

A new term for the Effelsberg pointing model

Uwe Bach, May 22, 2009

During pointing observations under very good weather condition a noticeable sin-wave was observed in the residual pointing offsets that were not corrected by our current pointing model (see Figs. 1 & 2). The current pointing model is documented on the Effelsberg web page under “advanced topics”.

Just by testing possible correction terms and by searching through various documented pointing models a term was found that fits those residuals and is used e.g, for pointing correction in the VLBI Field System pointing model. The terms are elevation corrections and have the following form:

$$\Delta elv = P19 \cdot \cos(8 \cdot elv) + P20 \cdot \sin(8 \cdot elv) \quad (1)$$

The terms are additive to the current pointing model and were found to fit the residual pointing offsets quite well. The current values of $P19$ and $P20$ are 2.45 arcsec and 2.78 arcsec, respectively (see Figs. 3 & 4). They were found by averaging the fitted values of $P19$ and $P20$ from several different prime focus and secondary focus pointing observations, to make them as common as possible. Using this correction the typical RMS of NULE goes down from about 4.8 arcsec to 3.5 arcsec. This is a substantial improvement. Therefore the term was implemented in the Effelsberg pointing model on May 5, 2009.

Fit of pointing functions (old model)

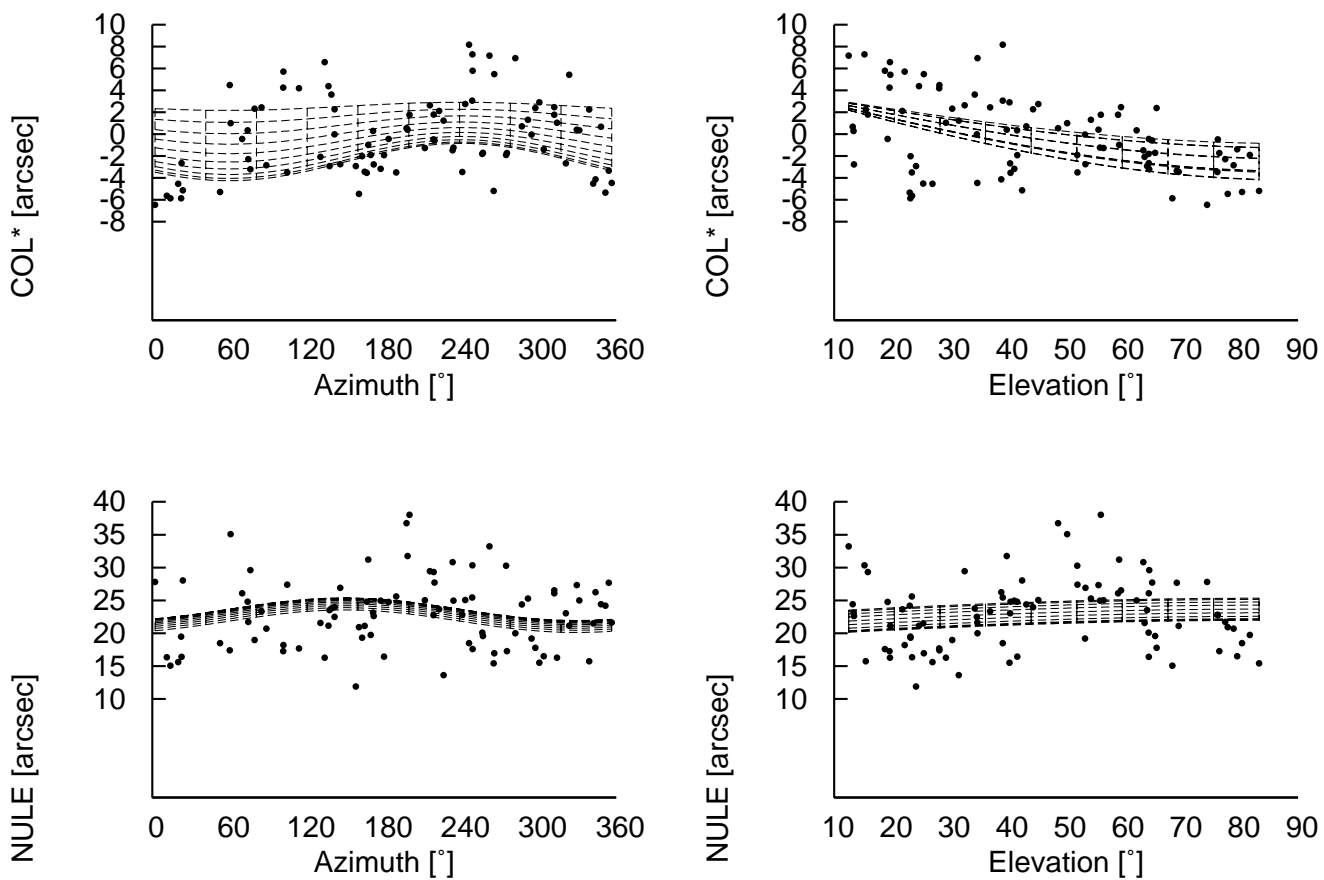


Figure 1: Observations and fitted corrections using the parameters of the old pointing model.

Pointing results with old model

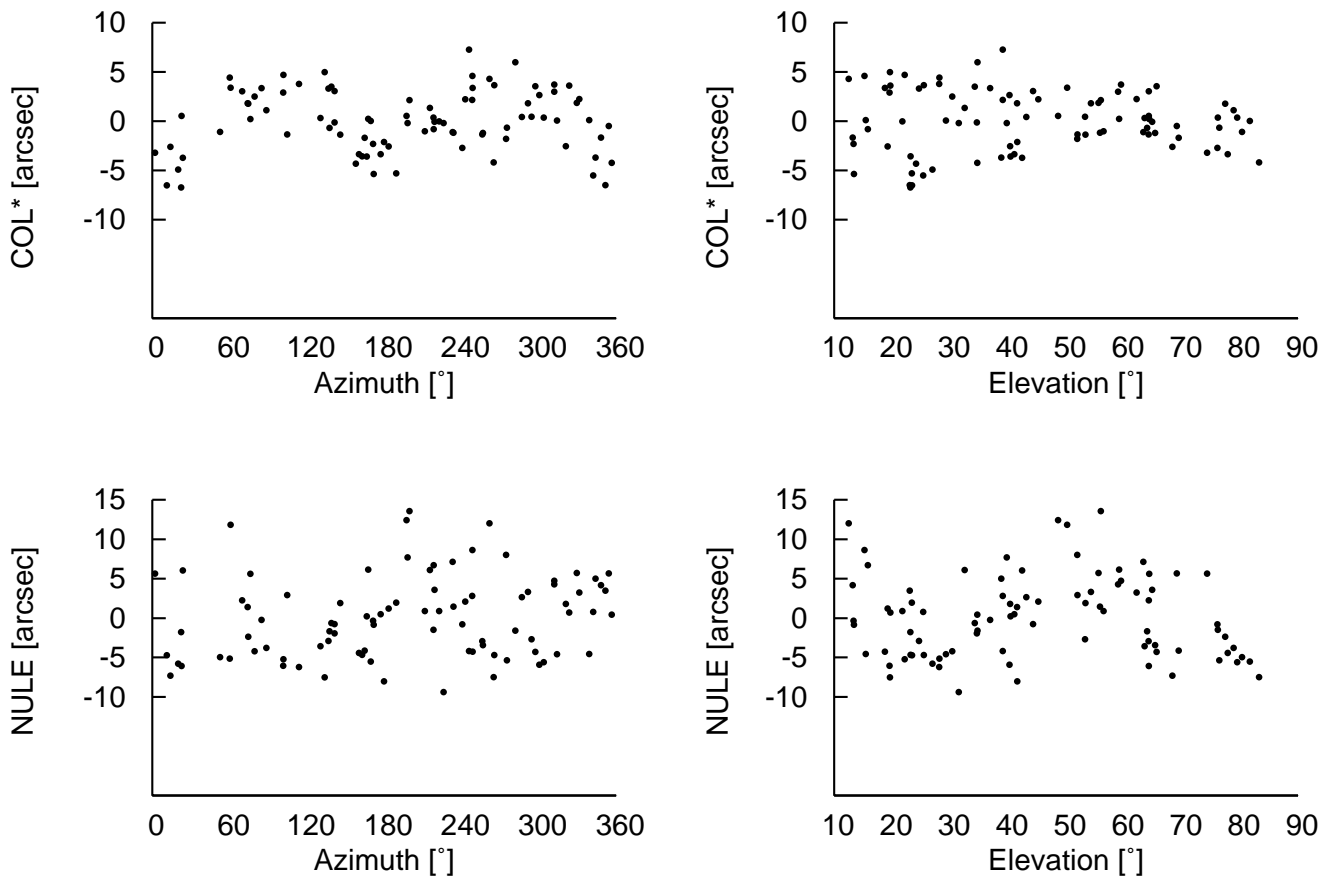


Figure 2: Observations correct by the fitted parameters of the old pointing model.

Fit of pointing functions (new model)

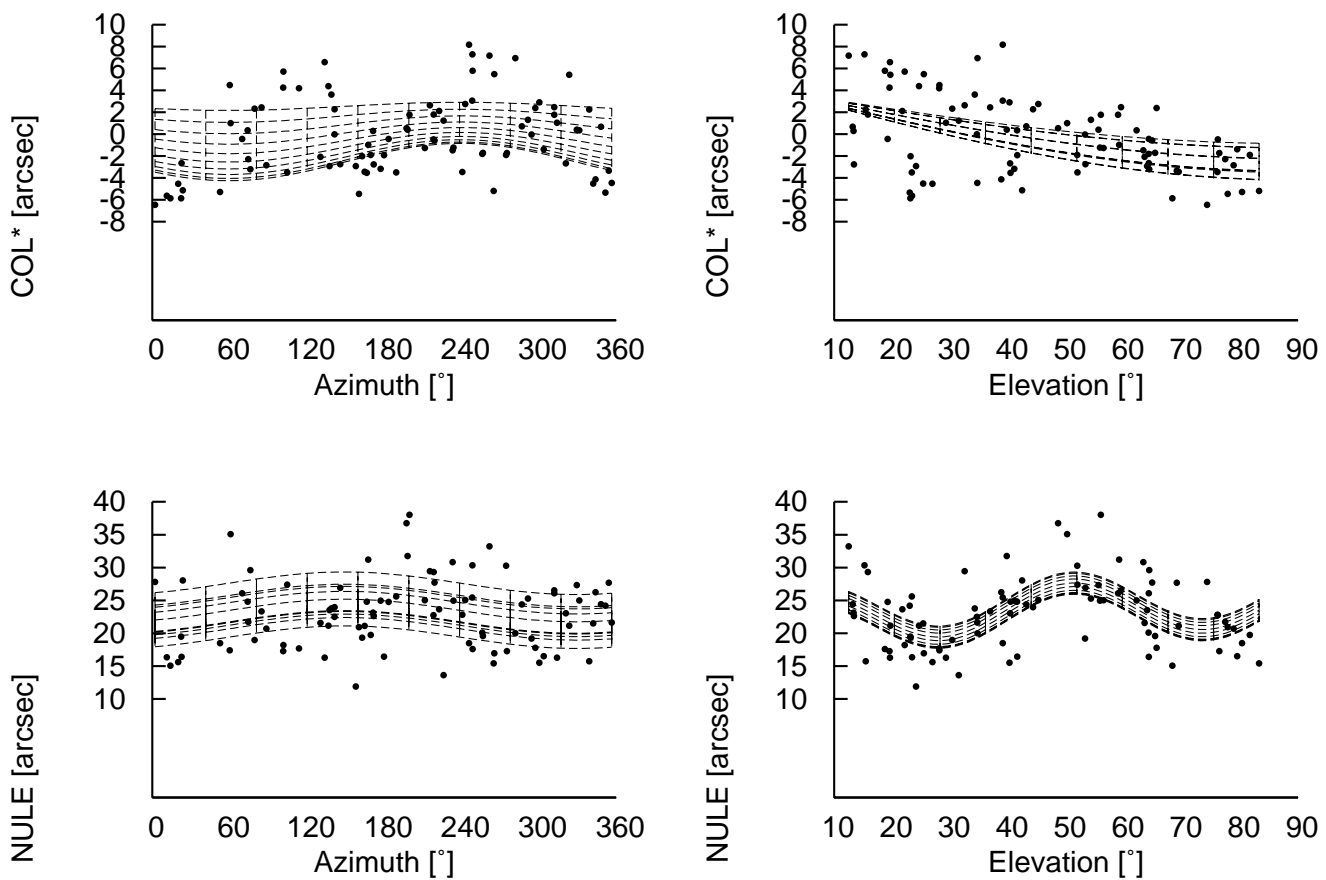
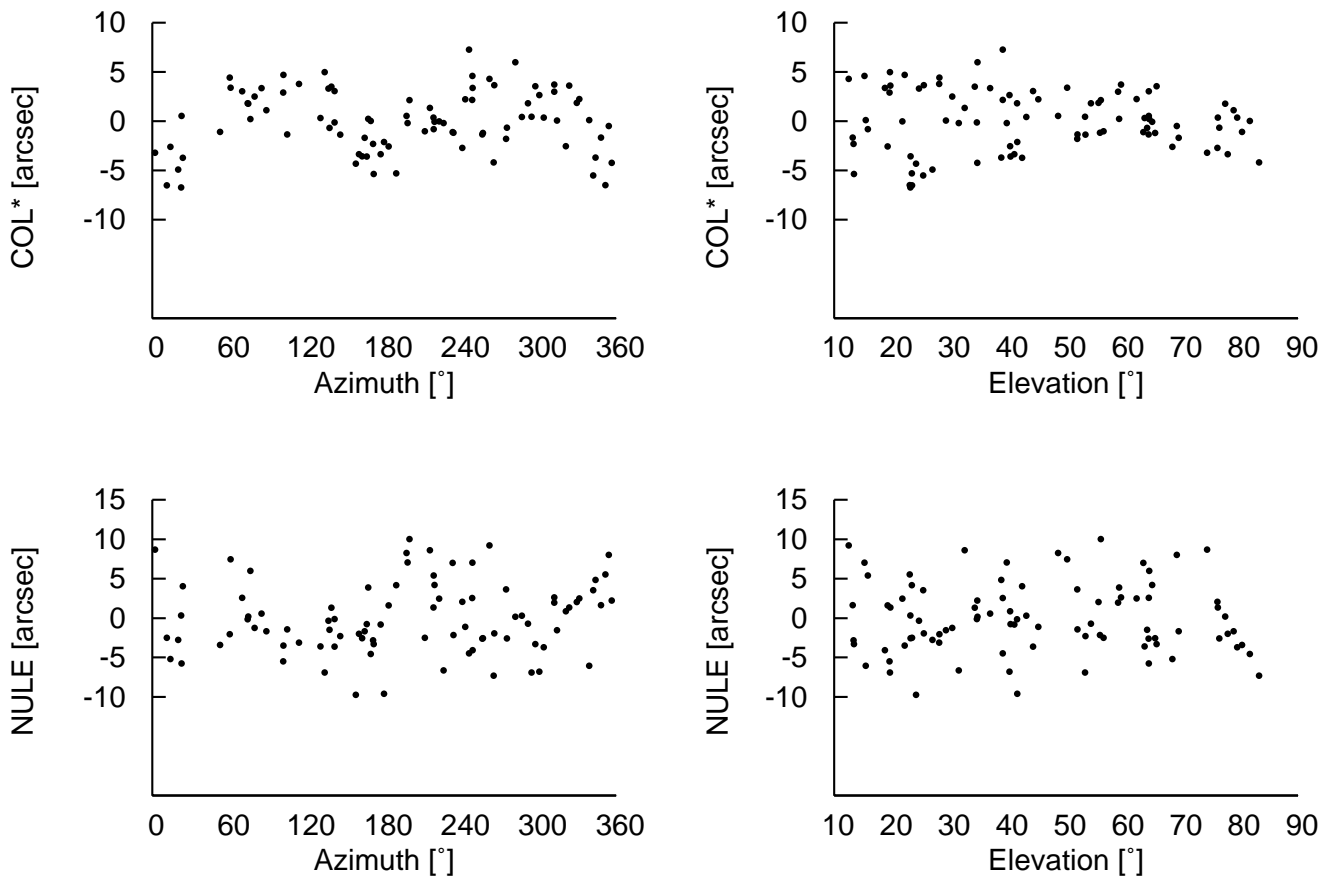


Figure 3: Observations and fitted corrections using the parameters of the new pointing model.

Pointing results with new model



5

Figure 4: Observations correct by the fitted parameters of the new pointing model.