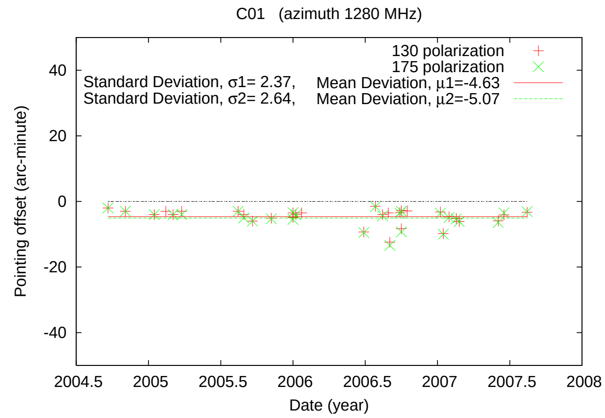
azimuth 325 MHz

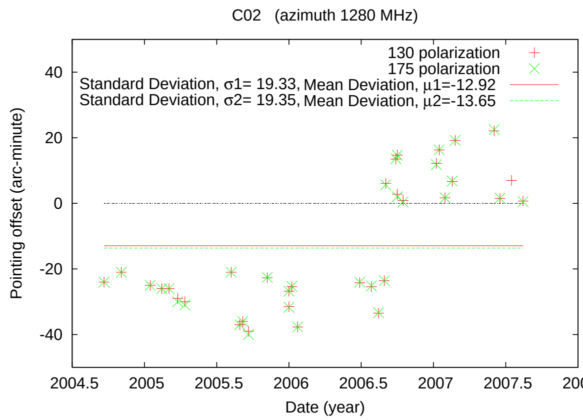
E02

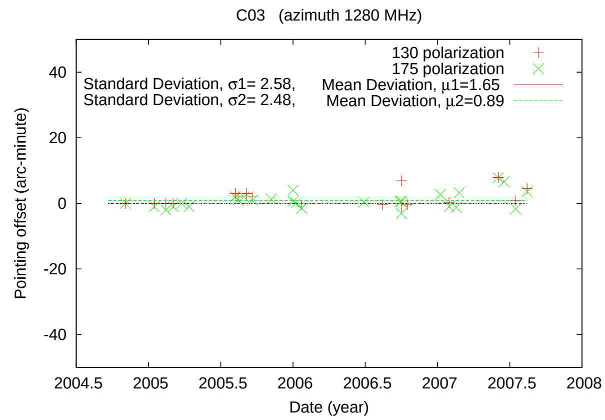
elevation 325 MHz

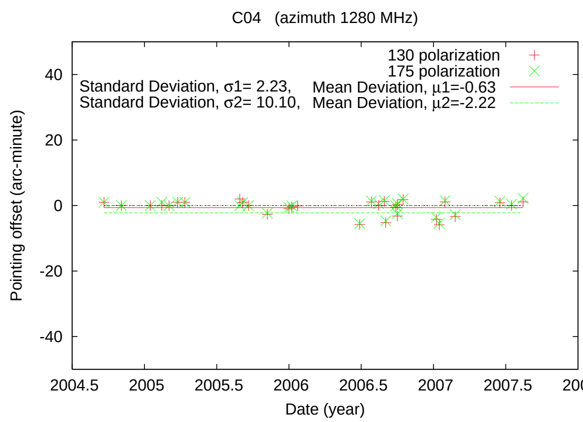
C01, E03, E05, E06 (different for 130 and 175 polarization), S04

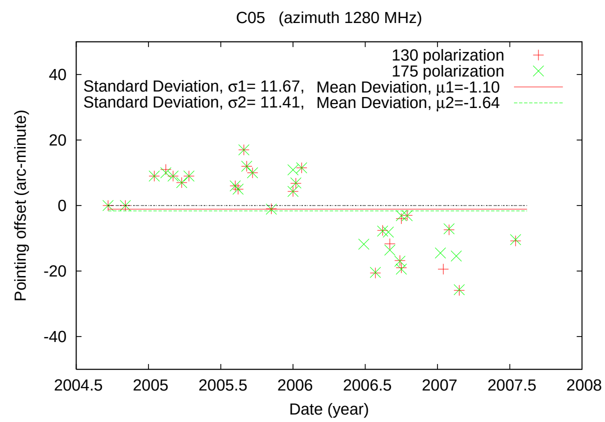

C00 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.84, Mean Deviation, μ1=-6.70
Standard Deviation, σ2=3.79, Mean Deviation, μ2=-6.83
Pointing offset (arc-minute)
Date (year)

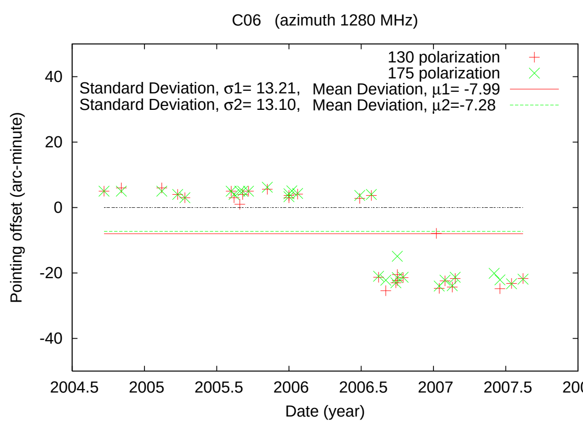

C01 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.37, Mean Deviation, μ1=-4.63
Standard Deviation, σ2= 2.64, Mean Deviation, μ2=-5.07
Pointing offset (arc-minute)
Date (year)

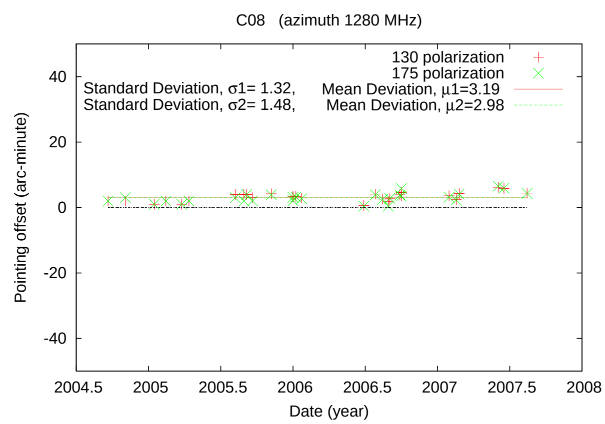

C02 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 19.33, Mean Deviation, μ1=-12.92
Standard Deviation, σ2= 19.35, Mean Deviation, μ2=-13.65
Pointing offset (arc-minute)
Date (year)

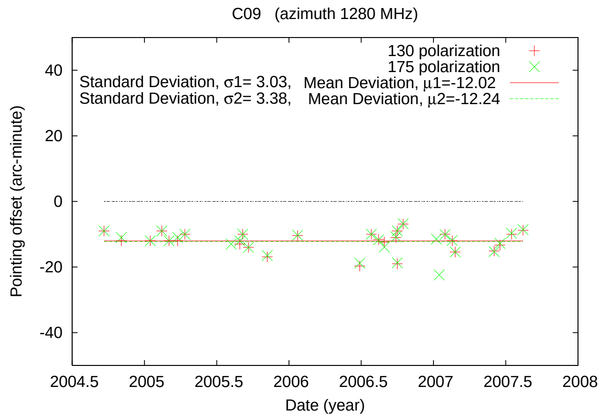

C03 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.58, Mean Deviation, μ1=1.65
Standard Deviation, σ2= 2.48, Mean Deviation, μ2=0.89
Pointing offset (arc-minute)
Date (year)

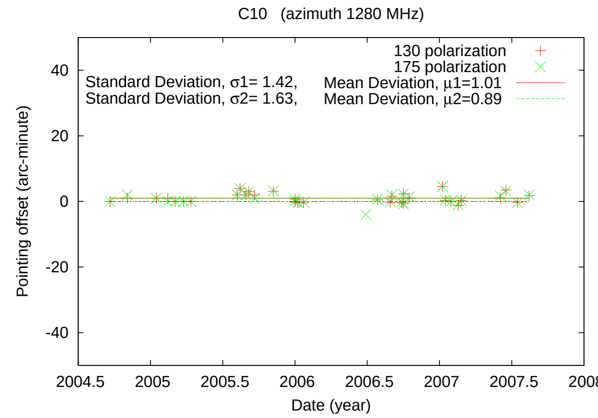

C04 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.23, Mean Deviation, μ1=-0.63
Standard Deviation, σ2= 10.10, Mean Deviation, μ2=-2.22
Pointing offset (arc-minute)
Date (year)

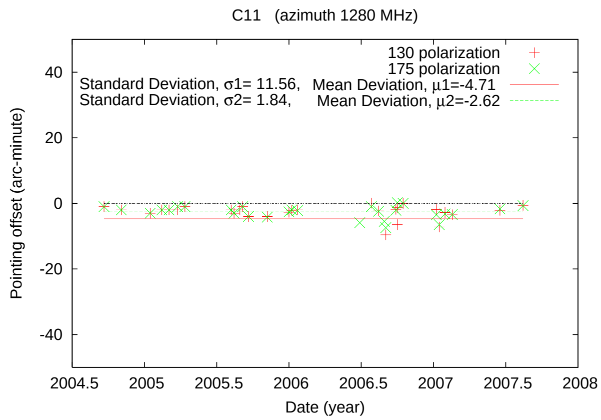

C05 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 11.67, Mean Deviation, μ1=-1.10
Standard Deviation, σ2= 11.41, Mean Deviation, μ2=-1.64
Pointing offset (arc-minute)
Date (year)

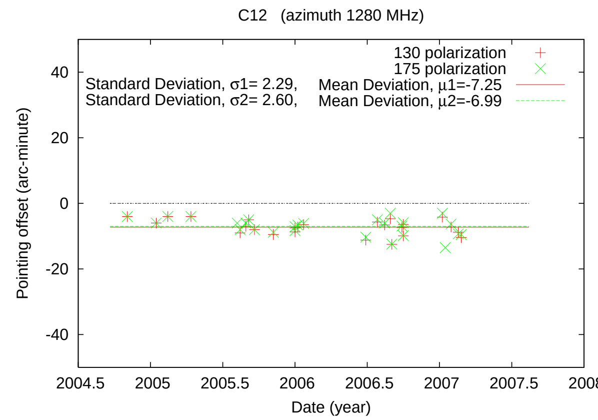

C06 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 13.21, Mean Deviation, μ1= -7.99
Standard Deviation, σ2= 13.10, Mean Deviation, μ2=-7.28
Pointing offset (arc-minute)
Date (year)

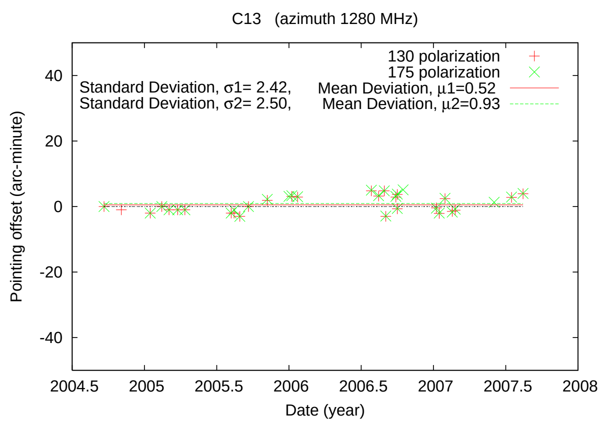

C08 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 1.32, Mean Deviation, μ1=3.19
Standard Deviation, σ2= 1.48, Mean Deviation, μ2=2.98
Pointing offset (arc-minute)
Date (year)

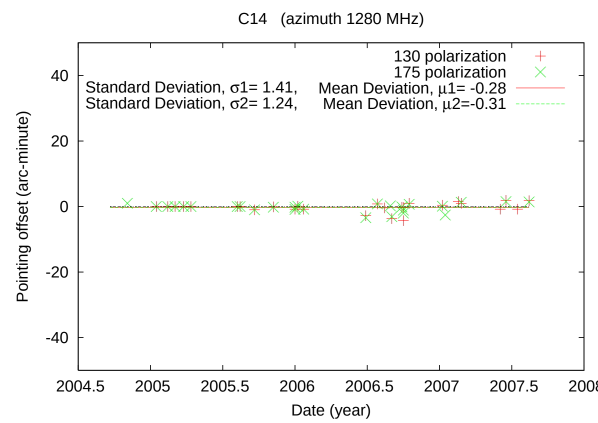

C09 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 3.03, Mean Deviation, µ1=-12.02
Standard Deviation, σ2= 3.38, Mean Deviation, µ2=-12.24
Pointing offset (arc-minute)
Date (year)

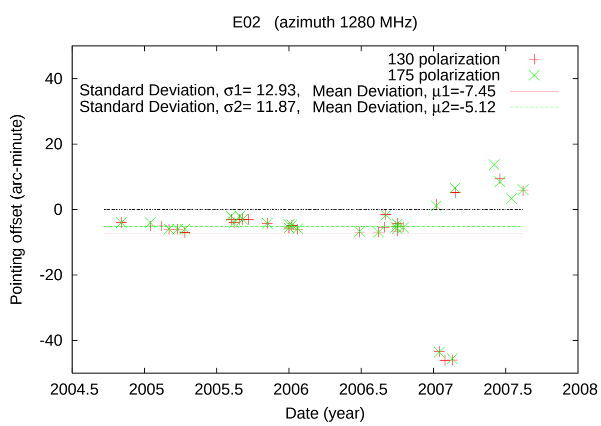

C10 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 1.42, Mean Deviation, µ1=1.01
Standard Deviation, σ2= 1.63, Mean Deviation, µ2=0.89
Pointing offset (arc-minute)
Date (year)

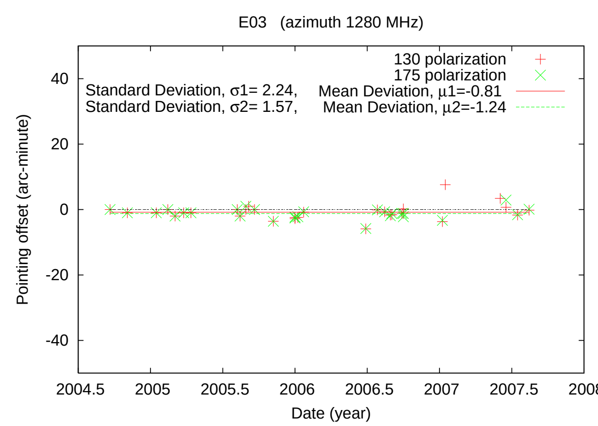

C11 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 11.56, Mean Deviation, µ1=-4.71
Standard Deviation, σ2= 1.84, Mean Deviation, µ2=-2.62
Pointing offset (arc-minute)
Date (year)

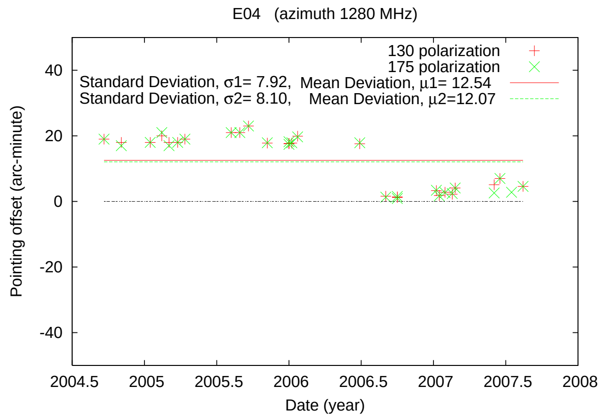

C12 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.29, Mean Deviation, µ1=-7.25
Standard Deviation, σ2= 2.60, Mean Deviation, µ2=-6.99
Pointing offset (arc-minute)
Date (year)

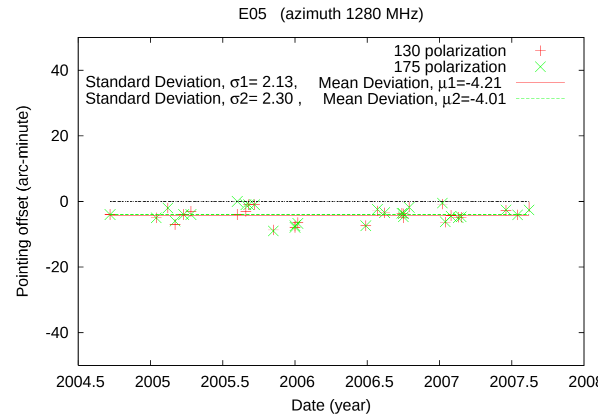

C13 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.42, Mean Deviation, µ1=0.52
Standard Deviation, σ2= 2.50, Mean Deviation, µ2=0.93
Pointing offset (arc-minute)
Date (year)

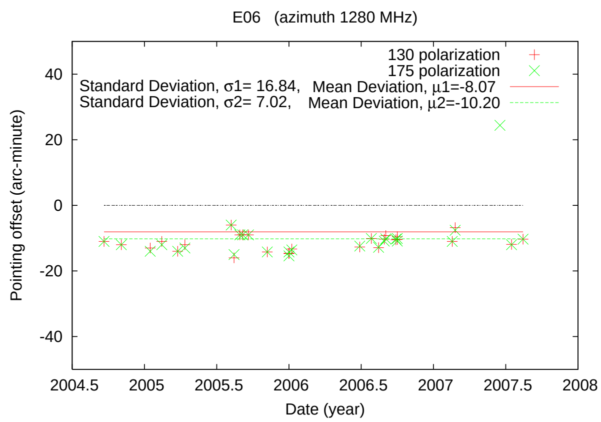

C14 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 1.41, Mean Deviation, µ1= -0.28
Standard Deviation, σ2= 1.24, Mean Deviation, µ2=-0.31
Pointing offset (arc-minute)
Date (year)

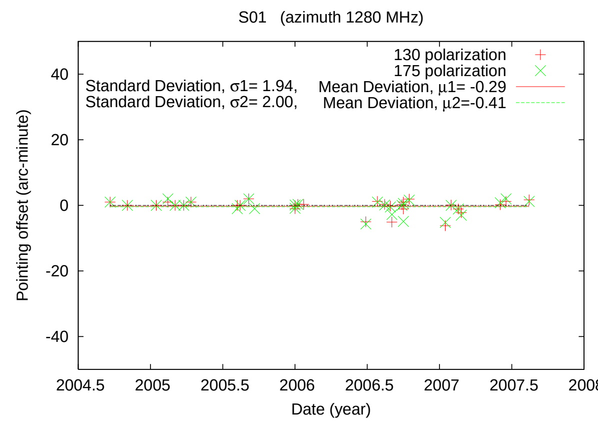

E02 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 12.93, Mean Deviation, µ1=-7.45
Standard Deviation, σ2= 11.87, Mean Deviation, µ2=-5.12
Pointing offset (arc-minute)
Date (year)

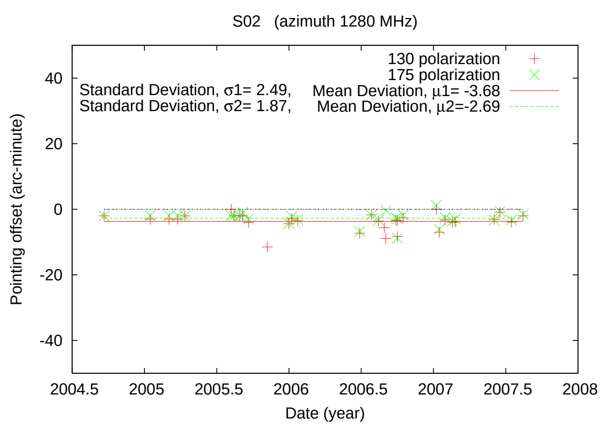

E03 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.24, Mean Deviation, µ1=-0.81
Standard Deviation, σ2= 1.57, Mean Deviation, µ2=-1.24
Pointing offset (arc-minute)
Date (year)

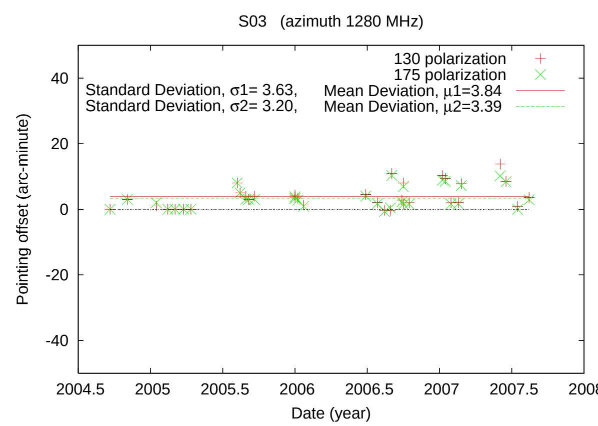

E04 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 7.92, Mean Deviation, µ1= 12.54
Standard Deviation, σ2= 8.10, Mean Deviation, µ2=12.07
Pointing offset (arc-minute)
Date (year)

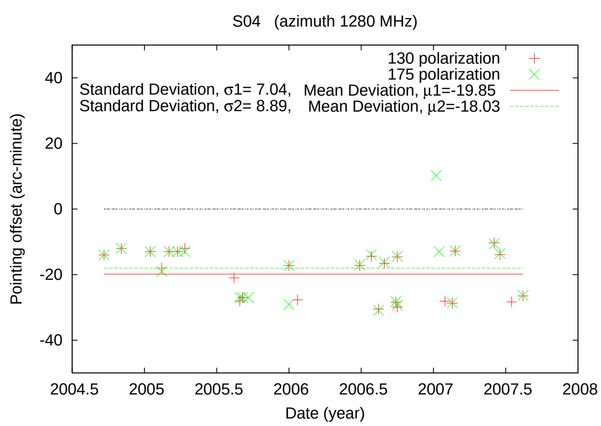

E05 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.13, Mean Deviation, µ1=-4.21
Standard Deviation, σ2= 2.30 , Mean Deviation, µ2=-4.01
Pointing offset (arc-minute)
Date (year)

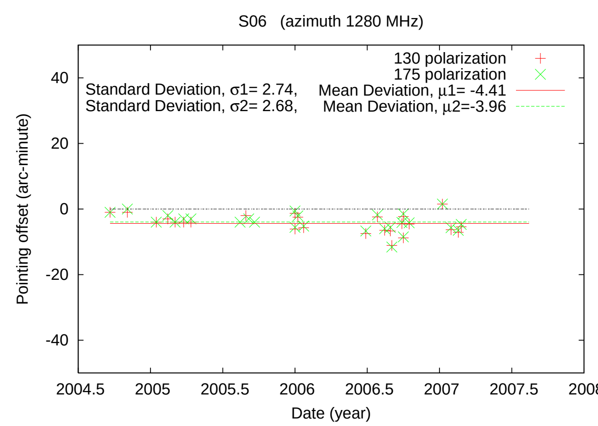

E06 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 16.84, Mean Deviation, µ1=-8.07
Standard Deviation, σ2= 7.02, Mean Deviation, µ2=-10.20
Pointing offset (arc-minute)
Date (year)

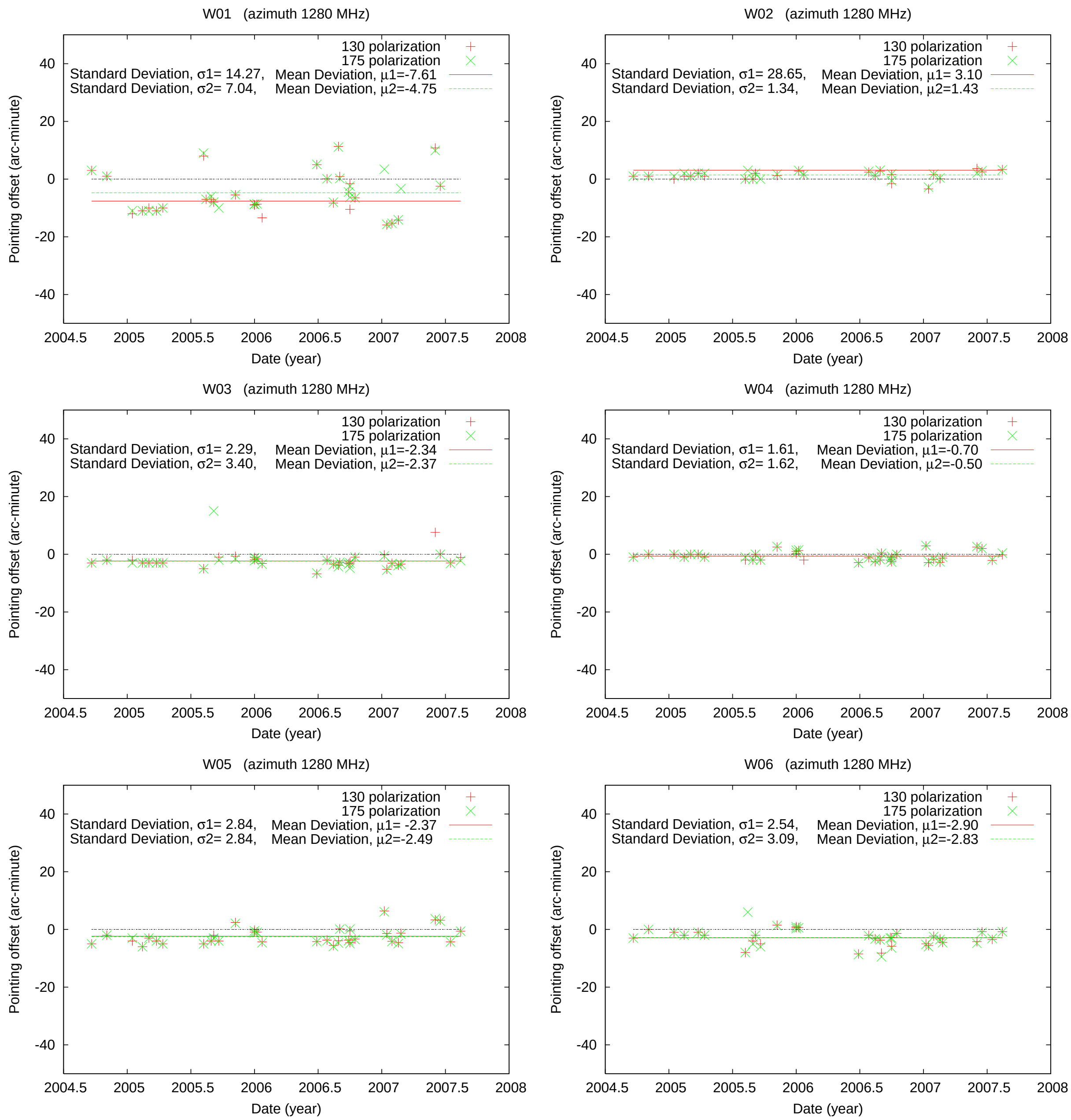

S01 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 1.94, Mean Deviation, µ1= -0.29
Standard Deviation, σ2= 2.00, Mean Deviation, µ2= -0.41
Pointing offset (arc-minute)
Date (year)

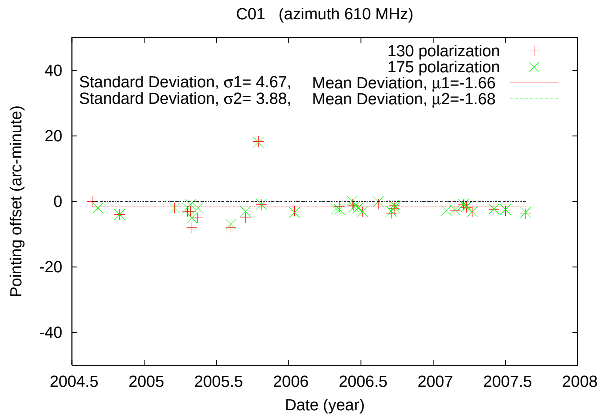

S02 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.49, Mean Deviation, µ1= -3.68
Standard Deviation, σ2= 1.87, Mean Deviation, µ2=-2.69
Pointing offset (arc-minute)
Date (year)

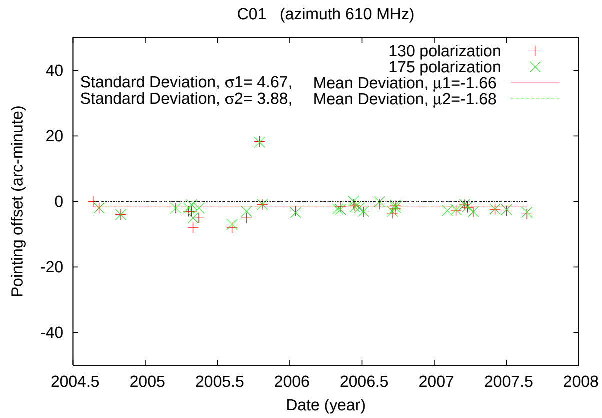

S03 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 3.63, Mean Deviation, µ1=3.84
Standard Deviation, σ2= 3.20, Mean Deviation, µ2=3.39
Pointing offset (arc-minute)
Date (year)

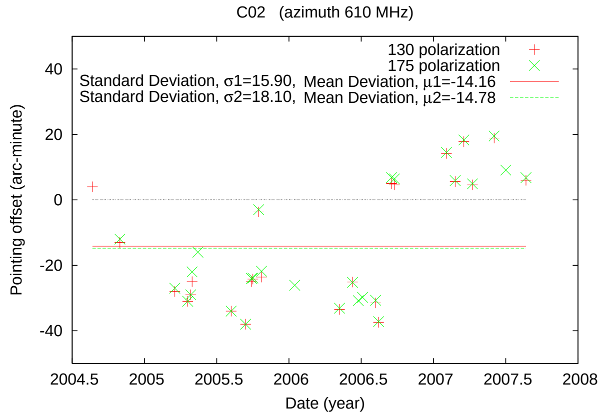

S04 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 7.04, Mean Deviation, µ1=-19.85
Standard Deviation, σ2= 8.89, Mean Deviation, µ2=-18.03
Pointing offset (arc-minute)
Date (year)

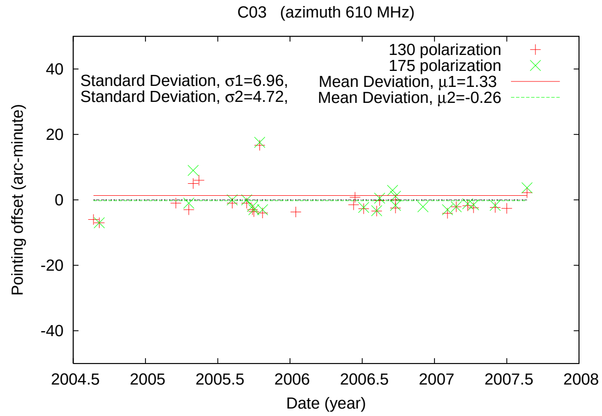

S06 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.74, Mean Deviation, µ1= -4.41
Standard Deviation, σ2= 2.68, Mean Deviation, µ2=-3.96
Pointing offset (arc-minute)
Date (year)

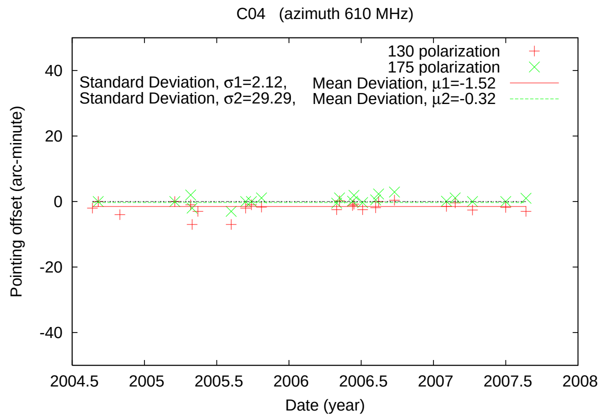

W01 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 14.27, Mean Deviation, μ1=-7.61
Standard Deviation, σ2= 7.04, Mean Deviation, μ2=-4.75
W02 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 28.65, Mean Deviation, μ1= 3.10
Standard Deviation, σ2= 1.34, Mean Deviation, μ2=1.43
W03 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.29, Mean Deviation, μ1=-2.34
Standard Deviation, σ2= 3.40, Mean Deviation, μ2=-2.37
W04 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 1.61, Mean Deviation, μ1=-0.70
Standard Deviation, σ2= 1.62, Mean Deviation, μ2=-0.50
W05 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.84, Mean Deviation, μ1= -2.37
Standard Deviation, σ2= 2.84, Mean Deviation, μ2=-2.49
W06 (azimuth 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.54, Mean Deviation, μ1=-2.90
Standard Deviation, σ2= 3.09, Mean Deviation, μ2=-2.83
Pointing offset (arc-minute)
Date (year)
2004.5
2005
2005.5
2006
2006.5
2007
2007.5
2008

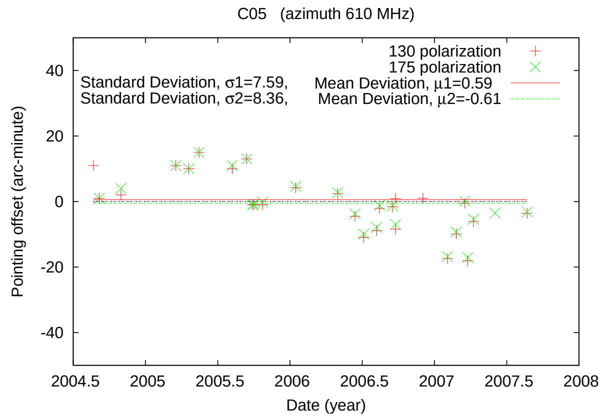

C01 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.67, Mean Deviation, µ1=-1.66
Standard Deviation, σ2= 3.88, Mean Deviation, µ2=-1.68
Pointing offset (arc-minute)
Date (year)

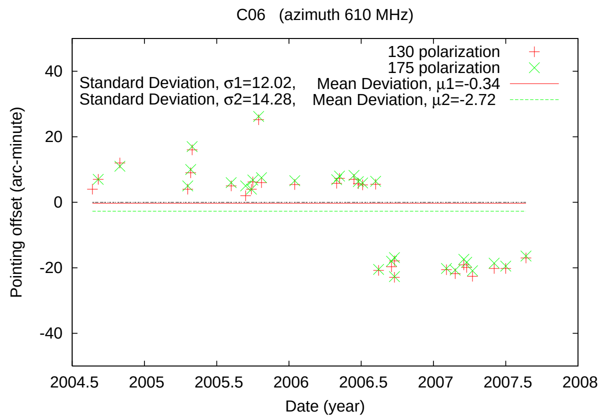

C01 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.67, Mean Deviation, µ1=-1.66
Standard Deviation, σ2= 3.88, Mean Deviation, µ2=-1.68
Pointing offset (arc-minute)
Date (year)

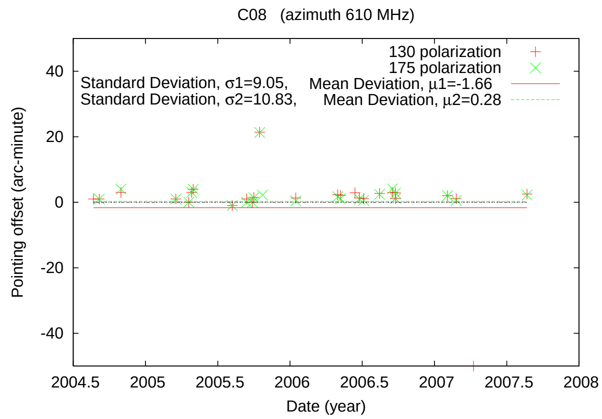

C02 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=15.90, Mean Deviation, µ1=-14.16
Standard Deviation, σ2=18.10, Mean Deviation, µ2=-14.78
Pointing offset (arc-minute)
Date (year)

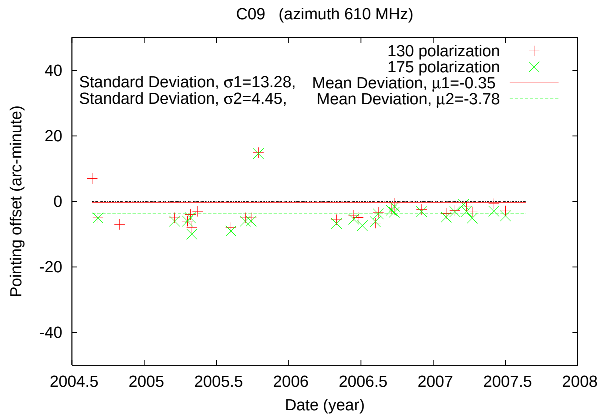

C03 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=6.96, Mean Deviation, µ1=1.33
Standard Deviation, σ2=4.72, Mean Deviation, µ2=-0.26
Pointing offset (arc-minute)
Date (year)

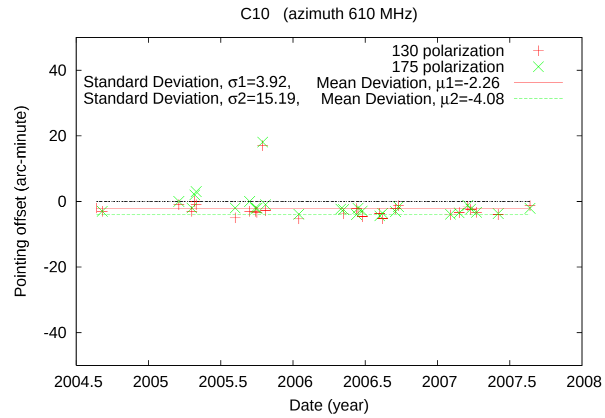

C04 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.12, Mean Deviation, µ1=-1.52
Standard Deviation, σ2=29.29, Mean Deviation, µ2=-0.32
Pointing offset (arc-minute)
Date (year)

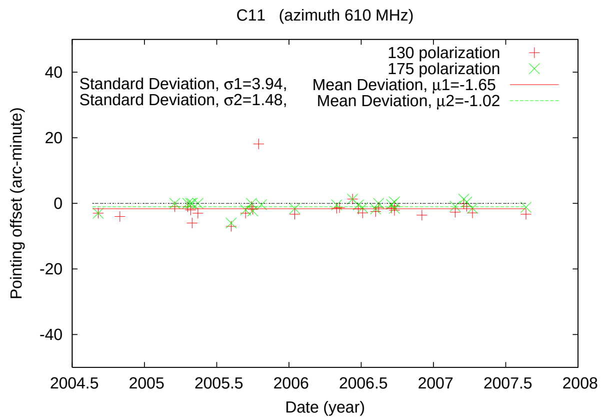

C05 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=7.59, Mean Deviation, µ1=0.59
Standard Deviation, σ2=8.36, Mean Deviation, µ2=-0.61
Pointing offset (arc-minute)
Date (year)

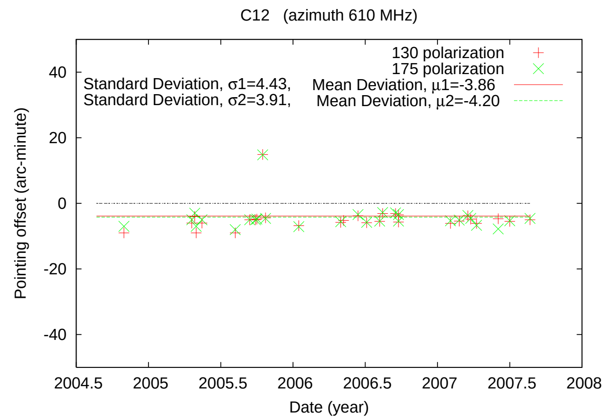

C06 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=12.02, Mean Deviation, µ1=-0.34
Standard Deviation, σ2=14.28, Mean Deviation, µ2=-2.72
Pointing offset (arc-minute)
Date (year)

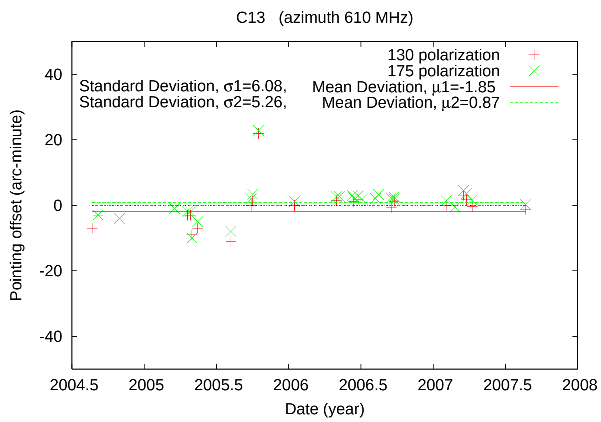

C08 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=9.05, Mean Deviation, µ1=-1.66
Standard Deviation, σ2=10.83, Mean Deviation, µ2=0.28
Pointing offset (arc-minute)
Date (year)

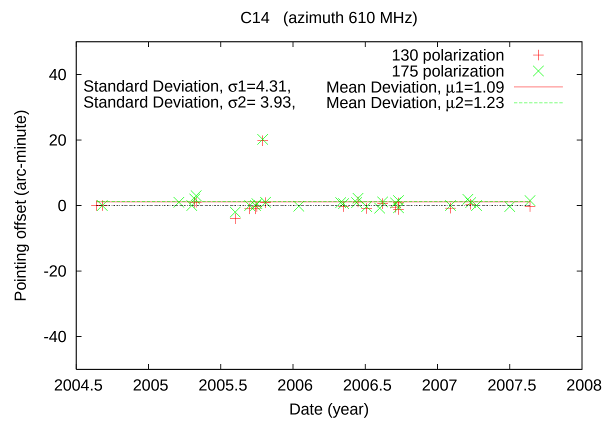

C09 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=13.28,
Standard Deviation, σ2=4.45,
Mean Deviation, µ1=-0.35
Mean Deviation, µ2=-3.78
Pointing offset (arc-minute)
Date (year)

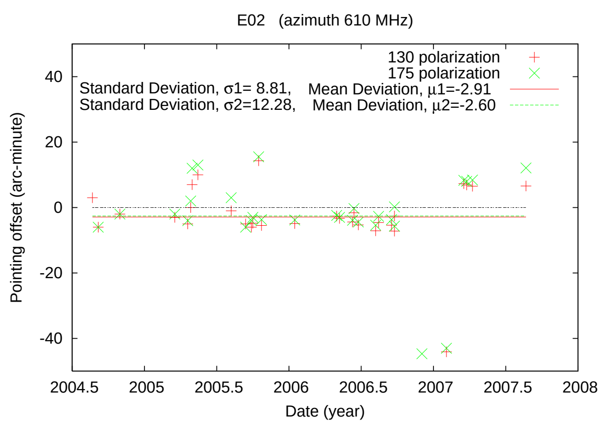

C10 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.92,
Standard Deviation, σ2=15.19,
Mean Deviation, µ1=-2.26
Mean Deviation, µ2=-4.08
Pointing offset (arc-minute)
Date (year)

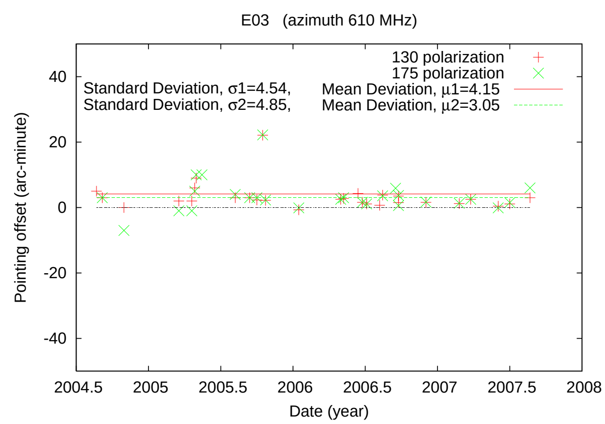

C11 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.94,
Standard Deviation, σ2=1.48,
Mean Deviation, µ1=-1.65
Mean Deviation, µ2=-1.02
Pointing offset (arc-minute)
Date (year)

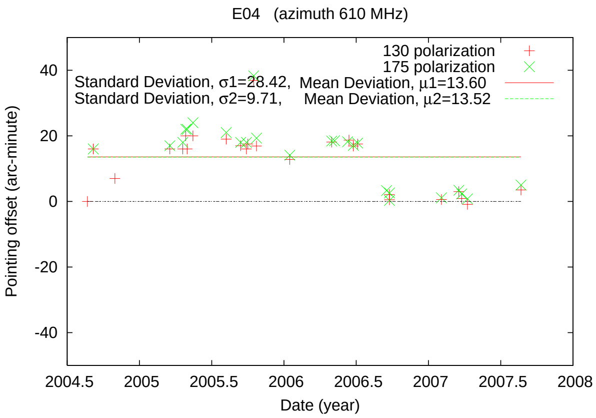

C12 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.43,
Standard Deviation, σ2=3.91,
Mean Deviation, µ1=-3.86
Mean Deviation, µ2=-4.20
Pointing offset (arc-minute)
Date (year)

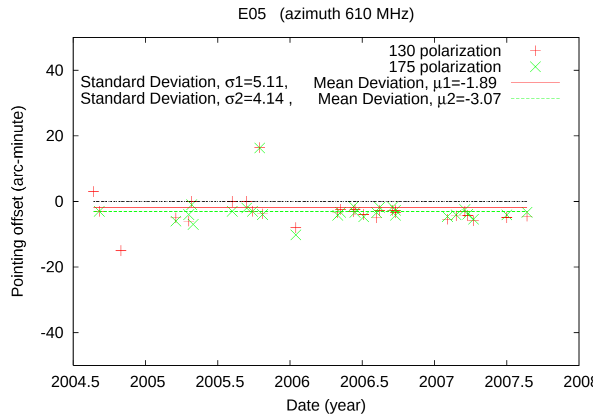

C13 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=6.08,
Standard Deviation, σ2=5.26,
Mean Deviation, µ1=-1.85
Mean Deviation, µ2=0.87
Pointing offset (arc-minute)
Date (year)

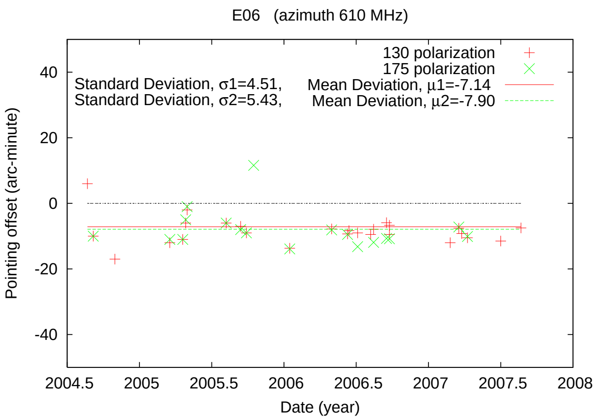

C14 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.31,
Standard Deviation, σ2= 3.93,
Mean Deviation, µ1=1.09
Mean Deviation, µ2=1.23
Pointing offset (arc-minute)
Date (year)

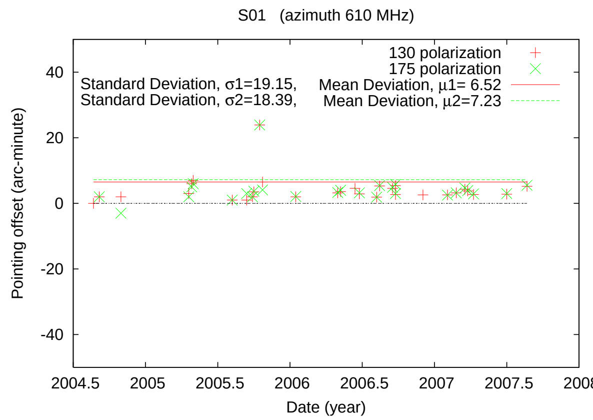

E02 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 8.81,
Standard Deviation, σ2=12.28,
Mean Deviation, µ1=-2.91
Mean Deviation, µ2=-2.60
Pointing offset (arc-minute)
Date (year)

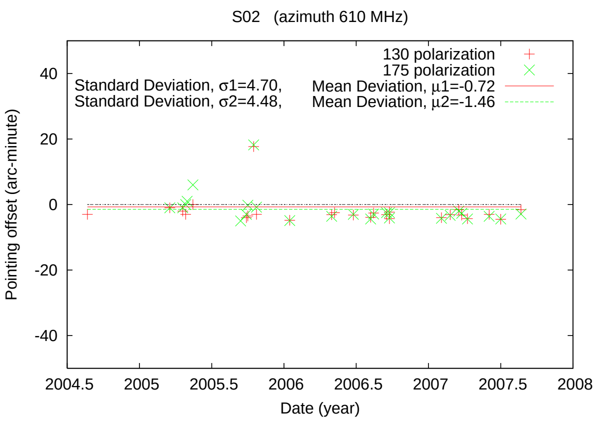

E03 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.54,
Standard Deviation, σ2=4.85,
Mean Deviation, µ1=4.15
Mean Deviation, µ2=3.05
Pointing offset (arc-minute)
Date (year)

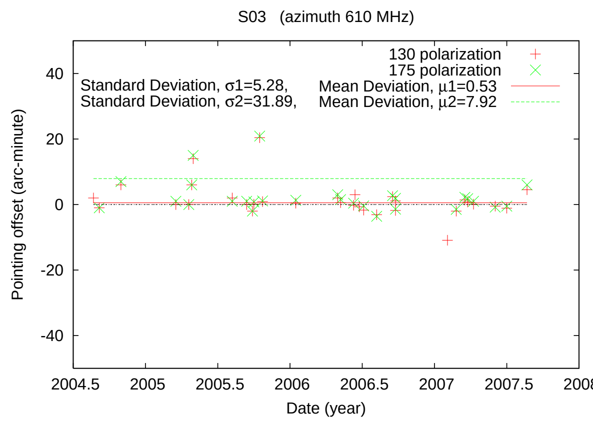

E04 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=28.42, Mean Deviation, µ1=13.60
Standard Deviation, σ2=9.71, Mean Deviation, µ2=13.52
Pointing offset (arc-minute)
Date (year)

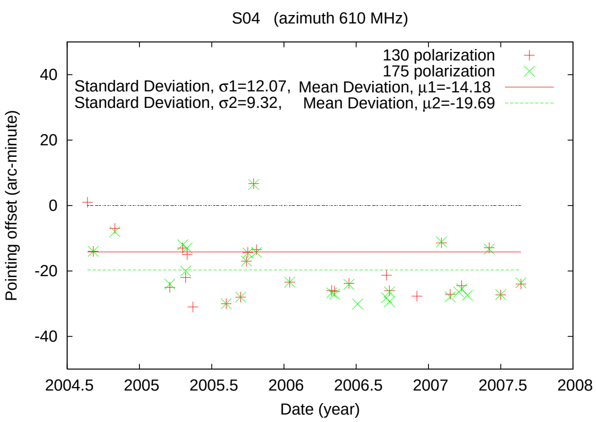

E05 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=5.11, Mean Deviation, µ1=-1.89
Standard Deviation, σ2=4.14 , Mean Deviation, µ2=-3.07
Pointing offset (arc-minute)
Date (year)

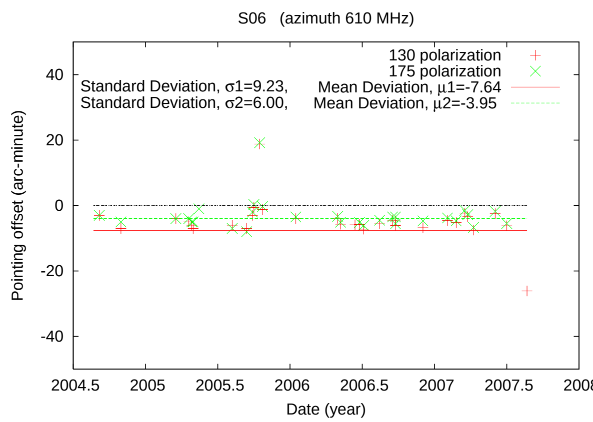

E06 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.51, Mean Deviation, µ1=-7.14
Standard Deviation, σ2=5.43, Mean Deviation, µ2=-7.90
Pointing offset (arc-minute)
Date (year)

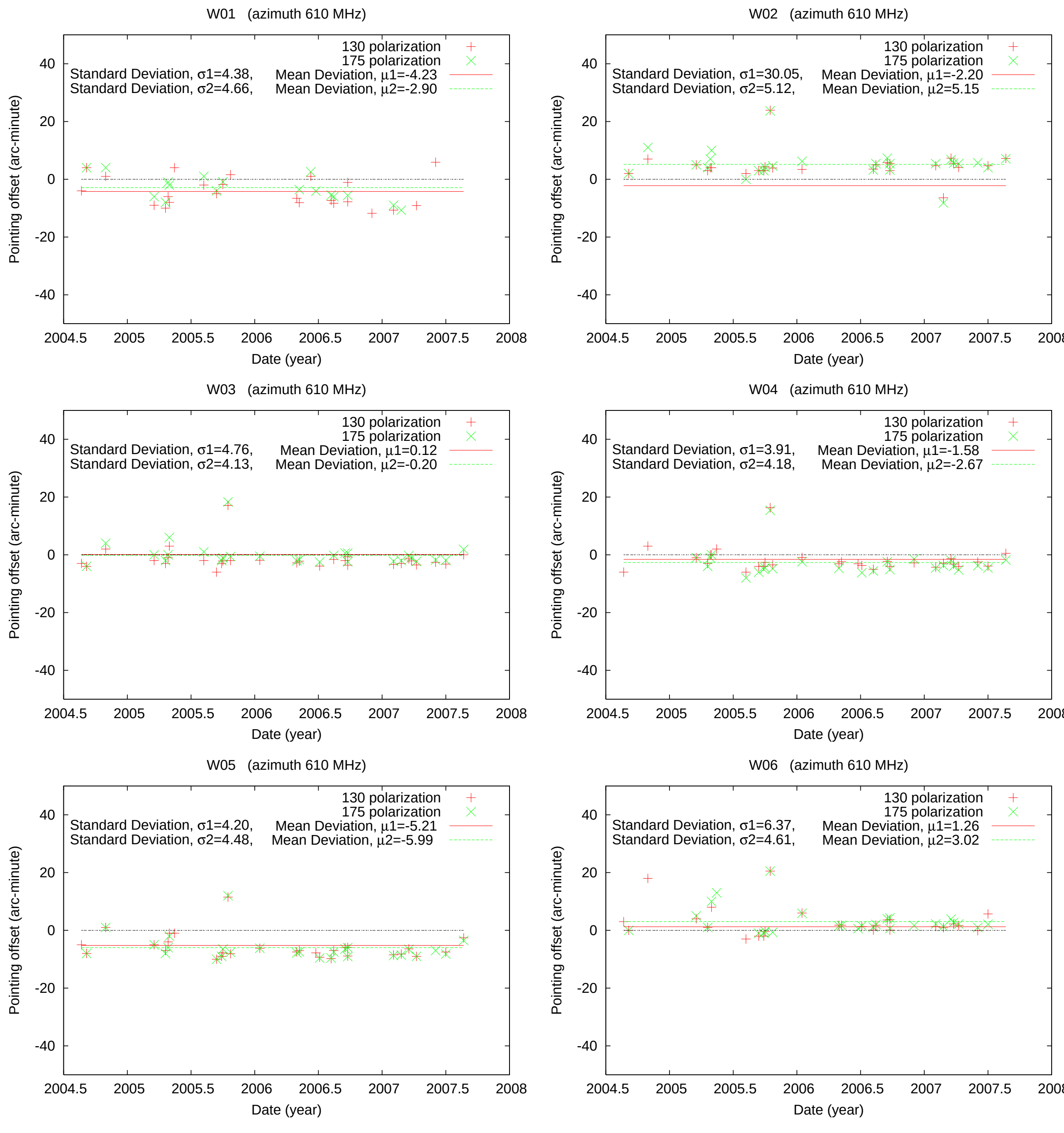

S01 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=19.15, Mean Deviation, µ1= 6.52
Standard Deviation, σ2=18.39, Mean Deviation, µ2=7.23
Pointing offset (arc-minute)
Date (year)

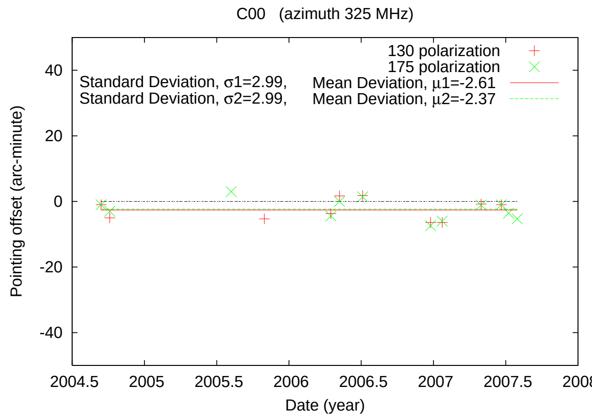

S02 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.70, Mean Deviation, µ1=-0.72
Standard Deviation, σ2=4.48, Mean Deviation, µ2=-1.46
Pointing offset (arc-minute)
Date (year)

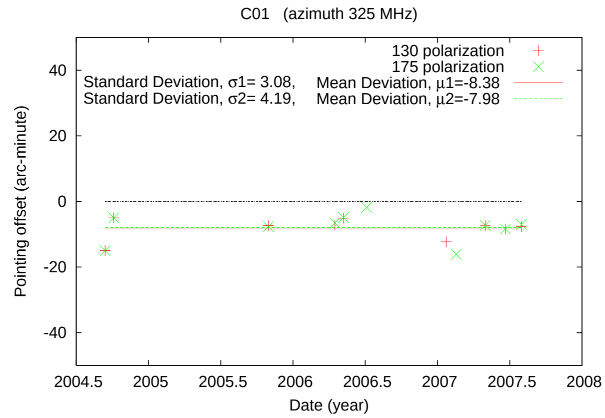

S03 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=5.28, Mean Deviation, µ1=0.53
Standard Deviation, σ2=31.89, Mean Deviation, µ2=7.92
Pointing offset (arc-minute)
Date (year)

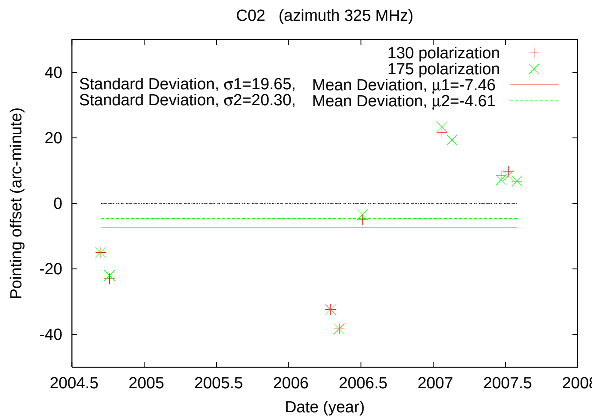

S04 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=12.07, Mean Deviation, µ1=-14.18
Standard Deviation, σ2=9.32, Mean Deviation, µ2=-19.69
Pointing offset (arc-minute)
Date (year)

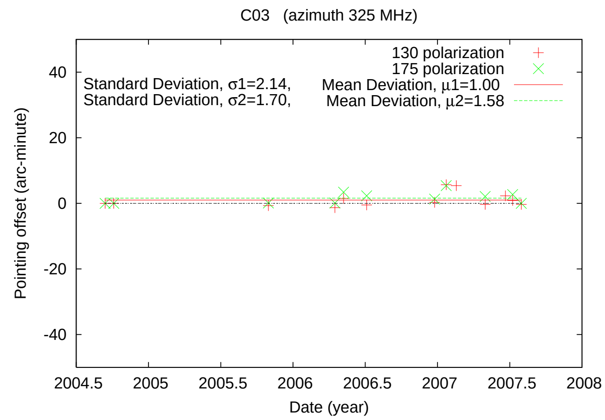

S06 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=9.23, Mean Deviation, µ1=-7.64
Standard Deviation, σ2=6.00, Mean Deviation, µ2=-3.95
Pointing offset (arc-minute)
Date (year)

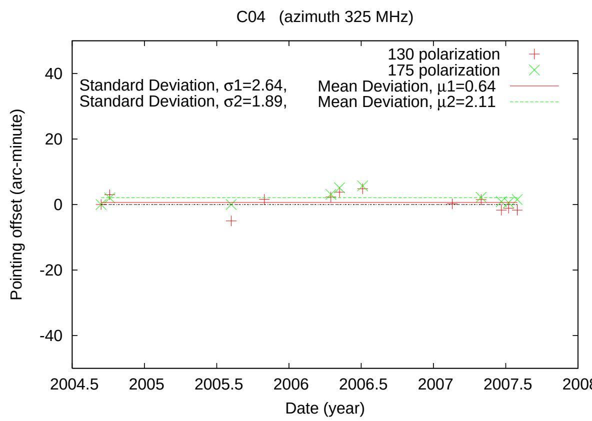

W01 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.38,
Standard Deviation, σ2=4.66,
Mean Deviation, µ1=-4.23
Mean Deviation, µ2=-2.90
W02 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=30.05,
Standard Deviation, σ2=5.12,
Mean Deviation, µ1=-2.20
Mean Deviation, µ2=5.15
W03 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.76,
Standard Deviation, σ2=4.13,
Mean Deviation, µ1=0.12
Mean Deviation, µ2=-0.20
W04 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.91,
Standard Deviation, σ2=4.18,
Mean Deviation, µ1=-1.58
Mean Deviation, µ2=-2.67
W05 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.20,
Standard Deviation, σ2=4.48,
Mean Deviation, µ1=-5.21
Mean Deviation, µ2=-5.99
W06 (azimuth 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=6.37,
Standard Deviation, σ2=4.61,
Mean Deviation, µ1=1.26
Mean Deviation, µ2=3.02
Pointing offset (arc-minute)
Date (year)
40
20
0
-20
-40
2004.5
2005
2005.5
2006
2006.5
2007
2007.5
2008

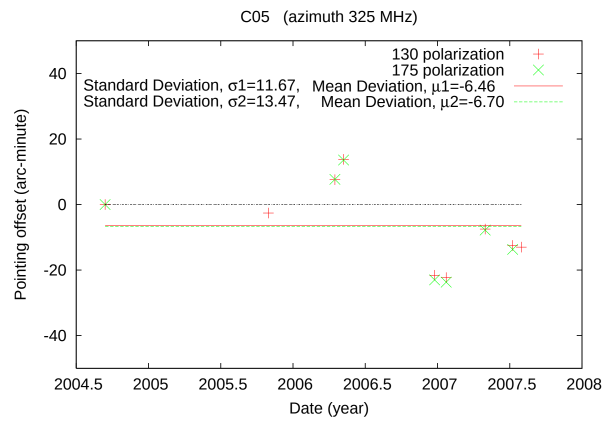

C00 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.99,
Standard Deviation, σ2=2.99,
Mean Deviation, µ1=-2.61
Mean Deviation, µ2=-2.37
Pointing offset (arc-minute)
Date (year)

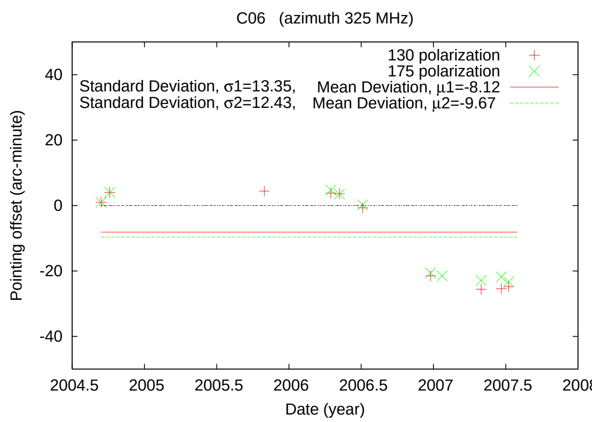

C01 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 3.08,
Standard Deviation, σ2= 4.19,
Mean Deviation, µ1=-8.38
Mean Deviation, µ2=-7.98
Pointing offset (arc-minute)
Date (year)

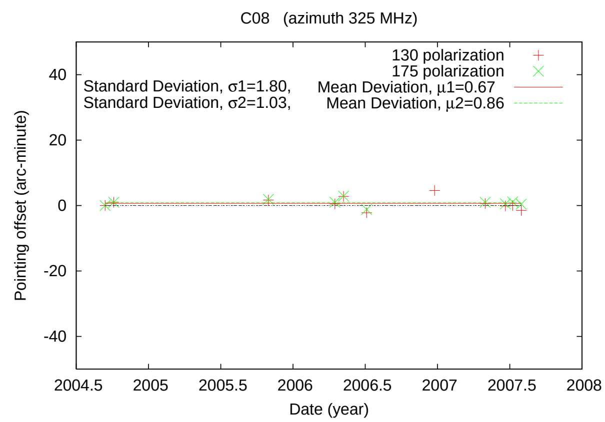

C02 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=19.65,
Standard Deviation, σ2=20.30,
Mean Deviation, µ1=-7.46
Mean Deviation, µ2=-4.61
Pointing offset (arc-minute)
Date (year)

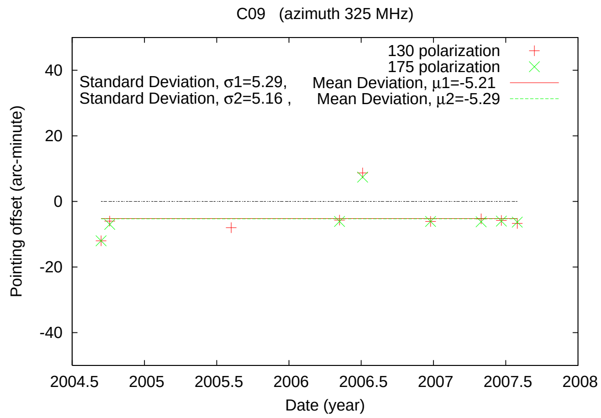

C03 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.14,
Standard Deviation, σ2=1.70,
Mean Deviation, µ1=1.00
Mean Deviation, µ2=1.58
Pointing offset (arc-minute)
Date (year)

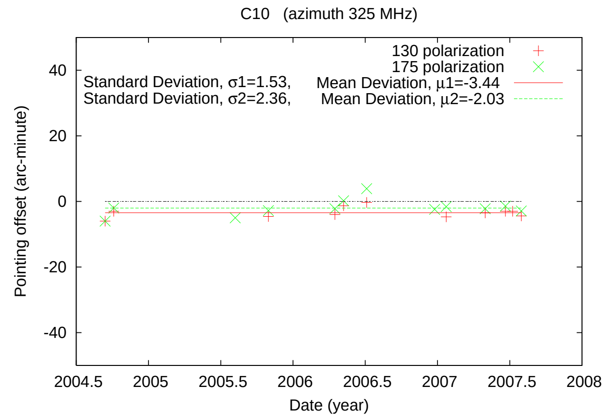

C04 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.64,
Standard Deviation, σ2=1.89,
Mean Deviation, µ1=0.64
Mean Deviation, µ2=2.11
Pointing offset (arc-minute)
Date (year)

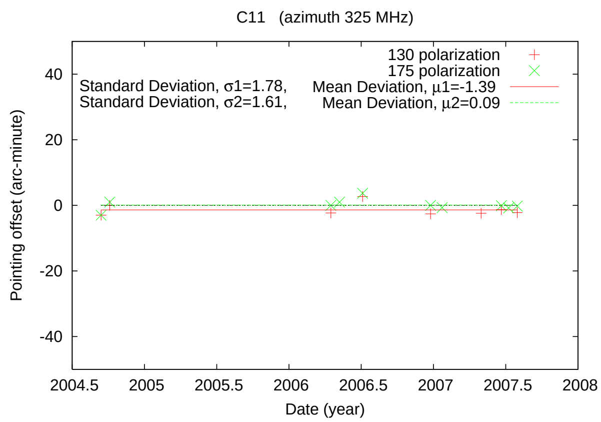

C05 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=11.67,
Standard Deviation, σ2=13.47,
Mean Deviation, µ1=-6.46
Mean Deviation, µ2=-6.70
Pointing offset (arc-minute)
Date (year)

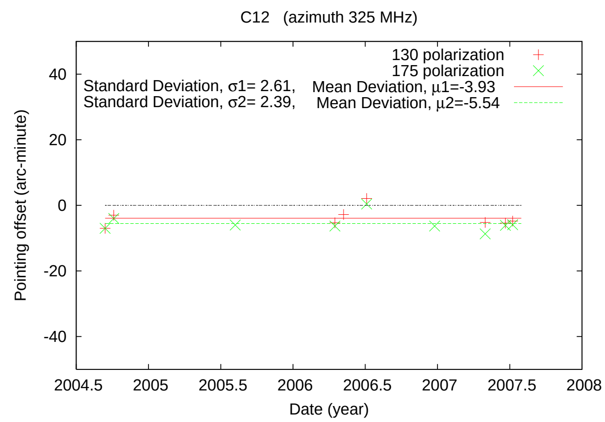

C06 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=13.35,
Standard Deviation, σ2=12.43,
Mean Deviation, µ1=-8.12
Mean Deviation, µ2=-9.67
Pointing offset (arc-minute)
Date (year)

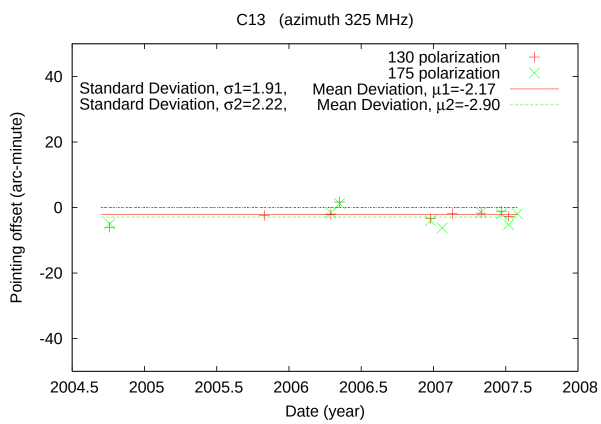

C08 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.80,
Standard Deviation, σ2=1.03,
Mean Deviation, µ1=0.67
Mean Deviation, µ2=0.86
Pointing offset (arc-minute)
Date (year)

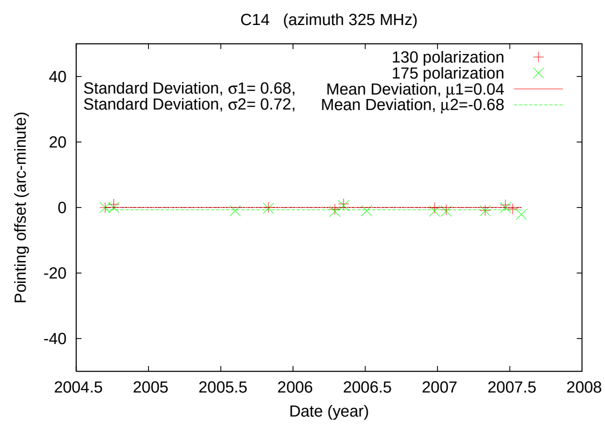

C09 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=5.29,
Standard Deviation, σ2=5.16 ,
Mean Deviation, µ1=-5.21
Mean Deviation, µ2=-5.29
Pointing offset (arc-minute)
Date (year)

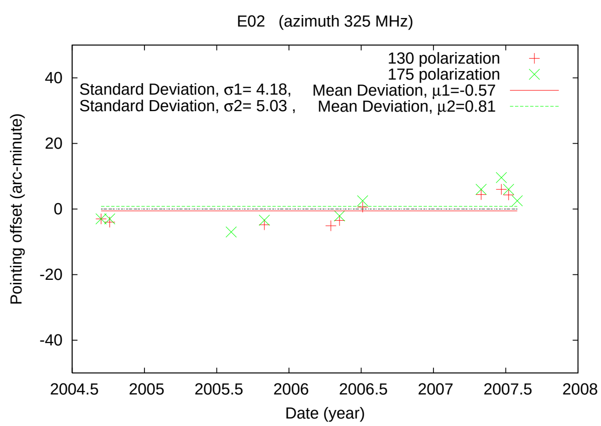

C10 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.53,
Standard Deviation, σ2=2.36,
Mean Deviation, µ1=-3.44
Mean Deviation, µ2=-2.03
Pointing offset (arc-minute)
Date (year)

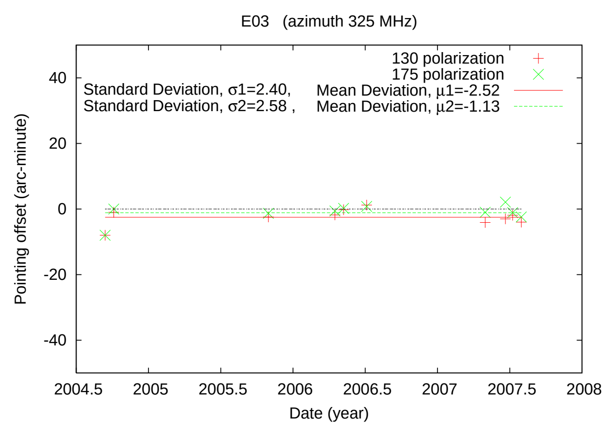

C11 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.78,
Standard Deviation, σ2=1.61,
Mean Deviation, µ1=-1.39
Mean Deviation, µ2=0.09
Pointing offset (arc-minute)
Date (year)

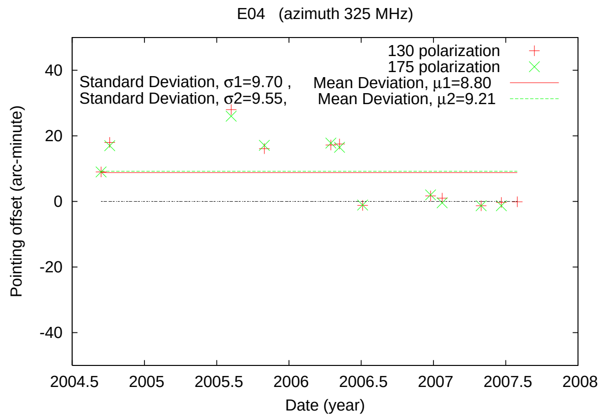

C12 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.61,
Standard Deviation, σ2= 2.39,
Mean Deviation, µ1=-3.93
Mean Deviation, µ2=-5.54
Pointing offset (arc-minute)
Date (year)

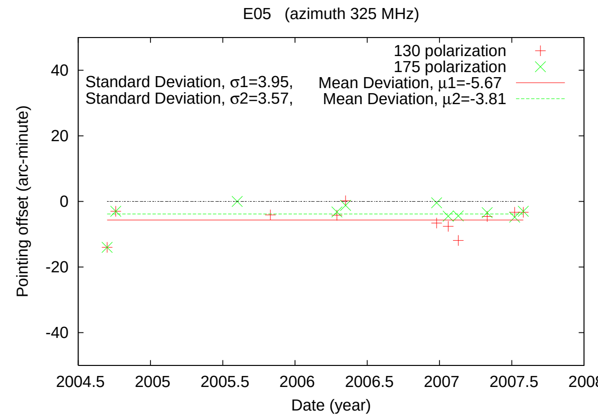

C13 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.91,
Standard Deviation, σ2=2.22,
Mean Deviation, µ1=-2.17
Mean Deviation, µ2=-2.90
Pointing offset (arc-minute)
Date (year)

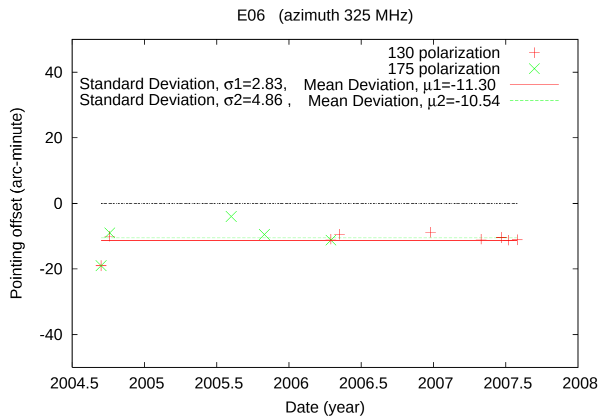

C14 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 0.68,
Standard Deviation, σ2= 0.72,
Mean Deviation, µ1=0.04
Mean Deviation, µ2=-0.68
Pointing offset (arc-minute)
Date (year)

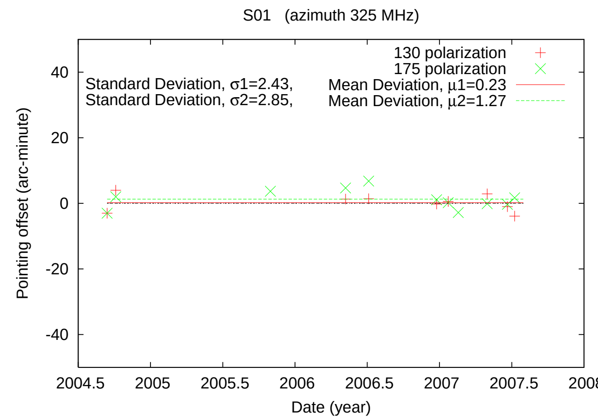

E02 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.18,
Standard Deviation, σ2= 5.03 ,
Mean Deviation, µ1=-0.57
Mean Deviation, µ2=0.81
Pointing offset (arc-minute)
Date (year)

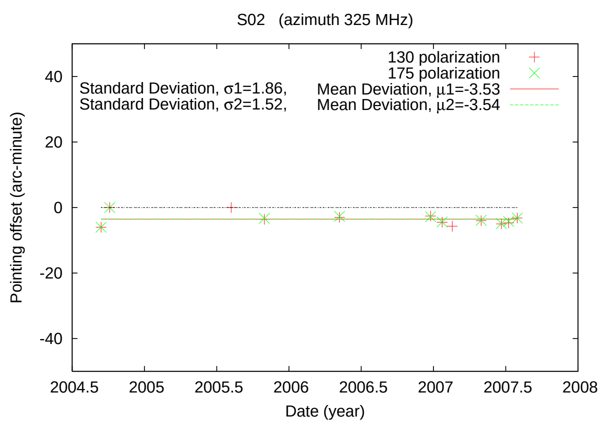

E03 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.40,
Standard Deviation, σ2=2.58 ,
Mean Deviation, µ1=-2.52
Mean Deviation, µ2=-1.13
Pointing offset (arc-minute)
Date (year)

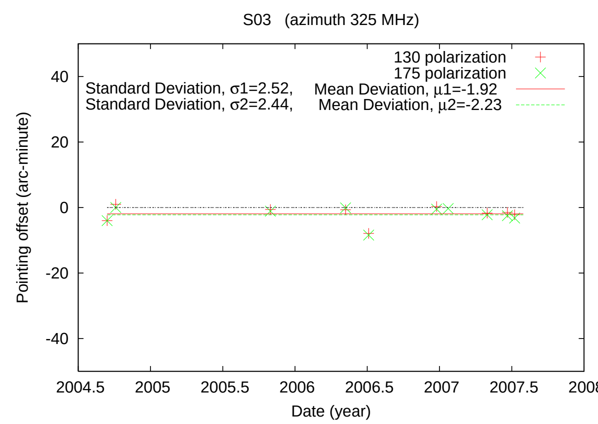

E04 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=9.70 ,
Standard Deviation, σ2=9.55,
Mean Deviation, µ1=8.80
Mean Deviation, µ2=9.21
Pointing offset (arc-minute)
Date (year)

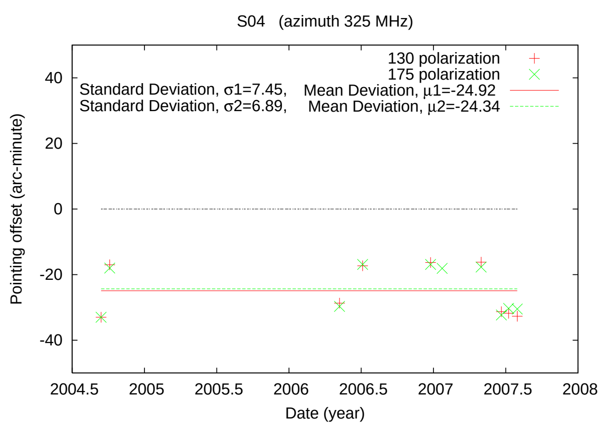

E05 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.95,
Standard Deviation, σ2=3.57,
Mean Deviation, µ1=-5.67
Mean Deviation, µ2=-3.81
Pointing offset (arc-minute)
Date (year)

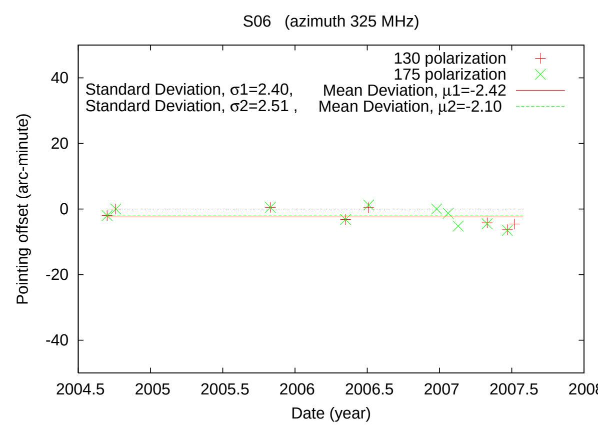

E06 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.83,
Standard Deviation, σ2=4.86 ,
Mean Deviation, µ1=-11.30
Mean Deviation, µ2=-10.54
Pointing offset (arc-minute)
Date (year)

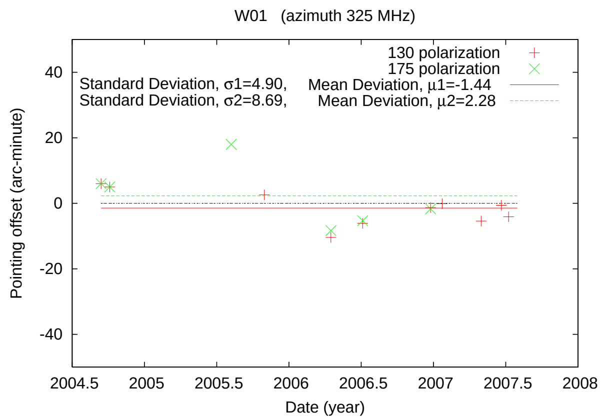

S01 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.43,
Standard Deviation, σ2=2.85,
Mean Deviation, µ1=0.23
Mean Deviation, µ2=1.27
Pointing offset (arc-minute)
Date (year)

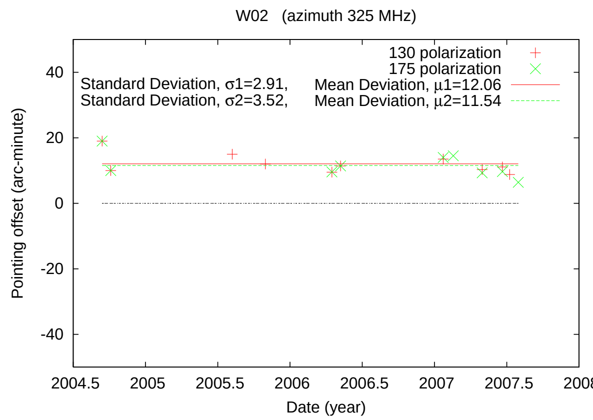

S02 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.86,
Standard Deviation, σ2=1.52,
Mean Deviation, µ1=-3.53
Mean Deviation, µ2=-3.54
Pointing offset (arc-minute)
Date (year)

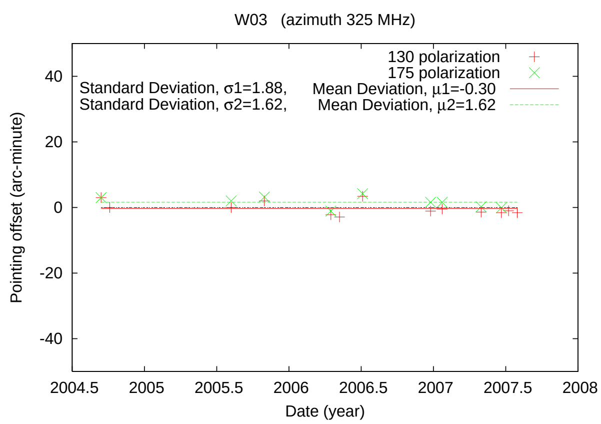

S03 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.52,
Standard Deviation, σ2=2.44,
Mean Deviation, µ1=-1.92
Mean Deviation, µ2=-2.23
Pointing offset (arc-minute)
Date (year)

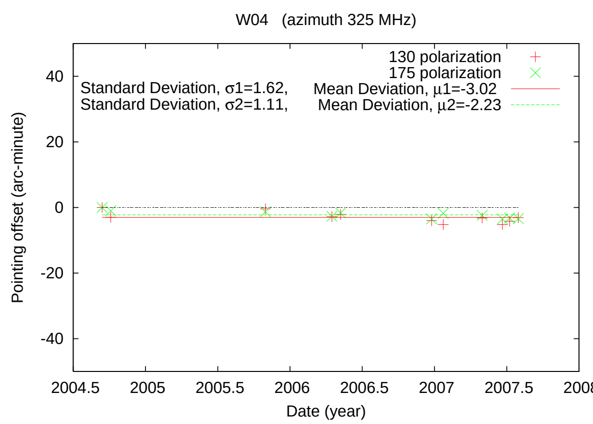

S04 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=7.45,
Standard Deviation, σ2=6.89,
Mean Deviation, µ1=-24.92
Mean Deviation, µ2=-24.34
Pointing offset (arc-minute)
Date (year)

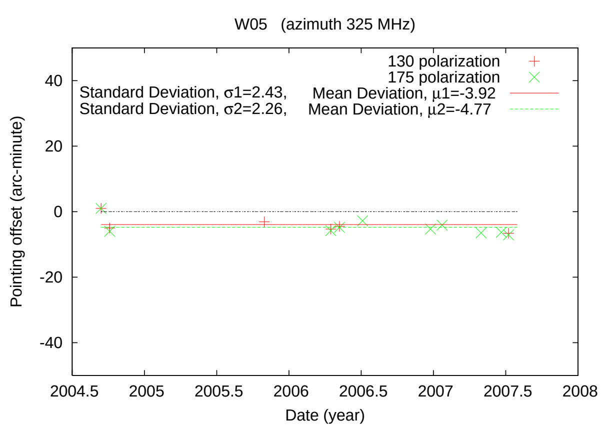

S06 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.40,
Standard Deviation, σ2=2.51 ,
Mean Deviation, µ1=-2.42
Mean Deviation, µ2=-2.10
Pointing offset (arc-minute)
Date (year)

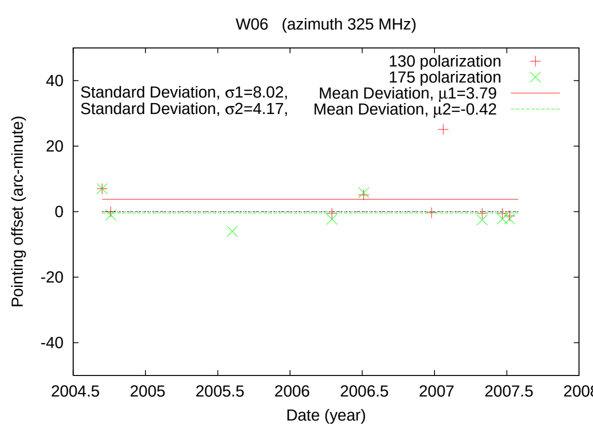

W01 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.90,
Standard Deviation, σ2=8.69,
Mean Deviation, µ1=-1.44
Mean Deviation, µ2=2.28
Pointing offset (arc-minute)
Date (year)

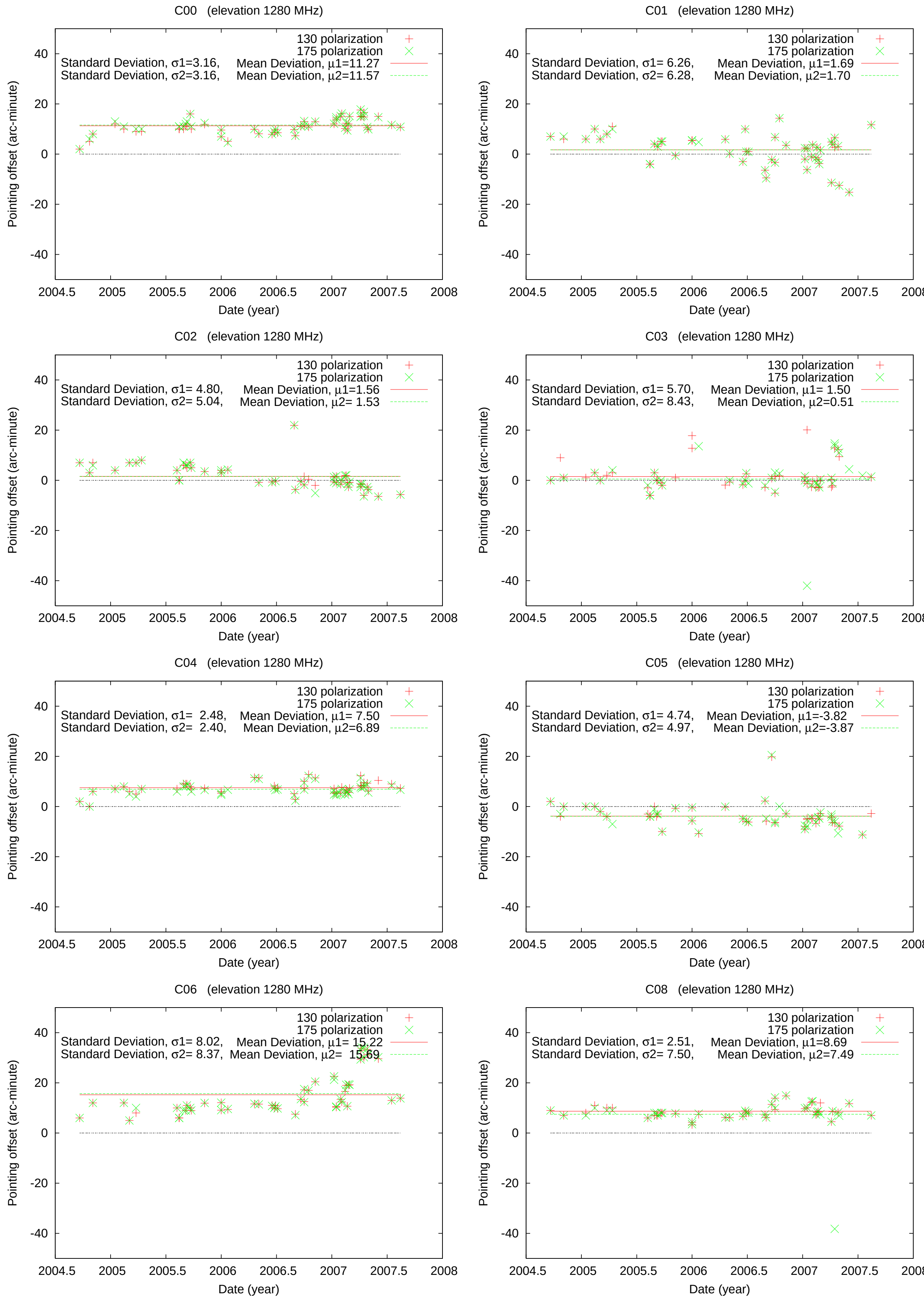

W02 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.91,
Standard Deviation, σ2=3.52,
Mean Deviation, µ1=12.06
Mean Deviation, µ2=11.54
Pointing offset (arc-minute)
Date (year)

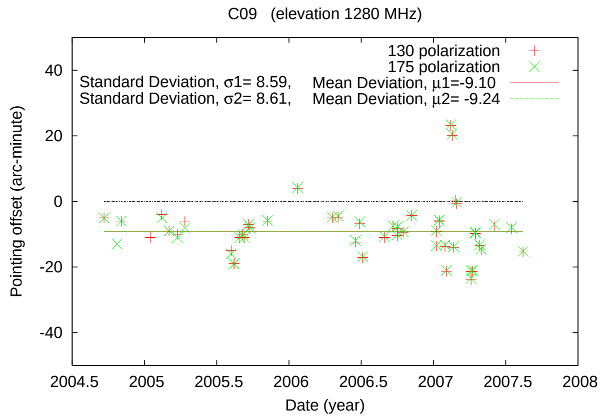

W03 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.88,
Standard Deviation, σ2=1.62,
Mean Deviation, µ1=-0.30
Mean Deviation, µ2=1.62
Pointing offset (arc-minute)
Date (year)

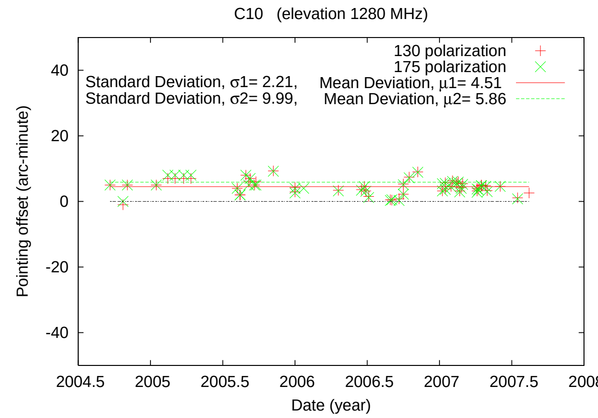

W04 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.62,
Standard Deviation, σ2=1.11,
Mean Deviation, µ1=-3.02
Mean Deviation, µ2=-2.23
Pointing offset (arc-minute)
Date (year)

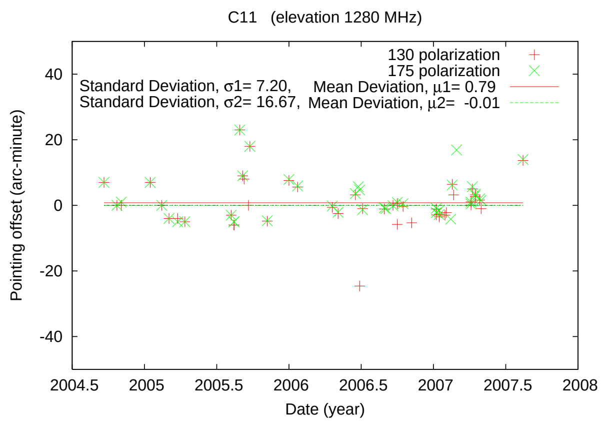

W05 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.43,
Standard Deviation, σ2=2.26,
Mean Deviation, µ1=-3.92
Mean Deviation, µ2=-4.77
Pointing offset (arc-minute)
Date (year)

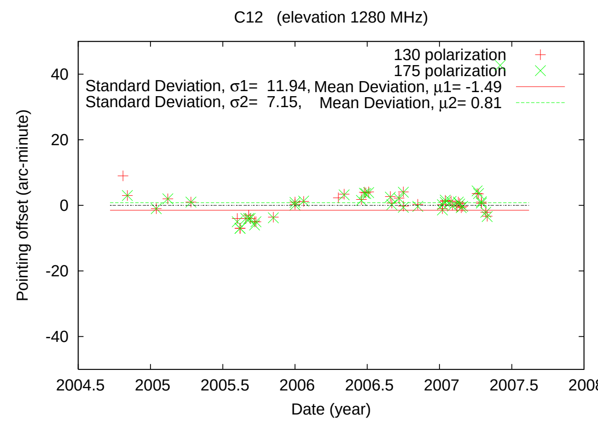

W06 (azimuth 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=8.02,
Standard Deviation, σ2=4.17,
Mean Deviation, µ1=3.79
Mean Deviation, µ2=-0.42
Pointing offset (arc-minute)
Date (year)

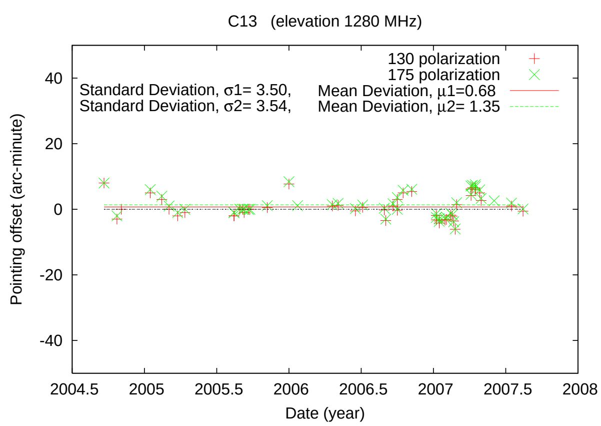

C00 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.16,
Standard Deviation, σ2=3.16,
Mean Deviation, µ1=11.27
Mean Deviation, µ2=11.57
Pointing offset (arc-minute)
Date (year)
C01 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 6.26,
Standard Deviation, σ2= 6.28,
Mean Deviation, µ1=1.69
Mean Deviation, µ2=1.70
Pointing offset (arc-minute)
Date (year)
C02 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.80,
Standard Deviation, σ2= 5.04,
Mean Deviation, µ1=1.56
Mean Deviation, µ2= 1.53
Pointing offset (arc-minute)
Date (year)
C03 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 5.70,
Standard Deviation, σ2= 8.43,
Mean Deviation, µ1= 1.50
Mean Deviation, µ2=0.51
Pointing offset (arc-minute)
Date (year)
C04 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.48,
Standard Deviation, σ2= 2.40,
Mean Deviation, µ1= 7.50
Mean Deviation, µ2=6.89
Pointing offset (arc-minute)
Date (year)
C05 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.74,
Standard Deviation, σ2= 4.97,
Mean Deviation, µ1=-3.82
Mean Deviation, µ2=-3.87
Pointing offset (arc-minute)
Date (year)
C06 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 8.02,
Standard Deviation, σ2= 8.37,
Mean Deviation, µ1= 15.22
Mean Deviation, µ2= 15.69
Pointing offset (arc-minute)
Date (year)
C08 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.51,
Standard Deviation, σ2= 7.50,
Mean Deviation, µ1=8.69
Mean Deviation, µ2=7.49
Pointing offset (arc-minute)
Date (year)

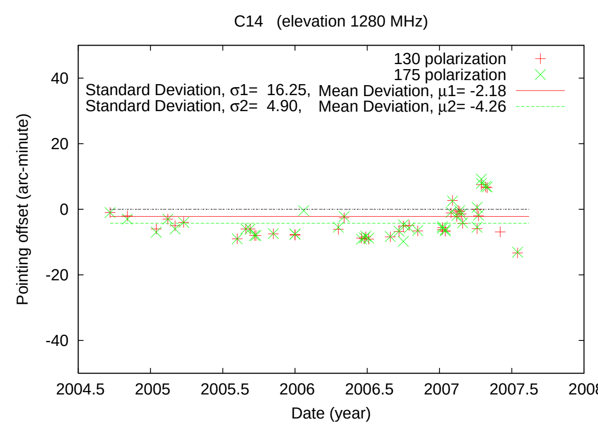

C09 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 8.59, Mean Deviation, µ1=-9.10
Standard Deviation, σ2= 8.61, Mean Deviation, µ2= -9.24
Pointing offset (arc-minute)
Date (year)

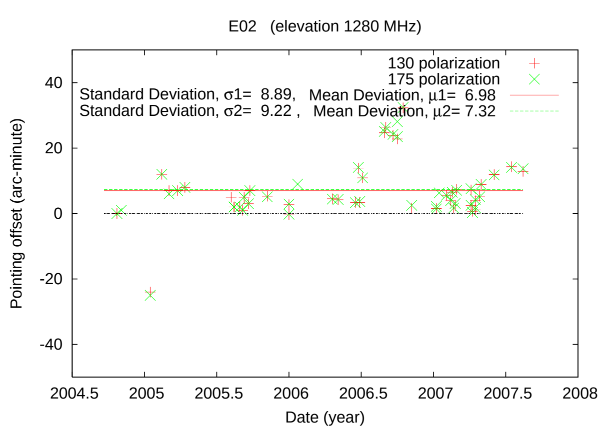

C10 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.21, Mean Deviation, µ1= 4.51
Standard Deviation, σ2= 9.99, Mean Deviation, µ2= 5.86
Pointing offset (arc-minute)
Date (year)

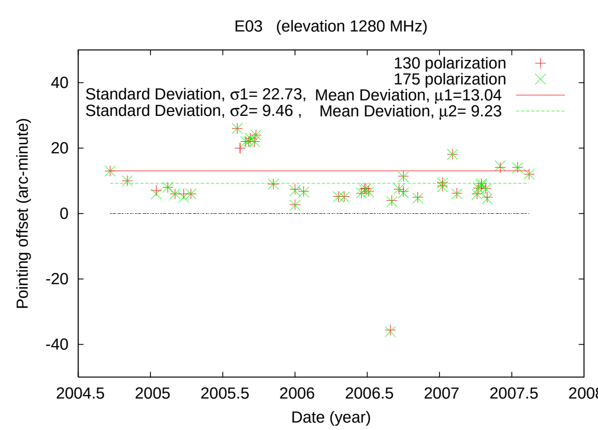

C11 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 7.20, Mean Deviation, µ1= 0.79
Standard Deviation, σ2= 16.67, Mean Deviation, µ2= -0.01
Pointing offset (arc-minute)
Date (year)

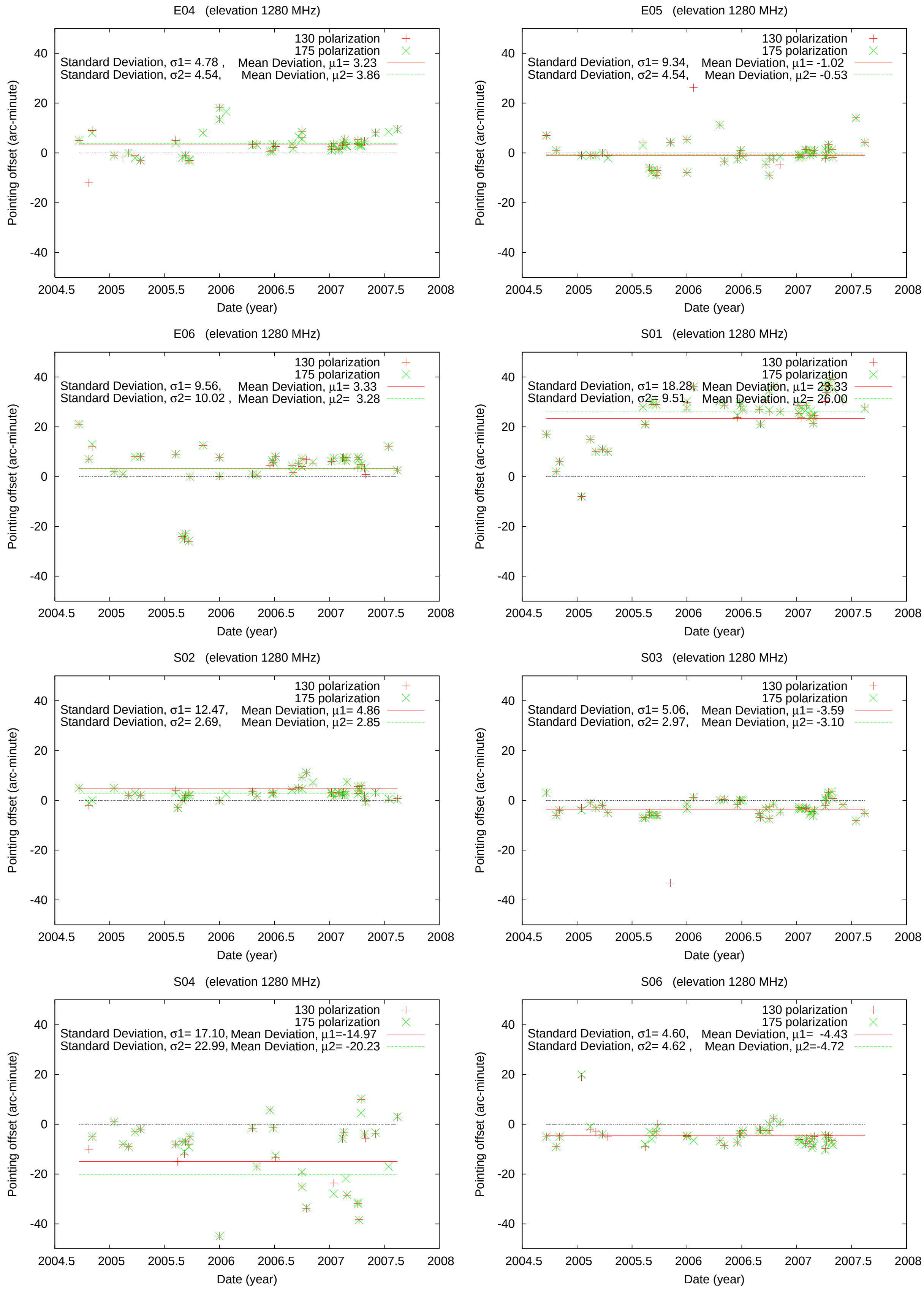

C12 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 11.94, Mean Deviation, µ1= -1.49
Standard Deviation, σ2= 7.15, Mean Deviation, µ2= 0.81
Pointing offset (arc-minute)
Date (year)

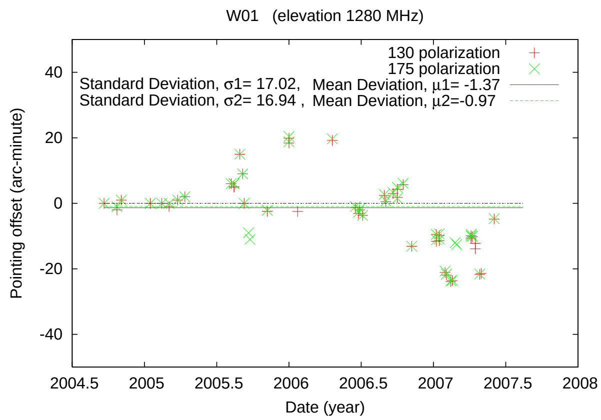

C13 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 3.50, Mean Deviation, µ1=0.68
Standard Deviation, σ2= 3.54, Mean Deviation, µ2= 1.35
Pointing offset (arc-minute)
Date (year)

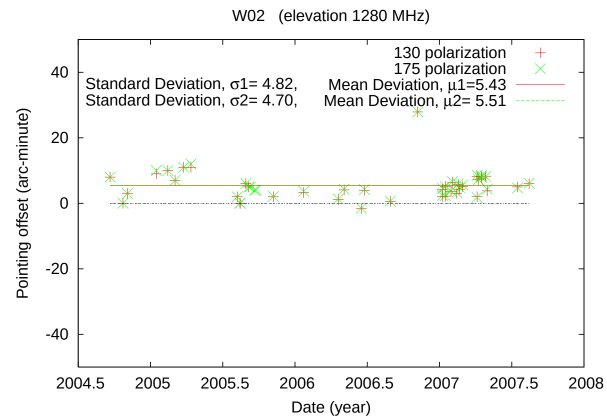

C14 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 16.25, Mean Deviation, µ1= -2.18
Standard Deviation, σ2= 4.90, Mean Deviation, µ2= -4.26
Pointing offset (arc-minute)
Date (year)

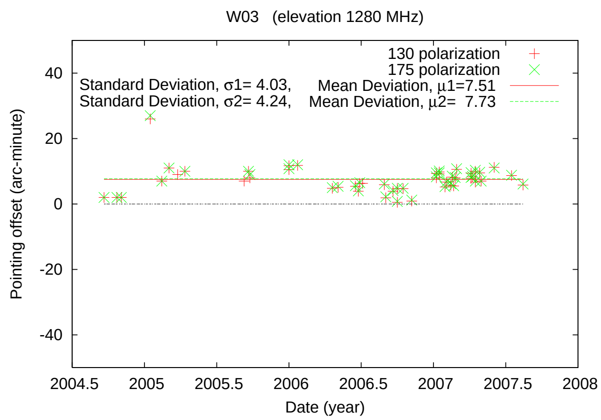

E02 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 8.89, Mean Deviation, µ1= 6.98
Standard Deviation, σ2= 9.22 , Mean Deviation, µ2= 7.32
Pointing offset (arc-minute)
Date (year)

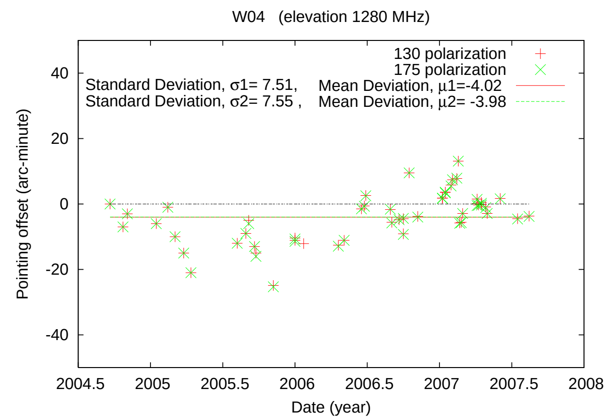

E03 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 22.73, Mean Deviation, µ1=13.04
Standard Deviation, σ2= 9.46 , Mean Deviation, µ2= 9.23
Pointing offset (arc-minute)
Date (year)

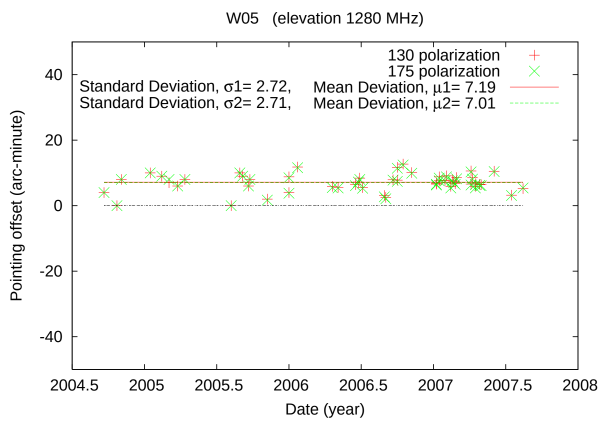

E04 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.78 , Mean Deviation, µ1= 3.23
Standard Deviation, σ2= 4.54, Mean Deviation, µ2= 3.86
E05 (elevation 1280 MHz)
Standard Deviation, σ1= 9.34, Mean Deviation, µ1= -1.02
Standard Deviation, σ2= 4.54, Mean Deviation, µ2= -0.53
E06 (elevation 1280 MHz)
Standard Deviation, σ1= 9.56, Mean Deviation, µ1= 3.33
Standard Deviation, σ2= 10.02 , Mean Deviation, µ2= 3.28
S01 (elevation 1280 MHz)
Standard Deviation, σ1= 18.28, Mean Deviation, µ1= 23.33
Standard Deviation, σ2= 9.51, Mean Deviation, µ2= 26.00
S02 (elevation 1280 MHz)
Standard Deviation, σ1= 12.47, Mean Deviation, µ1= 4.86
Standard Deviation, σ2= 2.69, Mean Deviation, µ2= 2.85
S03 (elevation 1280 MHz)
Standard Deviation, σ1= 5.06, Mean Deviation, µ1= -3.59
Standard Deviation, σ2= 2.97, Mean Deviation, µ2= -3.10
S04 (elevation 1280 MHz)
Standard Deviation, σ1= 17.10, Mean Deviation, µ1=-14.97
Standard Deviation, σ2= 22.99, Mean Deviation, µ2= -20.23
S06 (elevation 1280 MHz)
Standard Deviation, σ1= 4.60, Mean Deviation, µ1= -4.43
Standard Deviation, σ2= 4.62 , Mean Deviation, µ2=-4.72
Pointing offset (arc-minute)
Date (year)
2004.5 2005 2005.5 2006 2006.5 2007 2007.5 2008
40 20 0 -20 -40

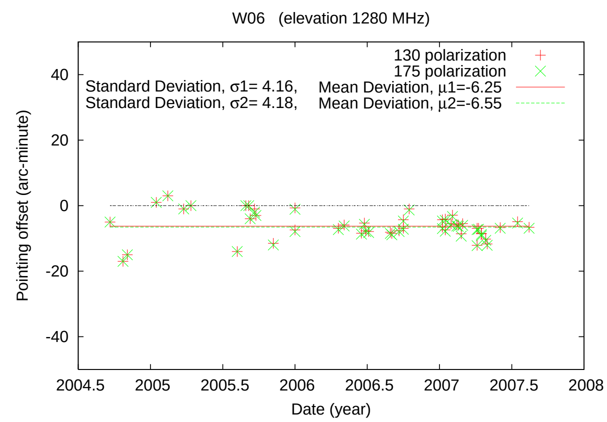

W01 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 17.02, Mean Deviation, µ1= -1.37
Standard Deviation, σ2= 16.94 , Mean Deviation, µ2=-0.97
Pointing offset (arc-minute)
Date (year)

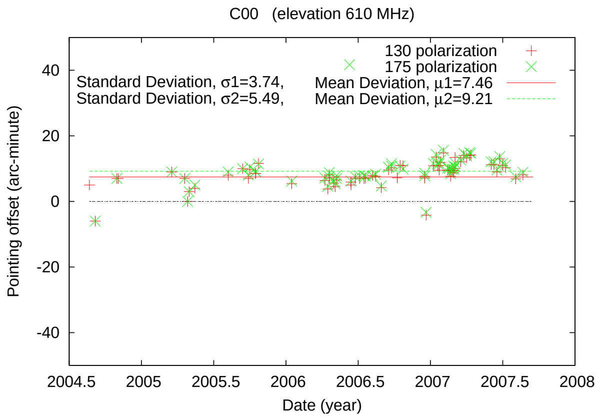

W02 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.82, Mean Deviation, µ1=5.43
Standard Deviation, σ2= 4.70, Mean Deviation, µ2= 5.51
Pointing offset (arc-minute)
Date (year)

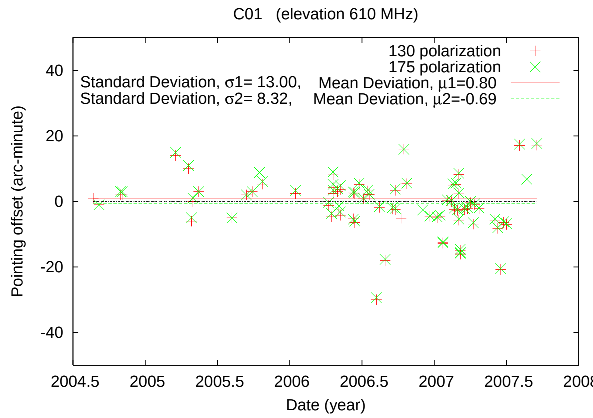

W03 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.03, Mean Deviation, µ1=7.51
Standard Deviation, σ2= 4.24, Mean Deviation, µ2= 7.73
Pointing offset (arc-minute)
Date (year)

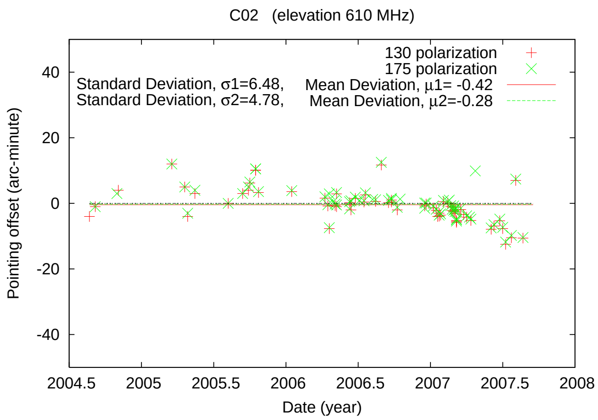

W04 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 7.51, Mean Deviation, µ1=-4.02
Standard Deviation, σ2= 7.55 , Mean Deviation, µ2= -3.98
Pointing offset (arc-minute)
Date (year)

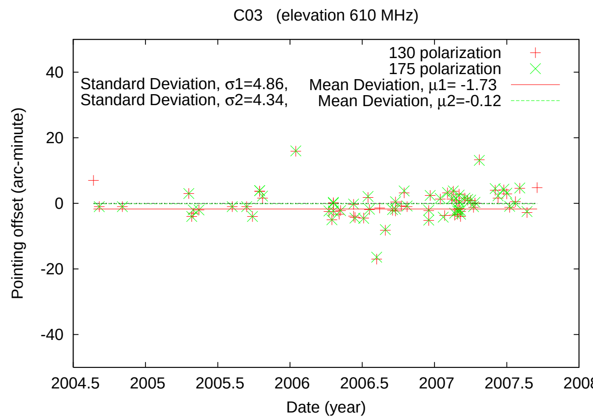

W05 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.72, Mean Deviation, µ1= 7.19
Standard Deviation, σ2= 2.71, Mean Deviation, µ2= 7.01
Pointing offset (arc-minute)
Date (year)

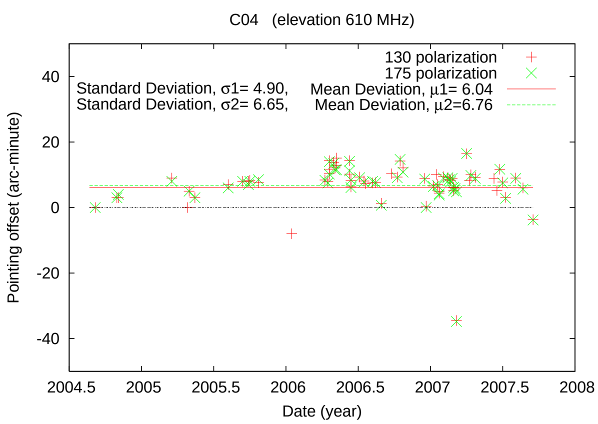

W06 (elevation 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.16, Mean Deviation, µ1=-6.25
Standard Deviation, σ2= 4.18, Mean Deviation, µ2=-6.55
Pointing offset (arc-minute)
Date (year)

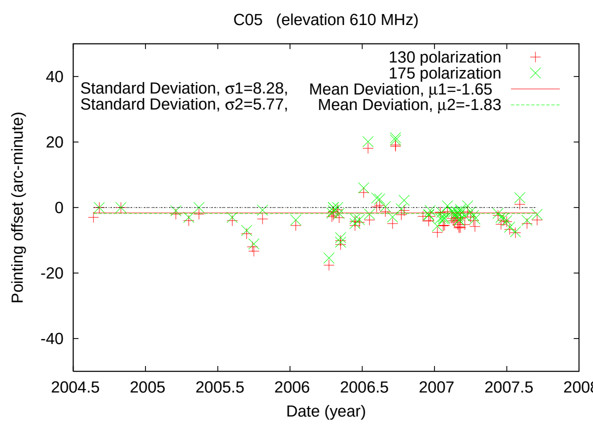

C00 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.74,
Standard Deviation, σ2=5.49,
Mean Deviation, μ1=7.46
Mean Deviation, μ2=9.21
Pointing offset (arc-minute)
Date (year)

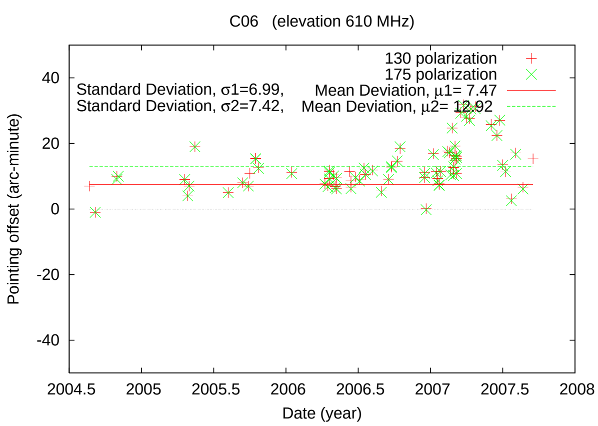

C01 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 13.00,
Standard Deviation, σ2= 8.32,
Mean Deviation, μ1=0.80
Mean Deviation, μ2=-0.69
Pointing offset (arc-minute)
Date (year)

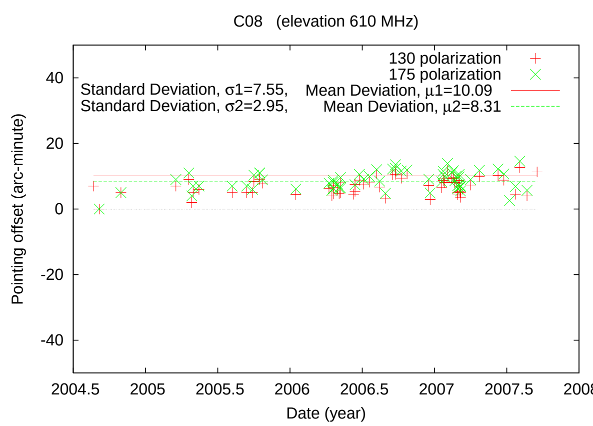

C02 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=6.48,
Standard Deviation, σ2=4.78,
Mean Deviation, μ1= -0.42
Mean Deviation, μ2=-0.28
Pointing offset (arc-minute)
Date (year)

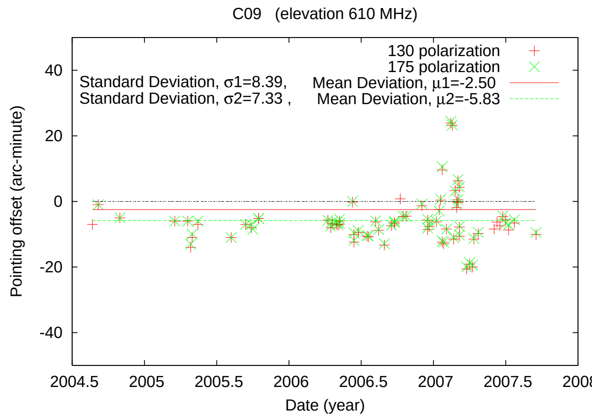

C03 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.86,
Standard Deviation, σ2=4.34,
Mean Deviation, μ1= -1.73
Mean Deviation, μ2=-0.12
Pointing offset (arc-minute)
Date (year)

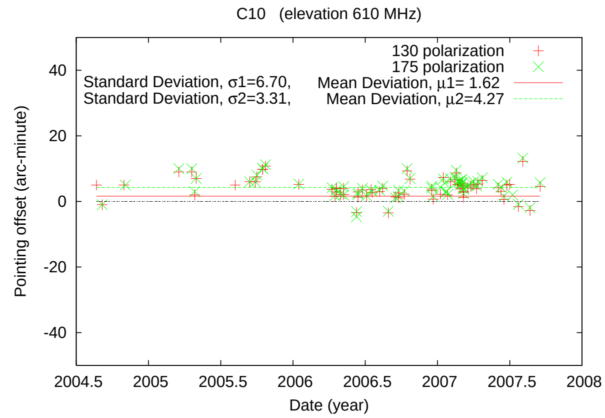

C04 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.90,
Standard Deviation, σ2= 6.65,
Mean Deviation, μ1= 6.04
Mean Deviation, μ2=6.76
Pointing offset (arc-minute)
Date (year)

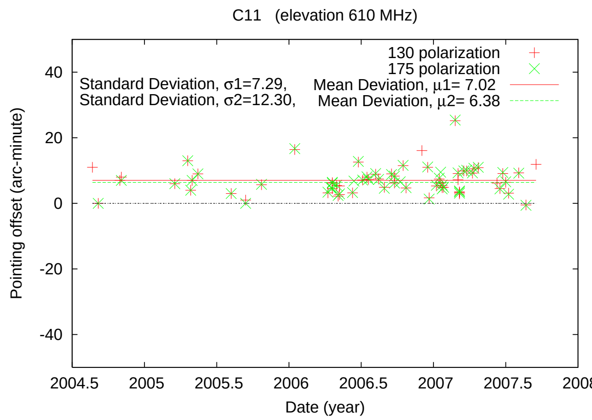

C05 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=8.28,
Standard Deviation, σ2=5.77,
Mean Deviation, μ1=-1.65
Mean Deviation, μ2=-1.83
Pointing offset (arc-minute)
Date (year)

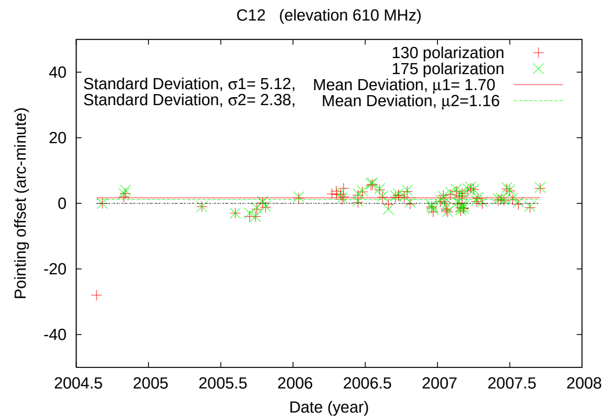

C06 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=6.99,
Standard Deviation, σ2=7.42,
Mean Deviation, μ1= 7.47
Mean Deviation, μ2= 12.92
Pointing offset (arc-minute)
Date (year)

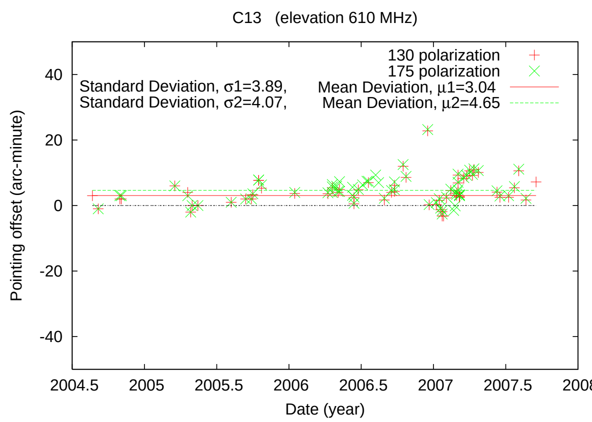

C08 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=7.55,
Standard Deviation, σ2=2.95,
Mean Deviation, μ1=10.09
Mean Deviation, μ2=8.31
Pointing offset (arc-minute)
Date (year)

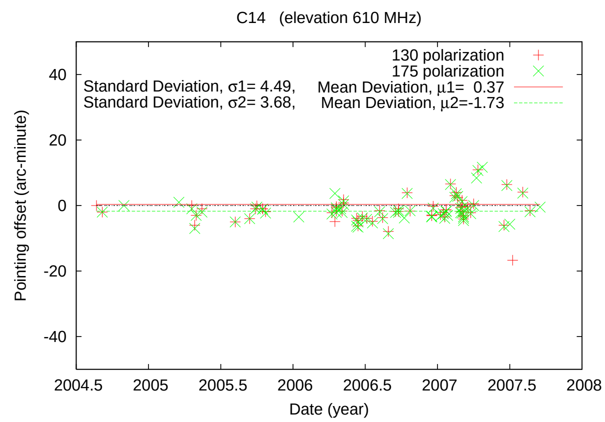

C09 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=8.39,
Standard Deviation, σ2=7.33 ,
Mean Deviation, µ1=-2.50
Mean Deviation, µ2=-5.83
Pointing offset (arc-minute)
Date (year)

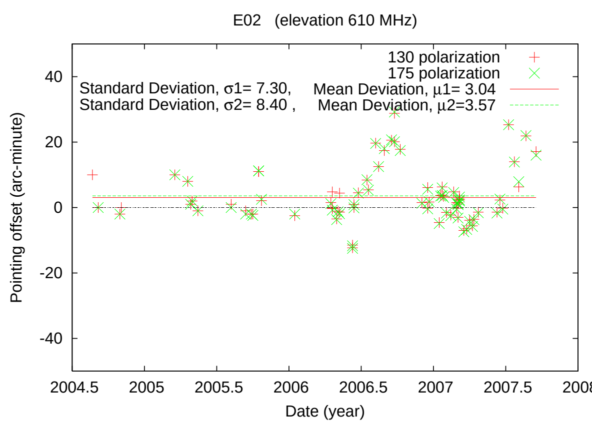

C10 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=6.70,
Standard Deviation, σ2=3.31,
Mean Deviation, µ1= 1.62
Mean Deviation, µ2=4.27
Pointing offset (arc-minute)
Date (year)

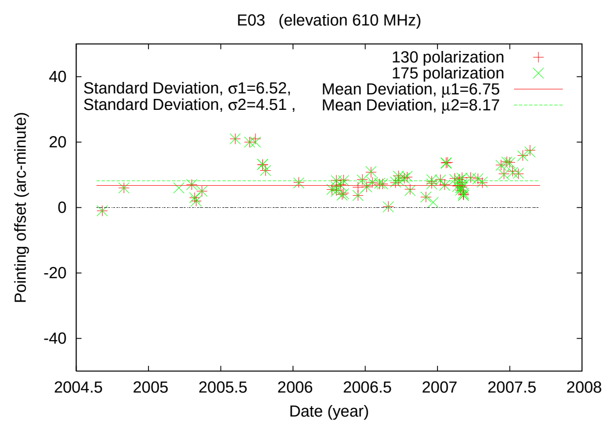

C11 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=7.29,
Standard Deviation, σ2=12.30,
Mean Deviation, µ1= 7.02
Mean Deviation, µ2= 6.38
Pointing offset (arc-minute)
Date (year)

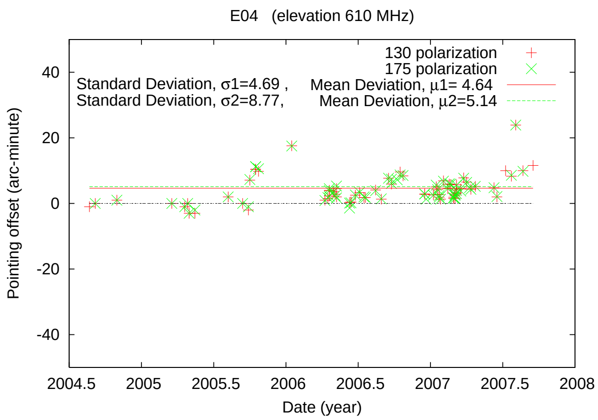

C12 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 5.12,
Standard Deviation, σ2= 2.38,
Mean Deviation, µ1= 1.70
Mean Deviation, µ2=1.16
Pointing offset (arc-minute)
Date (year)

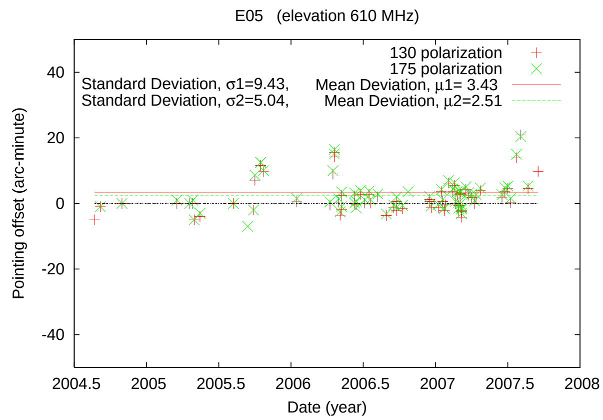

C13 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.89,
Standard Deviation, σ2=4.07,
Mean Deviation, µ1=3.04
Mean Deviation, µ2=4.65
Pointing offset (arc-minute)
Date (year)

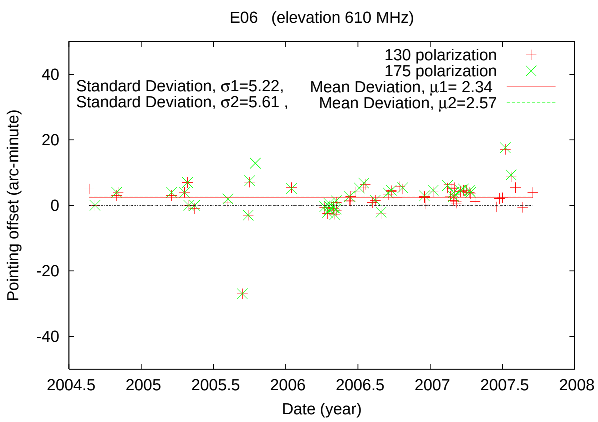

C14 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.49,
Standard Deviation, σ2= 3.68,
Mean Deviation, µ1= 0.37
Mean Deviation, µ2=-1.73
Pointing offset (arc-minute)
Date (year)

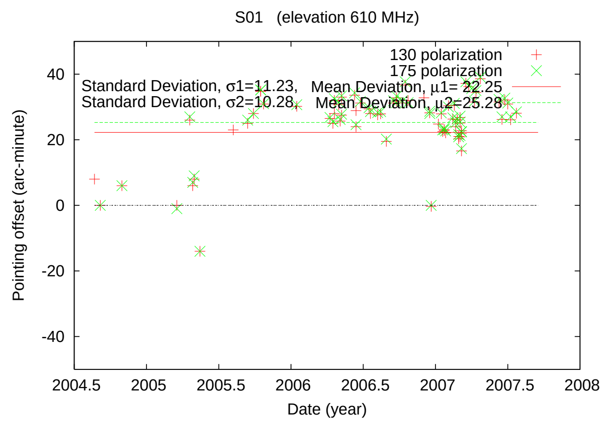

E02 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 7.30,
Standard Deviation, σ2= 8.40 ,
Mean Deviation, µ1= 3.04
Mean Deviation, µ2=3.57
Pointing offset (arc-minute)
Date (year)

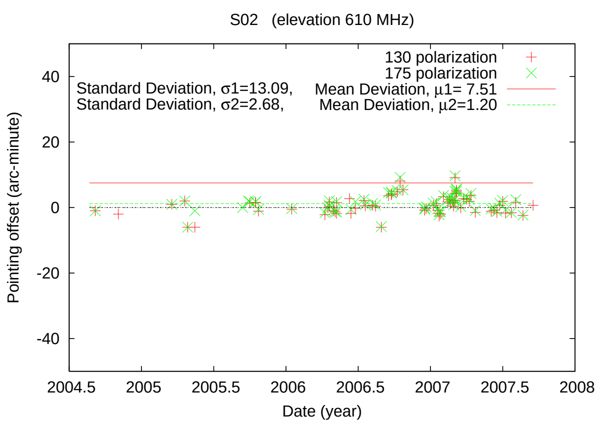

E03 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=6.52,
Standard Deviation, σ2=4.51 ,
Mean Deviation, µ1=6.75
Mean Deviation, µ2=8.17
Pointing offset (arc-minute)
Date (year)

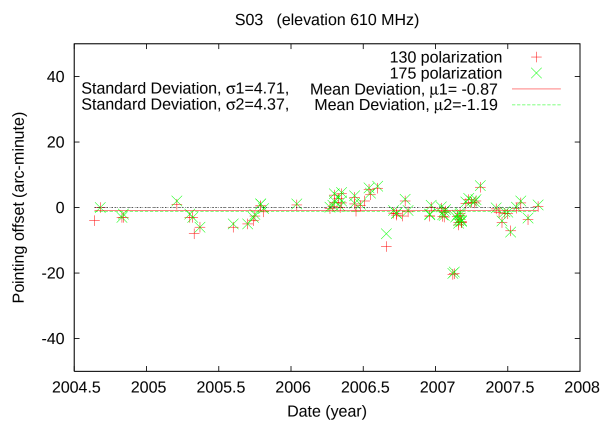

E04 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.69 ,
Standard Deviation, σ2=8.77,
Mean Deviation, µ1= 4.64
Mean Deviation, µ2=5.14
Pointing offset (arc-minute)
Date (year)

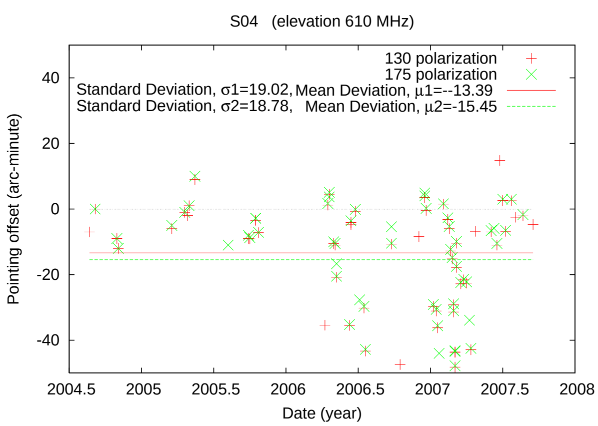

E05 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=9.43,
Standard Deviation, σ2=5.04,
Mean Deviation, µ1= 3.43
Mean Deviation, µ2=2.51
Pointing offset (arc-minute)
Date (year)

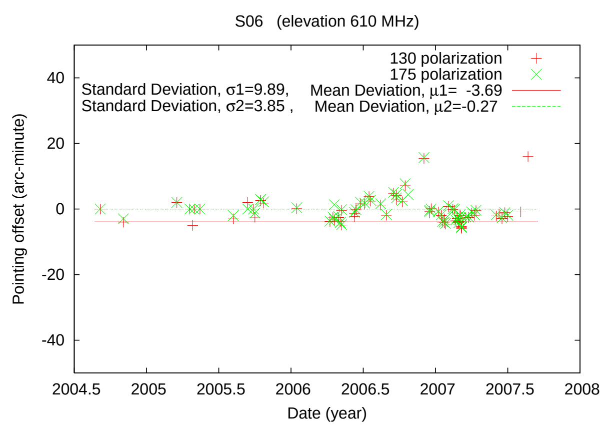

E06 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=5.22,
Standard Deviation, σ2=5.61 ,
Mean Deviation, µ1= 2.34
Mean Deviation, µ2=2.57
Pointing offset (arc-minute)
Date (year)

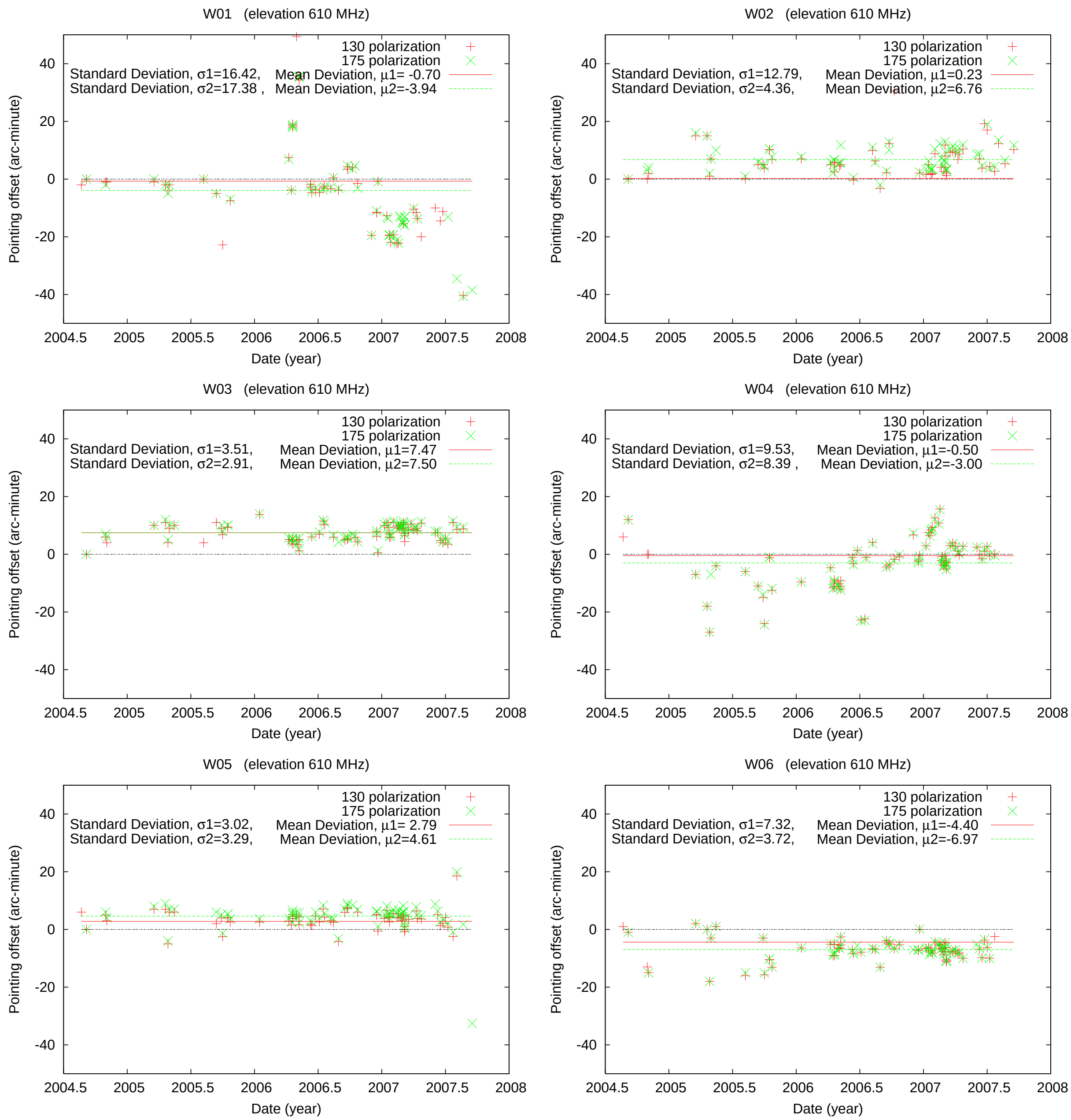

S01 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=11.23,
Standard Deviation, σ2=10.28,
Mean Deviation, µ1= 22.25
Mean Deviation, µ2=25.28
Pointing offset (arc-minute)
Date (year)

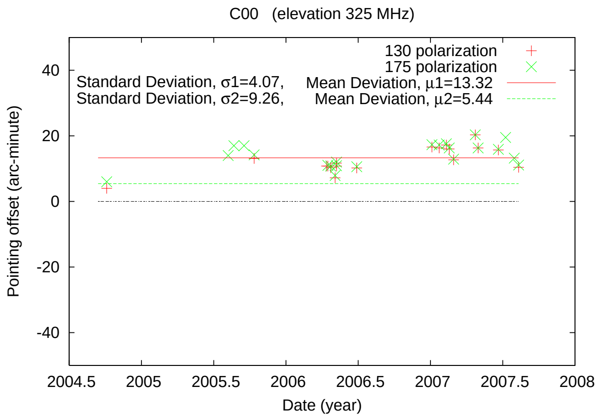

S02 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=13.09,
Standard Deviation, σ2=2.68,
Mean Deviation, µ1= 7.51
Mean Deviation, µ2=1.20
Pointing offset (arc-minute)
Date (year)

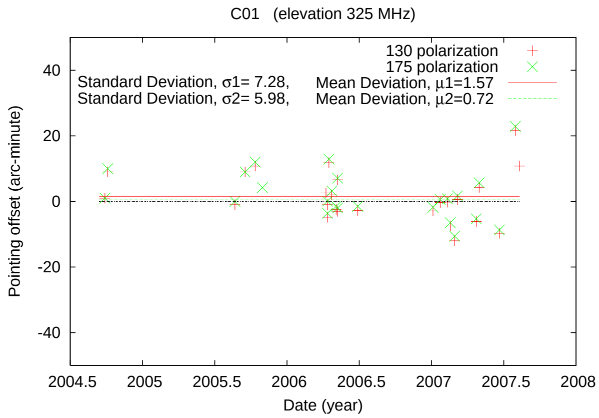

S03 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.71,
Standard Deviation, σ2=4.37,
Mean Deviation, µ1= -0.87
Mean Deviation, µ2=-1.19
Pointing offset (arc-minute)
Date (year)

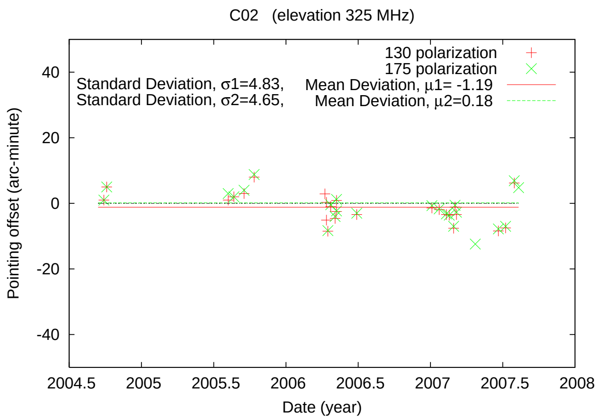

S04 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=19.02,
Standard Deviation, σ2=18.78,
Mean Deviation, µ1=--13.39
Mean Deviation, µ2=-15.45
Pointing offset (arc-minute)
Date (year)

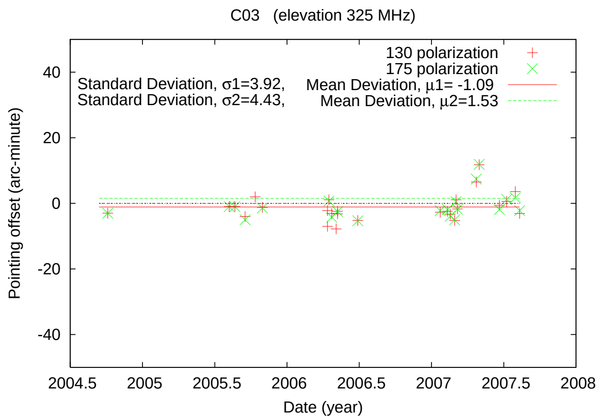

S06 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=9.89,
Standard Deviation, σ2=3.85 ,
Mean Deviation, µ1= -3.69
Mean Deviation, µ2=-0.27
Pointing offset (arc-minute)
Date (year)

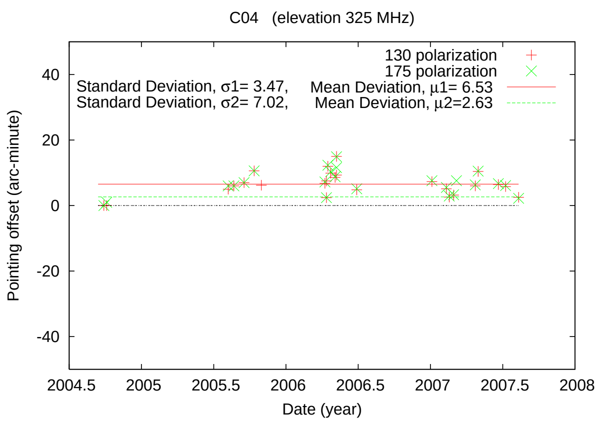

W01 (elevation 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=16.42, Mean Deviation, μ1= -0.70
Standard Deviation, σ2=17.38 , Mean Deviation, μ2=-3.94
W02 (elevation 610 MHz)
Standard Deviation, σ1=12.79, Mean Deviation, μ1=0.23
Standard Deviation, σ2=4.36, Mean Deviation, μ2=6.76
W03 (elevation 610 MHz)
Standard Deviation, σ1=3.51, Mean Deviation, μ1=7.47
Standard Deviation, σ2=2.91, Mean Deviation, μ2=7.50
W04 (elevation 610 MHz)
Standard Deviation, σ1=9.53, Mean Deviation, μ1=-0.50
Standard Deviation, σ2=8.39 , Mean Deviation, μ2=-3.00
W05 (elevation 610 MHz)
Standard Deviation, σ1=3.02, Mean Deviation, μ1= 2.79
Standard Deviation, σ2=3.29, Mean Deviation, μ2=4.61
W06 (elevation 610 MHz)
Standard Deviation, σ1=7.32, Mean Deviation, μ1=-4.40
Standard Deviation, σ2=3.72, Mean Deviation, μ2=-6.97
Pointing offset (arc-minute)
Date (year)

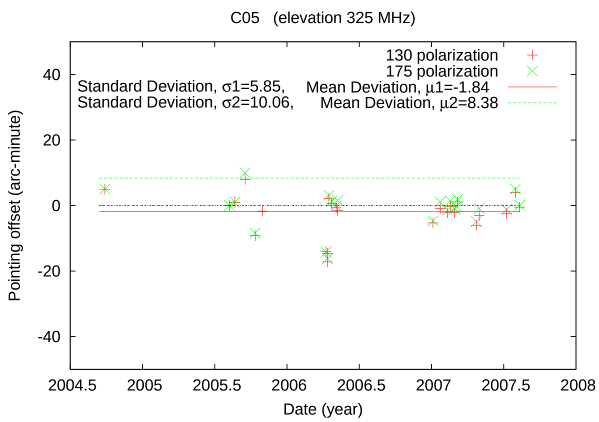

C00 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.07,
Standard Deviation, σ2=9.26,
Mean Deviation, µ1=13.32
Mean Deviation, µ2=5.44
Pointing offset (arc-minute)
Date (year)

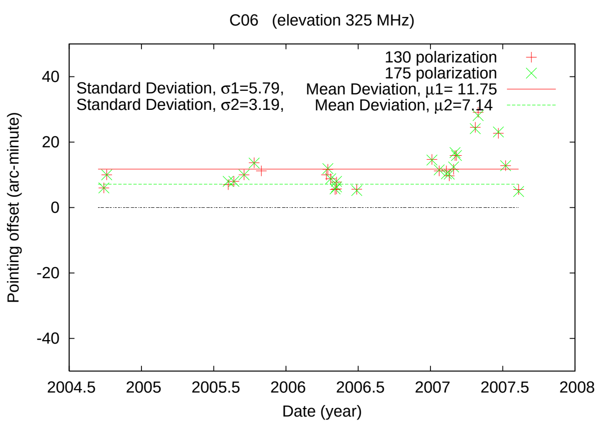

C01 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 7.28,
Standard Deviation, σ2= 5.98,
Mean Deviation, µ1=1.57
Mean Deviation, µ2=0.72
Pointing offset (arc-minute)
Date (year)

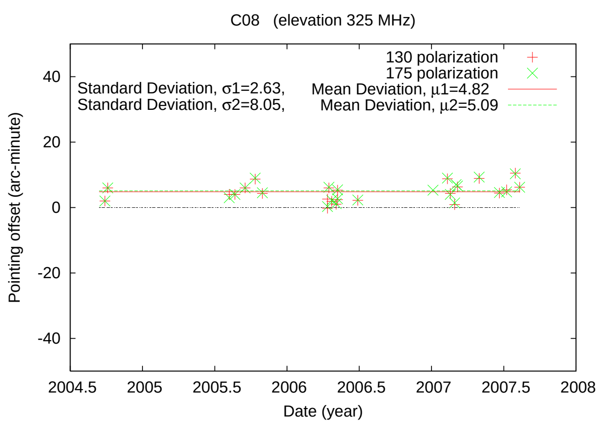

C02 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.83,
Standard Deviation, σ2=4.65,
Mean Deviation, µ1= -1.19
Mean Deviation, µ2=0.18
Pointing offset (arc-minute)
Date (year)

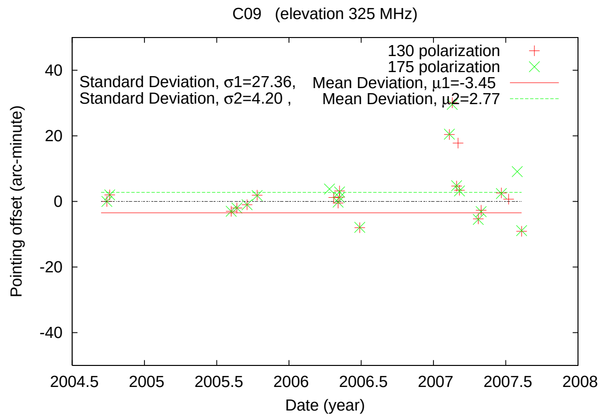

C03 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.92,
Standard Deviation, σ2=4.43,
Mean Deviation, µ1= -1.09
Mean Deviation, µ2=1.53
Pointing offset (arc-minute)
Date (year)

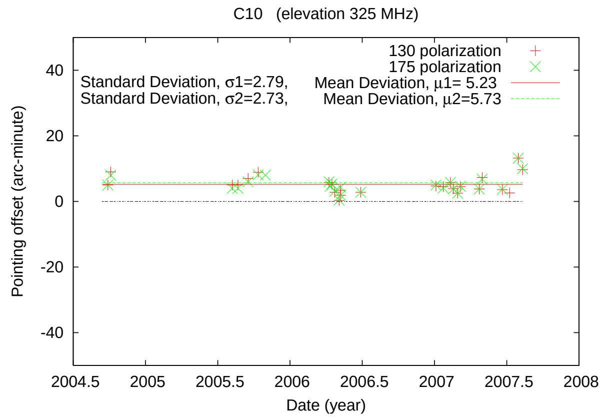

C04 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 3.47,
Standard Deviation, σ2= 7.02,
Mean Deviation, µ1= 6.53
Mean Deviation, µ2=2.63
Pointing offset (arc-minute)
Date (year)

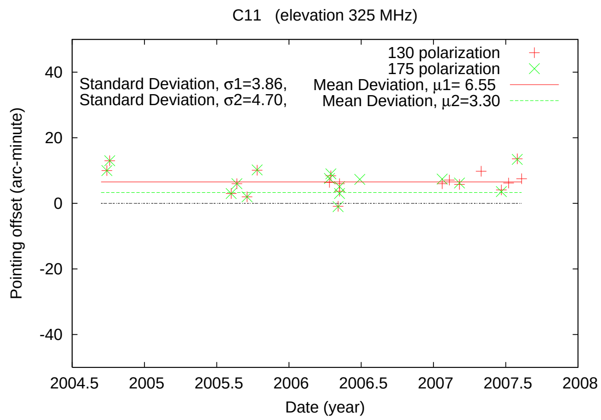

C05 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=5.85,
Standard Deviation, σ2=10.06,
Mean Deviation, µ1=-1.84
Mean Deviation, µ2=8.38
Pointing offset (arc-minute)
Date (year)

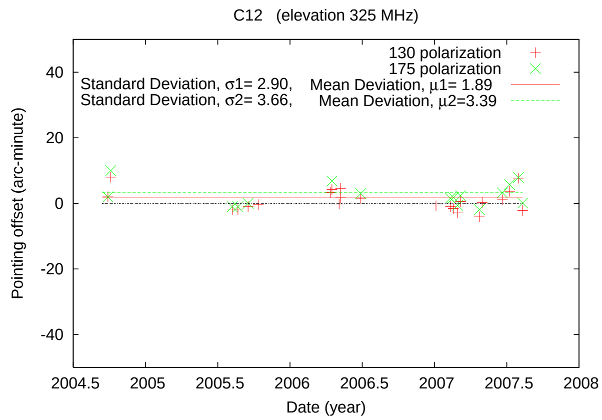

C06 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=5.79,
Standard Deviation, σ2=3.19,
Mean Deviation, µ1= 11.75
Mean Deviation, µ2=7.14
Pointing offset (arc-minute)
Date (year)

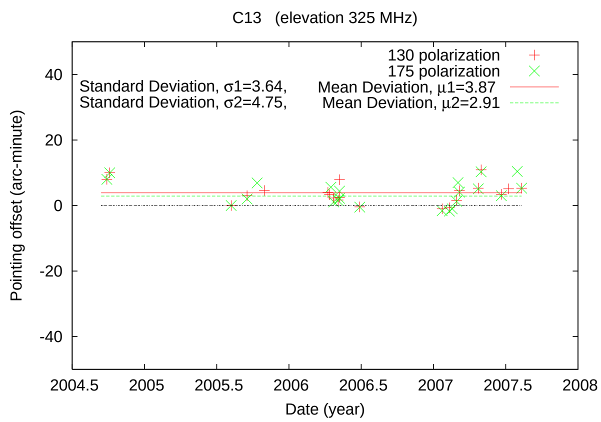

C08 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.63,
Standard Deviation, σ2=8.05,
Mean Deviation, µ1=4.82
Mean Deviation, µ2=5.09
Pointing offset (arc-minute)
Date (year)

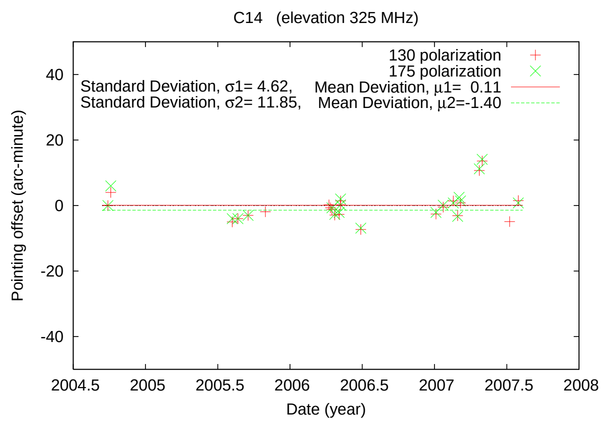

C09 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=27.36, Mean Deviation, µ1=-3.45
Standard Deviation, σ2=4.20 , Mean Deviation, µ2=2.77
Pointing offset (arc-minute)
Date (year)

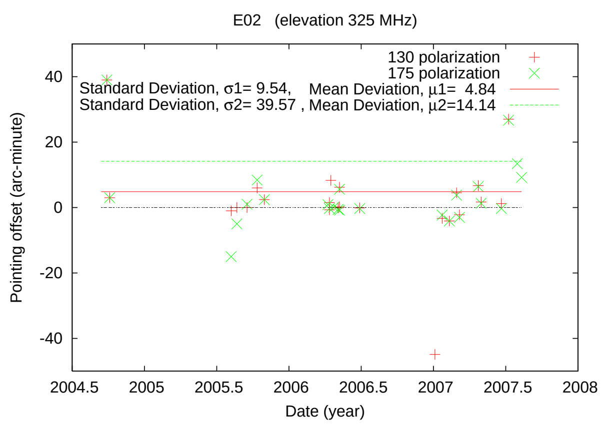

C10 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.79, Mean Deviation, µ1= 5.23
Standard Deviation, σ2=2.73, Mean Deviation, µ2=5.73
Pointing offset (arc-minute)
Date (year)

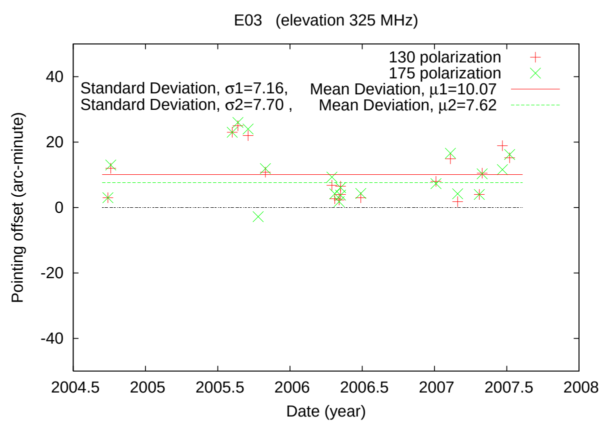

C11 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.86, Mean Deviation, µ1= 6.55
Standard Deviation, σ2=4.70, Mean Deviation, µ2=3.30
Pointing offset (arc-minute)
Date (year)

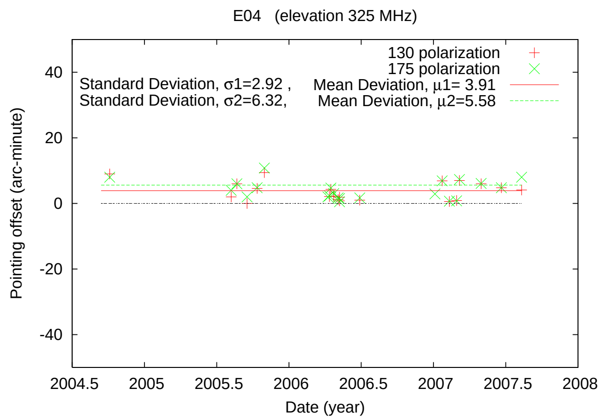

C12 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.90, Mean Deviation, µ1= 1.89
Standard Deviation, σ2= 3.66, Mean Deviation, µ2=3.39
Pointing offset (arc-minute)
Date (year)

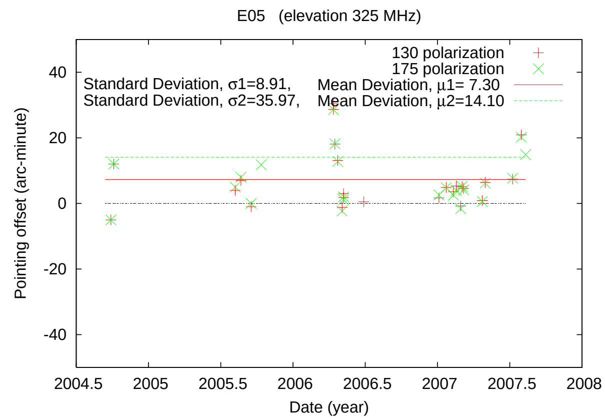

C13 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.64, Mean Deviation, µ1=3.87
Standard Deviation, σ2=4.75, Mean Deviation, µ2=2.91
Pointing offset (arc-minute)
Date (year)

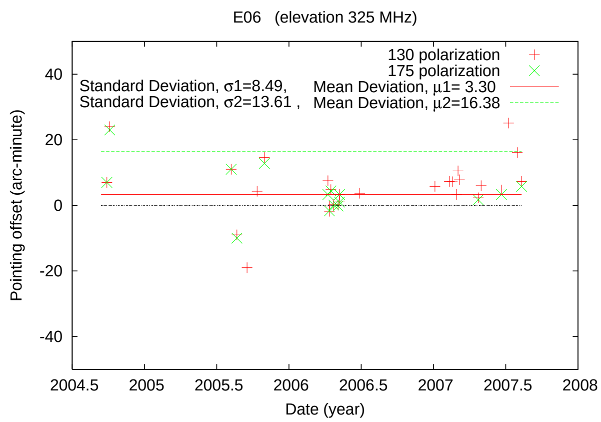

C14 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 4.62, Mean Deviation, µ1= 0.11
Standard Deviation, σ2= 11.85, Mean Deviation, µ2=-1.40
Pointing offset (arc-minute)
Date (year)

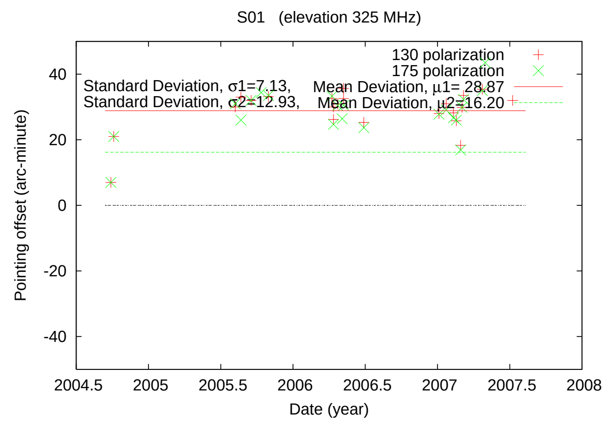

E02 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 9.54, Mean Deviation, µ1= 4.84
Standard Deviation, σ2= 39.57 , Mean Deviation, µ2=14.14
Pointing offset (arc-minute)
Date (year)

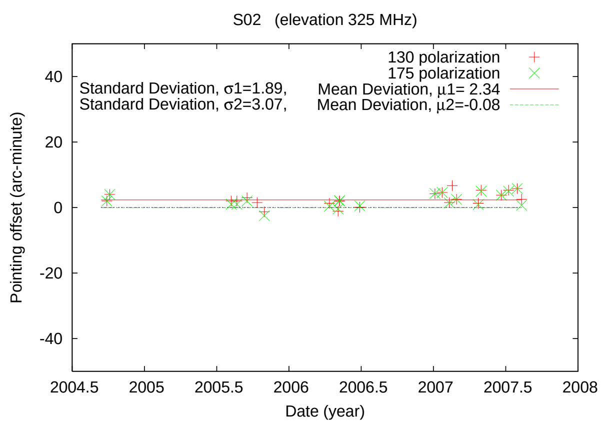

E03 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=7.16, Mean Deviation, µ1=10.07
Standard Deviation, σ2=7.70 , Mean Deviation, µ2=7.62
Pointing offset (arc-minute)
Date (year)

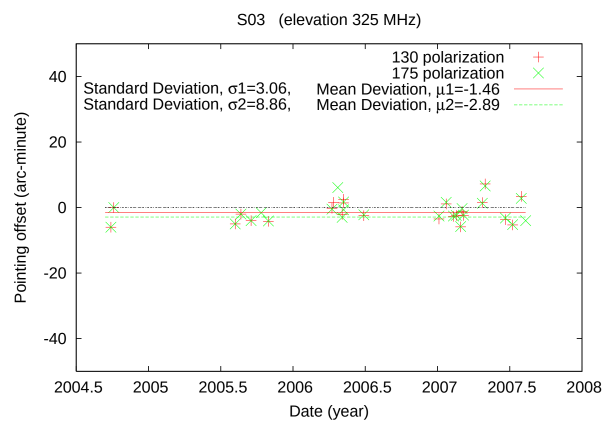

E04 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.92 , Mean Deviation, µ1= 3.91
Standard Deviation, σ2=6.32, Mean Deviation, µ2=5.58
Pointing offset (arc-minute)
Date (year)

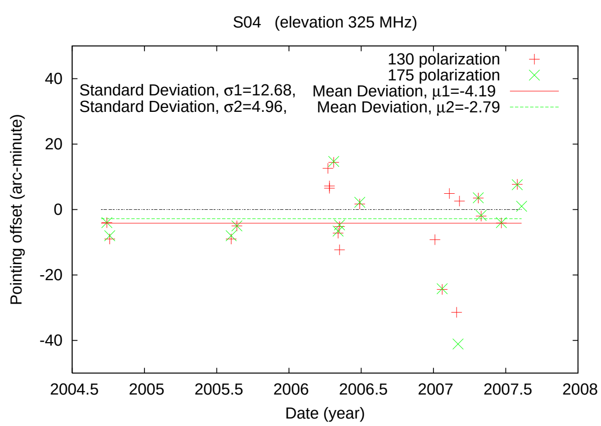

E05 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=8.91, Mean Deviation, µ1= 7.30
Standard Deviation, σ2=35.97, Mean Deviation, µ2=14.10
Pointing offset (arc-minute)
Date (year)

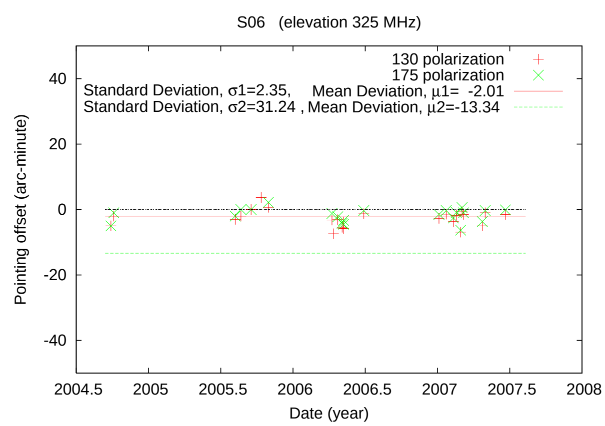

E06 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=8.49, Mean Deviation, µ1= 3.30
Standard Deviation, σ2=13.61 , Mean Deviation, µ2=16.38
Pointing offset (arc-minute)
Date (year)

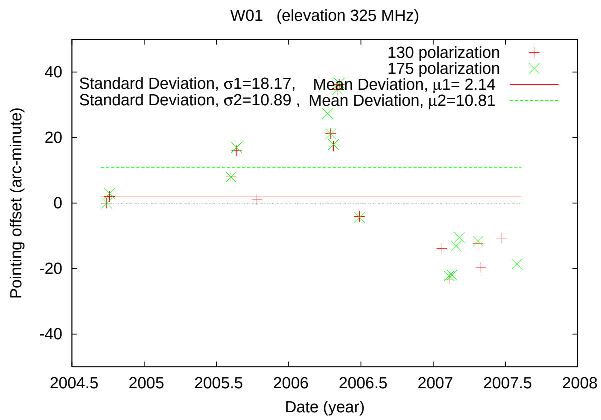

S01 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=7.13, Mean Deviation, µ1= 28.87
Standard Deviation, σ2=12.93, Mean Deviation, µ2=16.20
Pointing offset (arc-minute)
Date (year)

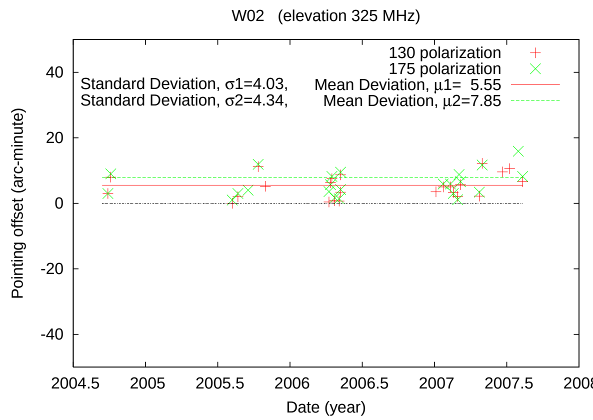

S02 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.89, Mean Deviation, µ1= 2.34
Standard Deviation, σ2=3.07, Mean Deviation, µ2=-0.08
Pointing offset (arc-minute)
Date (year)

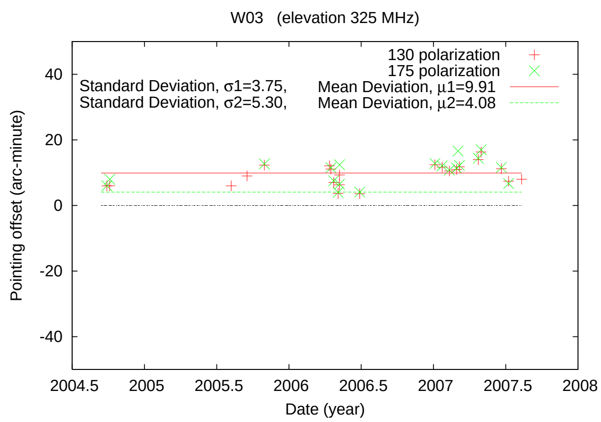

S03 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.06, Mean Deviation, µ1=-1.46
Standard Deviation, σ2=8.86, Mean Deviation, µ2=-2.89
Pointing offset (arc-minute)
Date (year)

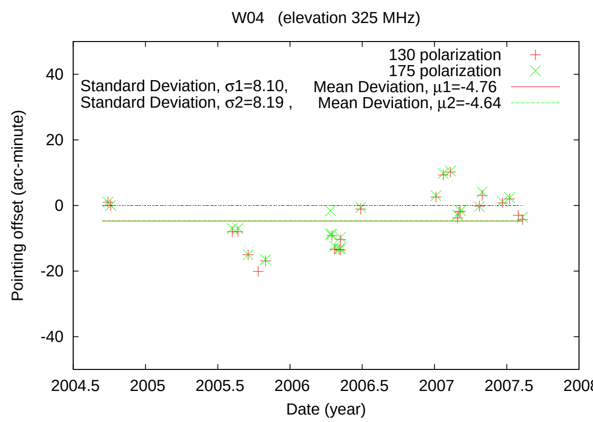

S04 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=12.68, Mean Deviation, µ1=-4.19
Standard Deviation, σ2=4.96, Mean Deviation, µ2=-2.79
Pointing offset (arc-minute)
Date (year)

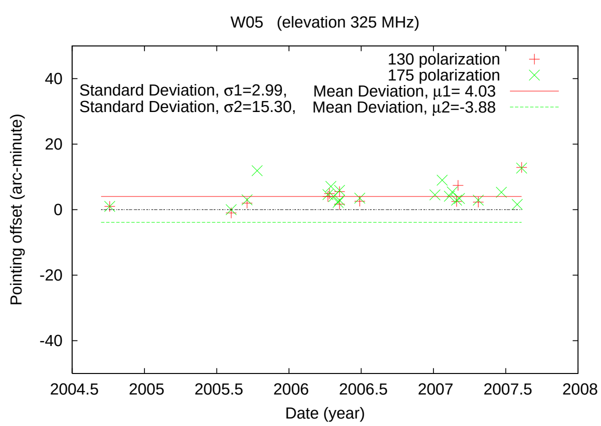

S06 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.35, Mean Deviation, µ1= -2.01
Standard Deviation, σ2=31.24 , Mean Deviation, µ2=-13.34
Pointing offset (arc-minute)
Date (year)

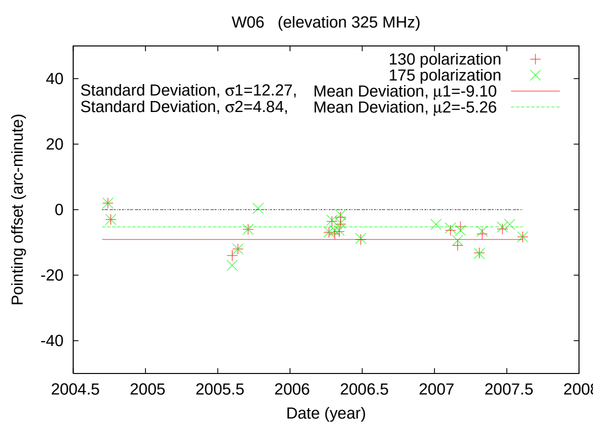

W01 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=18.17, Mean Deviation, µ1= 2.14
Standard Deviation, σ2=10.89 , Mean Deviation, µ2=10.81
Pointing offset (arc-minute)
Date (year)


W02 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.03, Mean Deviation, µ1= 5.55
Standard Deviation, σ2=4.34, Mean Deviation, µ2=7.85
Pointing offset (arc-minute)
Date (year)


W03 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.75, Mean Deviation, µ1=9.91
Standard Deviation, σ2=5.30, Mean Deviation, µ2=4.08
Pointing offset (arc-minute)
Date (year)


W04 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=8.10, Mean Deviation, µ1=-4.76
Standard Deviation, σ2=8.19 , Mean Deviation, µ2=-4.64
Pointing offset (arc-minute)
Date (year)


W05 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.99, Mean Deviation, µ1= 4.03
Standard Deviation, σ2=15.30, Mean Deviation, µ2=-3.88
Pointing offset (arc-minute)
Date (year)


W06 (elevation 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=12.27, Mean Deviation, µ1=-9.10
Standard Deviation, σ2=4.84, Mean Deviation, µ2=-5.26
Pointing offset (arc-minute)
Date (year)

Chapter 4

Result for Deflection

We have calculated the 'Deflection less by' value by subtracting the observed deflection (in dB) from the expected value (in dB). Below we summarise the 'Deflection less by' parameter for different antennas at different frequencies.

Deflection at 1280 MHz

Deflection less by within 0 to 1 dB of the expected value

For the antennas C00, C02, C04, C06, C08, C12, C13, C14, E03, E05, S02, S03, W01, W02, W05, W06 the deflection less by is within 0 to 1 dB of the expected value since 2005. 'Deflection less by' within 0 to 1 dB of the expected value is considered as good antenna.

Deflection less by within 1 to 2 dB of the expected value

For the antennas C01, C05, C10, E04, S01, W03 the deflection less by is within 1 to 2 dB of the expected value since 2005. Deflection less by within 1 to 2 dB of the expected value is considered resonable.

Deflection less by within 2 to 3 dB of expected value

For the antennas C03, C09, E02, E06, S04, S06, W02 the deflection less by is within 2 to 3 dB of the expected value since 2005, which should be taken seriously. Such antennas needs detailed investigation by concerned as to find out why the antenna deflection less is so significant.

For antenna C11, the mean deflection less was around 2 dB till the end of 2006, but changed to 7 dB after that.

Deflection at 610 MHz

Deflection less by within 0 to 1 dB of the expected value

For the antennas C00, C05, C06, C08, C12, S02 the deflection less by was within 0 to 1 dB of the expected value since 2005. Deflection less by within 0 to 1 dB of the expected value is considered as good antenna.

Deflection less by within 1 to 2 dB of the expected value

For the antennas C01, C02, C03, C04, C10, C13, C14, E02, E03, E04, E06, E07, S01, S06, W01, W03, W04, W05, W06 the deflection less by was within 1 to 2 dB of the expected value since 2005. Deflection less by within 1 to 2 dB of the expected value is considered resonable.

Deflection less by within 2 to 3 dB of expected value

For the antennas S04 and W02 the deflection less by was within 2 to 3 dB of the expected value since 2005, which should be taken seriously.

The antenna C11 has deflection less by around 3 dB. Therefore it needs detailed investigation by concerned as to find out why the antenna deflection less is so significant.

Different deflection less by dB for different polarization

For antenna C09, the mean deflection less by was around 2 dB for 130 channel, but around 3 dB for 175 channel.

For antenna S03, the mean deflection less was around 2.5 dB for 130 channel, but around 0.5 dB for 175 channel.

Deflection at 325 MHz

Deflection less by within 0 to 1 dB of the expected value

For the antennas C06, C09, C12, C13, W05 the deflection less by within 0 to 1 dB of the expected value in last one year. Deflection less by within 0 to 1 dB of the expected value is considered good antenna.

Deflection less by within 1 to 2 dB of the expected value

For the antennas C00, C01, C03, C04, C05, C08, C10, C12, E02, E06, S01, S03, S04, W01, W02, W03 the deflection less by within 0 to 1 dB of the expected value in last one year. Deflection less by within 0 to 1 dB of the expected value is considered good antenna.

Deflection lees within 2 to 3 dB of expected value

For antennaS C02, C11, S02, W04, W06 the deflection is within 2 to 3 dB less than expected value which should be taken seriously.

For antenna S06, the deflection less by was 3 dB till the end of 2006. But after that the mean deflection is less by 1.5 dB which is okay.

Deflection less by above 4 dB of expected value

For antennas E03 and E04 the Deflection is less by above 4 dB less than expected value. Such antennas needs detailed investigation by concerned as to find out why the antenna deflection less is so significant.

For antenna E05, the deflection was less by around 2 dB till the end of 2006. But after that the mean deflection is less by 5 dB which should needs detailed investigation by concerned as to find out why the antenna deflection less is so significant.

Deflection at 235 MHz

Deflection less by within 0 to 1 dB of the expected value

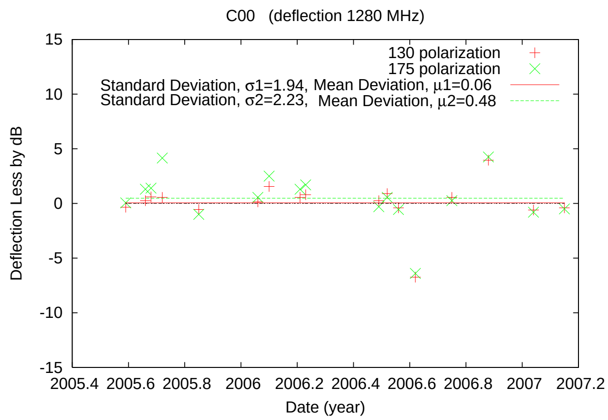
For the antennas C03, C06, C10, C13, C14 the deflection less by was within 0 to 1 dB of the expected value in last one year. Deflection less by within 0 to 1 dB of the expected value is considered good antenna.

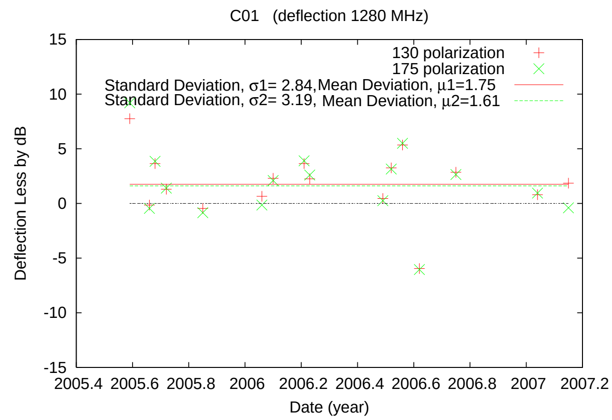
Deflection less by within 1 to 2 dB of the expected value

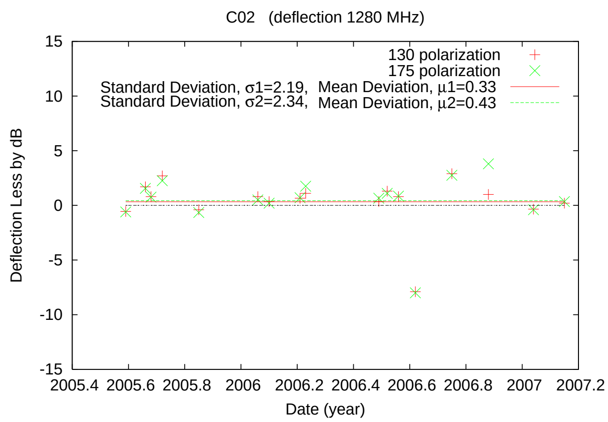
For the antennas C00, C02, C08, C09, C11, C12, E02, E03, E03, E04, E05, E06, S01, S02, S03, S06, W03, W04, W05, W06 the deflection less by was within 1 to 2 dB of the expected value in last one year. Deflection less by within 1 to 2 dB of the expected value is considered resonable.

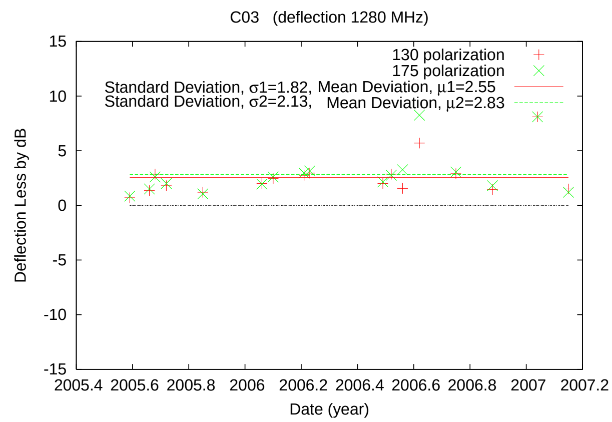
Deflection less by around 3 dB of expected value

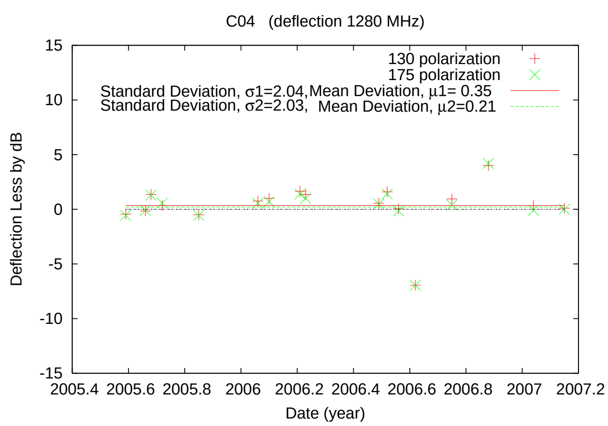
For antennas S04 and W01 the deflection was around 3 dB less than expected value. For antenna W02 the deflection less was around 3.5 for 130 polarization but around 2.5 for 175 polarization.

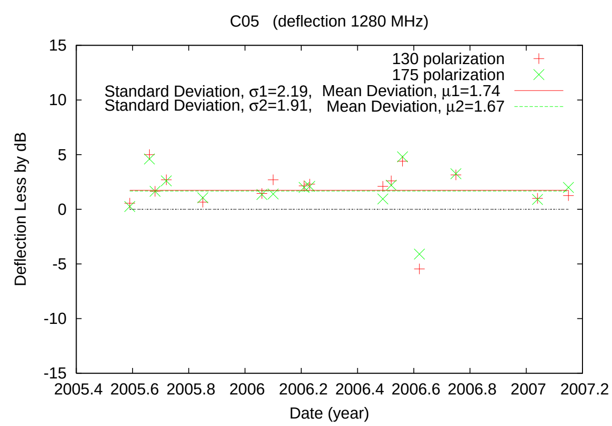

C00 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.94, Mean Deviation, µ1=0.06
Standard Deviation, σ2=2.23, Mean Deviation, µ2=0.48
Deflection Less by dB
Date (year)

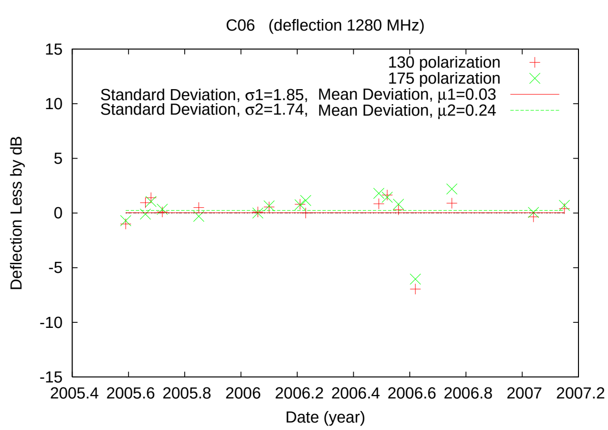

C01 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.84,Mean Deviation, µ1=1.75
Standard Deviation, σ2= 3.19, Mean Deviation, µ2=1.61
Deflection Less by dB
Date (year)

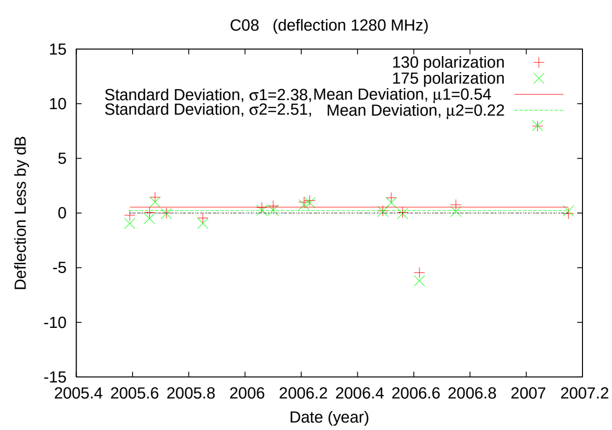

C02 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.19, Mean Deviation, µ1=0.33
Standard Deviation, σ2=2.34, Mean Deviation, µ2=0.43
Deflection Less by dB
Date (year)

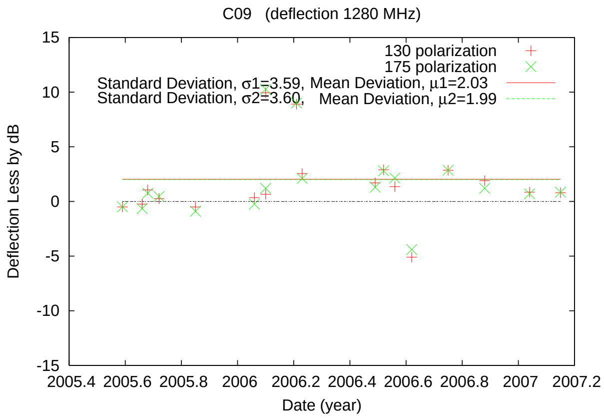

C03 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.82, Mean Deviation, µ1=2.55
Standard Deviation, σ2=2.13, Mean Deviation, µ2=2.83
Deflection Less by dB
Date (year)

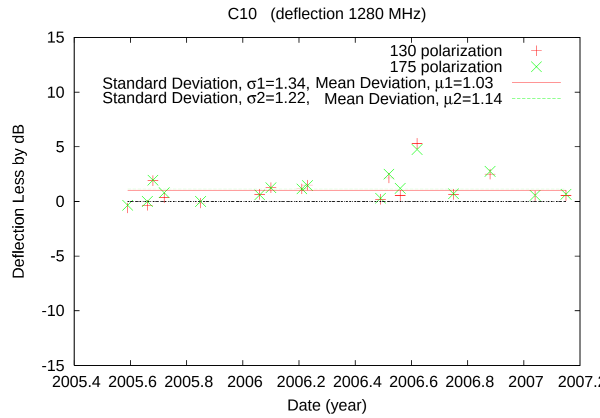

C04 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.04,Mean Deviation, µ1= 0.35
Standard Deviation, σ2=2.03, Mean Deviation, µ2=0.21
Deflection Less by dB
Date (year)

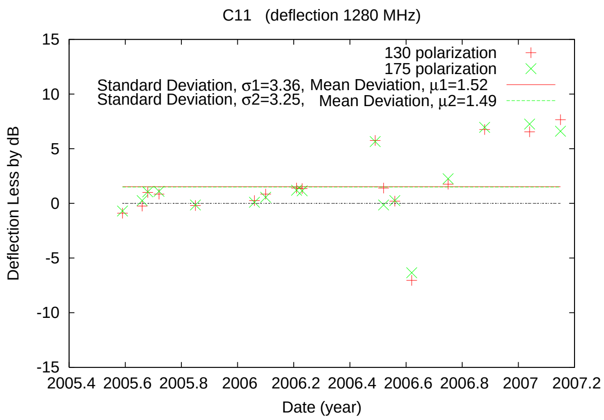

C05 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.19, Mean Deviation, µ1=1.74
Standard Deviation, σ2=1.91, Mean Deviation, µ2=1.67
Deflection Less by dB
Date (year)

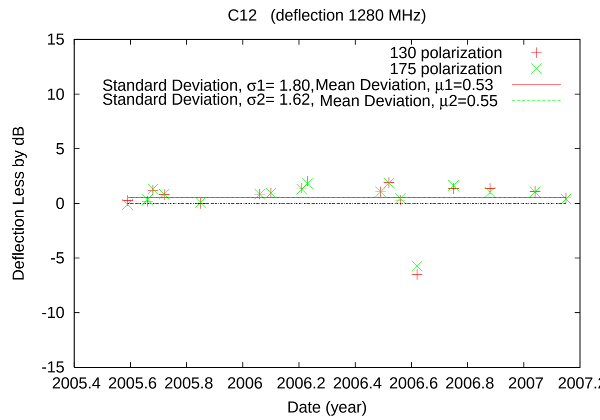

C06 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.85, Mean Deviation, µ1=0.03
Standard Deviation, σ2=1.74, Mean Deviation, µ2=0.24
Deflection Less by dB
Date (year)

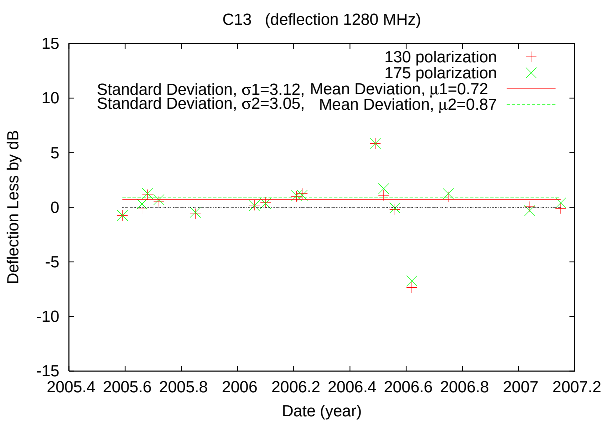

C08 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.38,Mean Deviation, µ1=0.54
Standard Deviation, σ2=2.51, Mean Deviation, µ2=0.22
Deflection Less by dB
Date (year)

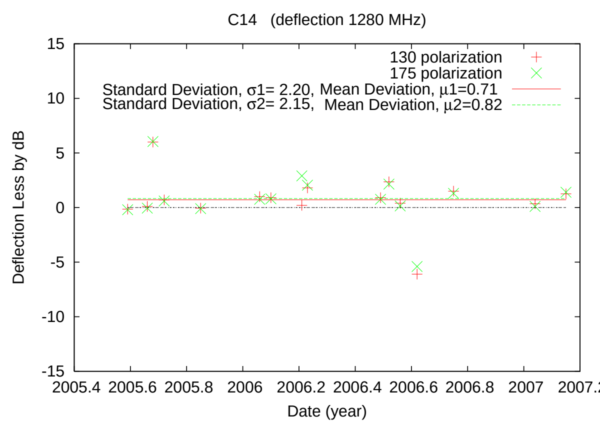

C09 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.59, Mean Deviation, µ1=2.03
Standard Deviation, σ2=3.60, Mean Deviation, µ2=1.99
Deflection Less by dB
Date (year)

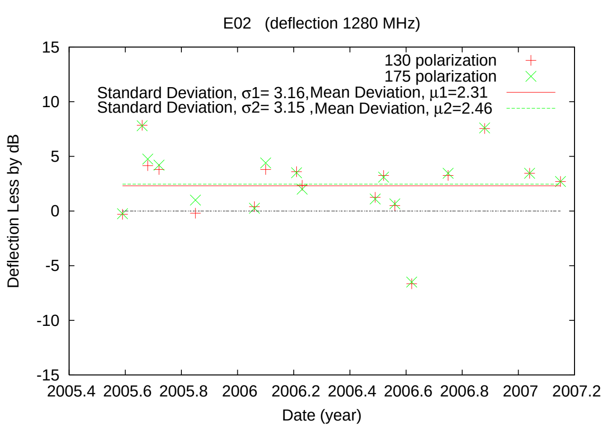

C10 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.34, Mean Deviation, µ1=1.03
Standard Deviation, σ2=1.22, Mean Deviation, µ2=1.14
Deflection Less by dB
Date (year)

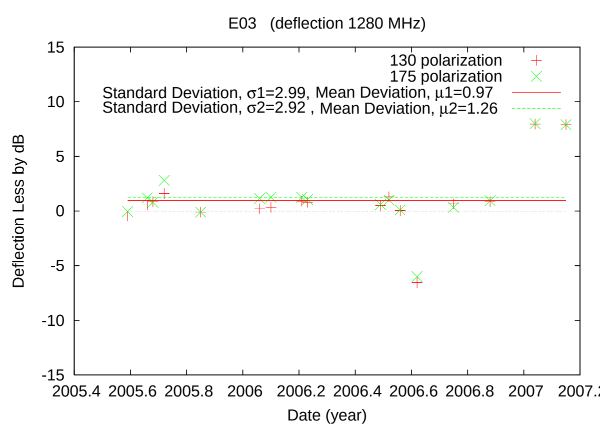

C11 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.36, Mean Deviation, µ1=1.52
Standard Deviation, σ2=3.25, Mean Deviation, µ2=1.49
Deflection Less by dB
Date (year)

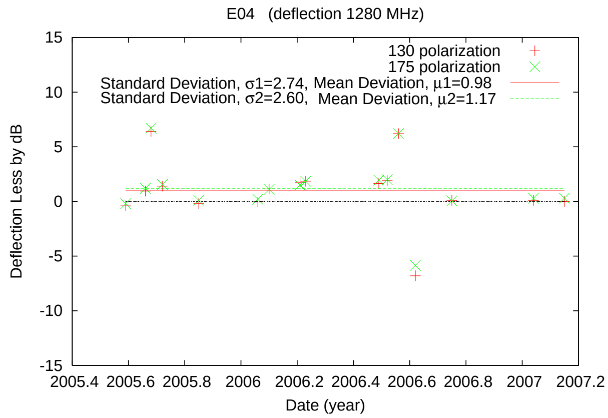

C12 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 1.80,Mean Deviation, µ1=0.53
Standard Deviation, σ2= 1.62, Mean Deviation, µ2=0.55
Deflection Less by dB
Date (year)

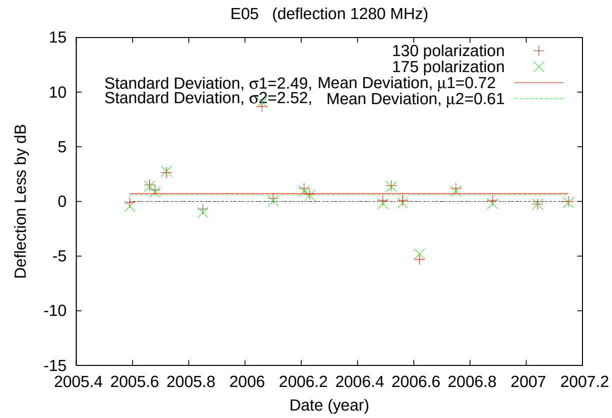

C13 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.12, Mean Deviation, µ1=0.72
Standard Deviation, σ2=3.05, Mean Deviation, µ2=0.87
Deflection Less by dB
Date (year)

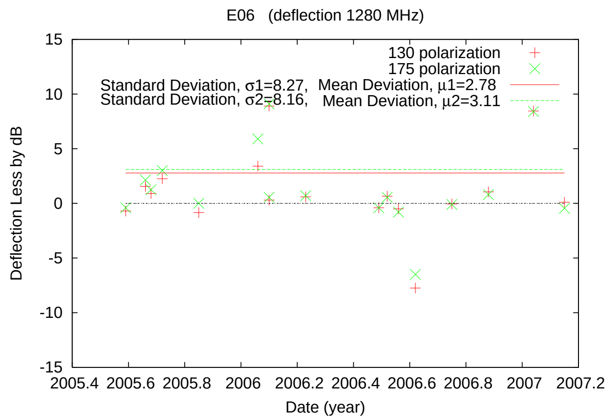

C14 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.20, Mean Deviation, µ1=0.71
Standard Deviation, σ2= 2.15, Mean Deviation, µ2=0.82
Deflection Less by dB
Date (year)

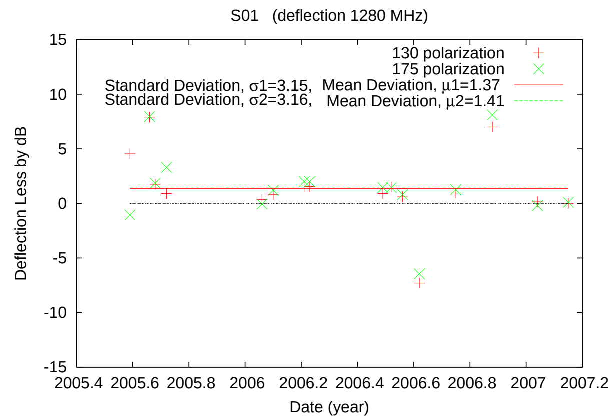

E02 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 3.16,Mean Deviation, µ1=2.31
Standard Deviation, σ2= 3.15 ,Mean Deviation, µ2=2.46
Deflection Less by dB
Date (year)

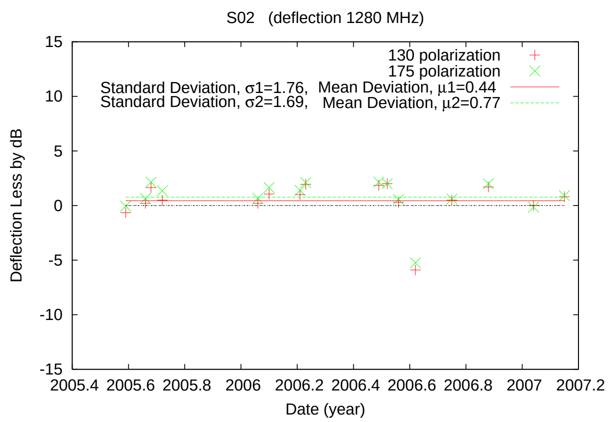

E03 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.99, Mean Deviation, µ1=0.97
Standard Deviation, σ2=2.92 , Mean Deviation, µ2=1.26
Deflection Less by dB
Date (year)

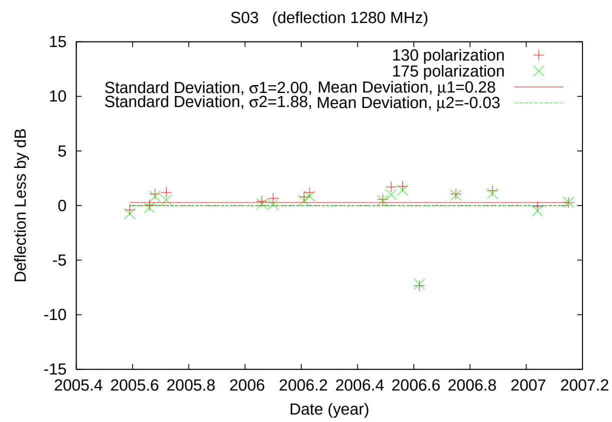

E04 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.74, Mean Deviation, µ1=0.98
Standard Deviation, σ2=2.60, Mean Deviation, µ2=1.17
Deflection Less by dB
Date (year)

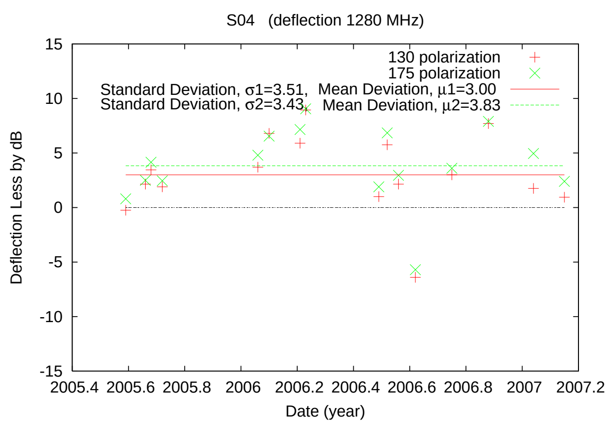

E05 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.49, Mean Deviation, µ1=0.72
Standard Deviation, σ2=2.52, Mean Deviation, µ2=0.61
Deflection Less by dB
Date (year)

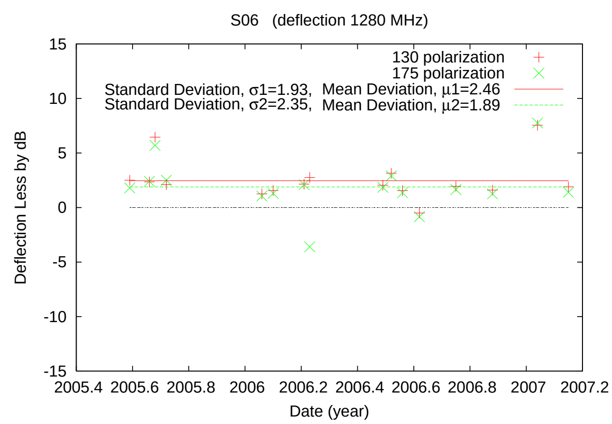

E06 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=8.27, Mean Deviation, µ1=2.78
Standard Deviation, σ2=8.16, Mean Deviation, µ2=3.11
Deflection Less by dB
Date (year)

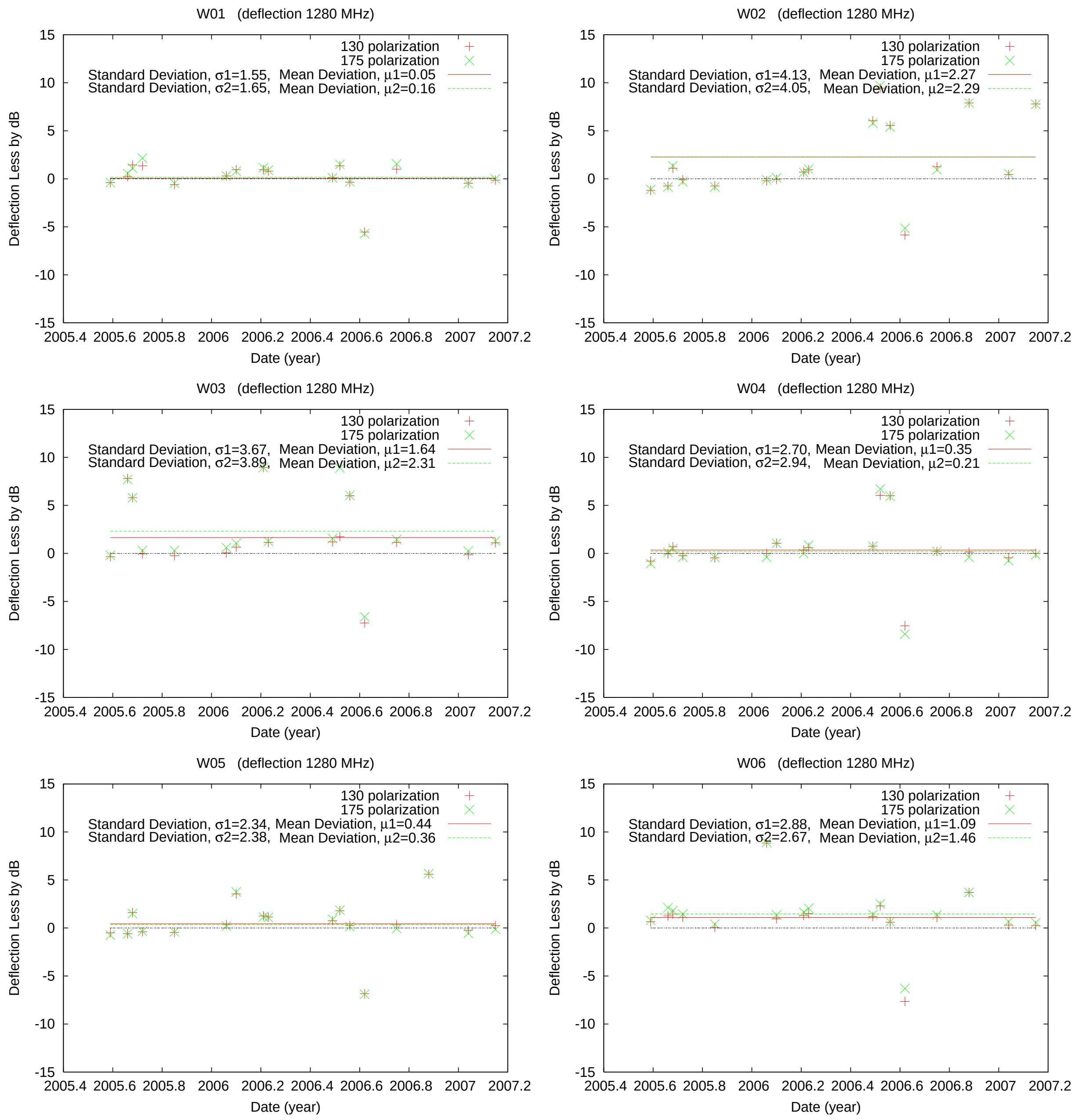

S01 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.15, Mean Deviation, µ1=1.37
Standard Deviation, σ2=3.16, Mean Deviation, µ2=1.41
Deflection Less by dB
Date (year)

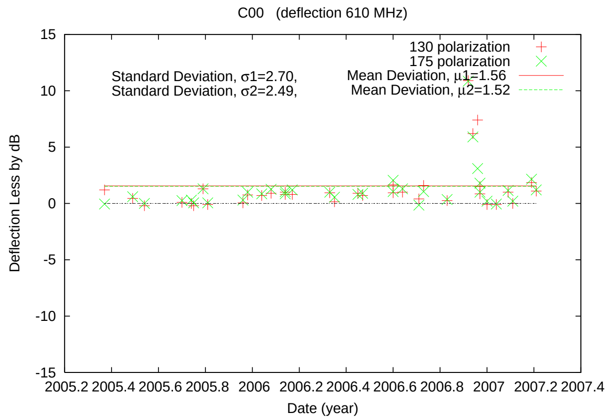

S02 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.76, Mean Deviation, µ1=0.44
Standard Deviation, σ2=1.69, Mean Deviation, µ2=0.77
Deflection Less by dB
Date (year)

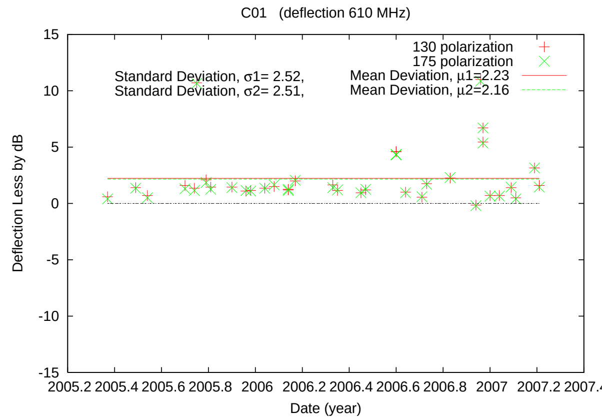

S03 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.00, Mean Deviation, µ1=0.28
Standard Deviation, σ2=1.88, Mean Deviation, µ2=-0.03
Deflection Less by dB
Date (year)

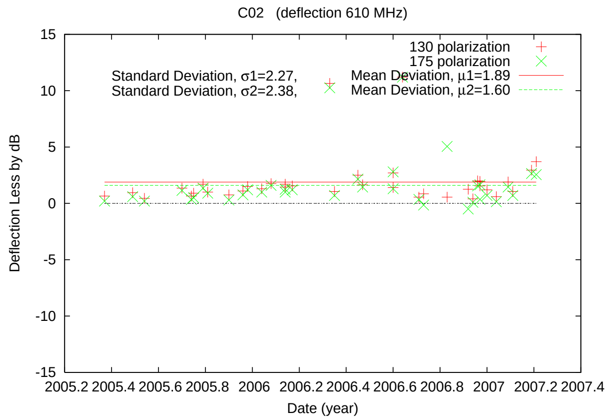

S04 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.51, Mean Deviation, µ1=3.00
Standard Deviation, σ2=3.43, Mean Deviation, µ2=3.83
Deflection Less by dB
Date (year)

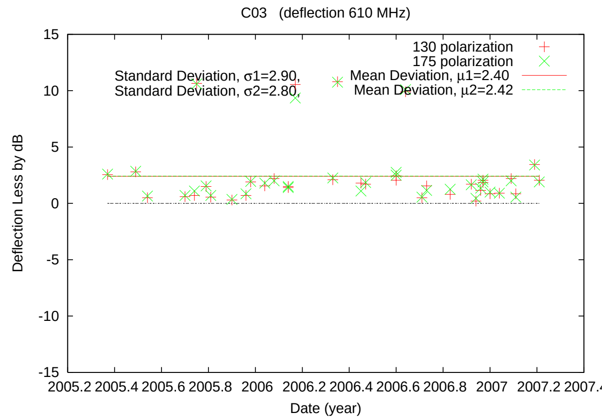

S06 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.93, Mean Deviation, µ1=2.46
Standard Deviation, σ2=2.35, Mean Deviation, µ2=1.89
Deflection Less by dB
Date (year)

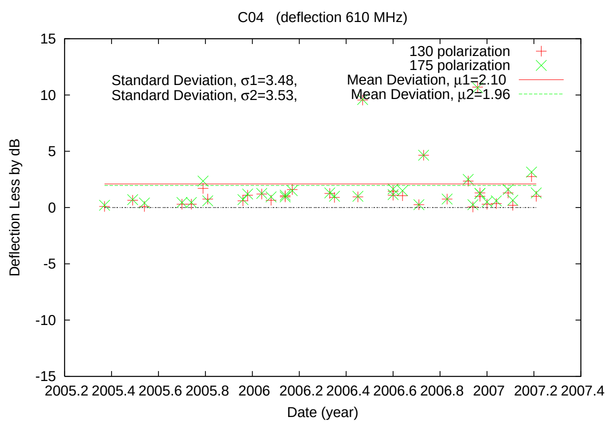

W01 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.55, Mean Deviation, µ1=0.05
Standard Deviation, σ2=1.65, Mean Deviation, µ2=0.16
W02 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.13, Mean Deviation, µ1=2.27
Standard Deviation, σ2=4.05, Mean Deviation, µ2=2.29
W03 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.67, Mean Deviation, µ1=1.64
Standard Deviation, σ2=3.89, Mean Deviation, µ2=2.31
W04 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.70, Mean Deviation, µ1=0.35
Standard Deviation, σ2=2.94, Mean Deviation, µ2=0.21
W05 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.34, Mean Deviation, µ1=0.44
Standard Deviation, σ2=2.38, Mean Deviation, µ2=0.36
W06 (deflection 1280 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.88, Mean Deviation, µ1=1.09
Standard Deviation, σ2=2.67, Mean Deviation, µ2=1.46
Deflection Less by dB
Date (year)
15
10
5
0
-5
-10
-15
2005.4
2005.6
2005.8
2006
2006.2
2006.4
2006.6
2006.8
2007
2007.2

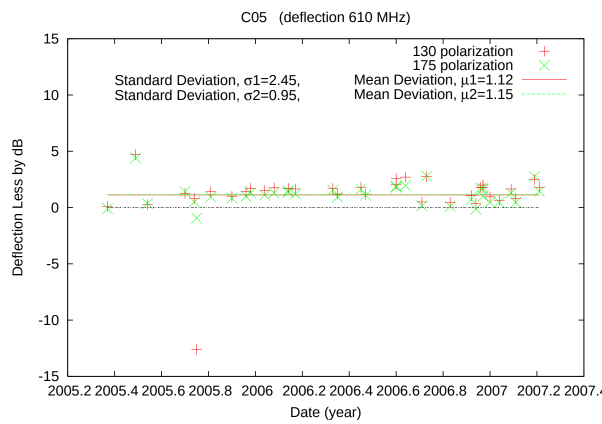

C00 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.70,
Standard Deviation, σ2=2.49,
Mean Deviation, µ1=1.56
Mean Deviation, µ2=1.52
Deflection Less by dB
Date (year)

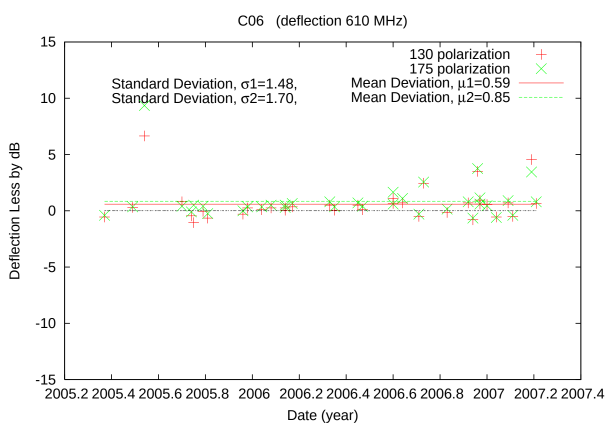

C01 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1= 2.52,
Standard Deviation, σ2= 2.51,
Mean Deviation, µ1=2.23
Mean Deviation, µ2=2.16
Deflection Less by dB
Date (year)

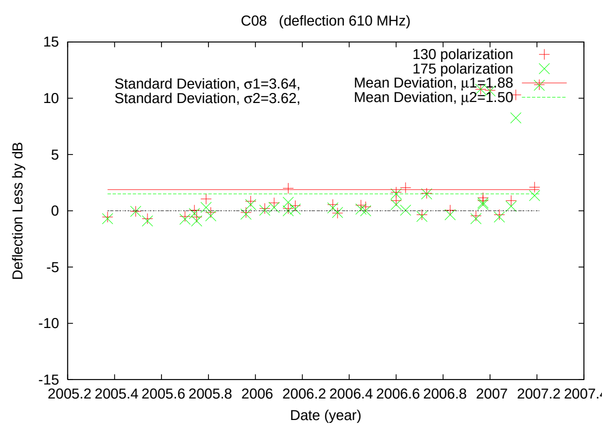

C02 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.27,
Standard Deviation, σ2=2.38,
Mean Deviation, µ1=1.89
Mean Deviation, µ2=1.60
Deflection Less by dB
Date (year)

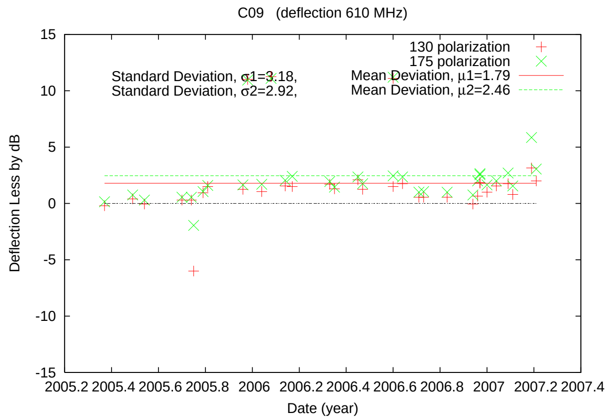

C03 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.90,
Standard Deviation, σ2=2.80,
Mean Deviation, µ1=2.40
Mean Deviation, µ2=2.42
Deflection Less by dB
Date (year)

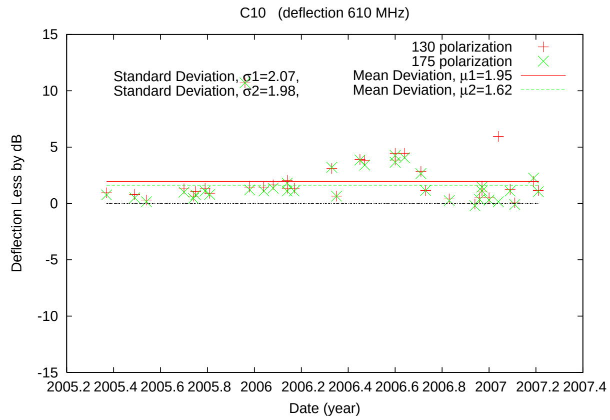

C04 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.48,
Standard Deviation, σ2=3.53,
Mean Deviation, µ1=2.10
Mean Deviation, µ2=1.96
Deflection Less by dB
Date (year)

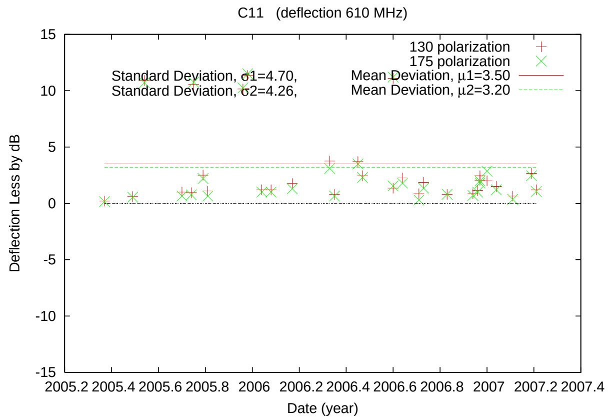

C05 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.45,
Standard Deviation, σ2=0.95,
Mean Deviation, µ1=1.12
Mean Deviation, µ2=1.15
Deflection Less by dB
Date (year)

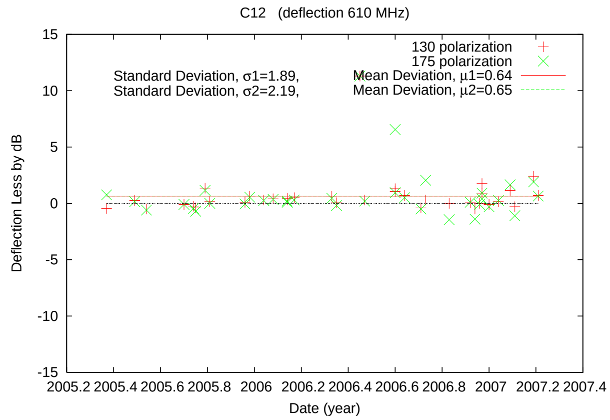

C06 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.48,
Standard Deviation, σ2=1.70,
Mean Deviation, µ1=0.59
Mean Deviation, µ2=0.85
Deflection Less by dB
Date (year)

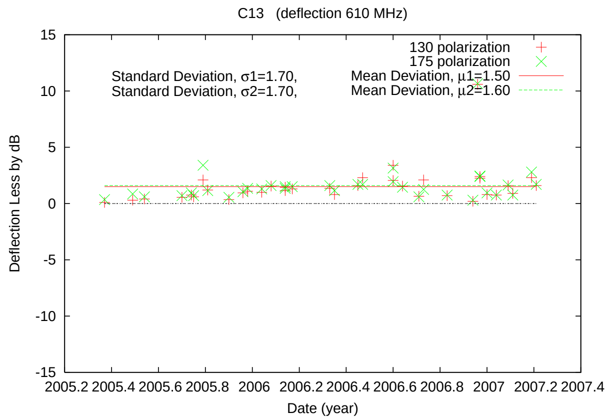

C08 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.64,
Standard Deviation, σ2=3.62,
Mean Deviation, µ1=1.88
Mean Deviation, µ2=1.50
Deflection Less by dB
Date (year)

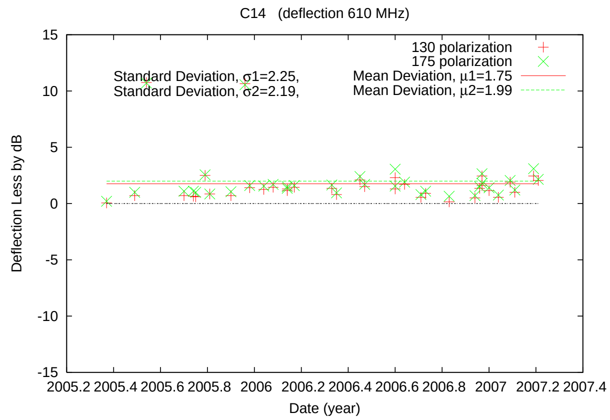

C09 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.18,
Standard Deviation, σ2=2.92,
Mean Deviation, μ1=1.79
Mean Deviation, μ2=2.46
Deflection Less by dB
Date (year)

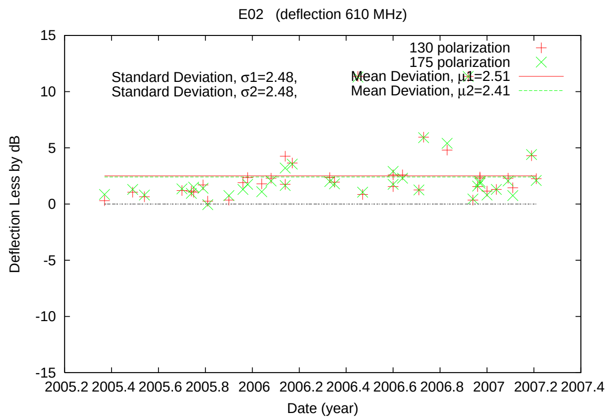

C10 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.07,
Standard Deviation, σ2=1.98,
Mean Deviation, μ1=1.95
Mean Deviation, μ2=1.62
Deflection Less by dB
Date (year)

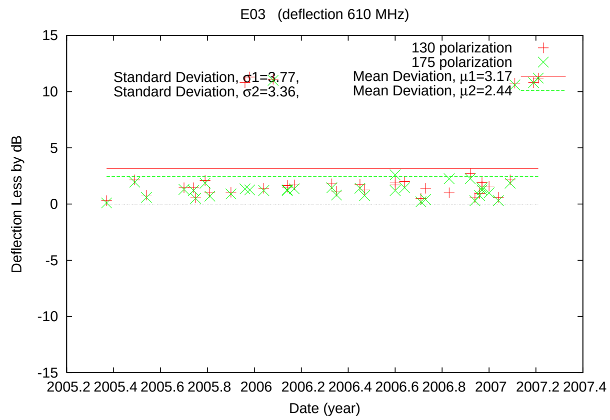

C11 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.70,
Standard Deviation, σ2=4.26,
Mean Deviation, μ1=3.50
Mean Deviation, μ2=3.20
Deflection Less by dB
Date (year)

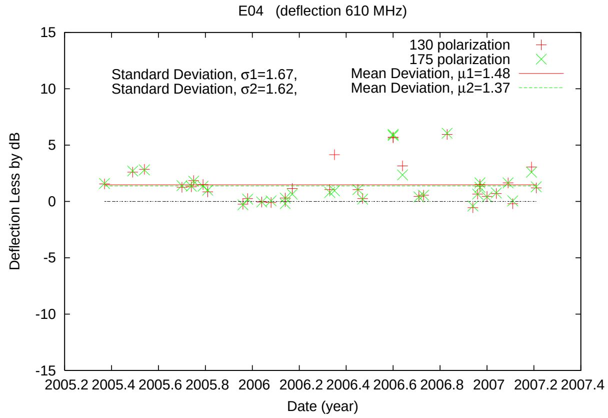

C12 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.89,
Standard Deviation, σ2=2.19,
Mean Deviation, μ1=0.64
Mean Deviation, μ2=0.65
Deflection Less by dB
Date (year)

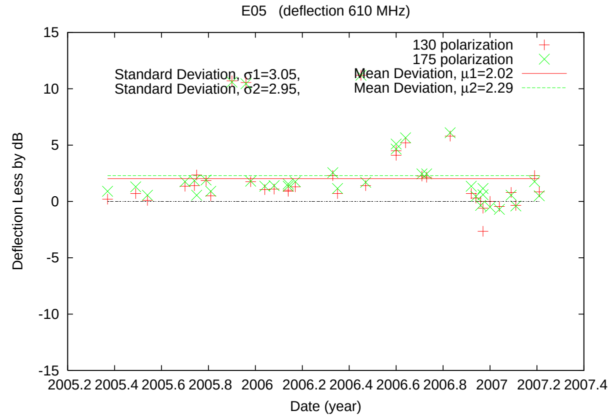

C13 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.70,
Standard Deviation, σ2=1.70,
Mean Deviation, μ1=1.50
Mean Deviation, μ2=1.60
Deflection Less by dB
Date (year)

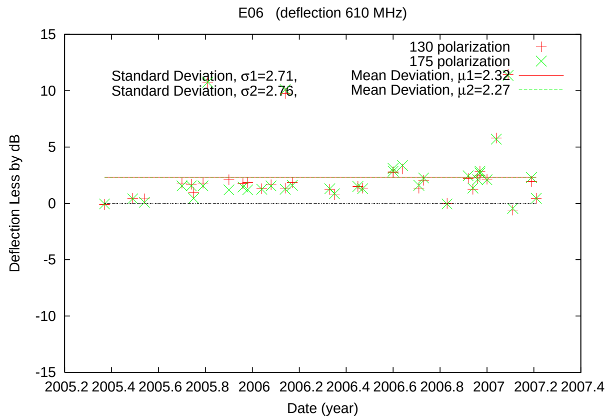

C14 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.25,
Standard Deviation, σ2=2.19,
Mean Deviation, μ1=1.75
Mean Deviation, μ2=1.99
Deflection Less by dB
Date (year)

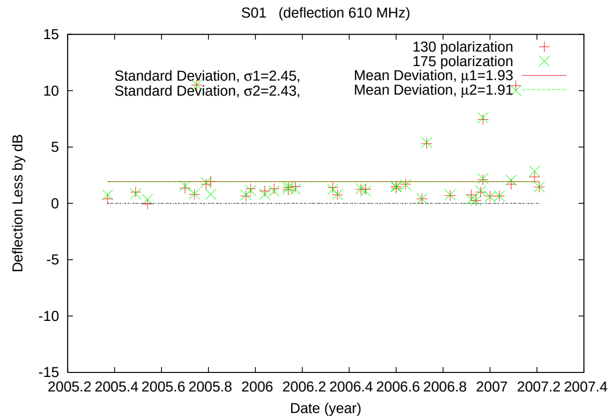

E02 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.48,
Standard Deviation, σ2=2.48,
Mean Deviation, μ1=2.51
Mean Deviation, μ2=2.41
Deflection Less by dB
Date (year)

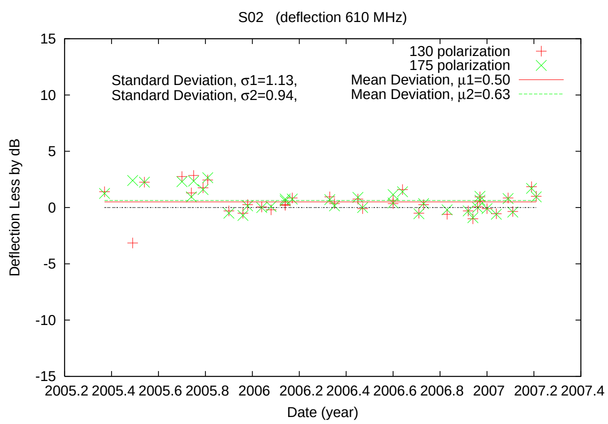

E03 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.77,
Standard Deviation, σ2=3.36,
Mean Deviation, μ1=3.17
Mean Deviation, μ2=2.44
Deflection Less by dB
Date (year)

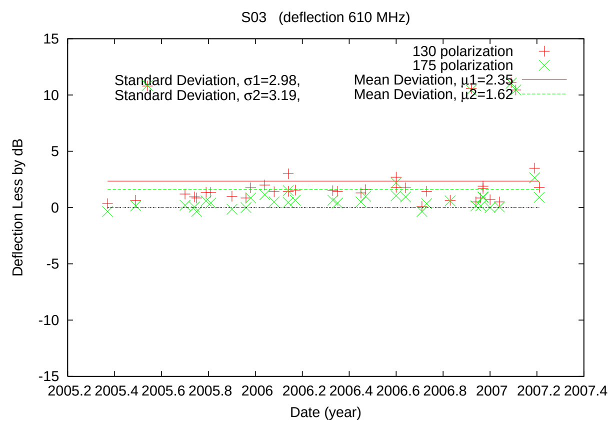

E04 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.67,
Standard Deviation, σ2=1.62,
Mean Deviation, µ1=1.48
Mean Deviation, µ2=1.37
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

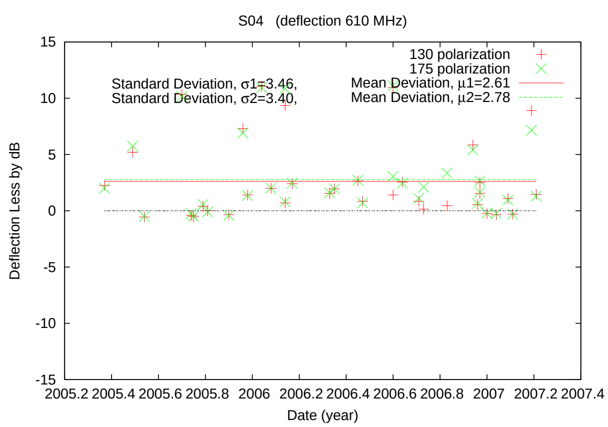

E05 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.05,
Standard Deviation, σ2=2.95,
Mean Deviation, µ1=2.02
Mean Deviation, µ2=2.29
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

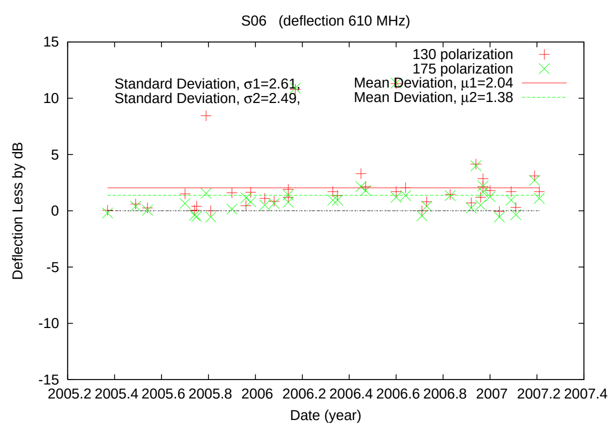

E06 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.71,
Standard Deviation, σ2=2.76,
Mean Deviation, µ1=2.32
Mean Deviation, µ2=2.27
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

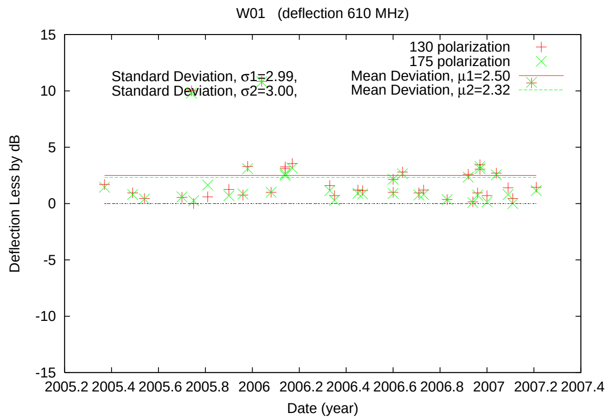

S01 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.45,
Standard Deviation, σ2=2.43,
Mean Deviation, µ1=1.93
Mean Deviation, µ2=1.91
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

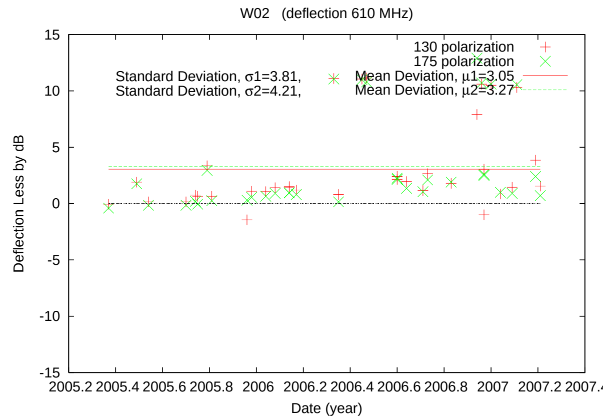

S02 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.13,
Standard Deviation, σ2=0.94,
Mean Deviation, µ1=0.50
Mean Deviation, µ2=0.63
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

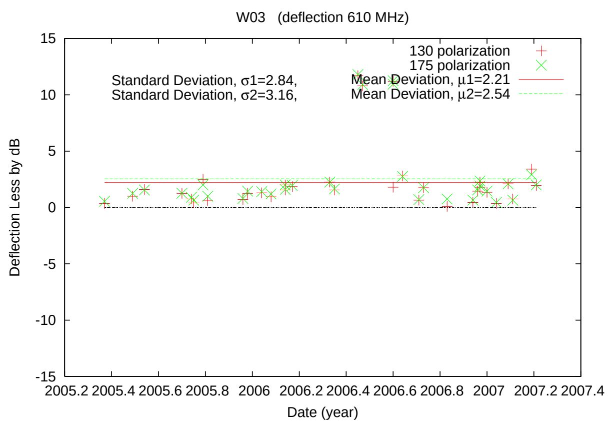

S03 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.98,
Standard Deviation, σ2=3.19,
Mean Deviation, µ1=2.35
Mean Deviation, µ2=1.62
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

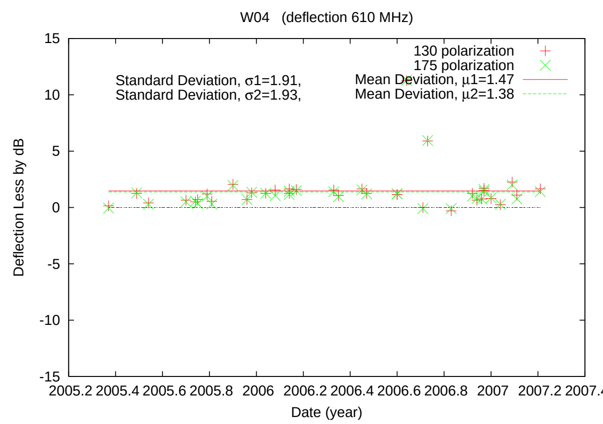

S04 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.46,
Standard Deviation, σ2=3.40,
Mean Deviation, µ1=2.61
Mean Deviation, µ2=2.78
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

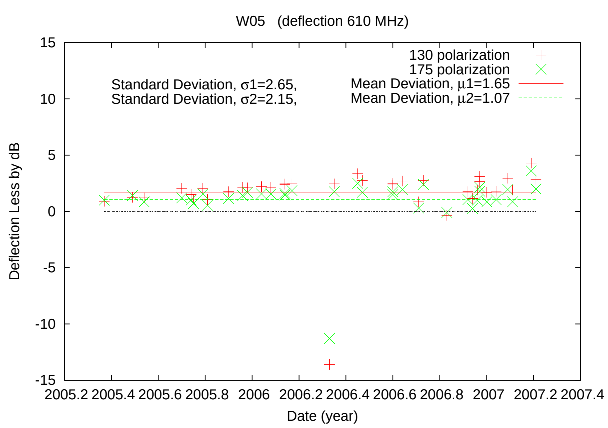

S06 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.61,
Standard Deviation, σ2=2.49,
Mean Deviation, µ1=2.04
Mean Deviation, µ2=1.38
Deflection Less by dB
Date (year)
15 10 5 0 -5 -10 -15
2005.2 2005.4 2005.6 2005.8 2006 2006.2 2006.4 2006.6 2006.8 2007 2007.2 2007.4

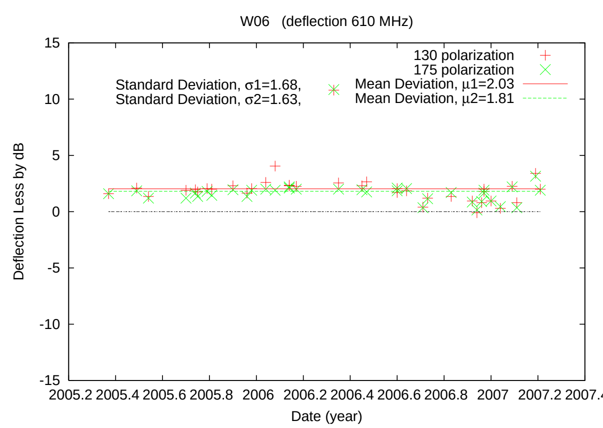

W01 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.99,
Standard Deviation, σ2=3.00,
Mean Deviation, µ1=2.50
Mean Deviation, µ2=2.32
Deflection Less by dB
Date (year)

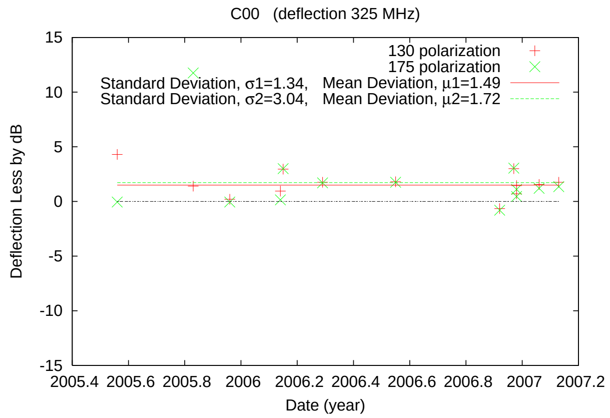

W02 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.81,
Standard Deviation, σ2=4.21,
Mean Deviation, µ1=3.05
Mean Deviation, µ2=3.27
Deflection Less by dB
Date (year)

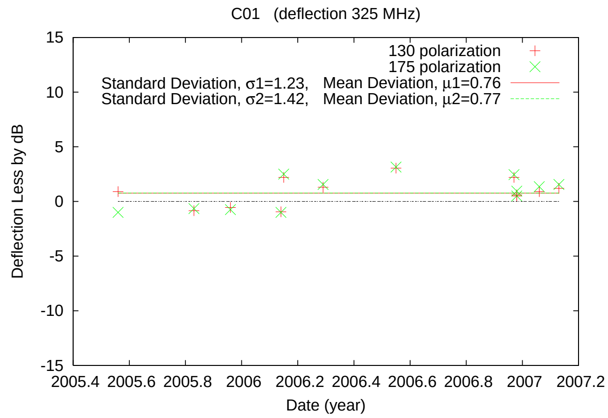

W03 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.84,
Standard Deviation, σ2=3.16,
Mean Deviation, µ1=2.21
Mean Deviation, µ2=2.54
Deflection Less by dB
Date (year)

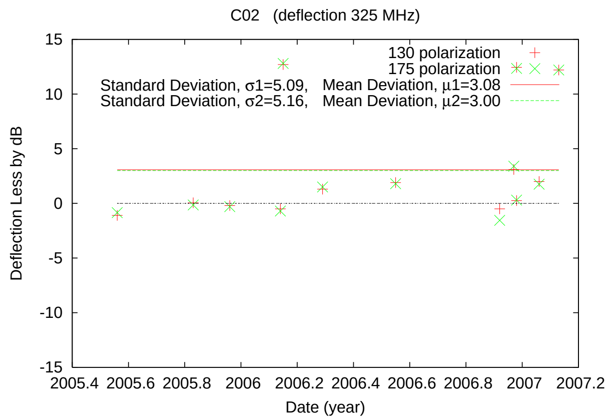

W04 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.91,
Standard Deviation, σ2=1.93,
Mean Deviation, µ1=1.47
Mean Deviation, µ2=1.38
Deflection Less by dB
Date (year)

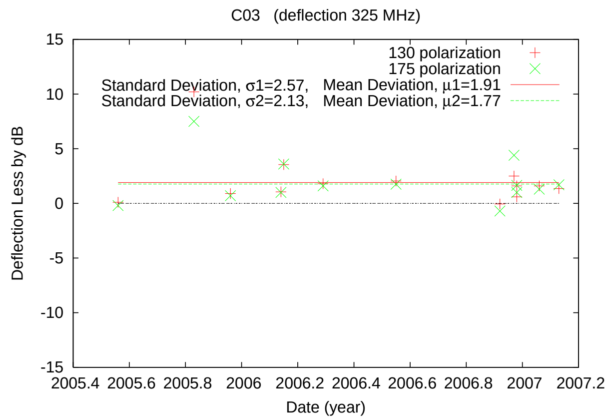

W05 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.65,
Standard Deviation, σ2=2.15,
Mean Deviation, µ1=1.65
Mean Deviation, µ2=1.07
Deflection Less by dB
Date (year)

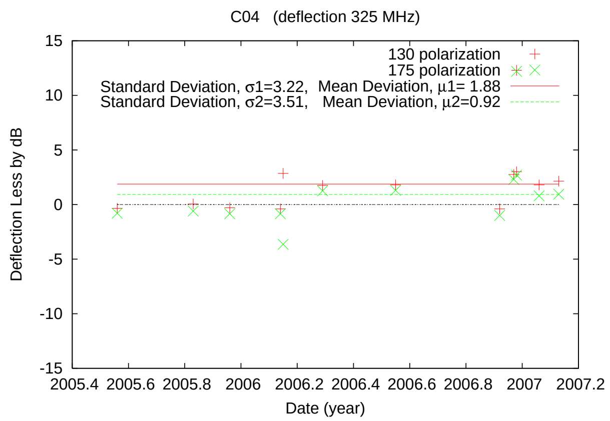

W06 (deflection 610 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.68,
Standard Deviation, σ2=1.63,
Mean Deviation, µ1=2.03
Mean Deviation, µ2=1.81
Deflection Less by dB
Date (year)

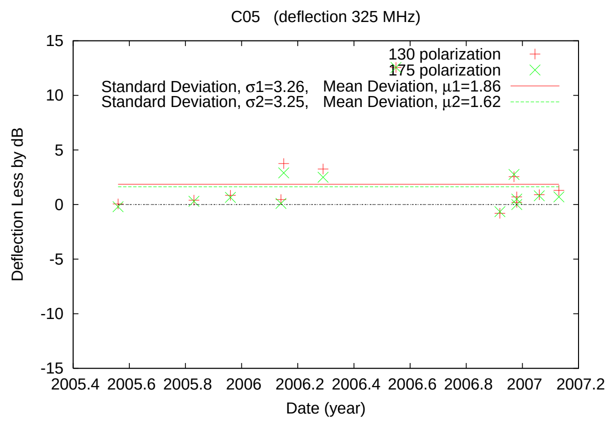

C00 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.34, Mean Deviation, µ1=1.49
Standard Deviation, σ2=3.04, Mean Deviation, µ2=1.72
Deflection Less by dB
Date (year)

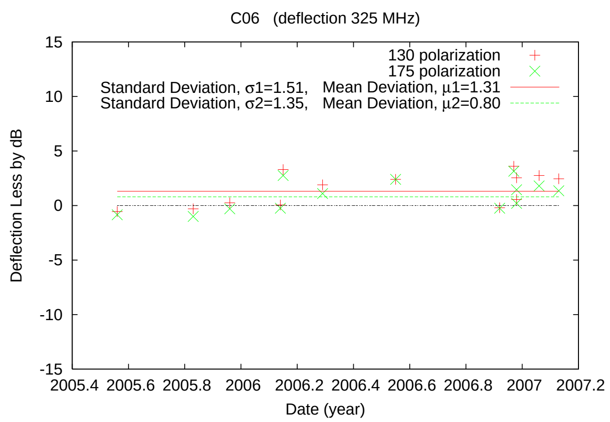

C01 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.23, Mean Deviation, µ1=0.76
Standard Deviation, σ2=1.42, Mean Deviation, µ2=0.77
Deflection Less by dB
Date (year)

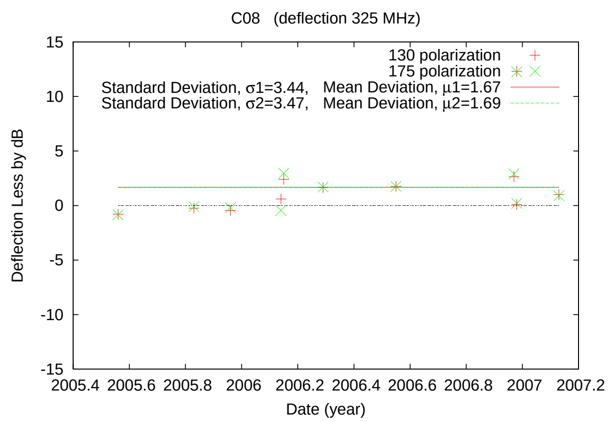

C02 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=5.09, Mean Deviation, µ1=3.08
Standard Deviation, σ2=5.16, Mean Deviation, µ2=3.00
Deflection Less by dB
Date (year)

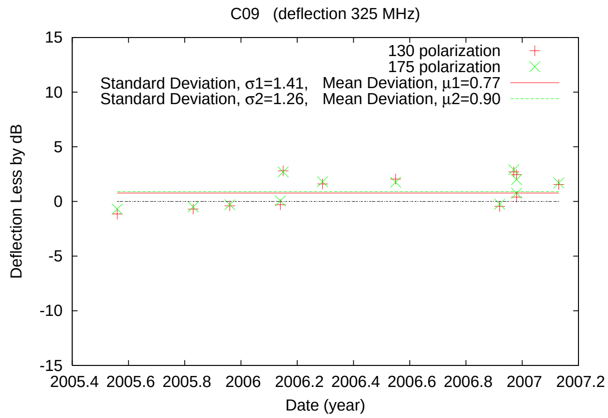

C03 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.57, Mean Deviation, µ1=1.91
Standard Deviation, σ2=2.13, Mean Deviation, µ2=1.77
Deflection Less by dB
Date (year)

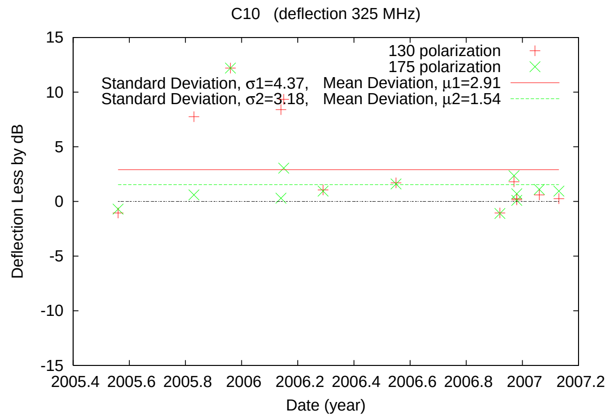

C04 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.22, Mean Deviation, µ1= 1.88
Standard Deviation, σ2=3.51, Mean Deviation, µ2=0.92
Deflection Less by dB
Date (year)

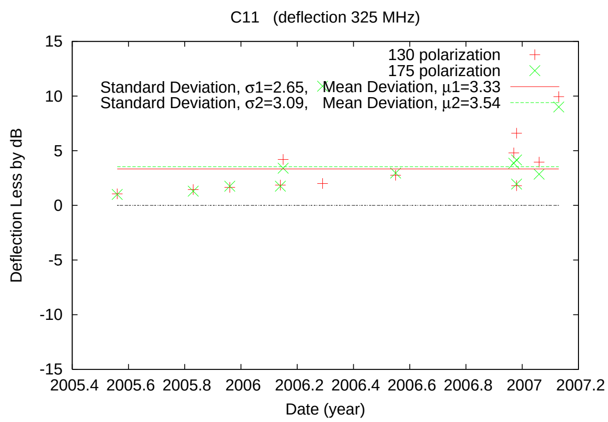

C05 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.26, Mean Deviation, µ1=1.86
Standard Deviation, σ2=3.25, Mean Deviation, µ2=1.62
Deflection Less by dB
Date (year)

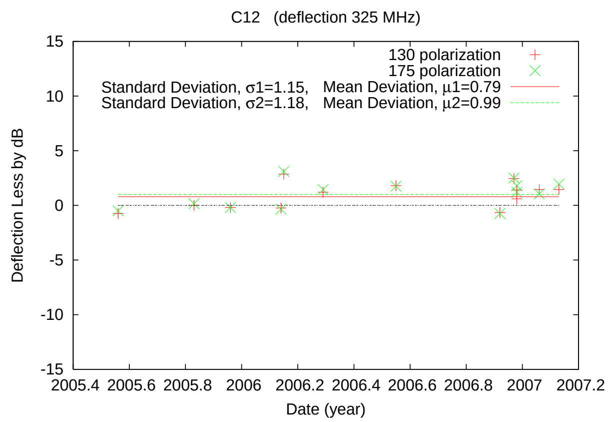

C06 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.51, Mean Deviation, µ1=1.31
Standard Deviation, σ2=1.35, Mean Deviation, µ2=0.80
Deflection Less by dB
Date (year)

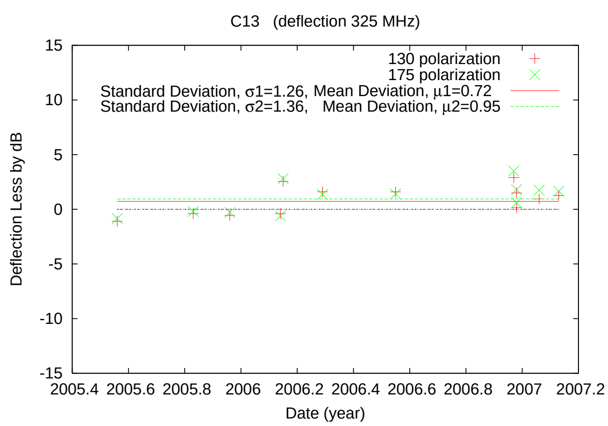

C08 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.44, Mean Deviation, µ1=1.67
Standard Deviation, σ2=3.47, Mean Deviation, µ2=1.69
Deflection Less by dB
Date (year)

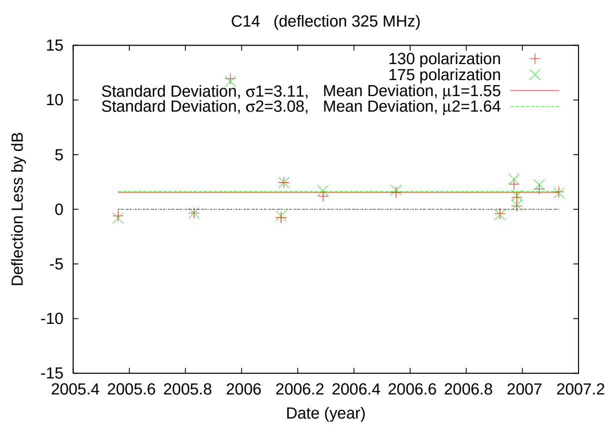

C09 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.41, Mean Deviation, µ1=0.77
Standard Deviation, σ2=1.26, Mean Deviation, µ2=0.90
Deflection Less by dB
Date (year)

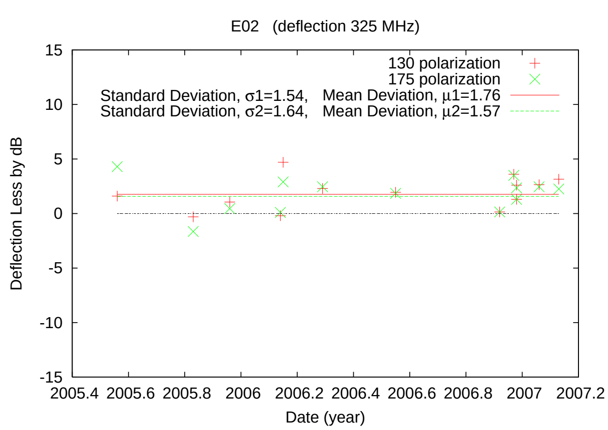

C10 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.37, Mean Deviation, µ1=2.91
Standard Deviation, σ2=3.18, Mean Deviation, µ2=1.54
Deflection Less by dB
Date (year)

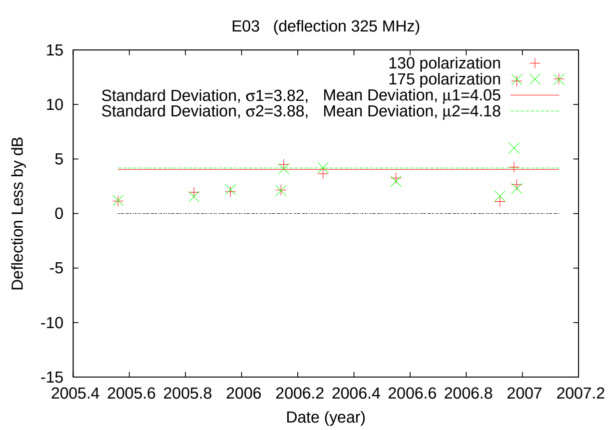

C11 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.65, Mean Deviation, µ1=3.33
Standard Deviation, σ2=3.09, Mean Deviation, µ2=3.54
Deflection Less by dB
Date (year)

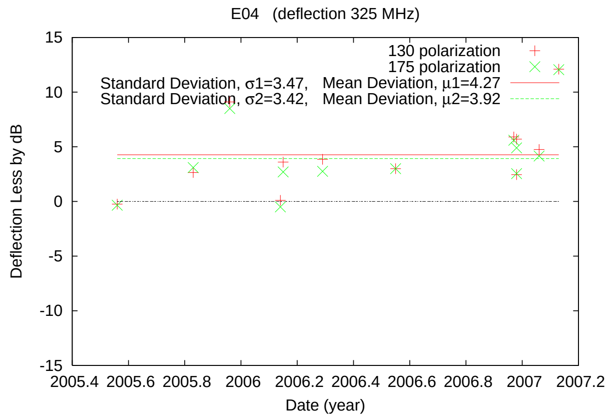

C12 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.15, Mean Deviation, µ1=0.79
Standard Deviation, σ2=1.18, Mean Deviation, µ2=0.99
Deflection Less by dB
Date (year)

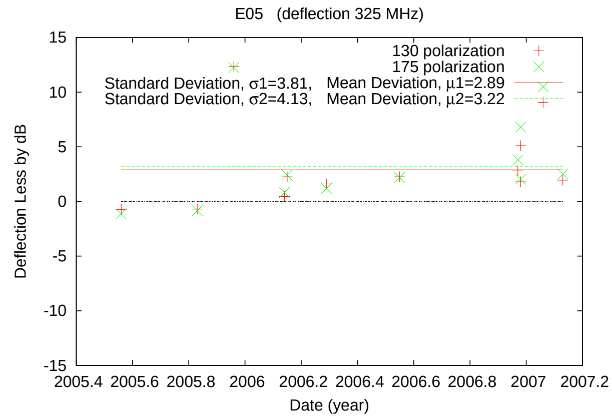

C13 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.26, Mean Deviation, µ1=0.72
Standard Deviation, σ2=1.36, Mean Deviation, µ2=0.95
Deflection Less by dB
Date (year)

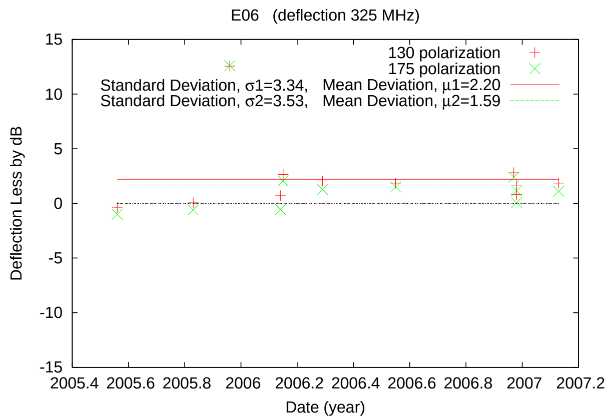

C14 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.11, Mean Deviation, µ1=1.55
Standard Deviation, σ2=3.08, Mean Deviation, µ2=1.64
Deflection Less by dB
Date (year)

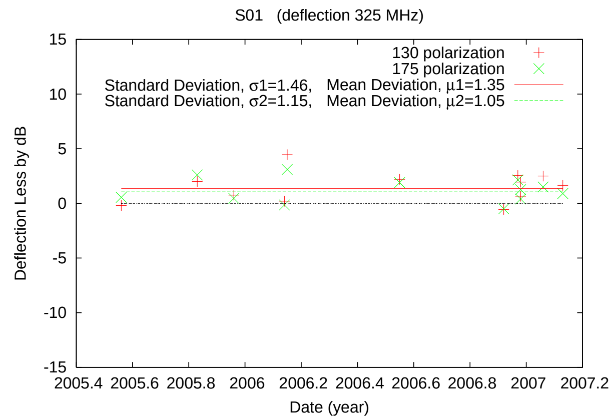

E02 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.54, Mean Deviation, µ1=1.76
Standard Deviation, σ2=1.64, Mean Deviation, µ2=1.57
Deflection Less by dB
Date (year)

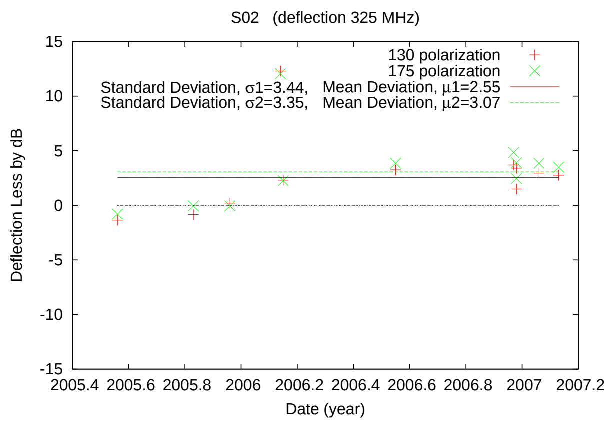

E03 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.82, Mean Deviation, µ1=4.05
Standard Deviation, σ2=3.88, Mean Deviation, µ2=4.18
Deflection Less by dB
Date (year)

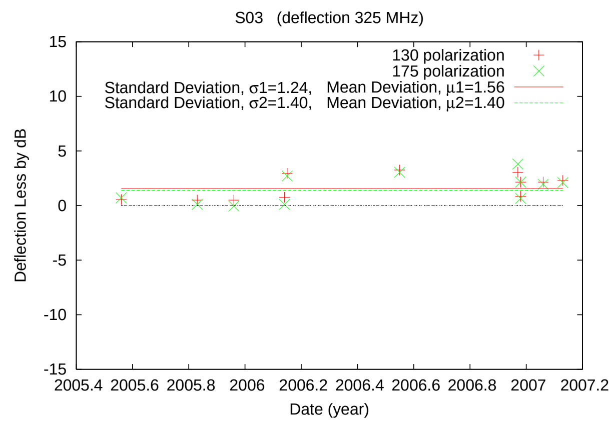

E04 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.47, Mean Deviation, μ1=4.27
Standard Deviation, σ2=3.42, Mean Deviation, μ2=3.92
Deflection Less by dB
Date (year)

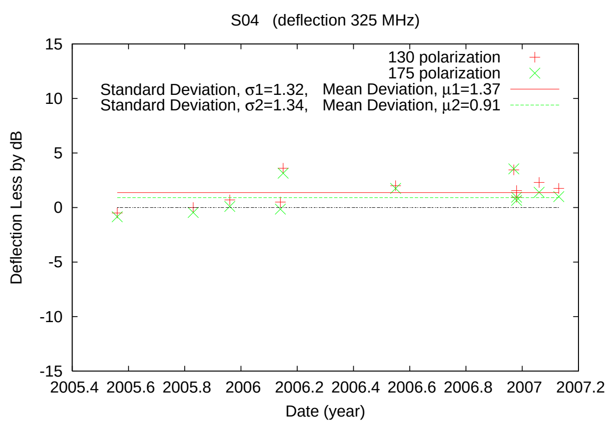

E05 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.81, Mean Deviation, μ1=2.89
Standard Deviation, σ2=4.13, Mean Deviation, μ2=3.22
Deflection Less by dB
Date (year)

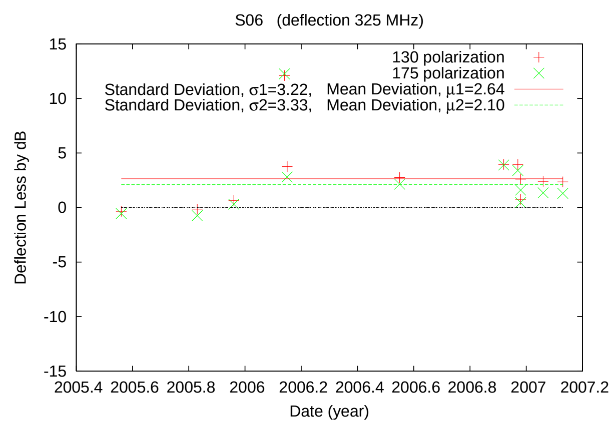

E06 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.34, Mean Deviation, μ1=2.20
Standard Deviation, σ2=3.53, Mean Deviation, μ2=1.59
Deflection Less by dB
Date (year)

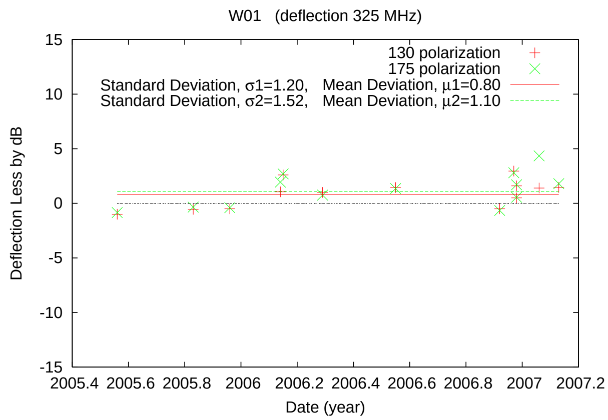

S01 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.46, Mean Deviation, μ1=1.35
Standard Deviation, σ2=1.15, Mean Deviation, μ2=1.05
Deflection Less by dB
Date (year)

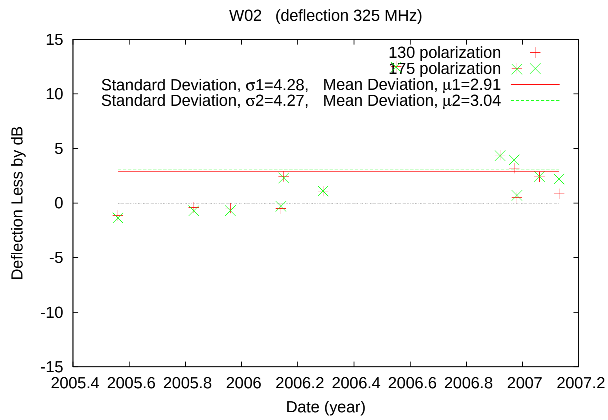

S02 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.44, Mean Deviation, μ1=2.55
Standard Deviation, σ2=3.35, Mean Deviation, μ2=3.07
Deflection Less by dB
Date (year)

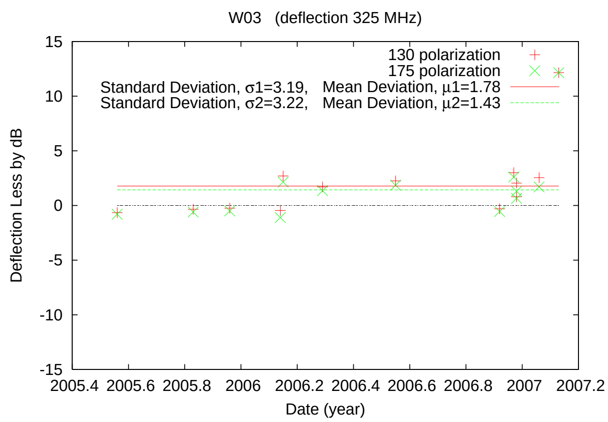

S03 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.24, Mean Deviation, μ1=1.56
Standard Deviation, σ2=1.40, Mean Deviation, μ2=1.40
Deflection Less by dB
Date (year)

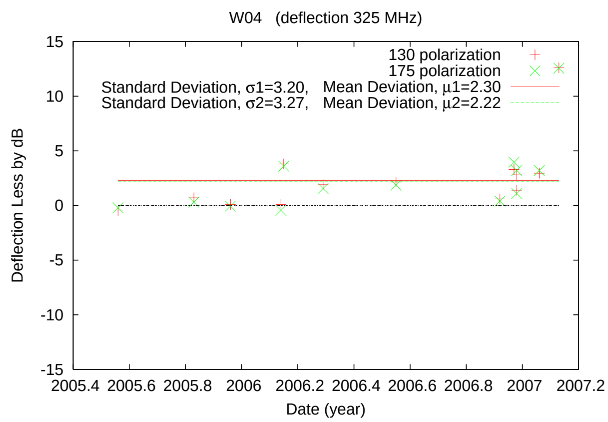

S04 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.32, Mean Deviation, μ1=1.37
Standard Deviation, σ2=1.34, Mean Deviation, μ2=0.91
Deflection Less by dB
Date (year)

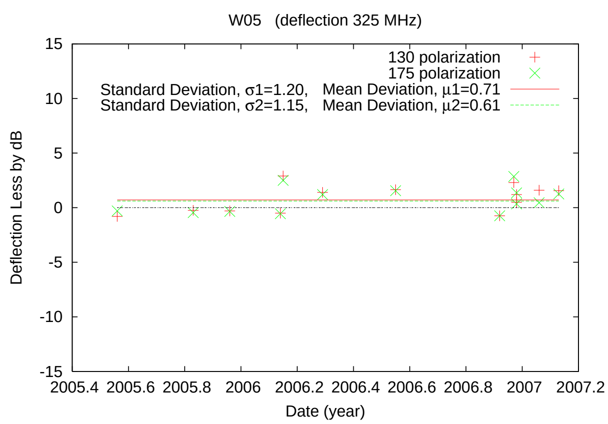

S06 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.22, Mean Deviation, μ1=2.64
Standard Deviation, σ2=3.33, Mean Deviation, μ2=2.10
Deflection Less by dB
Date (year)

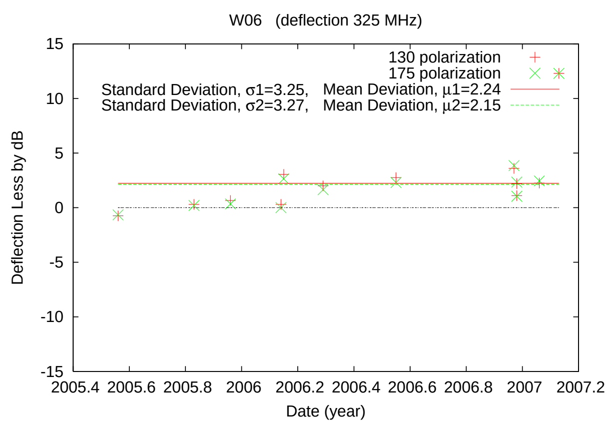

W01 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.20, Mean Deviation, µ1=0.80
Standard Deviation, σ2=1.52, Mean Deviation, µ2=1.10
Deflection Less by dB
Date (year)

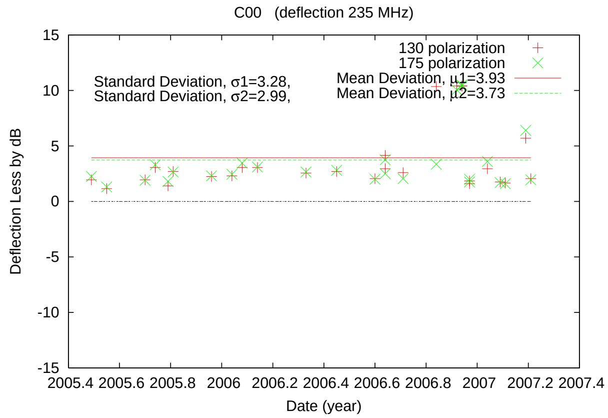

W02 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=4.28, Mean Deviation, µ1=2.91
Standard Deviation, σ2=4.27, Mean Deviation, µ2=3.04
Deflection Less by dB
Date (year)

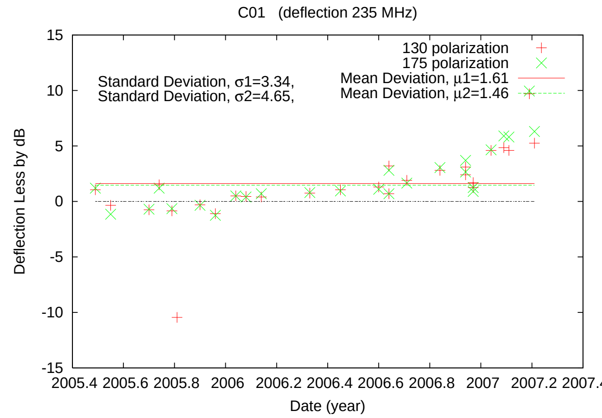

W03 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.19, Mean Deviation, µ1=1.78
Standard Deviation, σ2=3.22, Mean Deviation, µ2=1.43
Deflection Less by dB
Date (year)

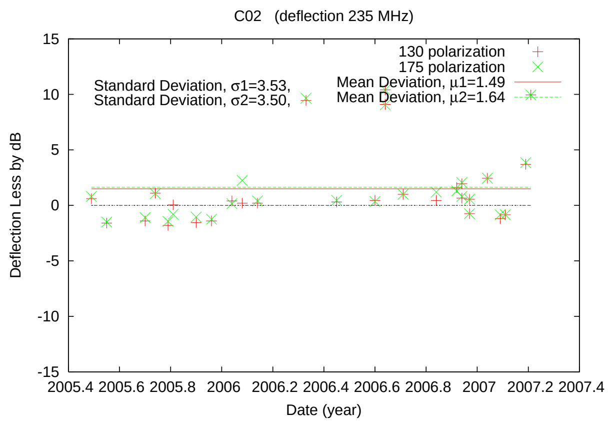

W04 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.20, Mean Deviation, µ1=2.30
Standard Deviation, σ2=3.27, Mean Deviation, µ2=2.22
Deflection Less by dB
Date (year)

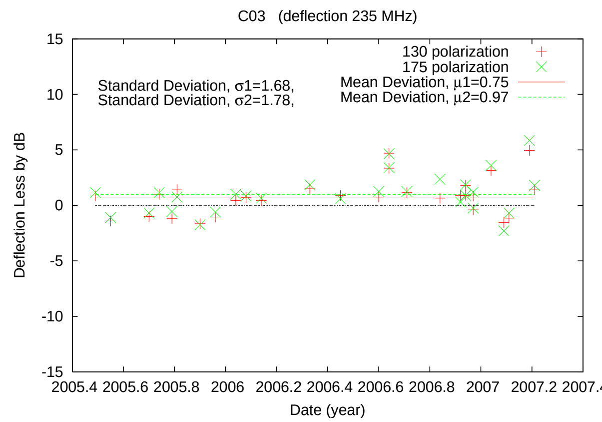

W05 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.20, Mean Deviation, µ1=0.71
Standard Deviation, σ2=1.15, Mean Deviation, µ2=0.61
Deflection Less by dB
Date (year)

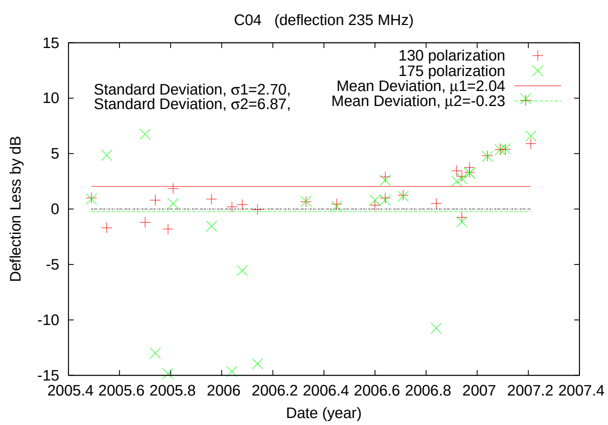

W06 (deflection 325 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.25, Mean Deviation, µ1=2.24
Standard Deviation, σ2=3.27, Mean Deviation, µ2=2.15
Deflection Less by dB
Date (year)

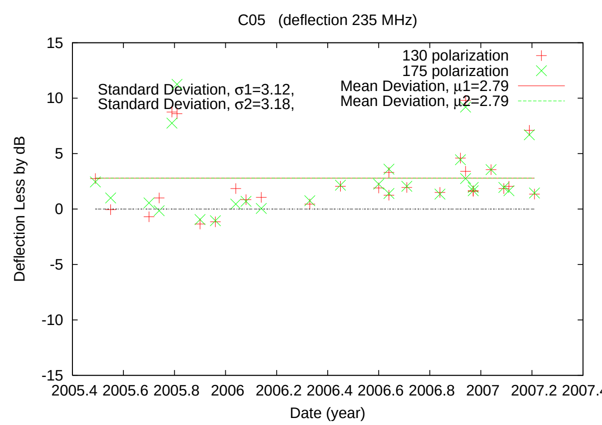

C00 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.28,
Standard Deviation, σ2=2.99,
Mean Deviation, µ1=3.93
Mean Deviation, µ2=3.73
Deflection Less by dB
Date (year)

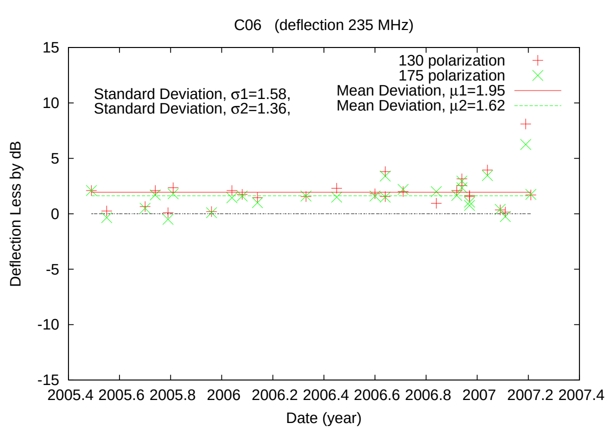

C01 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.34,
Standard Deviation, σ2=4.65,
Mean Deviation, µ1=1.61
Mean Deviation, µ2=1.46
Deflection Less by dB
Date (year)

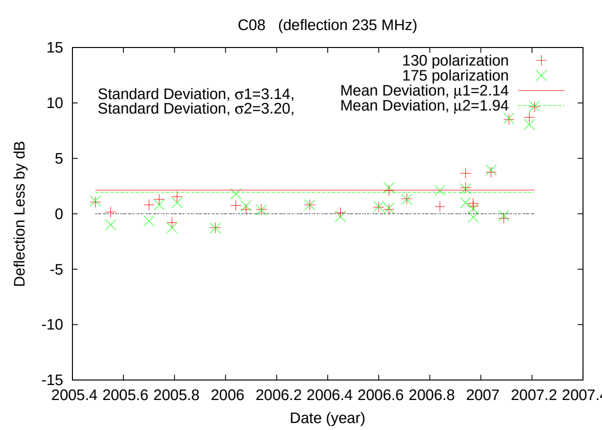

C02 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.53,
Standard Deviation, σ2=3.50,
Mean Deviation, µ1=1.49
Mean Deviation, µ2=1.64
Deflection Less by dB
Date (year)

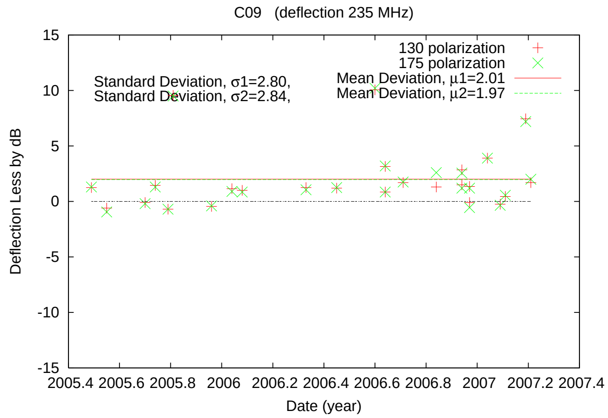

C03 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.68,
Standard Deviation, σ2=1.78,
Mean Deviation, µ1=0.75
Mean Deviation, µ2=0.97
Deflection Less by dB
Date (year)

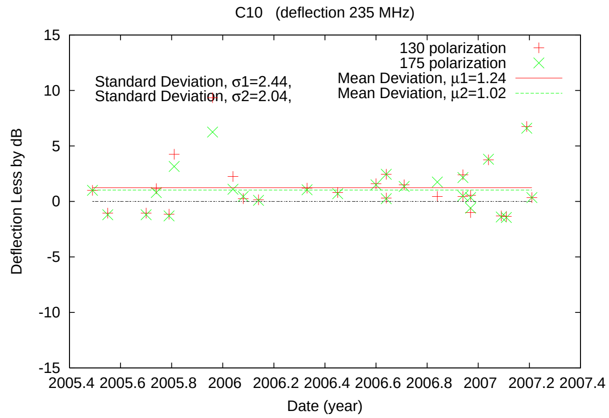

C04 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.70,
Standard Deviation, σ2=6.87,
Mean Deviation, µ1=2.04
Mean Deviation, µ2=-0.23
Deflection Less by dB
Date (year)

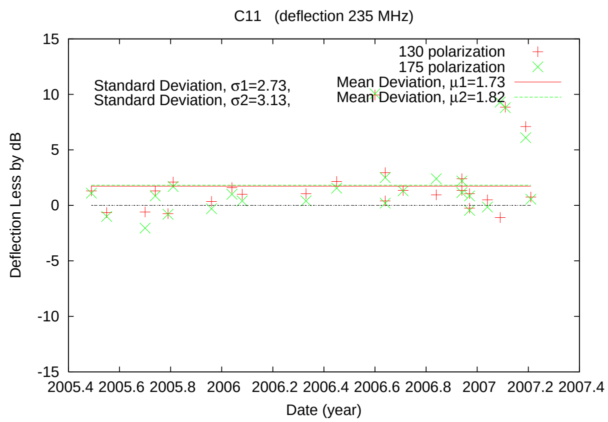

C05 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.12,
Standard Deviation, σ2=3.18,
Mean Deviation, µ1=2.79
Mean Deviation, µ2=2.79
Deflection Less by dB
Date (year)

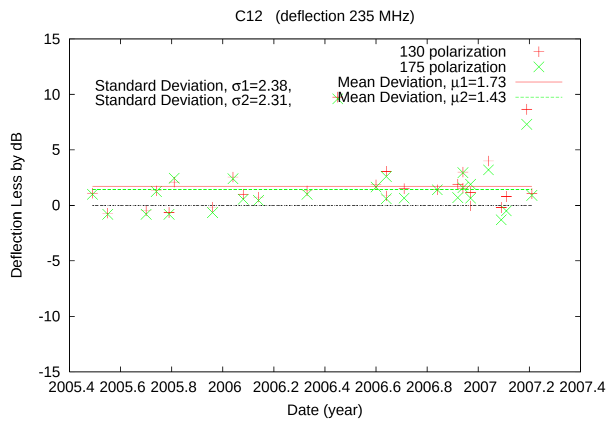

C06 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.58,
Standard Deviation, σ2=1.36,
Mean Deviation, µ1=1.95
Mean Deviation, µ2=1.62
Deflection Less by dB
Date (year)

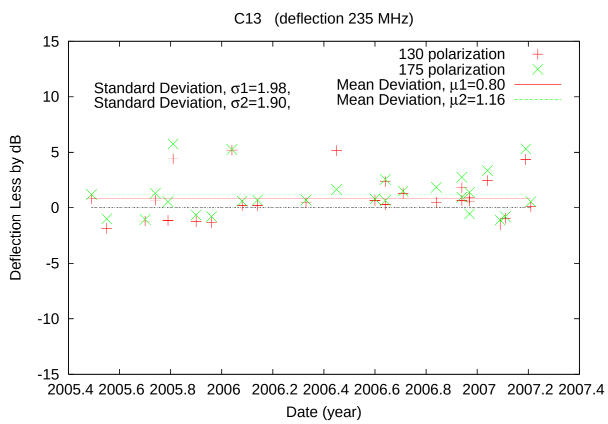

C08 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.14,
Standard Deviation, σ2=3.20,
Mean Deviation, µ1=2.14
Mean Deviation, µ2=1.94
Deflection Less by dB
Date (year)

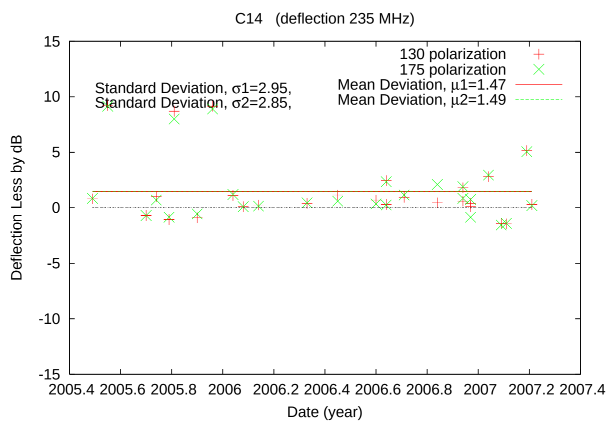

C09 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.80,
Standard Deviation, σ2=2.84,
Mean Deviation, µ1=2.01
Mean Deviation, µ2=1.97
Deflection Less by dB
Date (year)

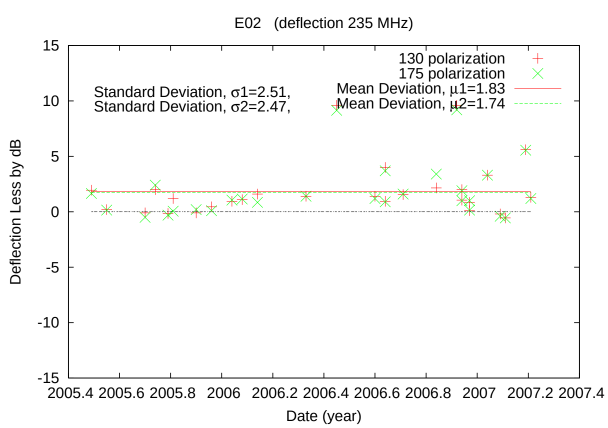

C10 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.44,
Standard Deviation, σ2=2.04,
Mean Deviation, µ1=1.24
Mean Deviation, µ2=1.02
Deflection Less by dB
Date (year)

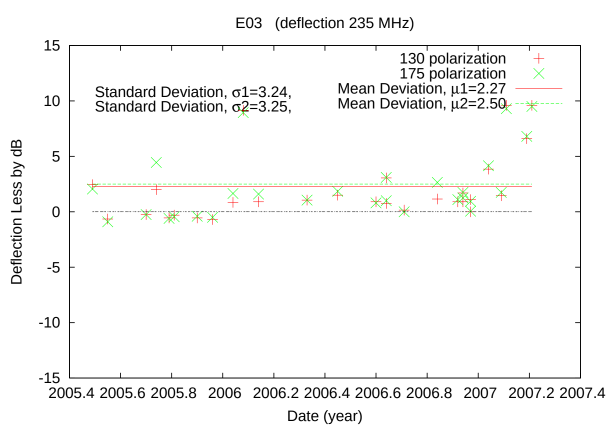

C11 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.73,
Standard Deviation, σ2=3.13,
Mean Deviation, µ1=1.73
Mean Deviation, µ2=1.82
Deflection Less by dB
Date (year)

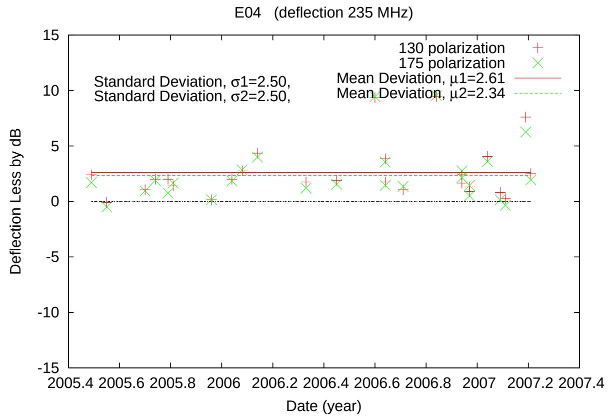

C12 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.38,
Standard Deviation, σ2=2.31,
Mean Deviation, µ1=1.73
Mean Deviation, µ2=1.43
Deflection Less by dB
Date (year)

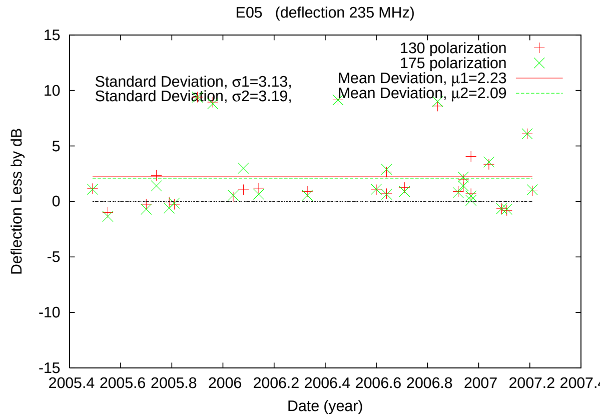

C13 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.98,
Standard Deviation, σ2=1.90,
Mean Deviation, µ1=0.80
Mean Deviation, µ2=1.16
Deflection Less by dB
Date (year)

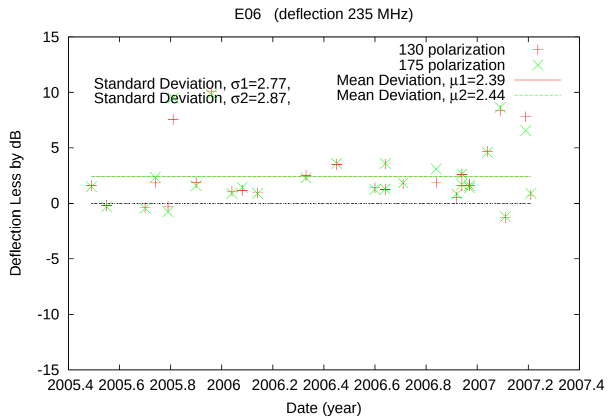

C14 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.95,
Standard Deviation, σ2=2.85,
Mean Deviation, µ1=1.47
Mean Deviation, µ2=1.49
Deflection Less by dB
Date (year)

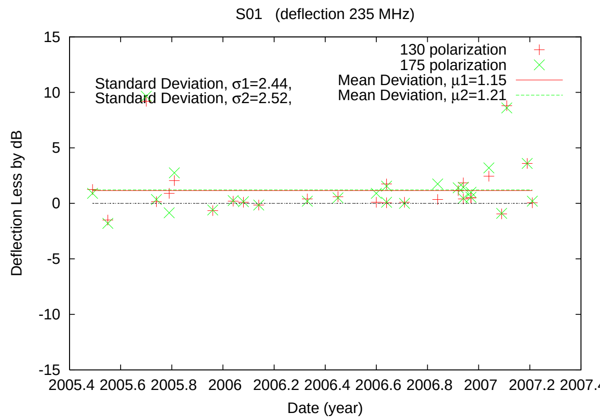

E02 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.51,
Standard Deviation, σ2=2.47,
Mean Deviation, µ1=1.83
Mean Deviation, µ2=1.74
Deflection Less by dB
Date (year)

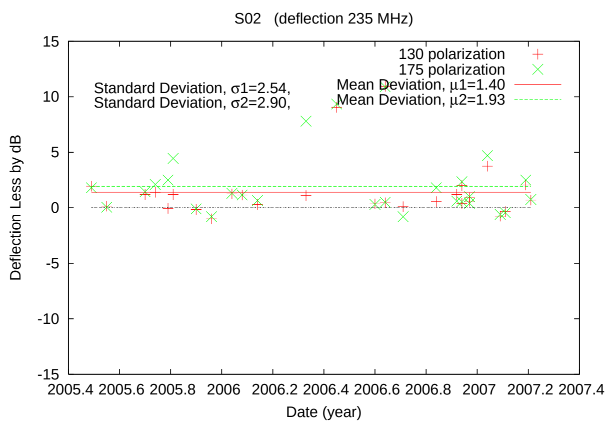

E03 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.24,
Standard Deviation, σ2=3.25,
Mean Deviation, µ1=2.27
Mean Deviation, µ2=2.50
Deflection Less by dB
Date (year)

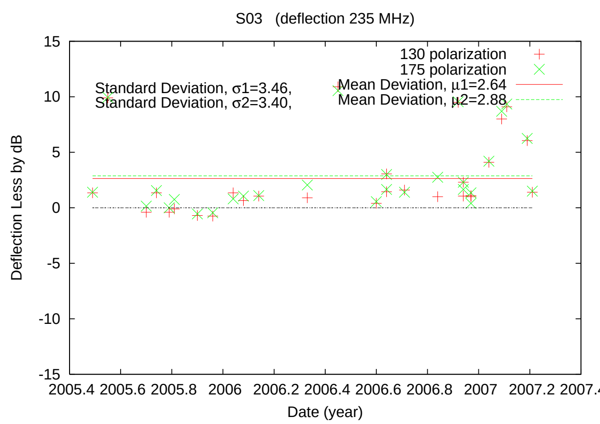

E04 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.50,
Standard Deviation, σ2=2.50,
Mean Deviation, µ1=2.61
Mean Deviation, µ2=2.34
Deflection Less by dB
Date (year)

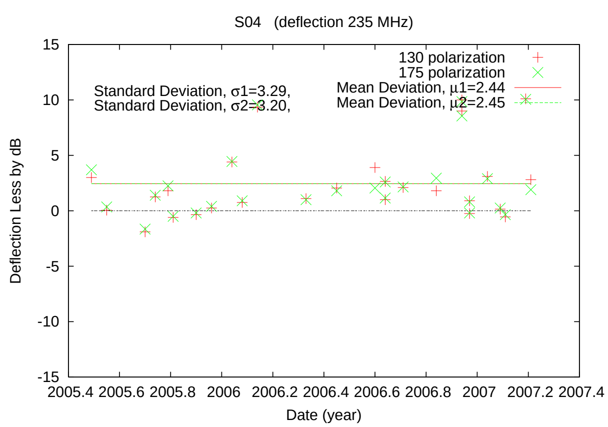

E05 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.13,
Standard Deviation, σ2=3.19,
Mean Deviation, µ1=2.23
Mean Deviation, µ2=2.09
Deflection Less by dB
Date (year)

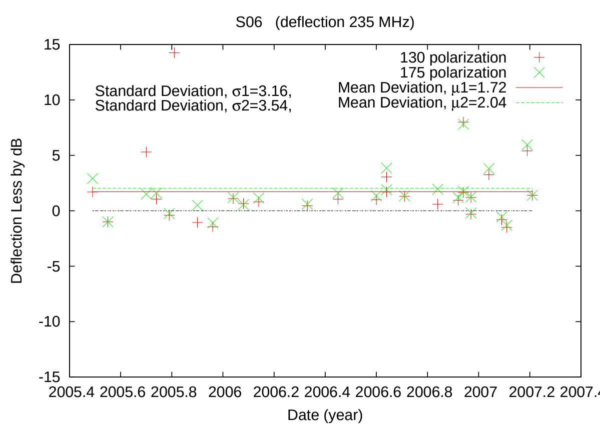

E06 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.77,
Standard Deviation, σ2=2.87,
Mean Deviation, µ1=2.39
Mean Deviation, µ2=2.44
Deflection Less by dB
Date (year)

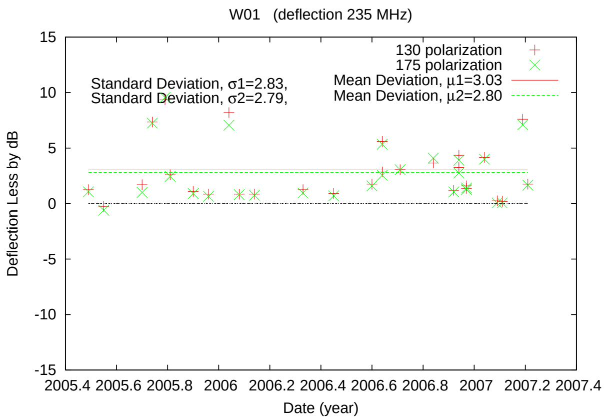

S01 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.44,
Standard Deviation, σ2=2.52,
Mean Deviation, µ1=1.15
Mean Deviation, µ2=1.21
Deflection Less by dB
Date (year)

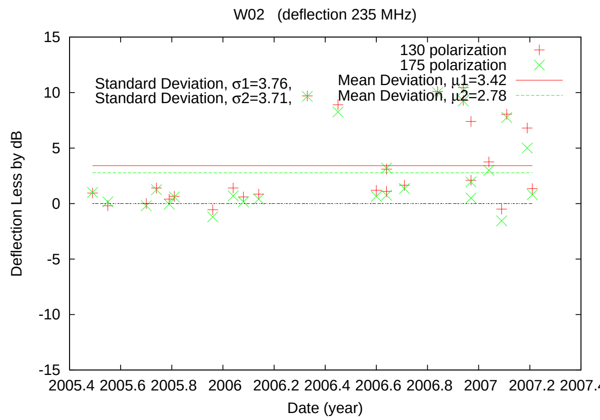

S02 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.54,
Standard Deviation, σ2=2.90,
Mean Deviation, µ1=1.40
Mean Deviation, µ2=1.93
Deflection Less by dB
Date (year)

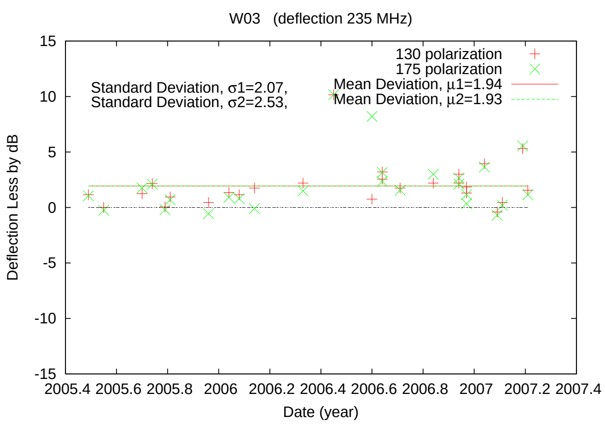

S03 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.46,
Standard Deviation, σ2=3.40,
Mean Deviation, µ1=2.64
Mean Deviation, µ2=2.88
Deflection Less by dB
Date (year)

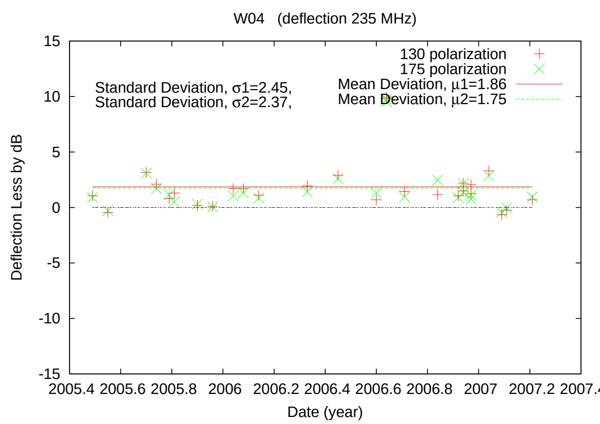

S04 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.29,
Standard Deviation, σ2=3.20,
Mean Deviation, µ1=2.44
Mean Deviation, µ2=2.45
Deflection Less by dB
Date (year)

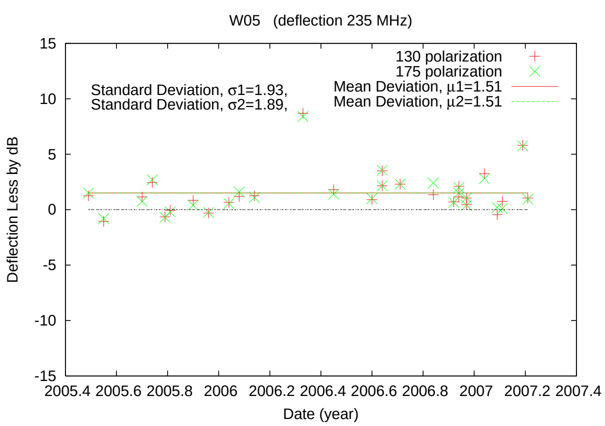

S06 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.16,
Standard Deviation, σ2=3.54,
Mean Deviation, µ1=1.72
Mean Deviation, µ2=2.04
Deflection Less by dB
Date (year)

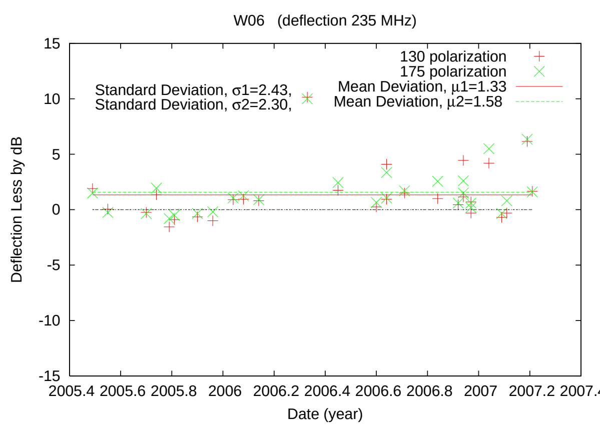

W01 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.83,
Standard Deviation, σ2=2.79,
Mean Deviation, µ1=3.03
Mean Deviation, µ2=2.80
Deflection Less by dB
Date (year)


W02 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=3.76,
Standard Deviation, σ2=3.71,
Mean Deviation, µ1=3.42
Mean Deviation, µ2=2.78
Deflection Less by dB
Date (year)


W03 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.07,
Standard Deviation, σ2=2.53,
Mean Deviation, µ1=1.94
Mean Deviation, µ2=1.93
Deflection Less by dB
Date (year)


W04 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.45,
Standard Deviation, σ2=2.37,
Mean Deviation, µ1=1.86
Mean Deviation, µ2=1.75
Deflection Less by dB
Date (year)


W05 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=1.93,
Standard Deviation, σ2=1.89,
Mean Deviation, µ1=1.51
Mean Deviation, µ2=1.51
Deflection Less by dB
Date (year)


W06 (deflection 235 MHz)
130 polarization
175 polarization
Standard Deviation, σ1=2.43,
Standard Deviation, σ2=2.30,
Mean Deviation, µ1=1.33
Mean Deviation, µ2=1.58
Deflection Less by dB
Date (year)

Chapter 5

Concluding remarks

We have developed an user friendly programme to study the archival pointing and deflection data at GMRT. The user of the programme need not know the details of individual measurements, sort in frequency, flag dead antennas etc. The user will only run the shell script which will produce separate plots at each frequency for each catagory showing the long term behaviour of the antennas. This can be used by the concerned technical group as appropriate.