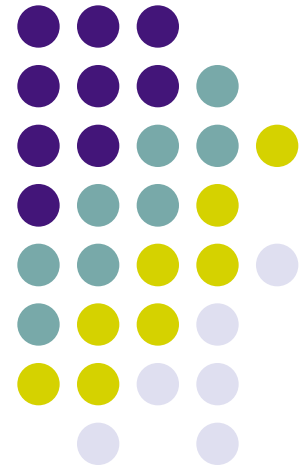


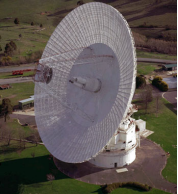
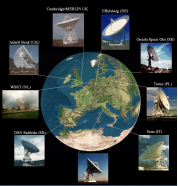
# Sensitivity comparisons

## DiFX ↔ SFXC

Adam Deller  
ASTRON

9th DiFX workshop, UTas, Hobart

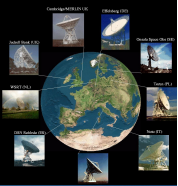




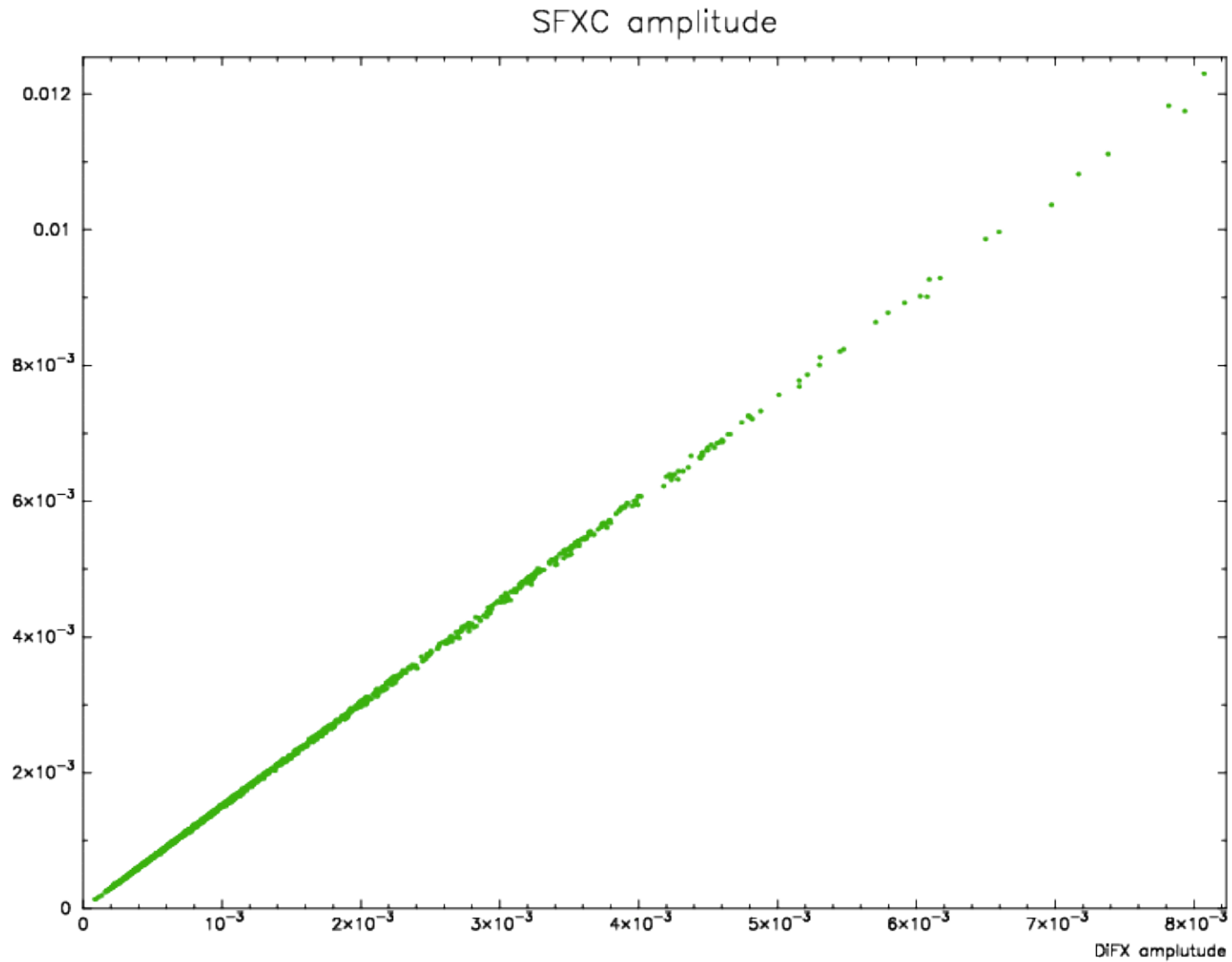
# How we arrive here

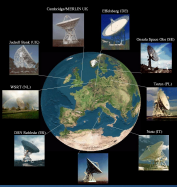
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- Leonid Petrov gets a geodetic observation correlated on SFXC (JIVE) and DiFX (Bonn)
- He notices higher fringe amplitudes and more good solutions with DiFX
  - Asks me to investigate
- I recorrelate a snippet of data and get JIVE to do the same
- Followed by tests on several other datasets

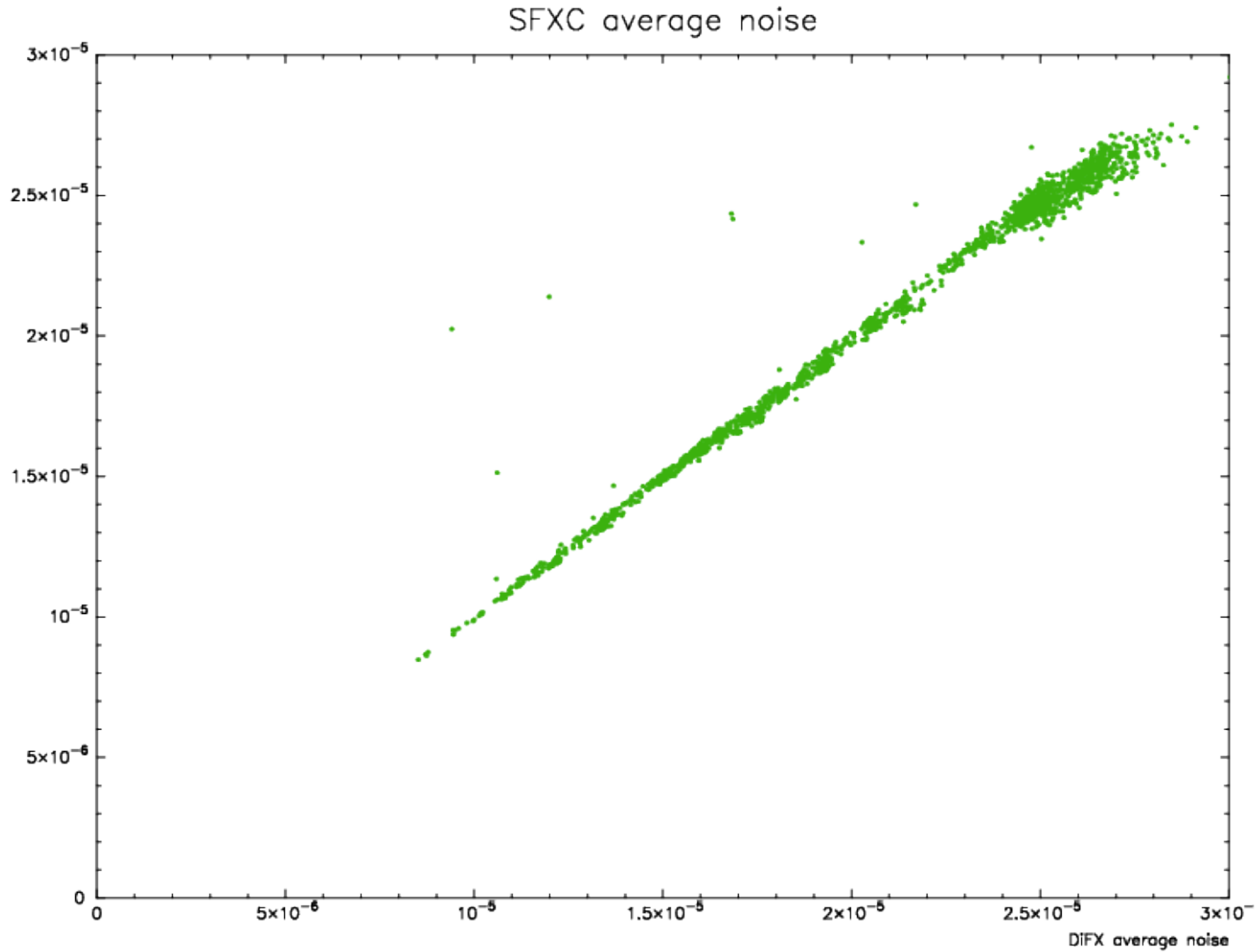


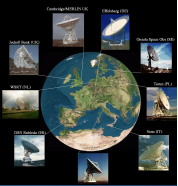
# Leonid's results



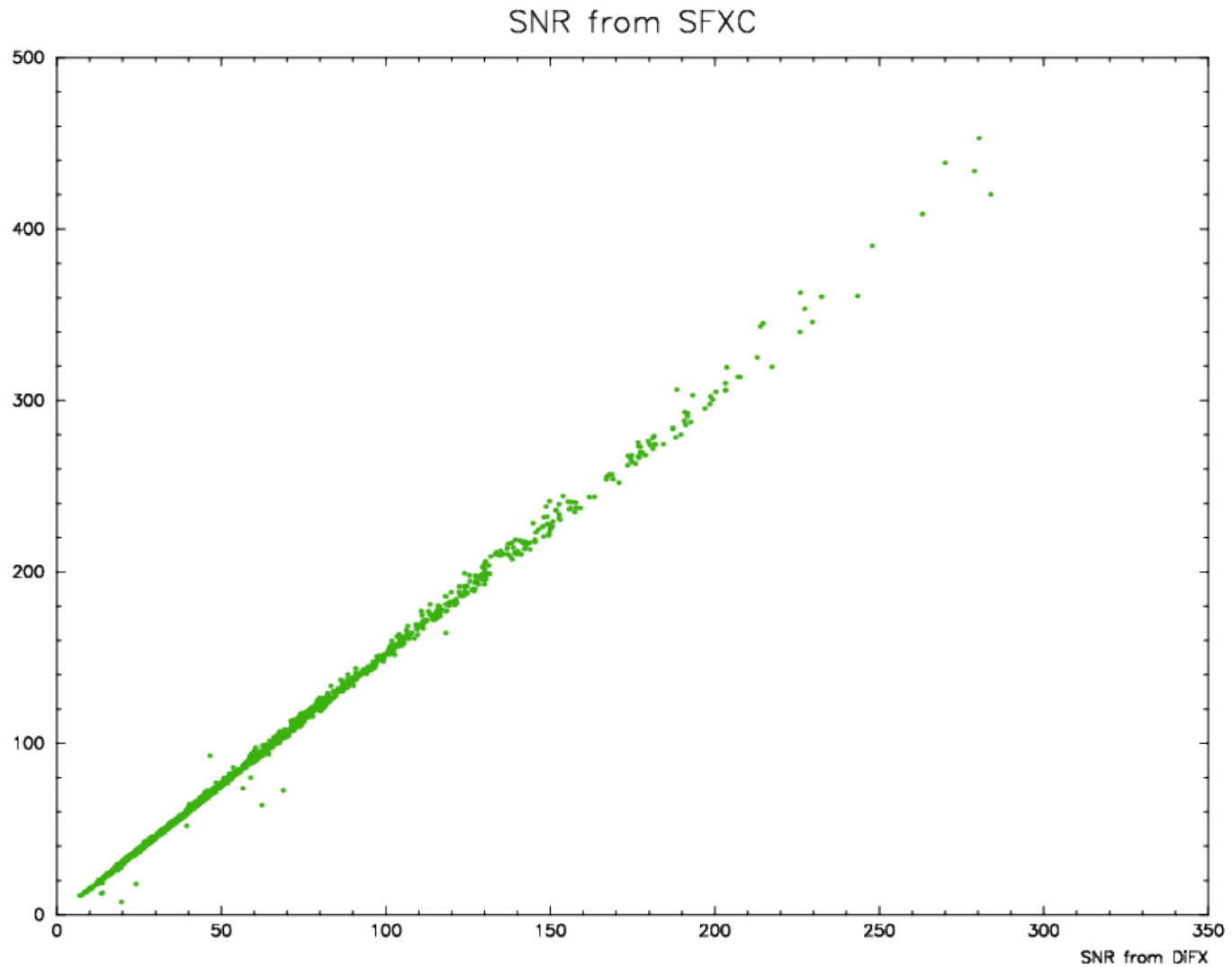


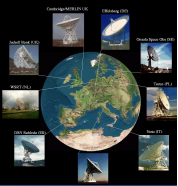
# Leonid's results





# Leonid's results

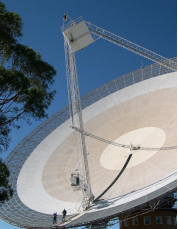
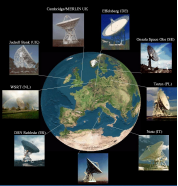




# Details of r1680 observation

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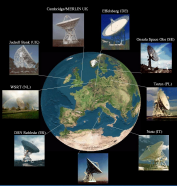
- 1 bit sampling
- Mark5B or MarkIV formatting
- My recorrelation matches the Bonn correlation
- I tested also DiFX 2.3 and 2.2 – no changes between versions
- My thought at this stage: problem with 1 bit data??



# Investigations: FR026

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- On my request, Bob Campbell arranged an EVN ftp fringe test with:
  - 3 x 2bit stations
  - 2 x 1bit stations
- SFXC correlated, DiFX correlated
- Similar S/N differences seen between DiFX and SFXC (as reported by FRING and seen visually in POSSM)
  - No apparent dependence on 1bit vs 2bit
  - "Spiky" bandpass for DiFX?



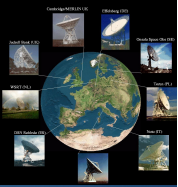
# More investigations: RDV70

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- One of the DiFX “golden” datasets used for regression testing
- 1 bit geodetic style
- SFXC still shows better S/N, similar ratio to the other tests (simple FRING results)





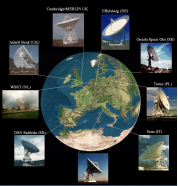


# Last investigation: TC016A

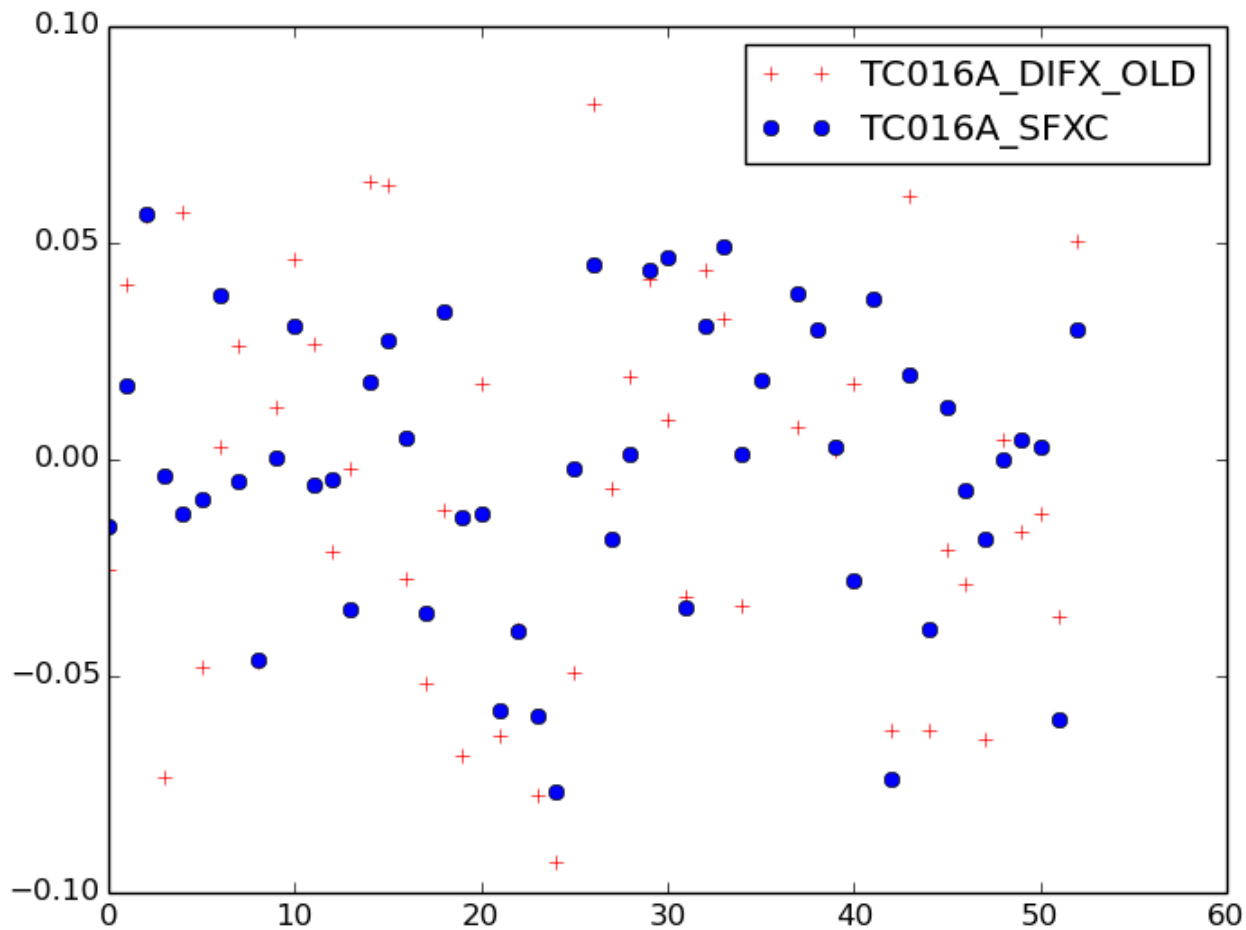
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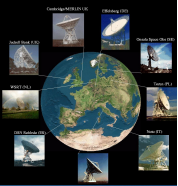
- Another “golden” dataset
  - Used for the definitive verification of DiFX vs the VLBA hardware correlator
  - And for DiFX2.0 vs DiFX1.5
  - 2 bit VLBA format data
- S/N difference *\*still\** persists
- Did a very simple test: apply FRING solutions, look at rms of phase residual for 1 channel over 40s



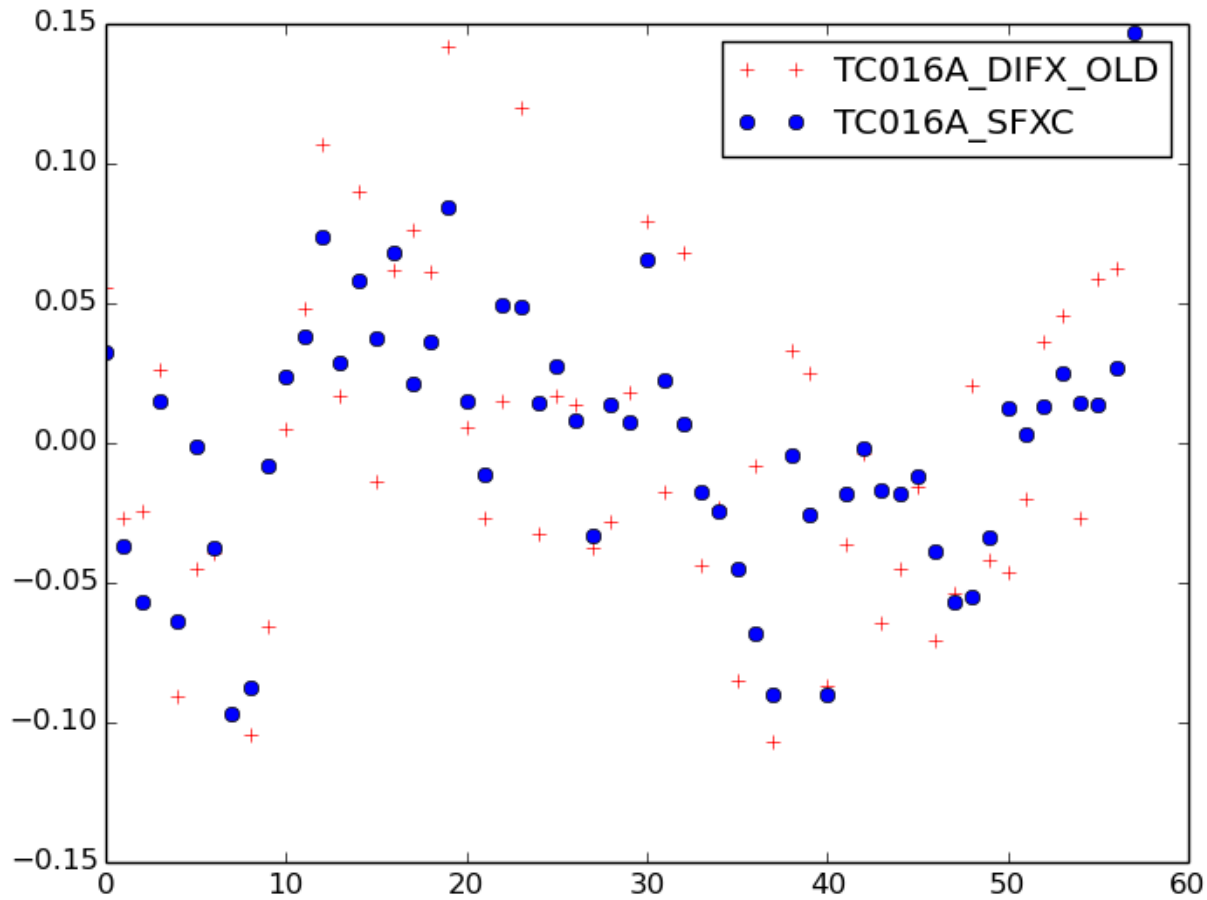


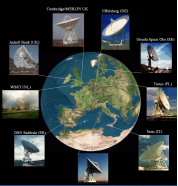
# Last investigation: TC016A





# Last investigation: TC016A

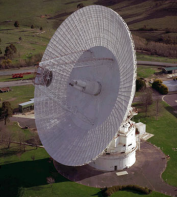


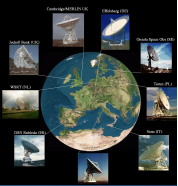


# What's the deal?

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1. SFXC really is 30+% better than DiFX
  - Due to the better windowed overlapped scheme vs DiFX simple unoverlapped FFT?
  - How would this have gone undetected so long?
  - Ands then why does DiFX data seem to give reasonable amplitudes and noise in the calibrated data? One or the other should be wrong, then.





# What's the deal?

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2. Somehow the data is going wrong in the comparison
  - This has been really simple though – just FITLD and FRING.
  - FITLD breaking something? Seems unlikely because Leonid uses PIMA.
  - All of this data has been with the FITS-IDI output format – would be nice to compare mark4 format.
  - Check native DiFX output format bandpass vs POSSM.

