Discussion:

Radio frequency interference (RFI)

2016-12-22

RFI flagging and excision:

- Simple thresholding (flagging)
- Spectral kurtosis (SK; statistical identification, flagging)
- Singular value decomposition (SVD; excision)
- Spectral filtering (flagging):
  Gaussian filtering
  Wavelet thresholding

Data example

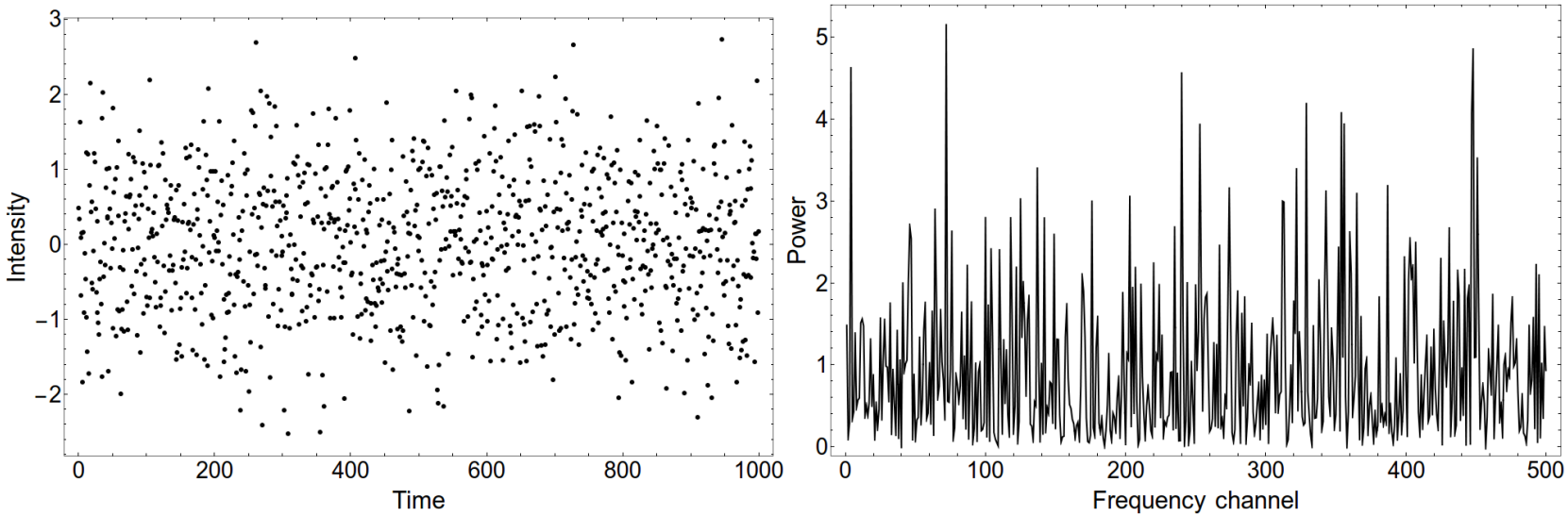

Figure : 1. Original data: Gaussian noise; 2. data PSD.

Data properties

- Post correlation.
- Power spectral densities (PSDs) from time series.
- Power/Intensity (frequency channel, baseline no.)
- Expected data: Gaussian noise based PSDs + RFI.

Simple thresholding

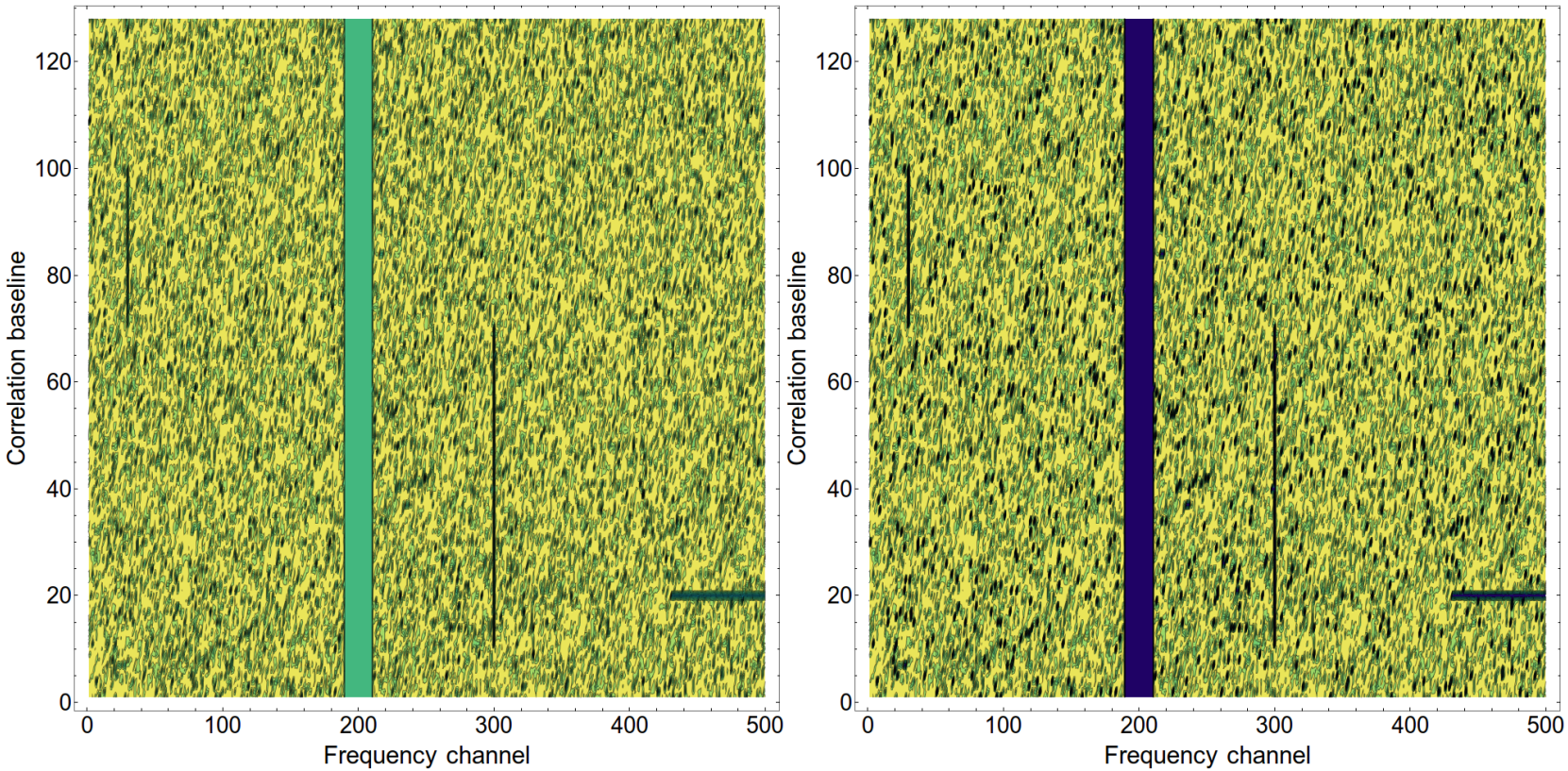

Figure : 1. Original data: Gaussian noise + RFI; 2. Simple threshold based RFI flagging.

Spectral kurtosis

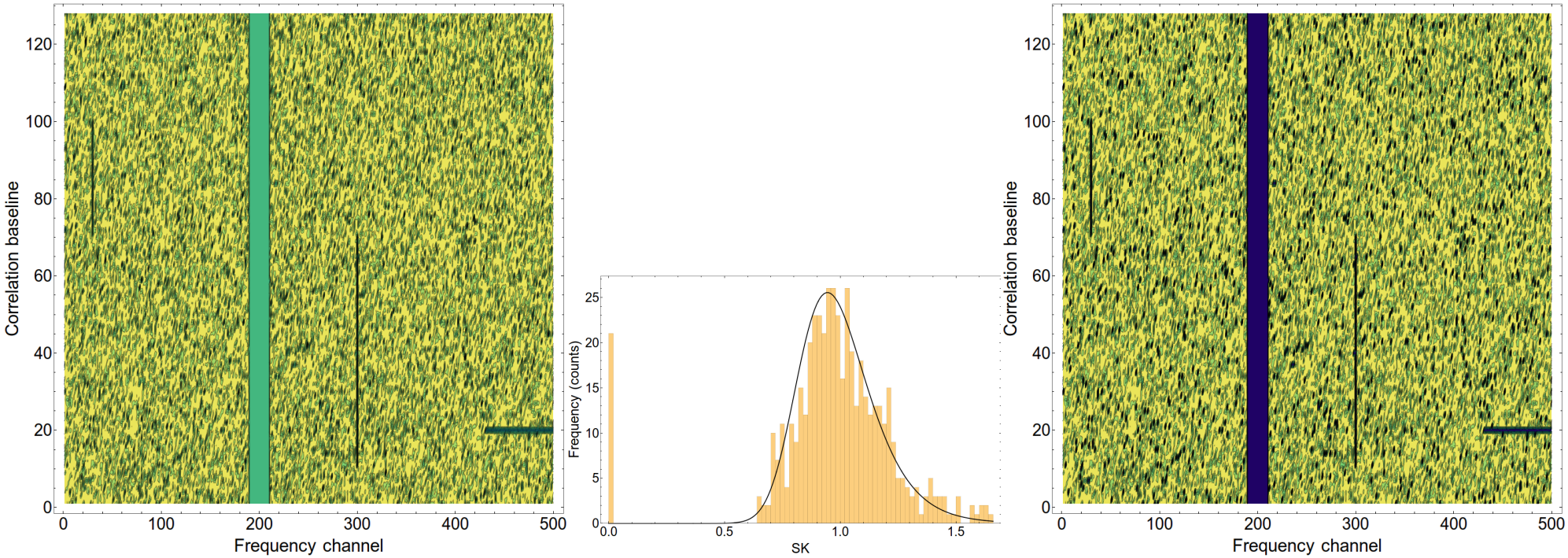

Figure : 1. Original data: Gaussian noise + RFI; 2. Spectral kurtosis distribution; 3. SK based RFI flagging.

Singular value decomposition

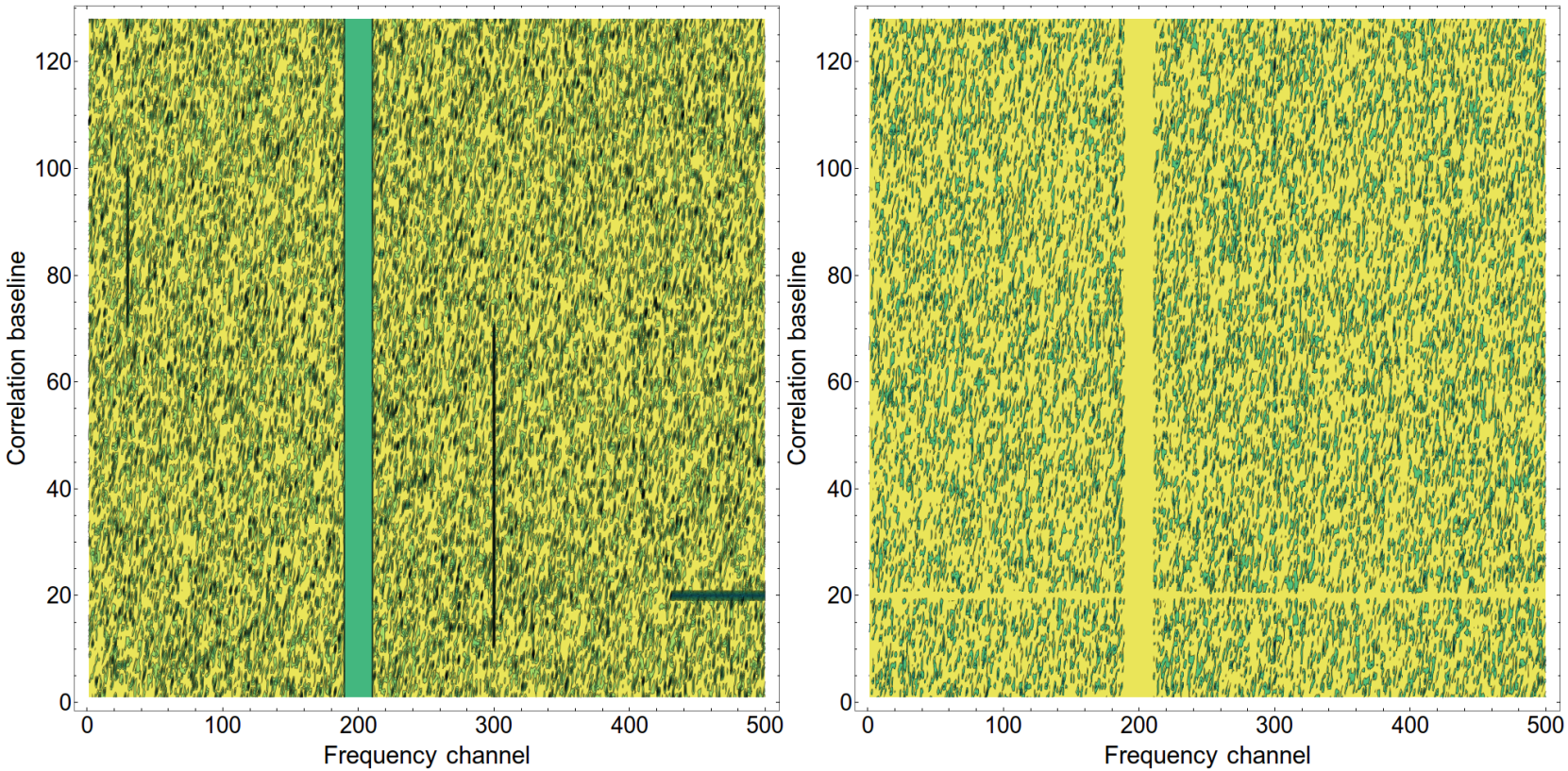

Figure : 1. Original data: Gaussian noise + RFI; 2. SVD based RFI excision.

Spectral filtering: Gaussian filtering

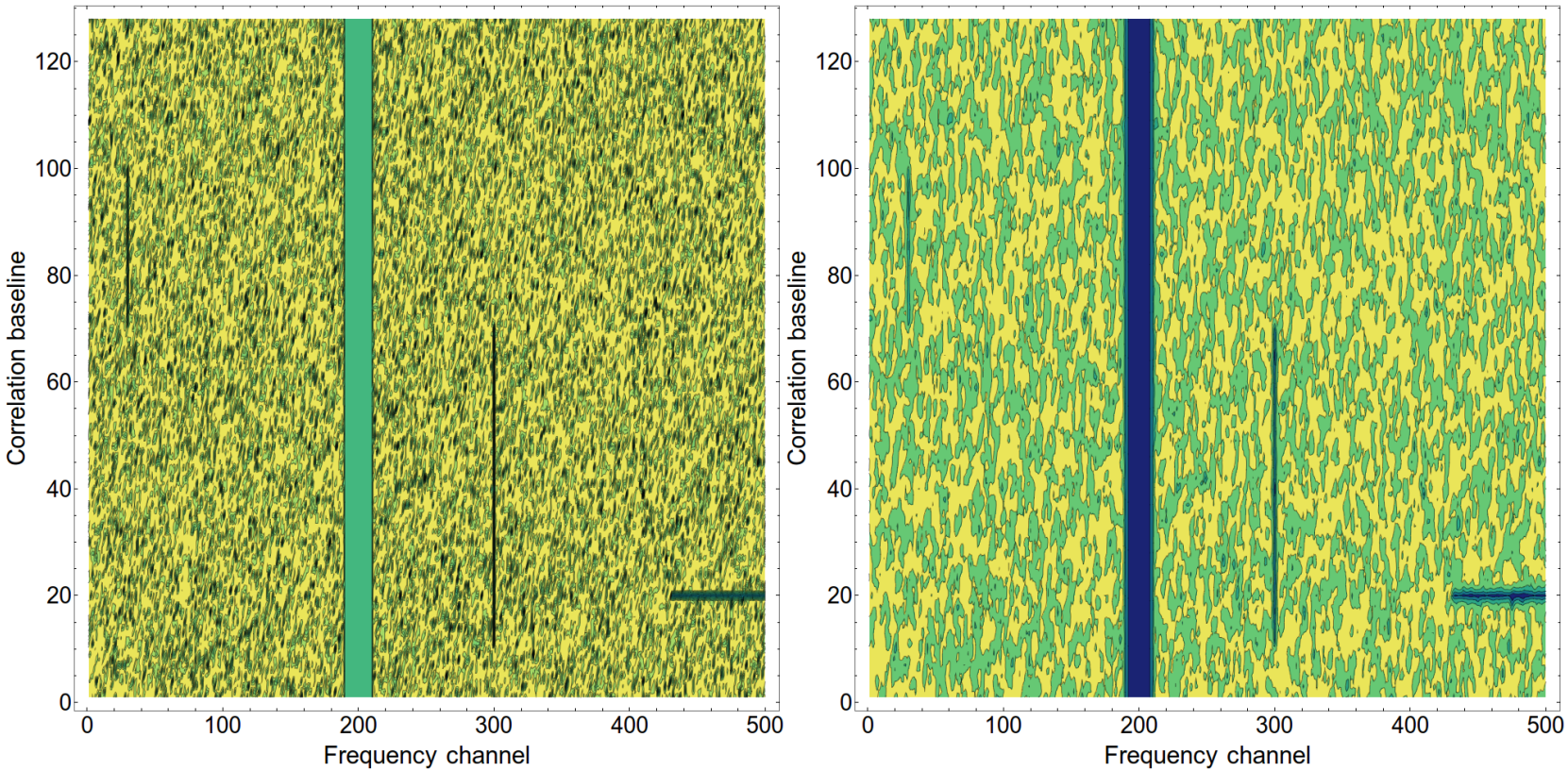

Figure : 1. Original data: Gaussian noise + RFI; 2. Gaussian filtering based RFI flagging.

Spectral filtering: Wavelet thresholding

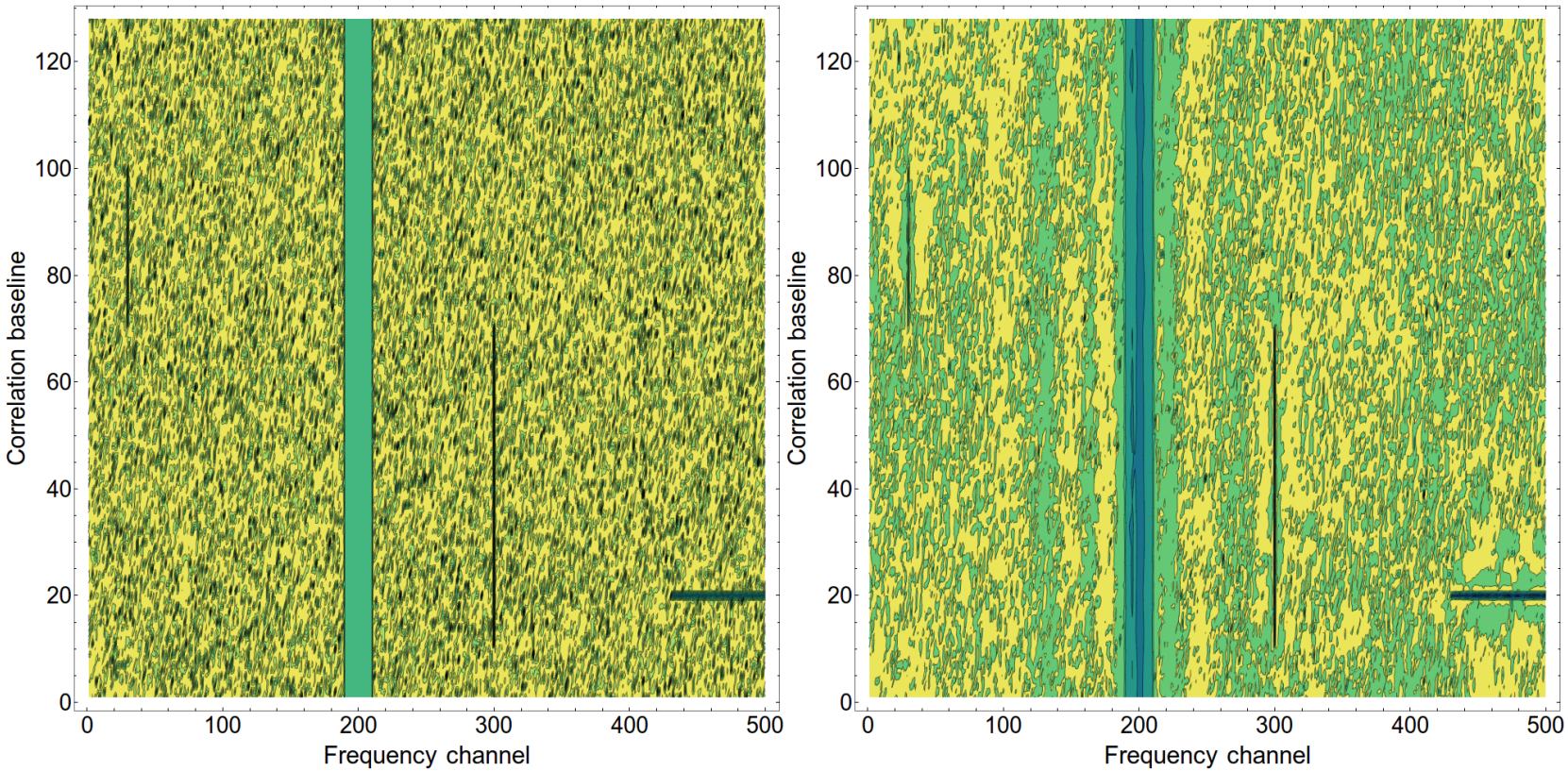

Figure : 1. Original data: Gaussian noise + RFI; 2. Wavelet thresholding based RFI flagging.

Work directions

- Computation time
- Parallelizability
- Computational resources: memory, storage, buffering
- Scalability: single system (e.g. laptop with 8 CPU cores), HPC server, supercomputing cluster
- Tests and prototyping (very important for our data centre and technical development team)