

SETI stands for the search for extraterrestrial intelligence. We look for technosignatures that suggest the existence of ET. These signals are thought to be narrow in frequency bandwidth and drifting in time and in frequency due to Doppler accelerations between the transmitter and the telescope. In this project, we use a very sensitive radio telescope array in South Africa called MeerKAT, which consists of 64 antennas. The [Breakthrough Listen Initiative](#) has provided funding to support a dedicated SETI backend which enables 24/7 commensal observations on two receivers (L-band and UHF-band).

Radio frequency interference (RFI) is radio waves emitted from human technologies. To determine the RFI contaminated region within the bandwidth of MeerKAT, I developed an [algorithm](#), using the [peakutils](#) Python package and the [spline fitting](#) algorithm to remove the baseline of the power spectrum of each observation and identify RFI above a certain threshold. Subsequently, we are able to disregard these RFI affected frequencies from the search. The overall RFI masked for L-band is around 30% and for UHF around 5%.

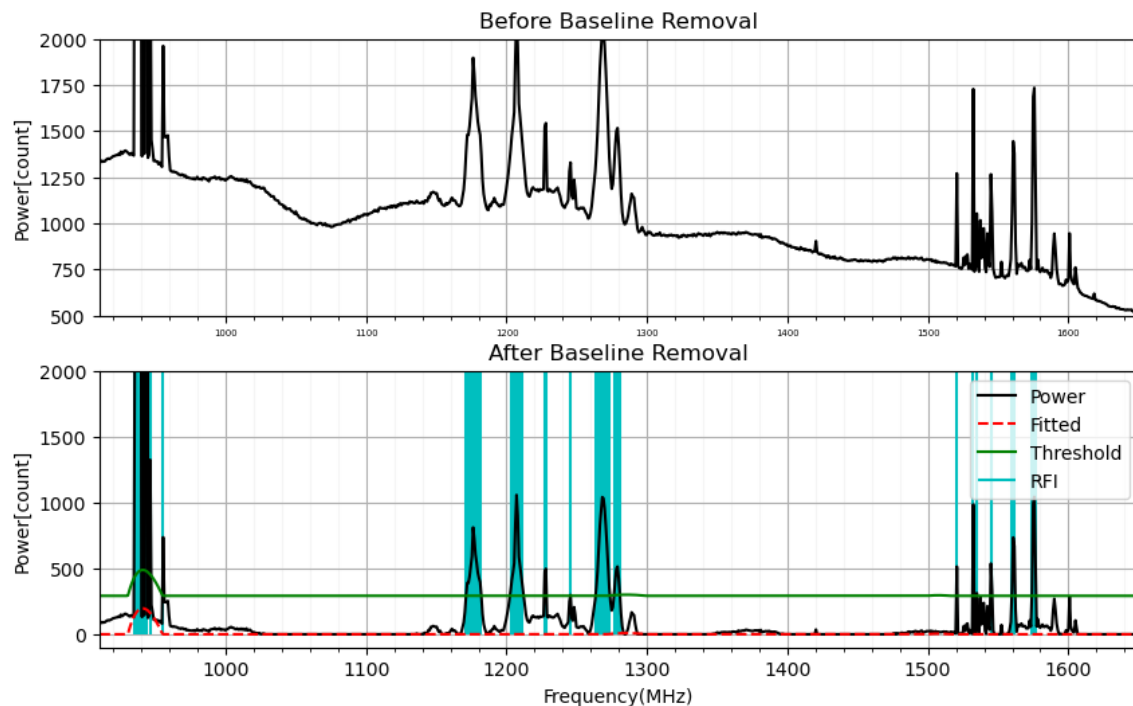


Figure 1. A comparison of a MeerKAT test data taken on 2020-04-08 before and after baseline removal. The red line is the model fitted baseline. The green line is the chosen threshold and the cyan regions are the RFI flagged frequencies.

I have also looked into automating the analysis pipeline with an implementation of the [turboSETI](#) search code, to enable a real-time search for ET using the MeerKAT data and to filter SETI candidates in RFI regions. A few features could be added to this pipeline in the future for a more automated processing. For example, detect when a new observation has been recorded, if so, start the processing and associate any SETI candidates found to the observations in a data base for future comparison. Also, the runtime for this pipeline still needs improving, which can be achieved by using Graphics Processing Unit (GPU) or by increasing the number of Central Processing Unit (CPU) used.