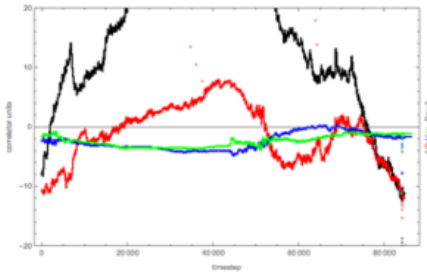# Understanding Sun-NP Data
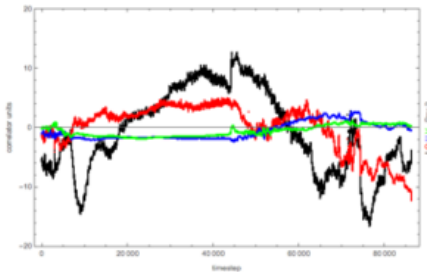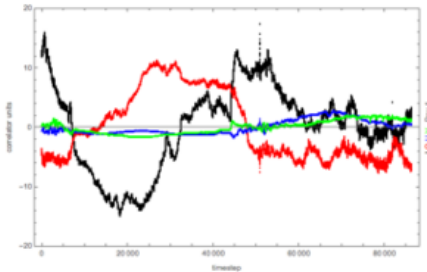
Santanu Das

NorthPole_20160513184533_20160516181643

Albert's plot last day
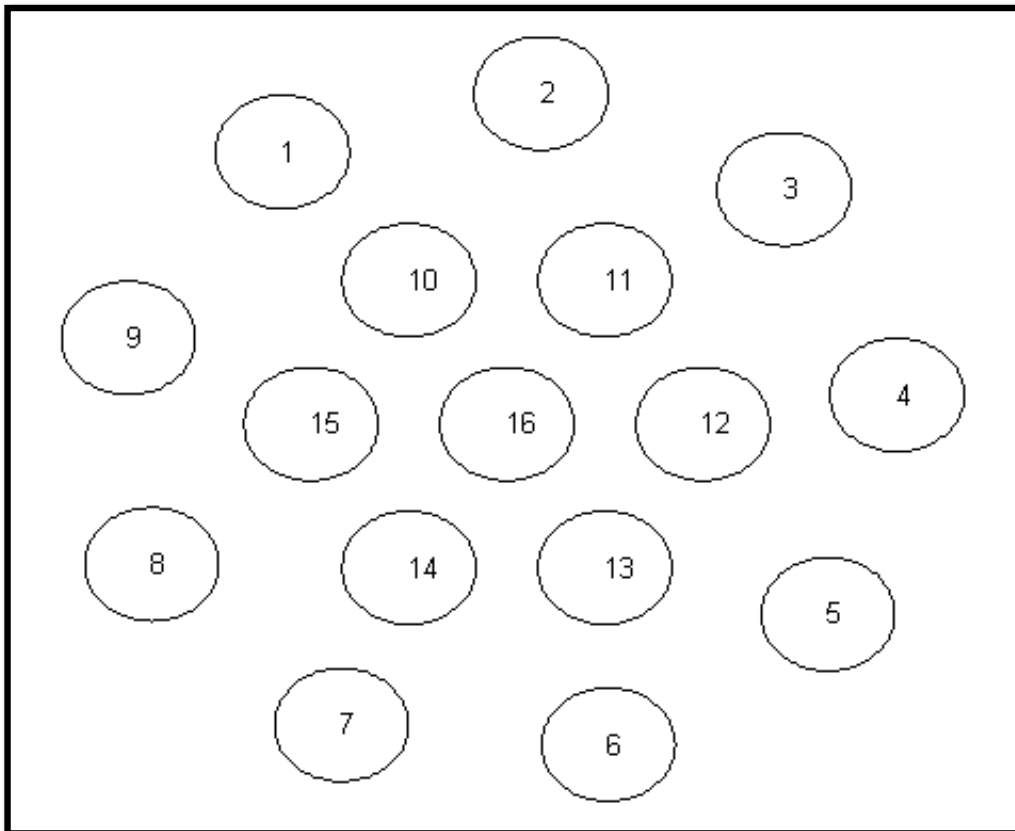
- I = XX + YY
- Q = XX - YY
- U = 2 Re XY
- V = 2 Im XY

Black and Red has some random feature

Green and Blue has some feature which is getting repeated everyday

Albert's hypothesis was that may be some signals are getting reflected on ground or somewhere (may be on the dish in front of those).
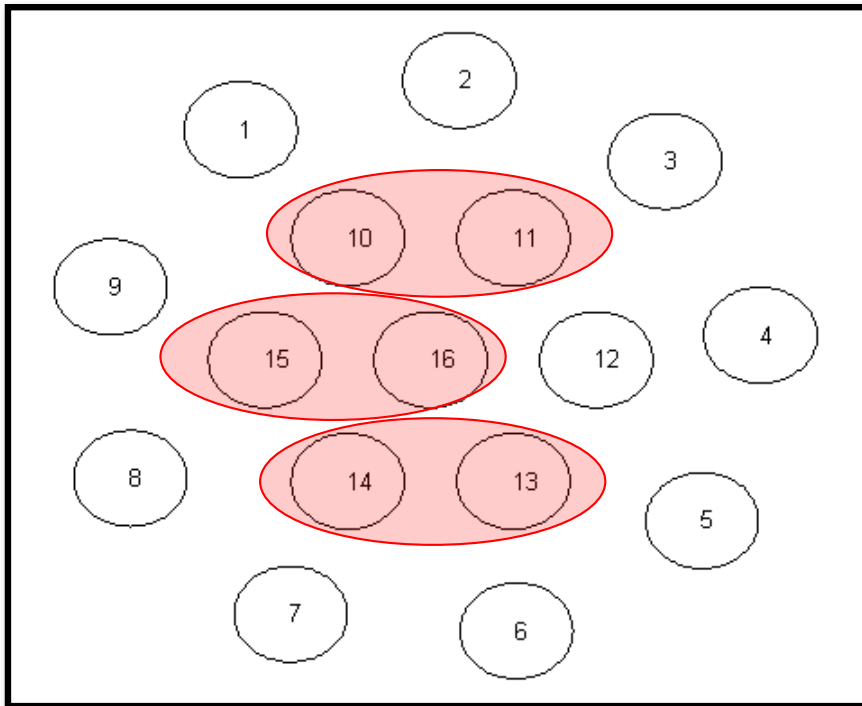
Rough position of the Dishes

According to data given in the Wiki

http://tianlai.bao.ac.cn/wiki/index.php/Position_of_dishes_and_cylinders_antennae#The_theory_data

John's Calculation

V = P * exp(i φ)

Where P is the absolute value of the visibilities. If the array were calibrated we would expect P to be the same for each and every visibility. The information is all in the phase phi.

φ = 2*π* δ / λ

δ = path length difference between the 2 dishes.

When the sun is overhead (and approximating its path as strictly east-west), the path difference is

δ = 8.8 meters * sin(ɵ)

ɵ is the angle of the sun relative to the zenith. So, when the sun is overhead, an angle change in the position of the sun of 0.028 radians will produce a phase shift of 360 degrees.
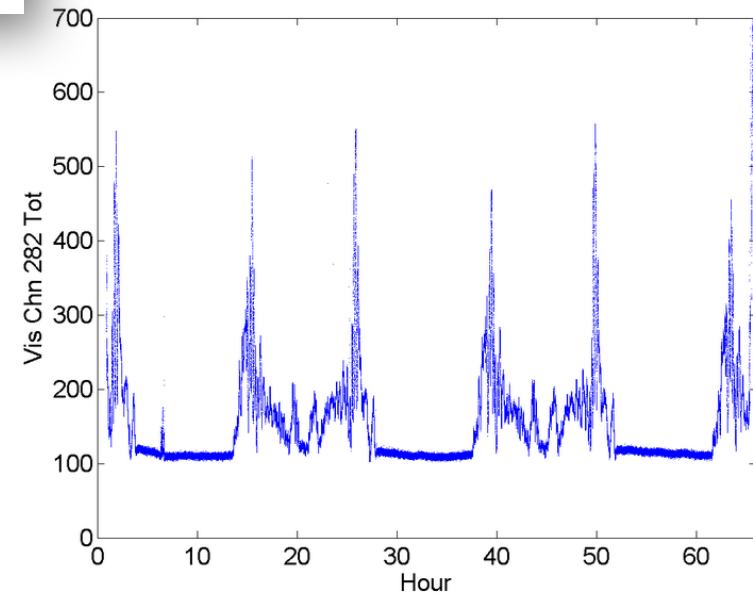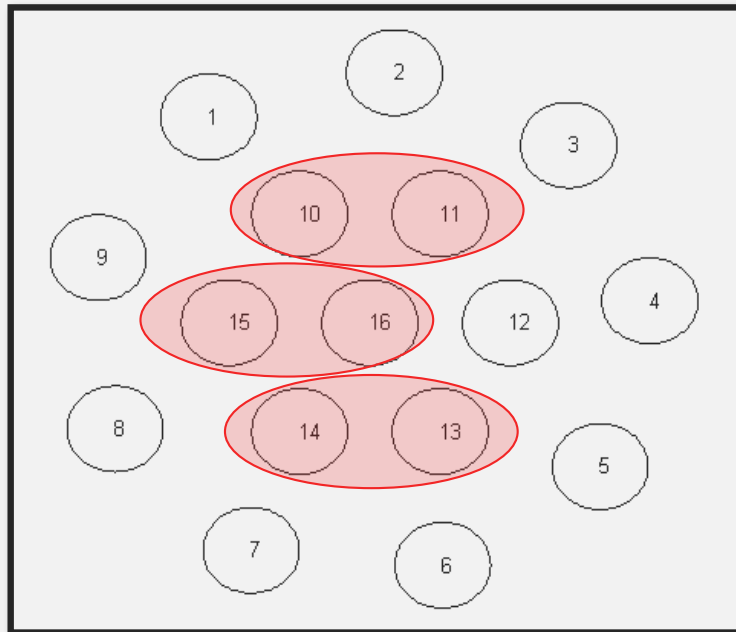
It would happen at approximately 10 minute intervals.

- 275 - (25,27)
- 295 - (29,31)
- 320 - (19,21)

- 282 - (26,28)
- 302 - (30,32)
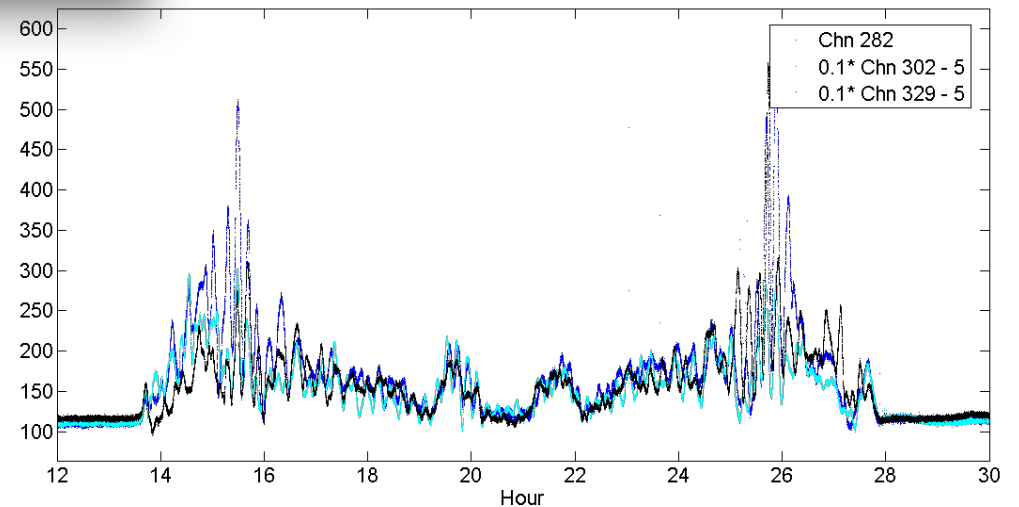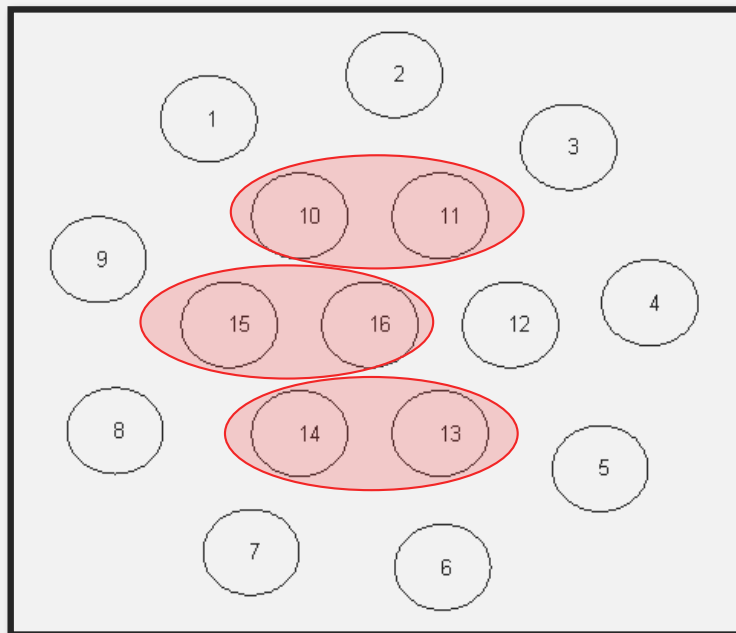- 329 - (20,22)

Sun-NorthPole Data

Everyday during daytime same kind of pattern is getting repeated.

- 275 - (25,27)
- 295 - (29,31)
- 320 - (19,21)

- 282 - (26,28)
- 302 - (30,32)
- 329 - (20,22)

Sun-NorthPole Data

Amplitudes for three channels. Almost superimpose over each other. (With some scaling and bias term)
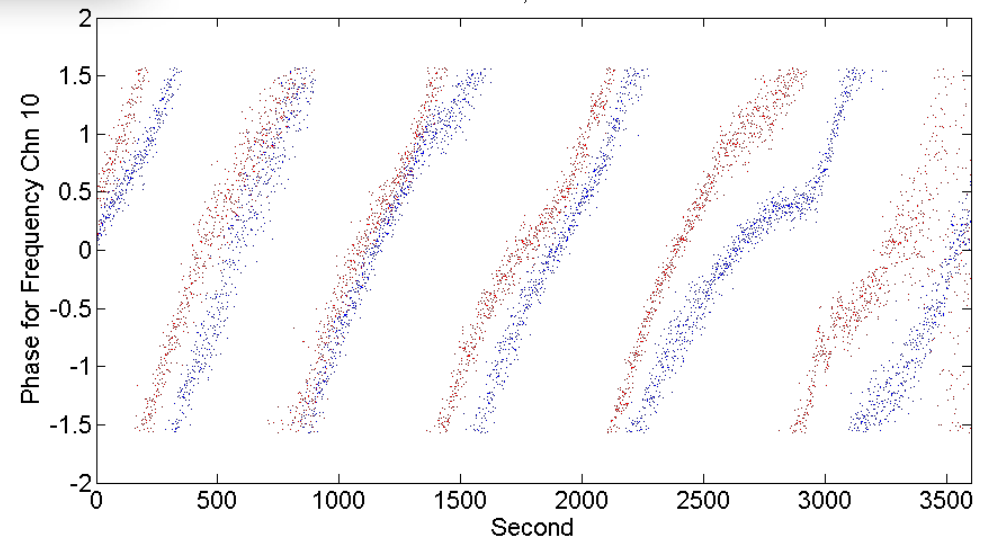
- 275 - (25,27)
- 295 - (29,31)
- 320 - (19,21)

- 282 - (26,28)
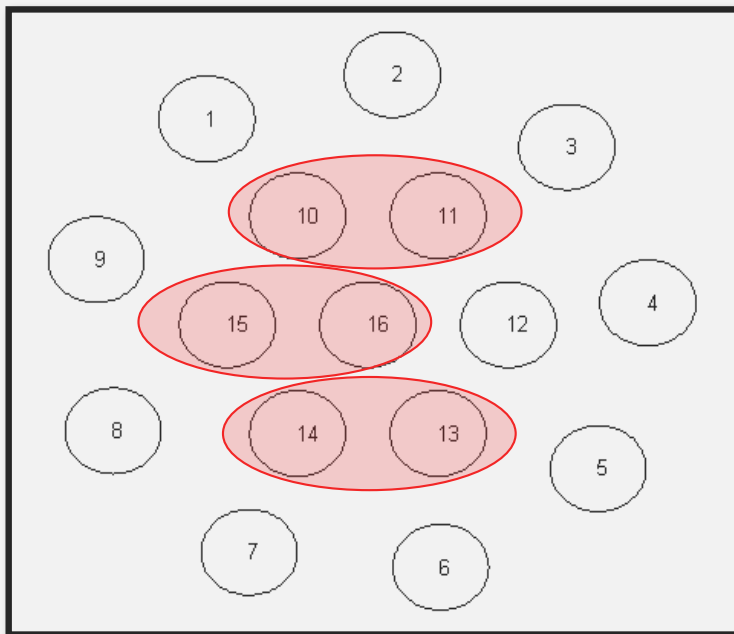- 302 - (30,32)
- 329 - (20,22)

Sun-NorthPole Data

Red : Chn No 329, Blue : Chn No 302

Phases for Hour 17-18 of the 1st day.
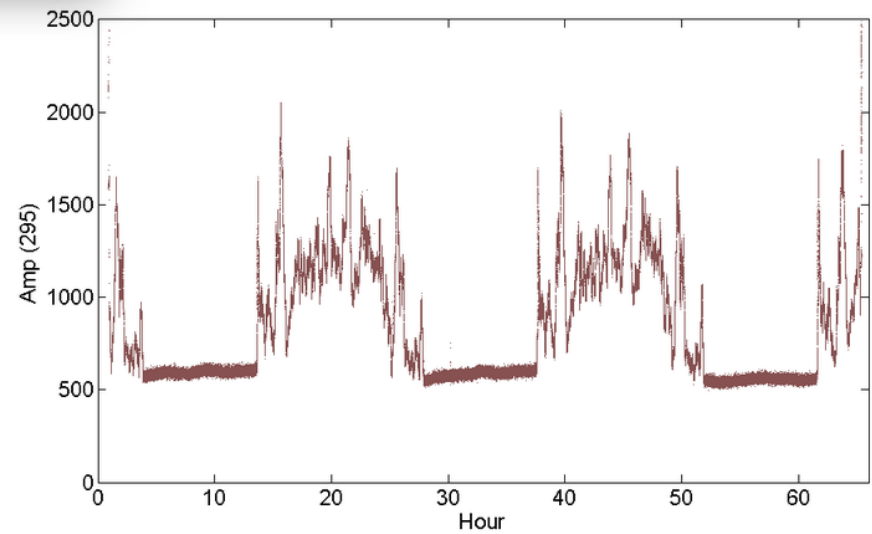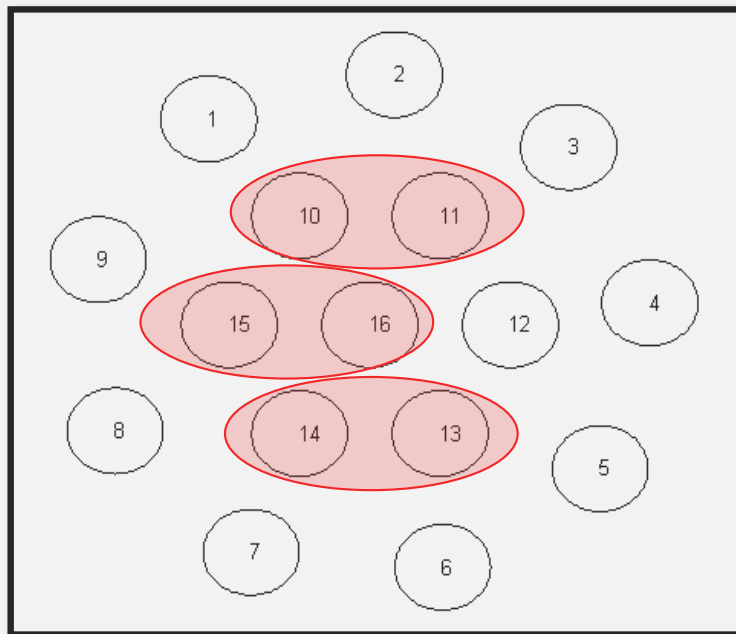
Phases are changing as expected.

- 275 - (25,27)
- 295 - (29,31)
- 320 - (19,21)

- 282 - (26,28)
- 302 - (30,32)
- 329 - (20,22)

Sun-NorthPole Data
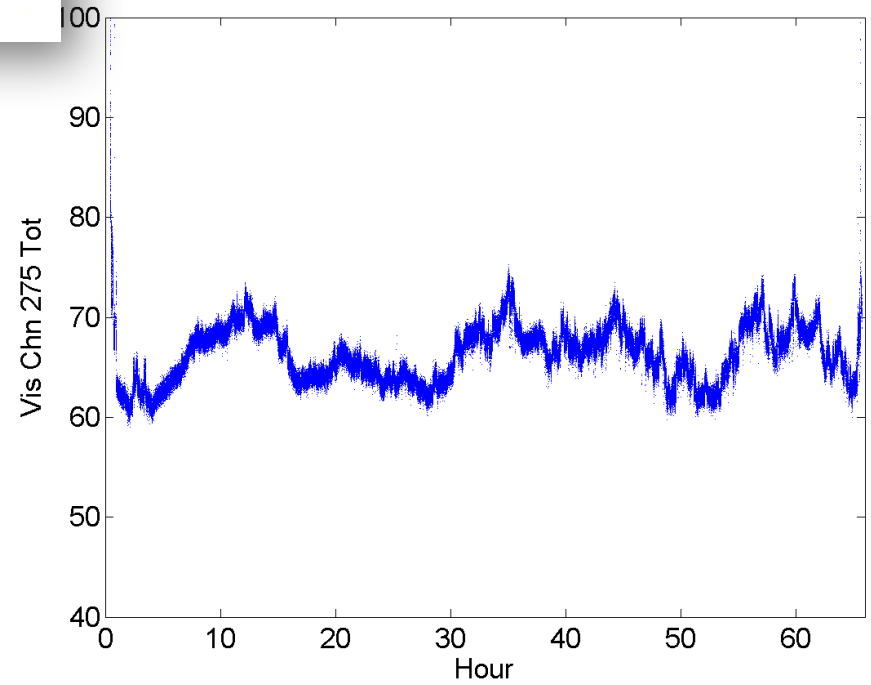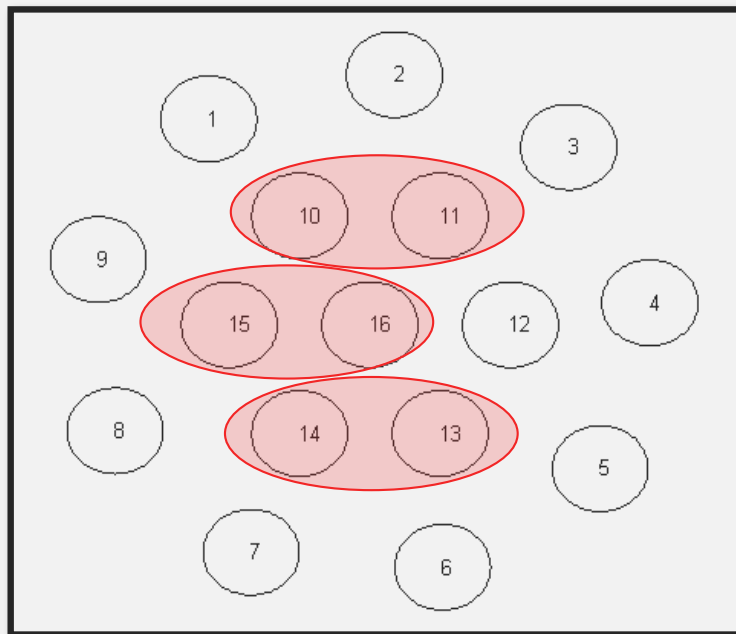

For the other set of polarization:

Data is getting repeated. But nature is different.

- 275 - (25,27)
- 295 - (29,31)
- 320 - (19,21)

•282 - (26,28)
•302 - (30,32)
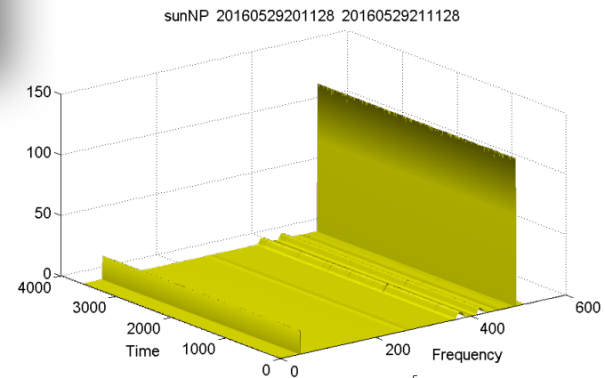•329 - (20,22)

Sun-NorthPole Data

Where is the repetition??
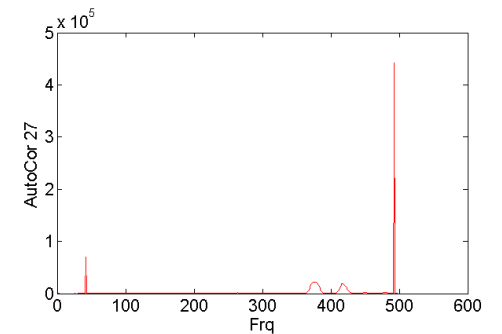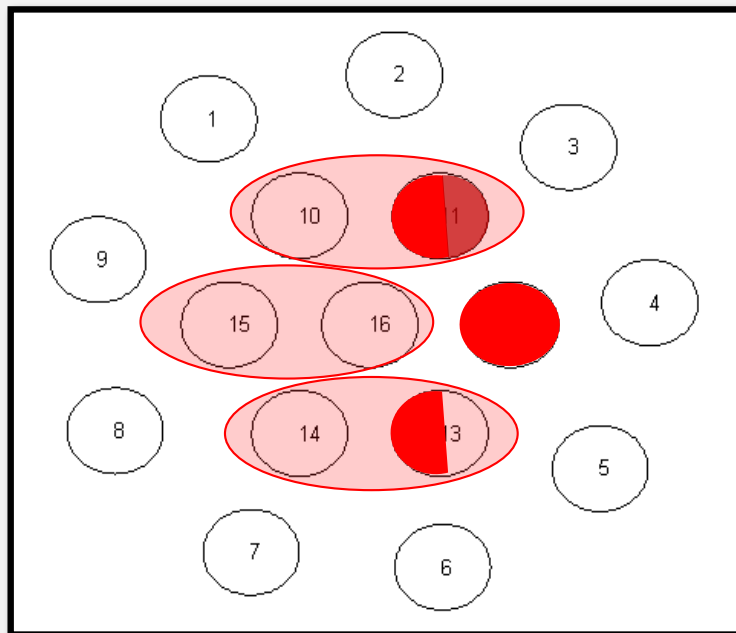
- 275 - (25,**27**)
- 295 - (29,31)
- 320 - (19,**21**)

•282 - (26,28)
•302 - (30,32)
•329 - (20,22)

Sun-NorthPole Data
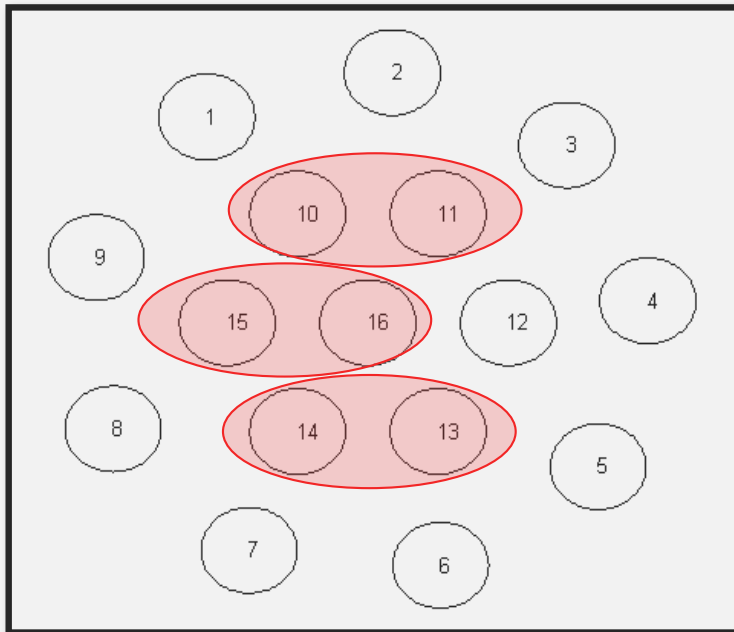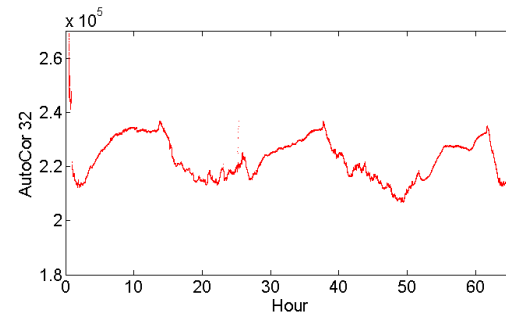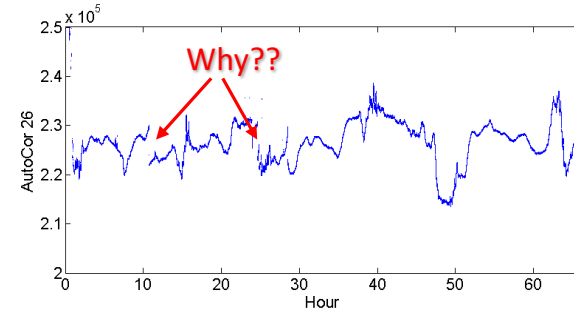
Channel No : 27

sunNP 20160529201128 20160529211128

27 is a bad channel. Even though its not marked as bad. (Chn 21, 23, 24 are also bad.. Chn 22 has few bad frequency bands)

- 275 - (25,27)
- 295 - (29,31)
- 320 - (19,21)

- 282 - (26,28)
- 302 - (30,32)
- 329 - (20,22)

Sun-NorthPole Data

Why??

Auto Correlation (useless)

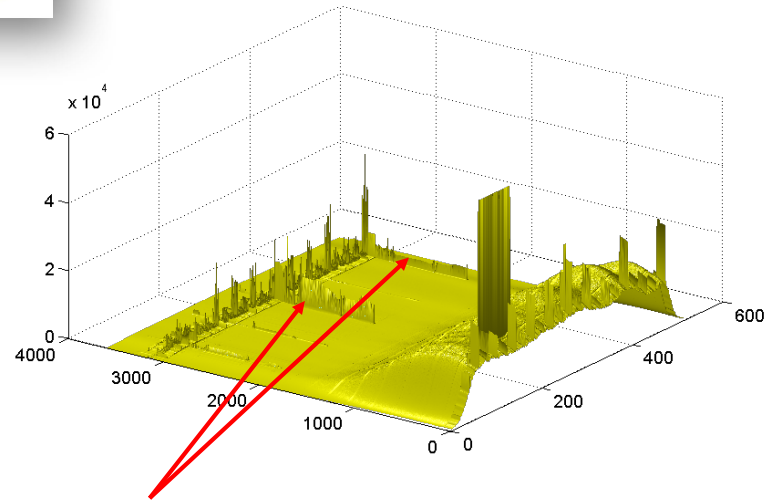**No pattern??** Probably because its all noise

- 275 - (25,**27**)
- 295 - (29,31)
- 320 - (19,**21**)

- 282 - (26,28)
- 302 - (30,32)
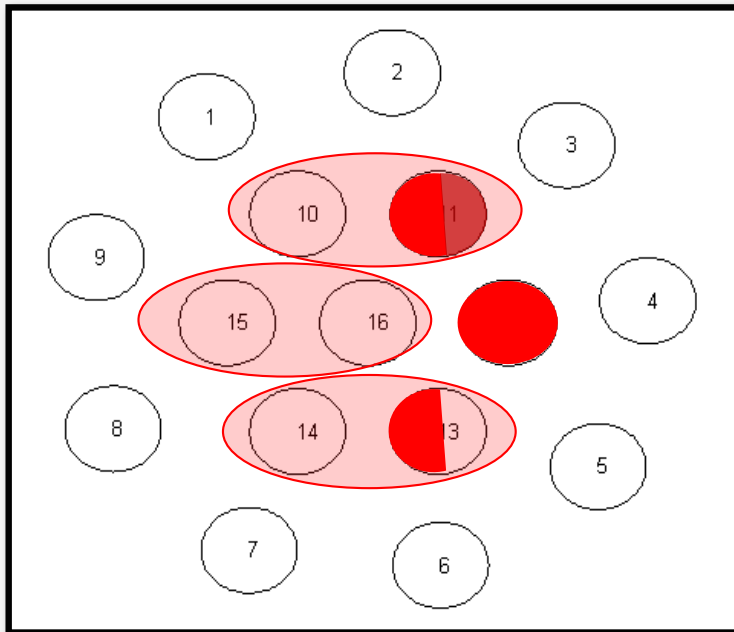- 329 - (20,22)

Sun-NorthPole Data

sunNP 20160528171128 20160528181128

What are these spikes in the frequency bands?

These spikes are there in many of the feeds. I don't understand why they are coming

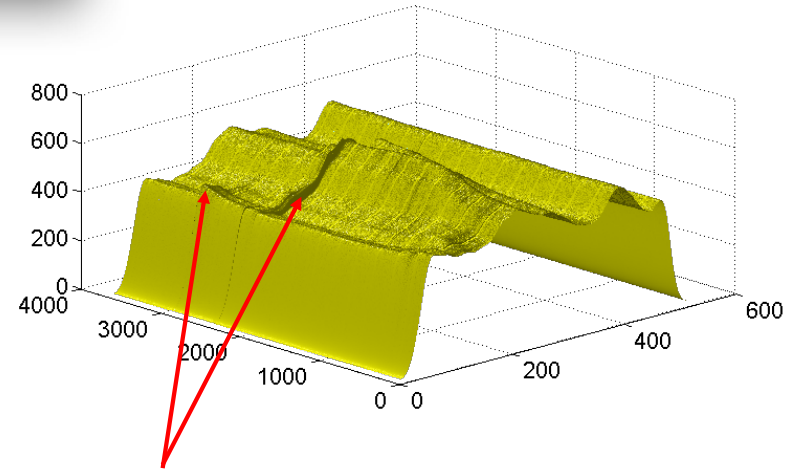**GOD** knows.... Or may be **HE** is also waiting for us to understand it !!

12

- 275 - (25,**27**)
- 295 - (29,31)
- 320 - (19,**21**)

- 282 - (26,28)
- 302 - (30,32)
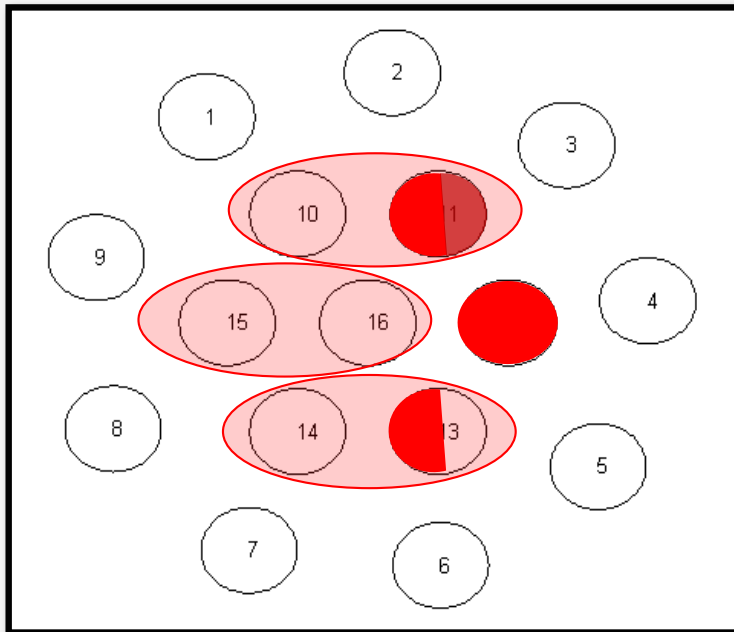- 329 - (20,22)

Sun-NorthPole Data

26 sunNP 20160529171128 20160529181128

Why are these discontinuity in the data??

Are these due to the noise?? Or there something wrong going on ?

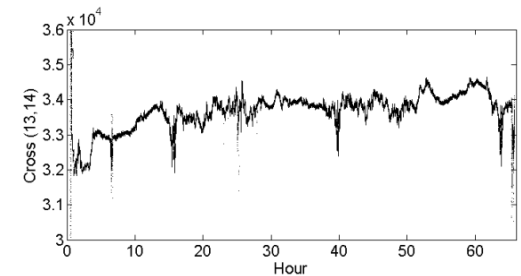**GOD** knows.... Or may be **HE** is also waiting for us to understand it !!
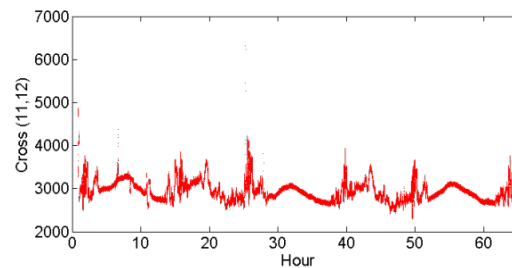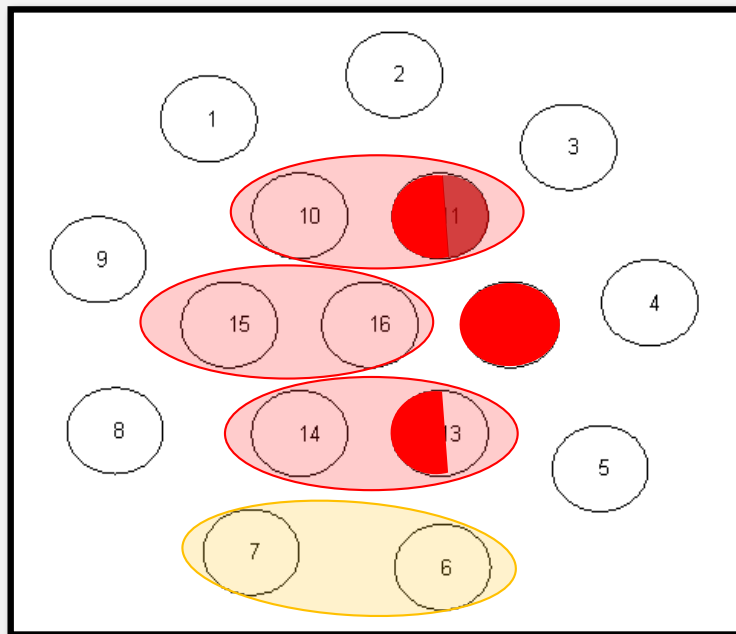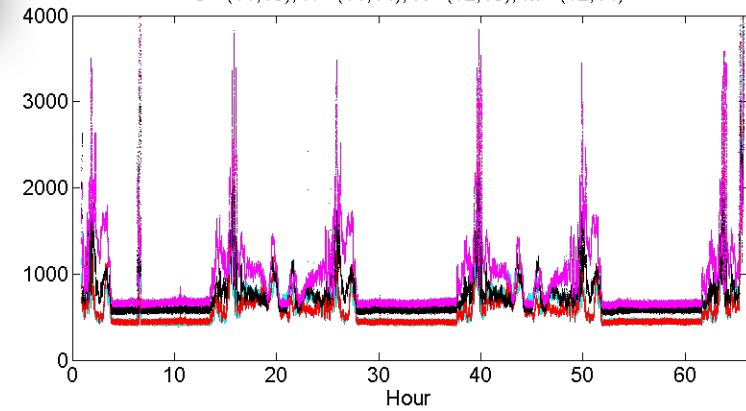
Auto Correlation of **26**

- 275 - (25,**27**)
- 295 - (29,31)
- 320 - (19,**21**)

- 282 - (26,28)
- 302 - (30,32)
- 329 - (20,22)

Sun-NorthPole Data
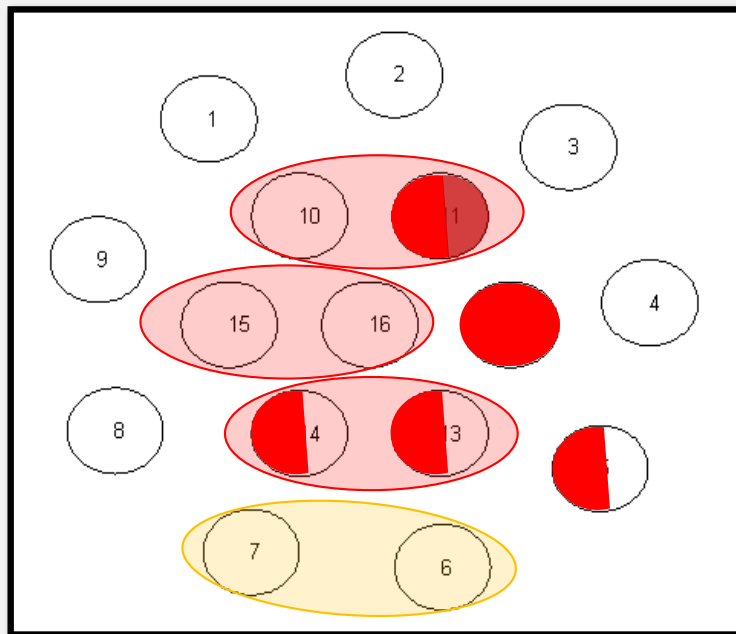

C - (11,13), R - (11,14), K - (12,13), M - (12,14)

Is 295 also bad?? Or is it detecting something else?
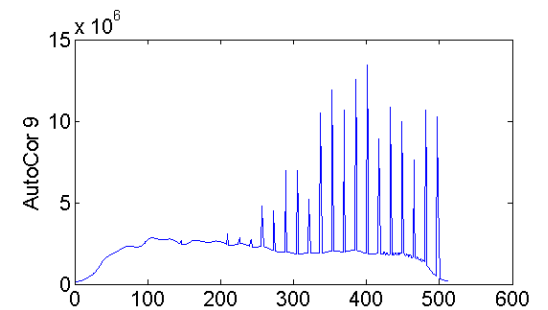
14

- 275 - (25,**27**)
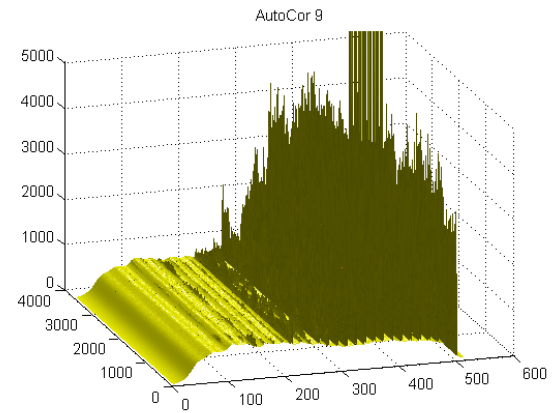- 295 - (29,31)
- 320 - (19,**21**)

•282 - (26,28)
•302 - (30,32)
•329 - (20,22)

Sun-NorthPole Data

Channel No 9 Bad

AutoCor 9

AutoCor 9

I saw many other channels with similar features (22,..)

Summary :

1. There are more bad channels then listed.

2. Some bad channels can be fixed by removing few rows.

3. Why some spikes are coming in some of the frequency bands??

4. Why Channel No 295 is behaving like that?

Thank You

for not sleeping in my talk

If you have the answers then please explain