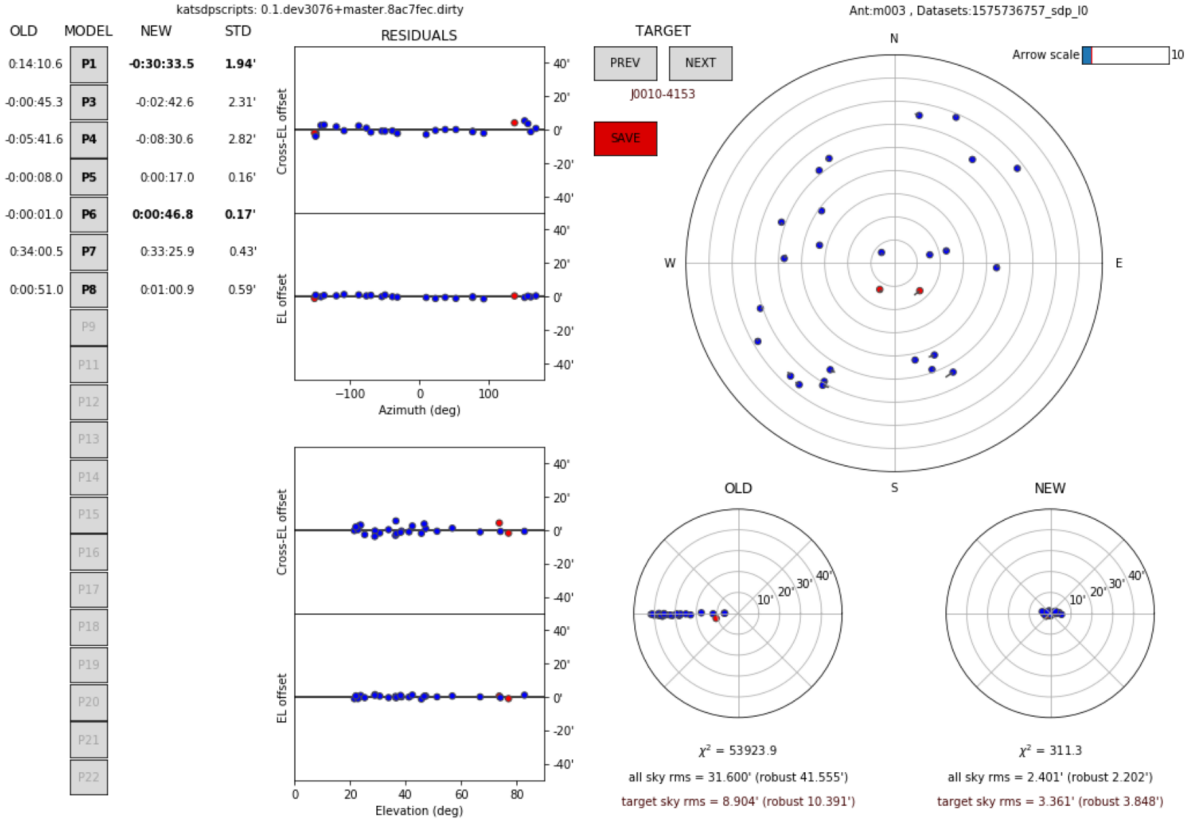
2019-12-07 REPORT ON INTERFEROMETRIC POINTING FOR M003

During a phaseup on 2019-12-09, it was reported in OPS-472 that M003 had a slope in its bandpass for both polarisations and it was suspected that this was due to bad pointing. In this JIRA, Mattieu mentions that the holography showed M003 had a 0.5 degree azimuthal pointing error in L-band and a 0.5 degree azimuthal pointing error in UHF.
The last interferometric pointing that I had a look at is the one that ran on 2019-12-07 (SB ID 20191207-0005). Link to workbook for data reduction is below
http://kat-imager.kat.ac.za:8888/notebooks/Operators/Lavashni/Interferometric%20Pointing%20Workbook-v1-20191207-0005.ipynb

This workbook explains what every script does. Screenshot of the plots for M003 is shown below



The first thing to look at are the old and new models on the bottom right and the information below these models. These plots and information indicate that M003 has pointing issues.

Firstly,the differences between the old and new all sky rms and the old and new χ^2 are large. The maximum all sky rms should be between 2 and 3. Good scatter plots are clustered but in this case, they are smeared. If you compare the old model to the new model, the scatter plots have big jumps in arc minutes. The parameters highlighted in bold indicate that there are issues

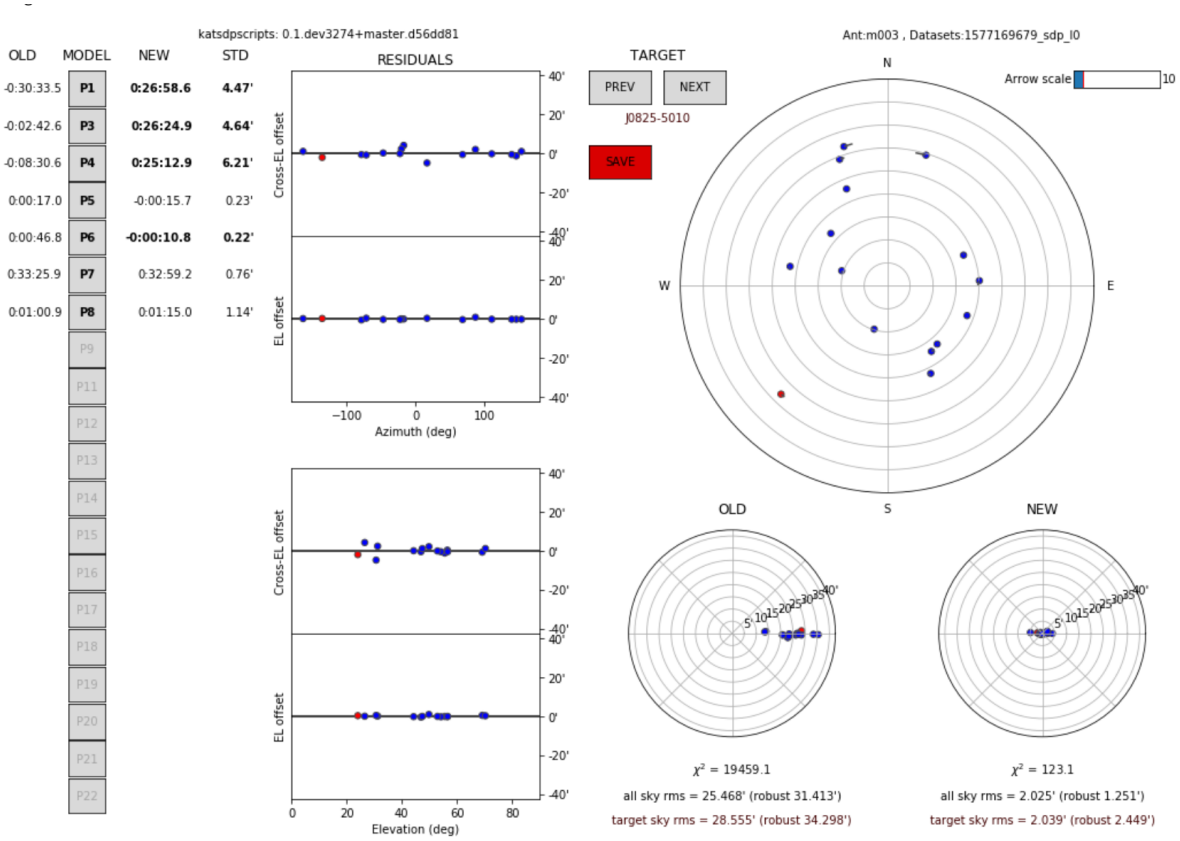
with the azimuth encode offset (P1) and azimuth axis offset/misalignment East-West (P6). In OPS-472, Boitumelo reported that he inspected this AP for misalignment as its been reported to be out by 0.5 deg and the azimuth encoder had been preset to 0 deg. He suggested that we run another pointing after this.

Applying corrections to pointing models

Pointing models were updated for M003 on GitHub, this is done by filling in the new values of every parameter in the screenshot. I issued a pull request to Tony, Sean, Sharmila and Sarah awaiting their approval. At least one approval is needed to merge the PR,Sean and Sharmila approved the pull request to update the pointing model on M003 and the PR was merged on 18 December 2019.
https://github.com/ska-sa/katconfig/pull/981

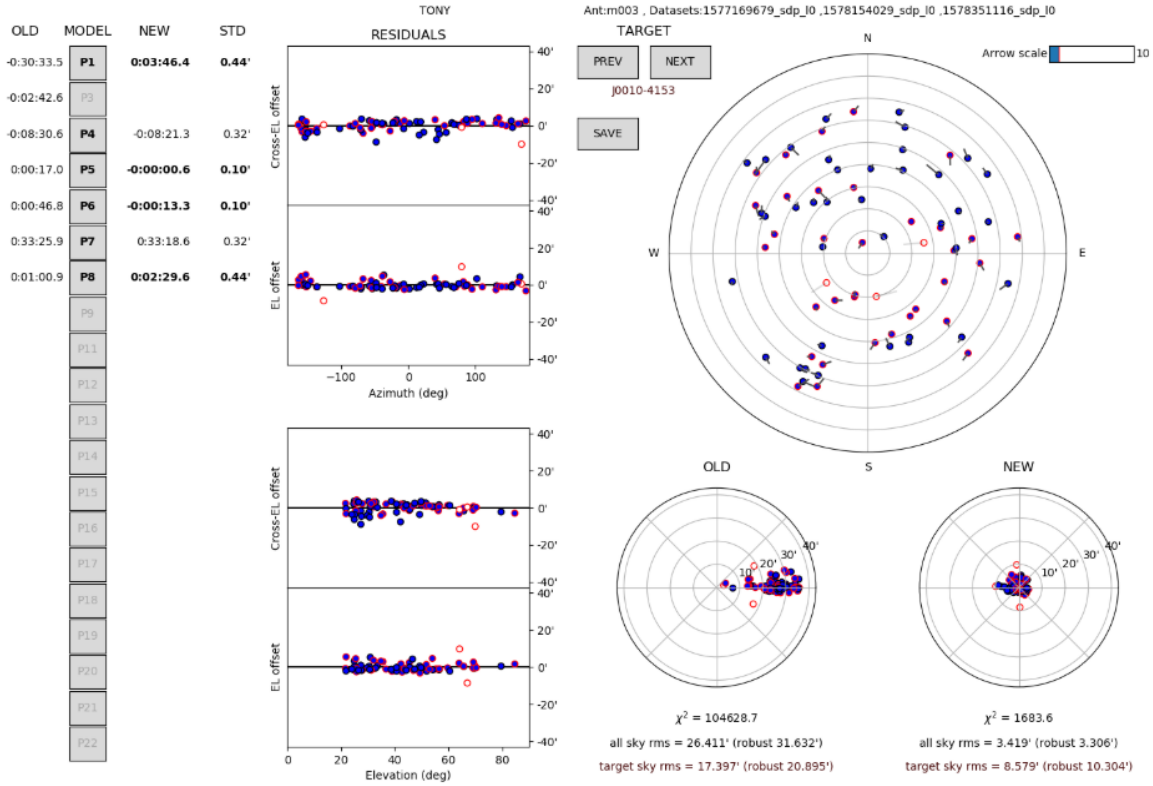
Latest pointing had been done on 18 December 2019 (SB ID: 20191218-0002). Unfortunately this had been done a few hours before the pull request had been merged. So another pointing had been scheduled to run on 2019-12-24 (SB ID: 20191224-0003).

SB ID: 20191224-0003 2019-12-24:



Looks like there was not much of an improvement on M003.

Tony combined the datasets from 3 pointings that ran afterwards and produced plots with a greater sky coverage as can be seen on the big plot .

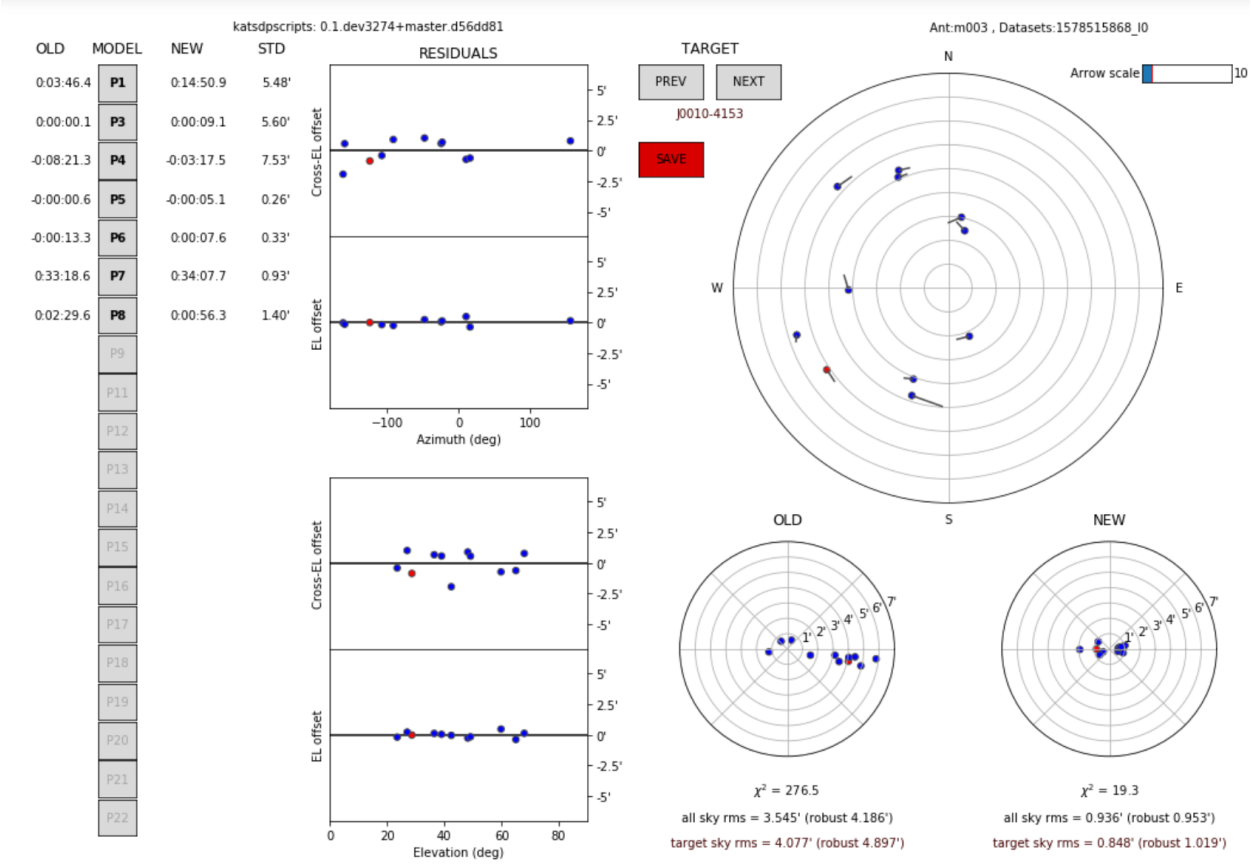


The pointing models were updated on github using these datasets.

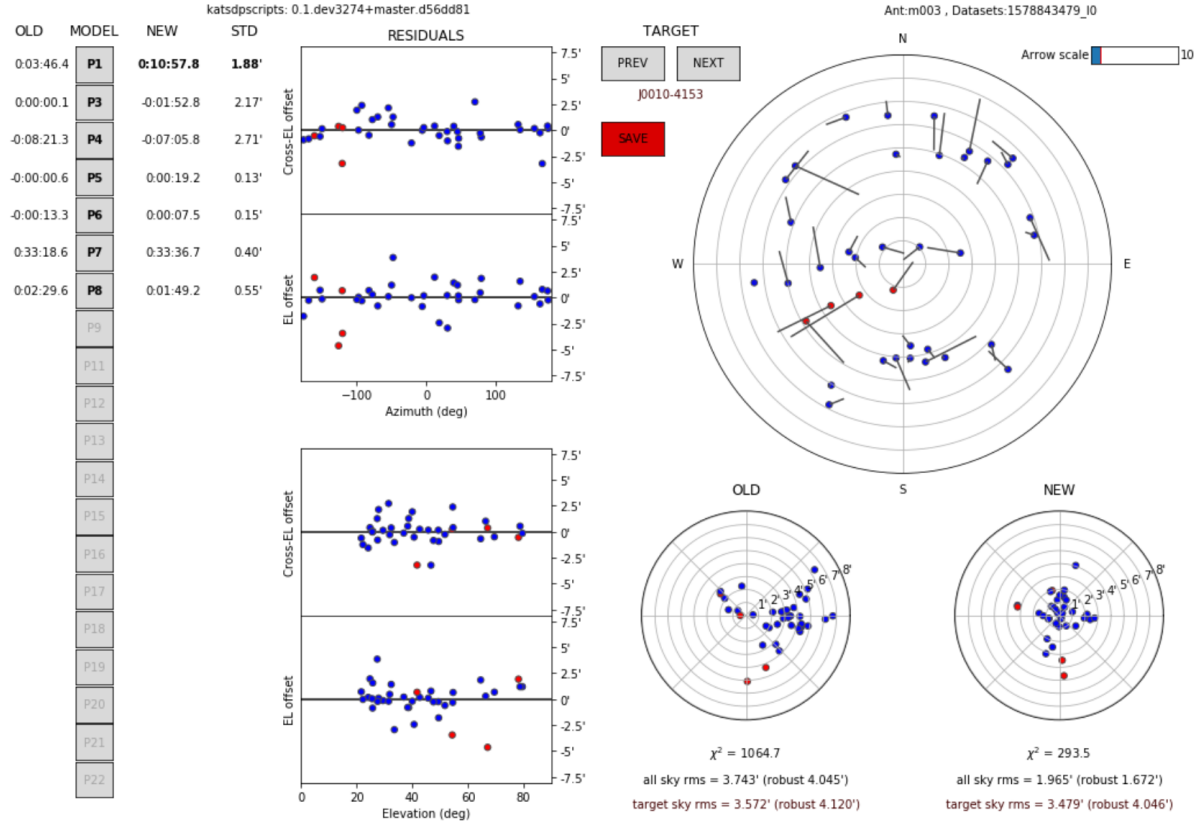
https://github.com/ska-sa/katconfig/pull/987

SB: 20200108-0034 2020-01-08:

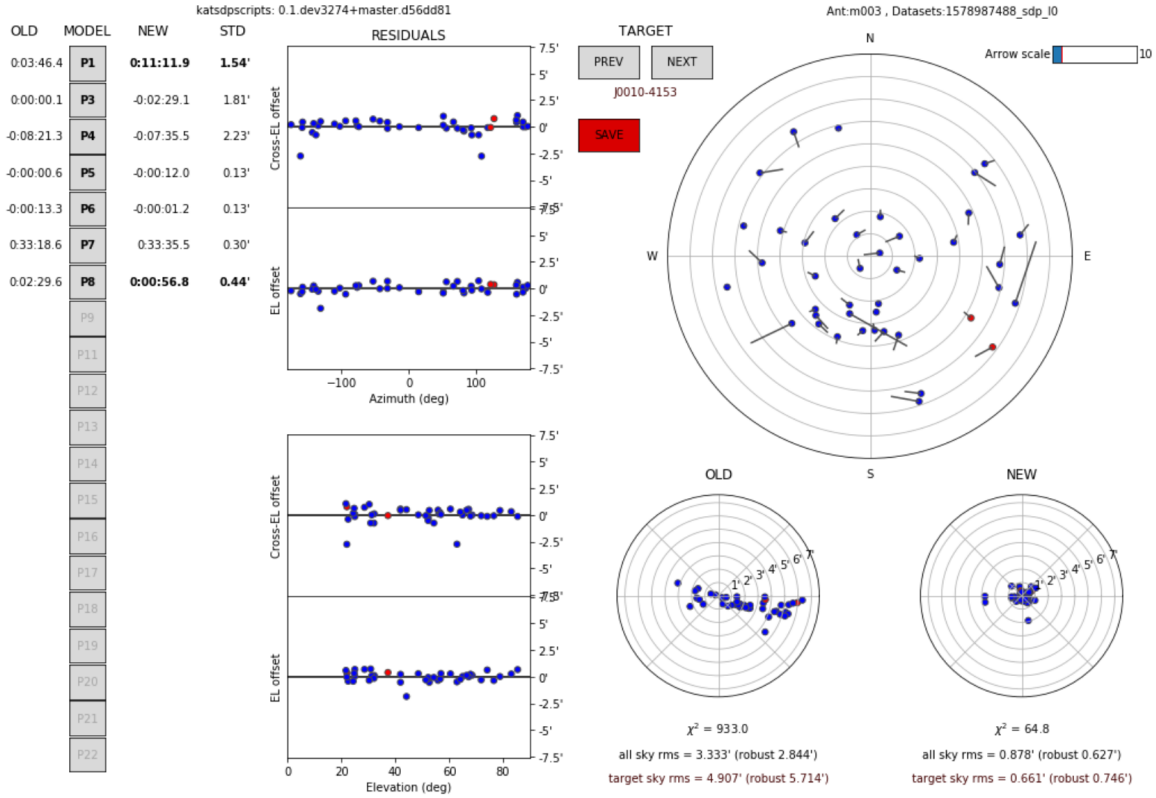
Plots show an improvement for M003.



SB: 20200112-0013 2020-01-12:



SB ID: 20200114-0002 2020-01-14



SB ID: 20200117-0004 2020-01-17