RFI Mitigation Through Prediction and Avoidance

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1. Extended Abstract

Low frequency radio sites are susceptible to radio frequency interference (RFI) from a vast array of man-made interferers. To select the most suitable sites, astronomers try to steer clear from populated areas for that reason. On occasion, however, anomalous propagation leads to signals from far away population centres impinging on these otherwise radio quiet sites. Using an array of bespoke software and receivers, we have characterised the site of the Murchison Radio Observatory (MRO) [1] in remote Western Australia (WA) during times when anomalous propagation (also known as "ducting") was active. This is the same site where the Australian Square Kilometre Pathfinder (ASKAP) [2] is now in early science operations. This is also the future site of the Australian contribution to the Square Kilometre Array (SKA) telescope. We describe the setup of the RFI system used to track all known emitters providing location information, including terrestrial mobile communications, aviation, rail, marine, and space based transmitters, all of which are used to detect and analyse anomalous propagation events and cross correlate the data with meteorological model and observational data. We discuss integration of these data into a tropospheric ducting situation report that is presented in a concise manner to the telescope operators and is exposed as an Application Programmable Interface (API) to the Telescope Operating System (TOS) at ASKAP to allow adaptive scheduling for observations that are least affected by the predicted radio propagation conditions.

2. References

1. B. T. Indermuehle, L. Harvey-Smith, C. Wilson and K. Chow, "*The ASKAP RFI environment as seen through BETA*," 2016 Radio Frequency Interference (RFI), Socorro, NM, USA, 2016, pp. 43-48.
2. Johnston S., et al, "*Science with the Australian Square Kilometre Array Pathfinder*". Publications of the Astronomical Society of Australia 24, 2007, 174-188.