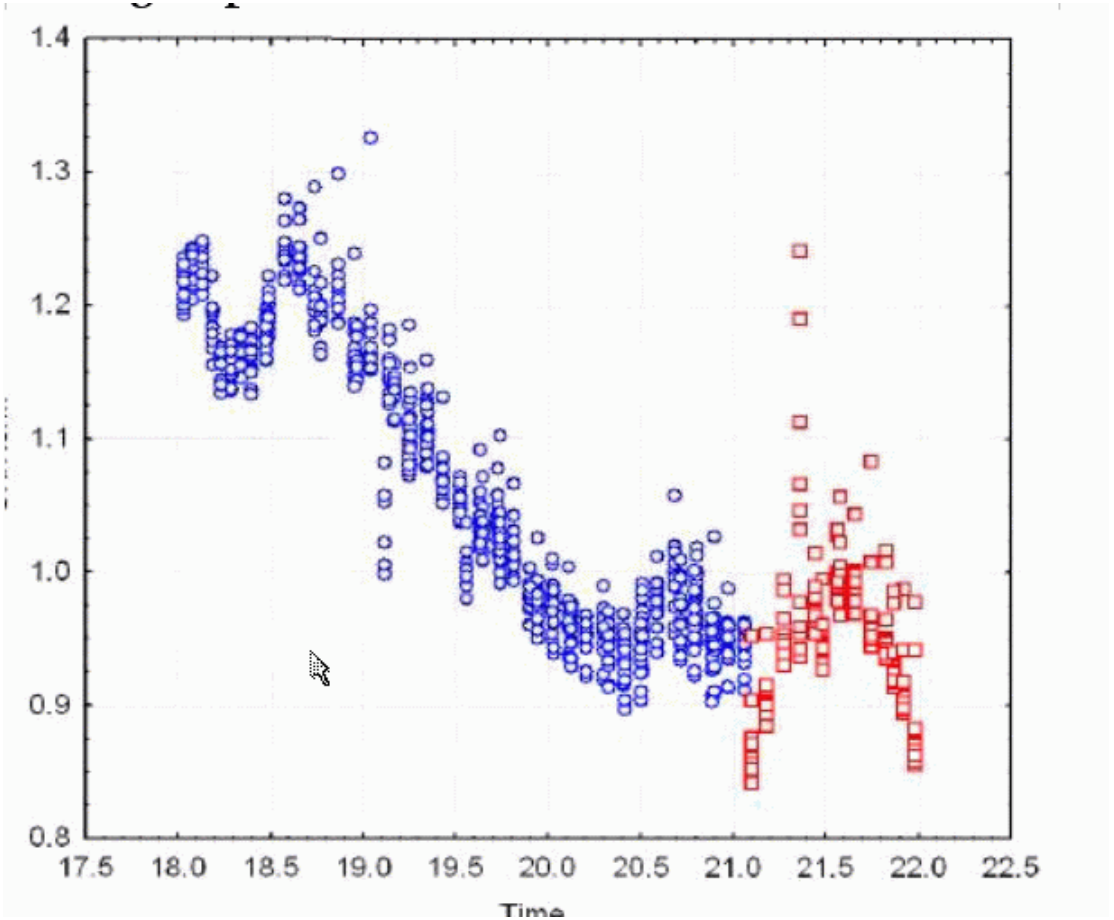
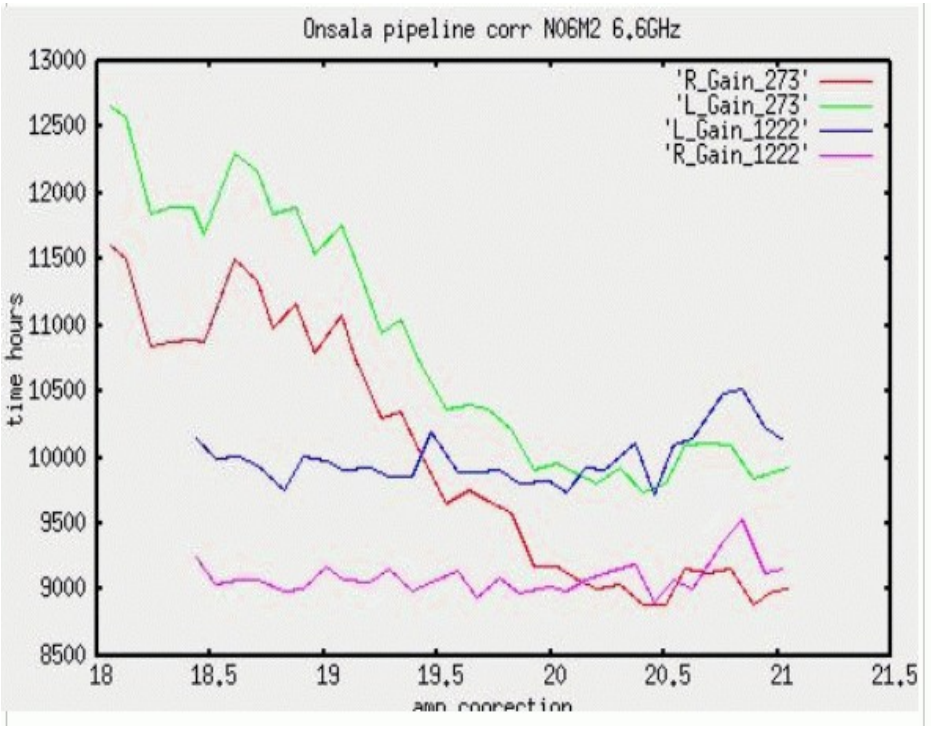
Calibration : pipeline (N06M2)

- Michael Lindquist saw a change of selfcal amplitude correction during an experiment, reported by JIVE pipeline:



Changes to Pipeline analysis N06M2

- Adjusted calibration of individual stations for consistency
- separate calibration of 3C273 and 1222+037. (1222 less resolved than 3C273)
- different correction curves seen for the two sources.
- Looks like the structure of 3C273 is messing up corrections. Parameters of mapping could be adjusted, or use difmap in pipeline.



Are pipeline scale corrections OK?

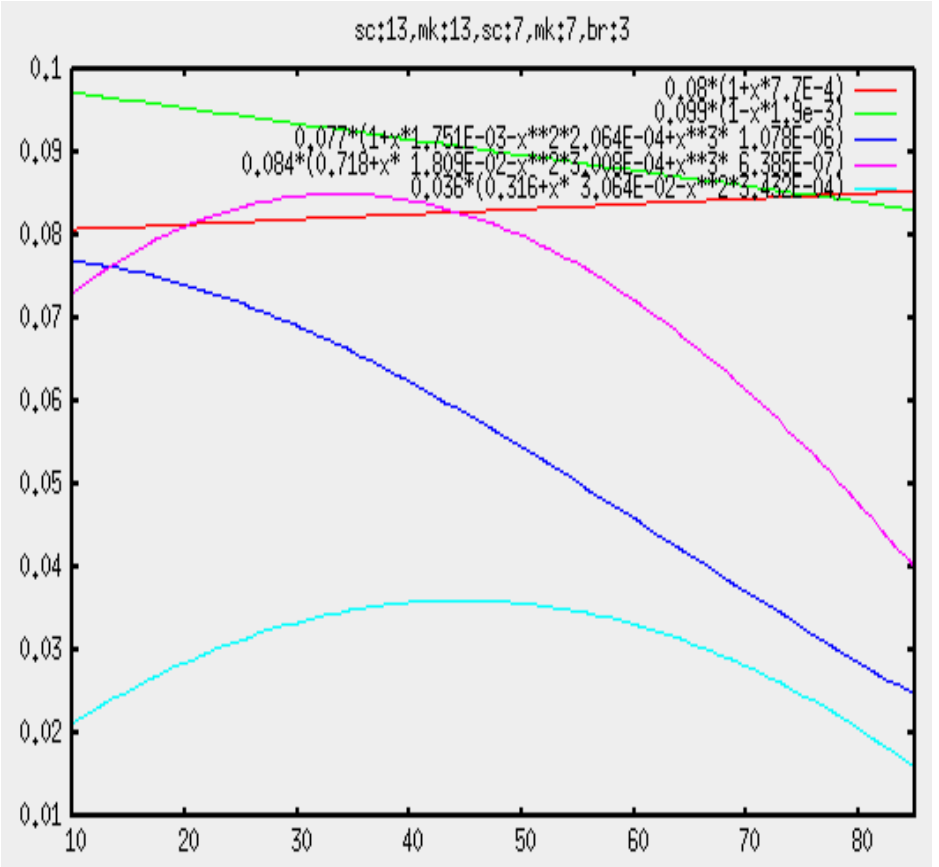
- Question: does weighting favour large stations? If so, then large antennas will always be reported as well-calibrated, real errors on large stations wrongly be reported as from small stations.
- Experiment: on N06M2 data, changed calibration of Effelsberg data by 33% by changing assumend 1.5K/Jy to 1.0 .
- Result: AIPS selfcal reports a calibration error of only a few percent on all the stations, which is rather surprising:
- With nominal calibration, corrections are:
  EF 1.02 WB 0.91 JB 1.17 ON 1.00 MC 1.00 NT 0.99 TR 1.01 HH 0.98
- With Effelsberg calibration scale changed by 33% :
  EF 0.98 WB 0.92 JB 1.21 ON 1.02 MC 1.03 NT 1.02 TR 1.04 HH 1.01

Alternative mapping: difmap

- pipeline using difmap possible: www.phys.unm.edu/~gbtaylor/VIPS/
- Using phase selfcal followed by 'gscale' in difmap gives a singe correction for one source all through the experiment. The derived corrections seem better than those from AIPS.
- For instance the N06M2 example in which Effelsberg cal is intentionally given a wrong gain (1.0 instead of 1.5K/Jy) leads to gscale results:
  DA : 0.84 EF: 0.88 WB:1.03 JB: 1.03 ON:1.01 MC: 0.96 NT:1.03 TR :1.12 HH:1.09
- The scale is rather distorted because Darnhall has no calibration, however gscale has done approximately the right thing for Effelsberg, with a 14% correction, the rest of the correction has probably been distributed over the other stations.

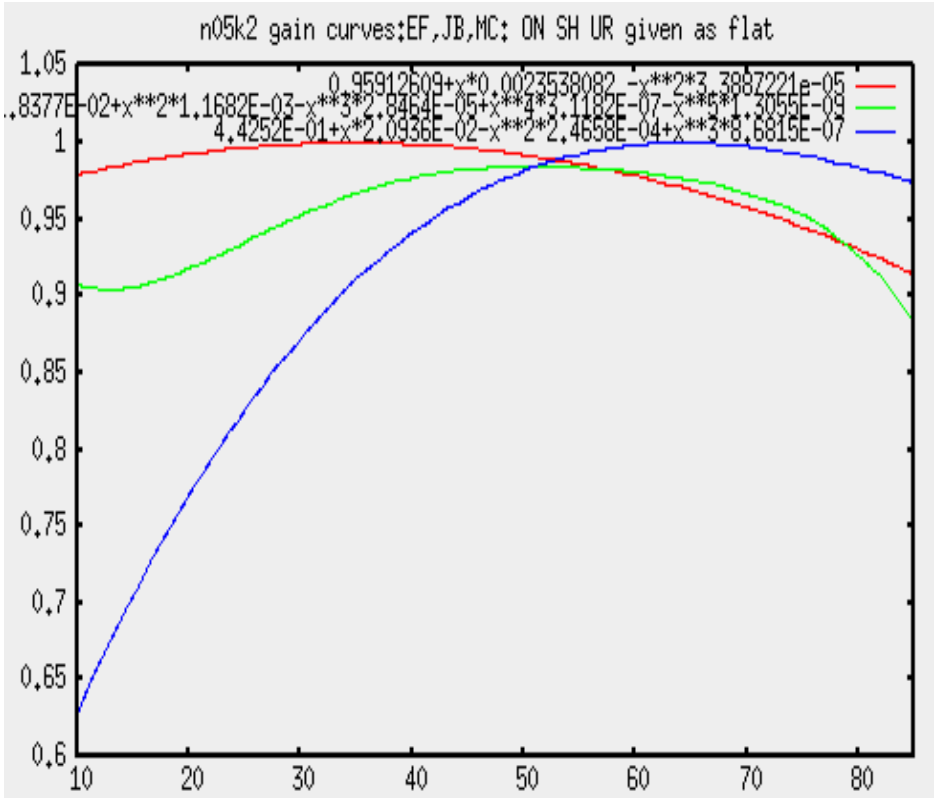
Opacity: cal at 22GHz

- VLBA gain curves are opacity-corrected, as if taken outside atmosphere.
- AIPS task APCAL can be used to estimate Trec and tau from Tsys and local weather
- PI s do not use it < 10GHz
- Procedure described by Leppänen in VLBA scientific memo #1



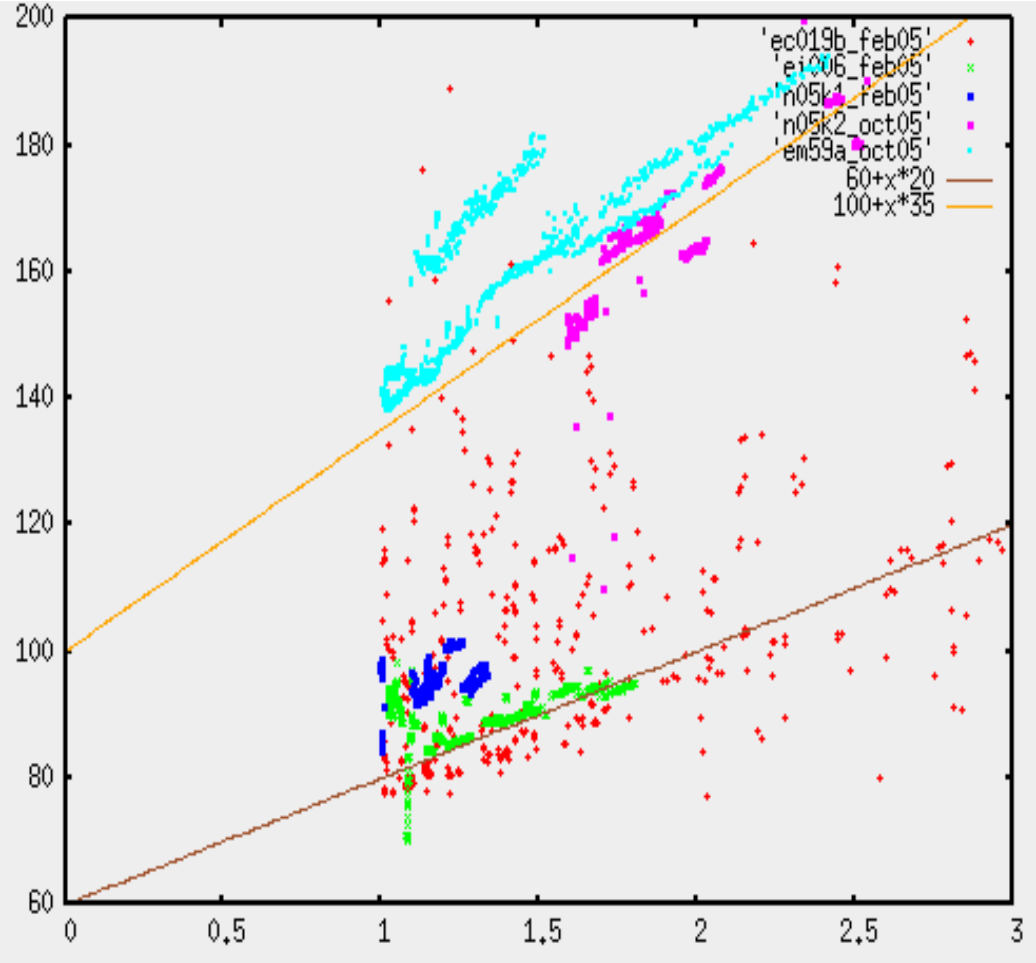
EVN K-band curves

- EF,JB,MC curves, ON,SH UR given as flat. EF and JB give opacity-corrected
- looks like MC curve includes opacity



Typical Tsys against Airmass

- Here Tsys is shown for Effelsberg against airmass
- Two families of curves: feb05 and oct05, colder in february so less absorption
- These curves could be used to calibrate opacity using APCAL
- BUT why is Trec (Tsys at 0 airmass) different...?



Onsala calibration

- At K band and above, Onsala uses hot load for calibration.
- If sky is same temperature as hot load, then atmosphere absorbs completely, antabfs then reports infinite Tsys.
- Therefore for Onsala, Tsys values , taken with opacity-corrected gain curve, are already corrected for opacity for each moment in the observation. (see Ulich and Haas ApJ supplement 30,247)

What should other stations do ?

- Ideally, the stations using noise-adding Tsys measurements, including VLBA should be corrected for opacity by the PI using APCAL.
- Probably many PI s will not do this.
- But it is also unrealistic to expect stations to correct their Tsys values for opacity.
- This is not a big problem with line measurements which can be calibrated using the autocorrelation spectra.

VLBA terminals 80Hz cal

- Current status: code in local version of FS 9.7.7
- All integration in BBCs, 1 sec for on/off, 10 sec tpicd
- tpicd given as ratio of cal to Tsys
- recoding needed to incorporate this in a more modular structure, also for digital BBCs
- Using onoff, get Tcal about 5% lower than standard because of blanking, but this has equal effect on experiment cal.