2D noise power spectrum for various instrument configurations

2015.10.08

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The observed sky map for transit telescope

$$\widehat{\mathcal{I}}(l,m) = (N^{-\frac{1}{2}}A)^{-1}N^{-\frac{1}{2}} \times \widetilde{\mathcal{V}}_{ij}^{\delta_k}(m)$$

The estimated sky Alm

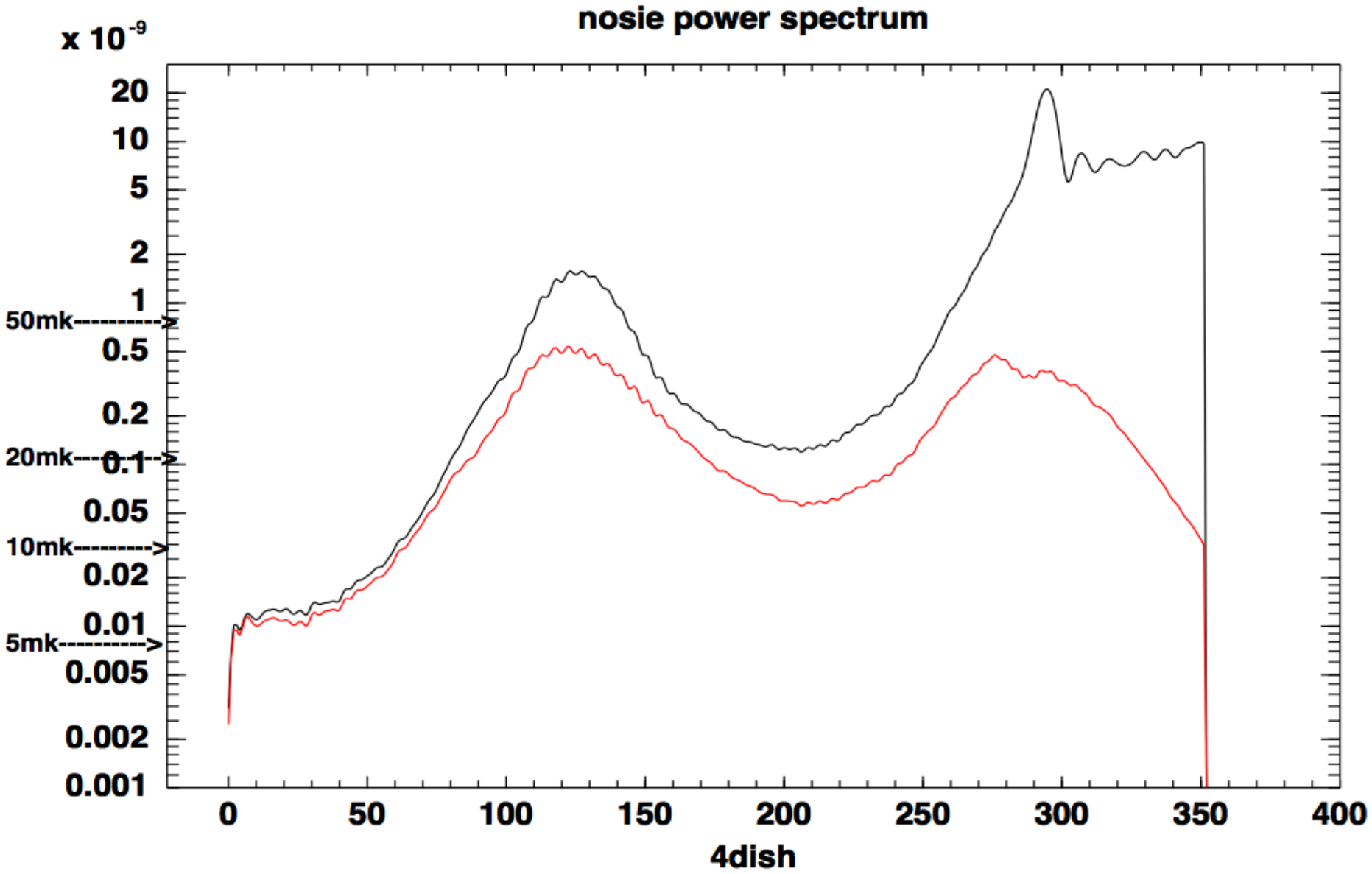
Noise weighted pseudo-inverse: beam pattern, Scan strategy, instrument configuration

Spherical harmonics of Visibilities

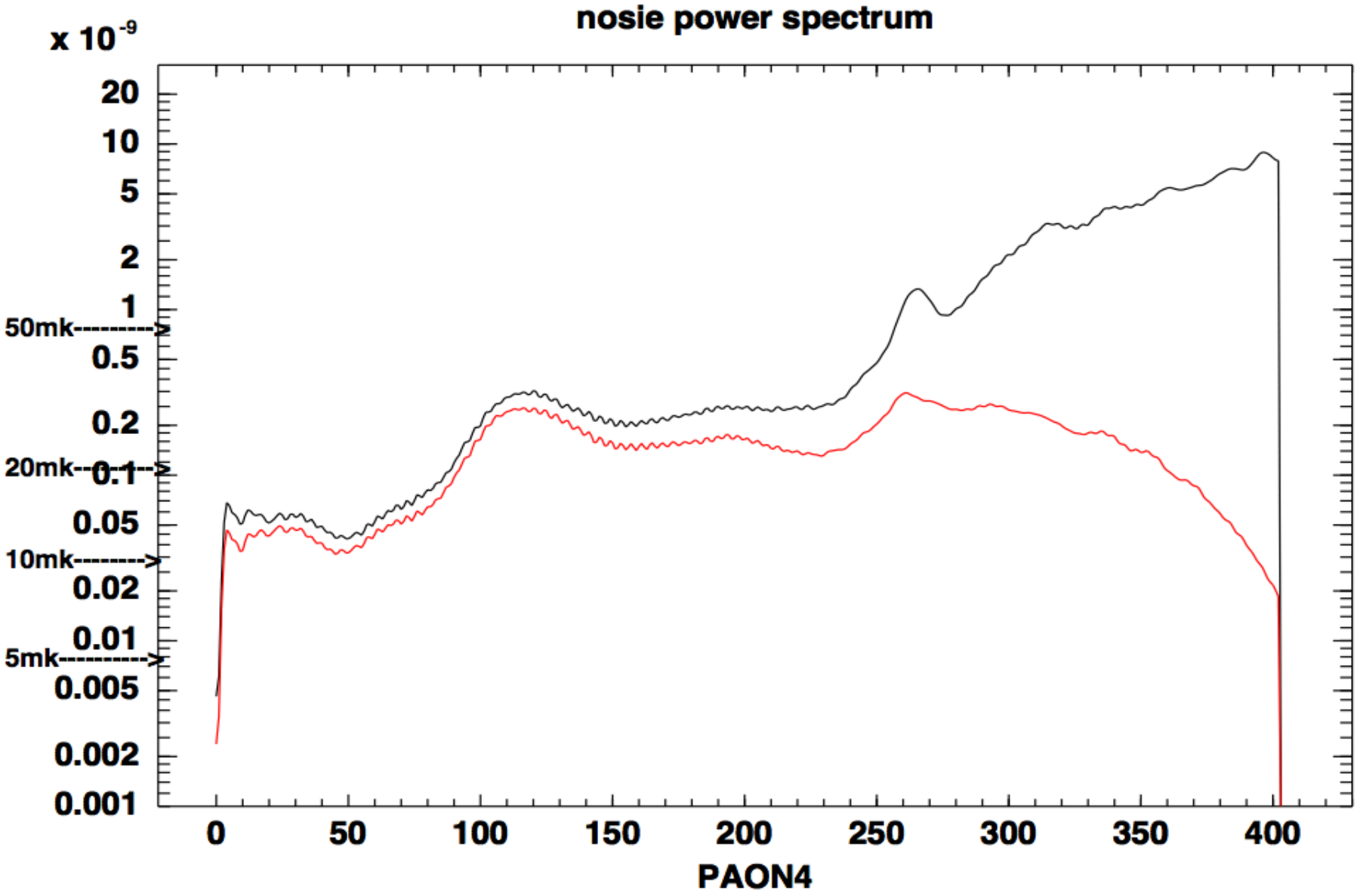
Noise power spectrum from pure noise visibilities

$$C(l) = < Alm \times Alm^* >_m$$

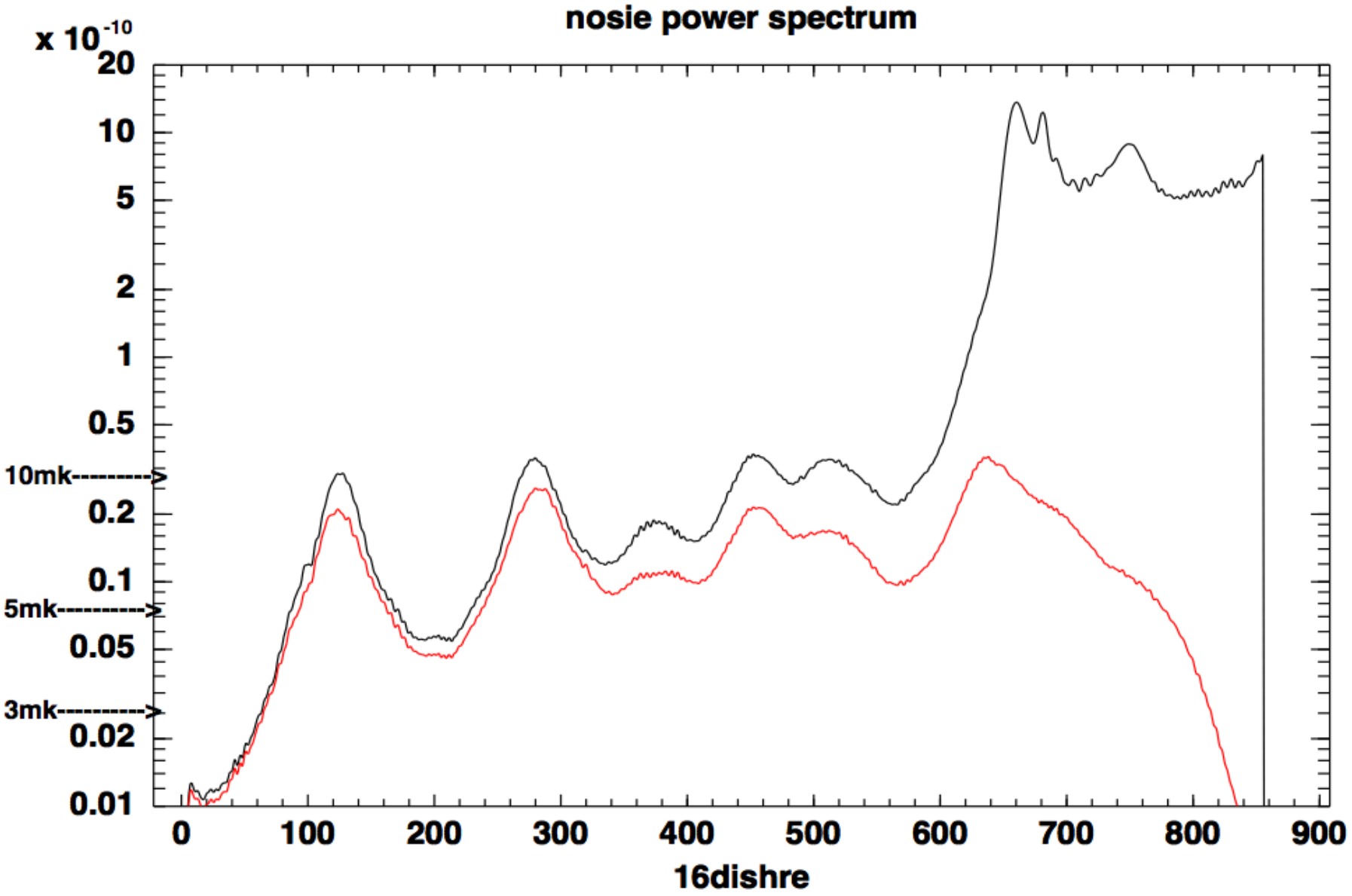
Reconstructed noise power spectrum (after map-making) for 2x2, D=5m @ 1400 MHz, 9 scans, 1 degree step in declination



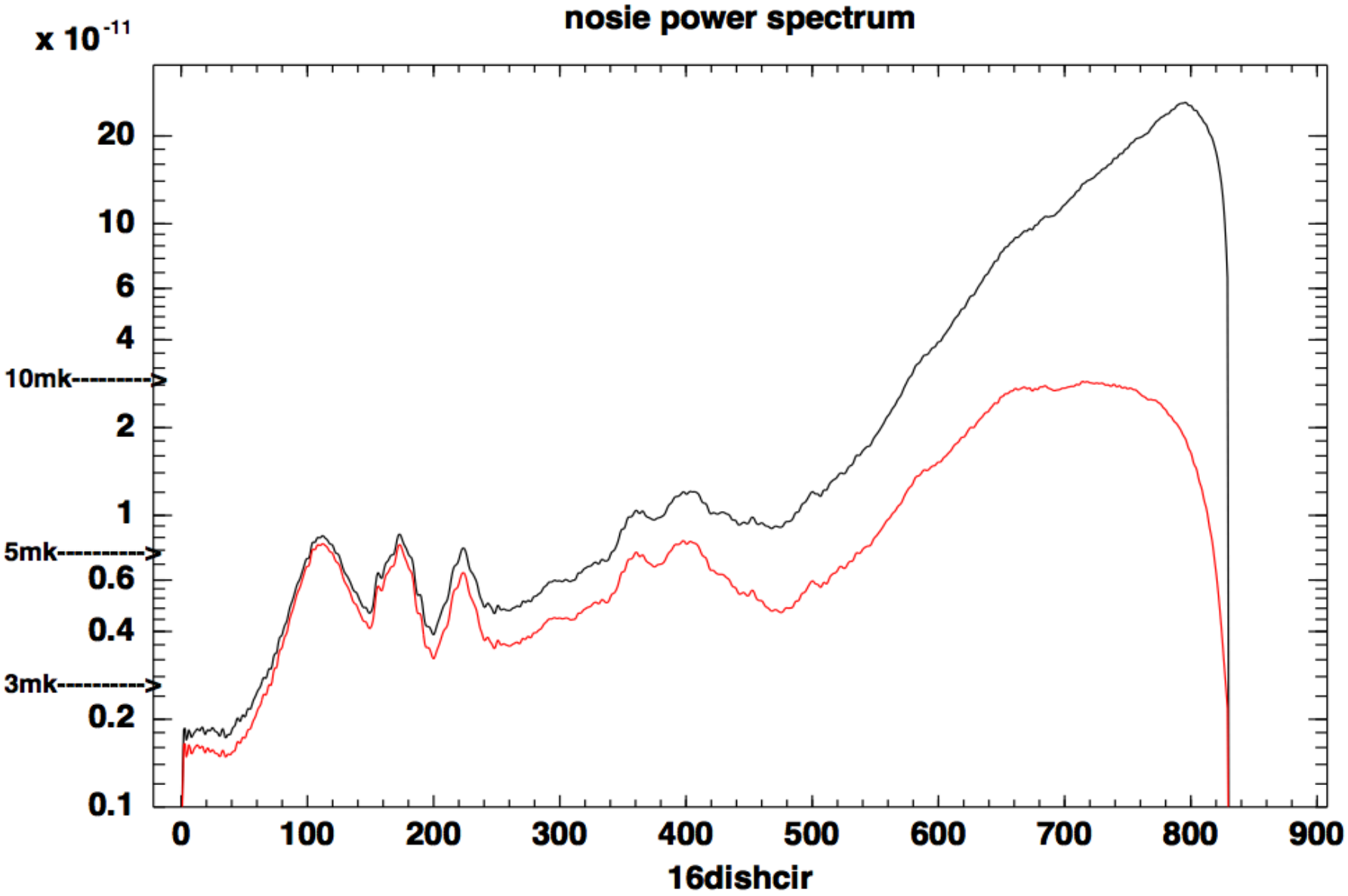
Reconstructed noise power spectrum (after map-making) for PAON4, D=5m @ 1400 MHz, 9 scans, 1 degree step in declination



Reconstructed noise power spectrum (after map-making) for 4x4, D=5m @ 1400 MHz, 9 scans, 1 degree step in declination



Reconstructed noise power spectrum (after map-making) for Tianlai, D=5m @ 1400 MHz, 9 scans, 1 degree step in declination



Conclusions

- The noise visibilities are different for auto-correlation and cross correlation, which is Hermitian conjugate for auto-correlation
- The noise power spectrum are lower for larger instrument.
- Rejecting large error mode and applying global beam could reduce noise power spectrum property.