

DEUTERIUM ARRAY MEMO #051

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To: Deuterium Array Group

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Subject: Summary of RFI mitigation method for D1 array

1] Transient excision

Events that are detectable in the 8 sigma level in the 100 second integration of the RFI monitor or at the 500 second integration of the separate polarization of each array are transient and these time spans are excluded from the post processing array integration. Continuum transients are detected from statistically significant curvature deviation in the spectrum (see memo #49). Both the individual element channels and the average of all the channels in the RFI monitor and each polarization of each station are tested for transients.

2] Spectral exclusion

Spectral exclusion is based upon spectral features which exceed the 8 sigma level in each days integration from the RFI monitor and the array stations. As with the transients both the spectra of the individual dipoles and the average of all the channels of the RFI monitor and each polarization of each station are examined for detectable spectral features. On a daily basis the spectral channels with detectable signals are downweighted in the spectral smoothing. In order to account for small frequency differences between stations and the RFI monitor at the 100 Hz (300 parts per billion) level, frequency channels adjacent (244 Hz away) to the channels with detected signal are also downweighted.

3] Justification for finding transients and spectral RFI signals in individual antennas.

Most of the RFI sources, except those from the sky, are heavily multipathed. In a multipath environment signal strengths vary spatially with a lognormal distribution. Typical standard deviation is between 6 and 12 dB. The large variation of signal strength is sufficient so that a particular RFI source may be detected in an individual antenna element and not in the average despite the lower noise level in the average.