REMOVING INTERFERENCE FROM SPACE SCIENCE SIGNAL DATA

[<u>https://arxiv.org/abs/2210.12931</u>]

Removing Radio Frequency Interference from Auroral Kilometric Radiation with Stacked Autoencoders

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Auroral radio emissions are a rich data source for space science.

Auroral Kilometric Radiation (AKR)









However, AKR signals can be corrupted by interference.



Planetary Emissions [20 kHz - 1 MHz]

Man-made Transmissions [> 1 MHz] (e.g., AM/FM, EMI from research instruments)

South Pole Station Antenna







However, AKR signals can be corrupted by interference.



Problem Definition: Science Data Recall

Given: Observed Signal (X)



Recover: Underlying Signal (Y)









Approach: we leverage synthetic data simulations and CNNs to identify and remove RFI.



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School of Engineering









SPS AKR observation: 08-11-2016 00:40 UTC









Dartmouth

SPS AKR observation: 07-03-2021 01:26 UTC









Dartmouth

More SPS observations:









Our code is publicly available for use.

Code and documentation can be accessed at: <u>https://github.com/Cylumn/daare</u>.

The repository contains instructions to train and test the model, as well as an API to abstractify use for scientists.

Cylumn / daare Public				
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Thank you, 2022 Haystack REU!

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