

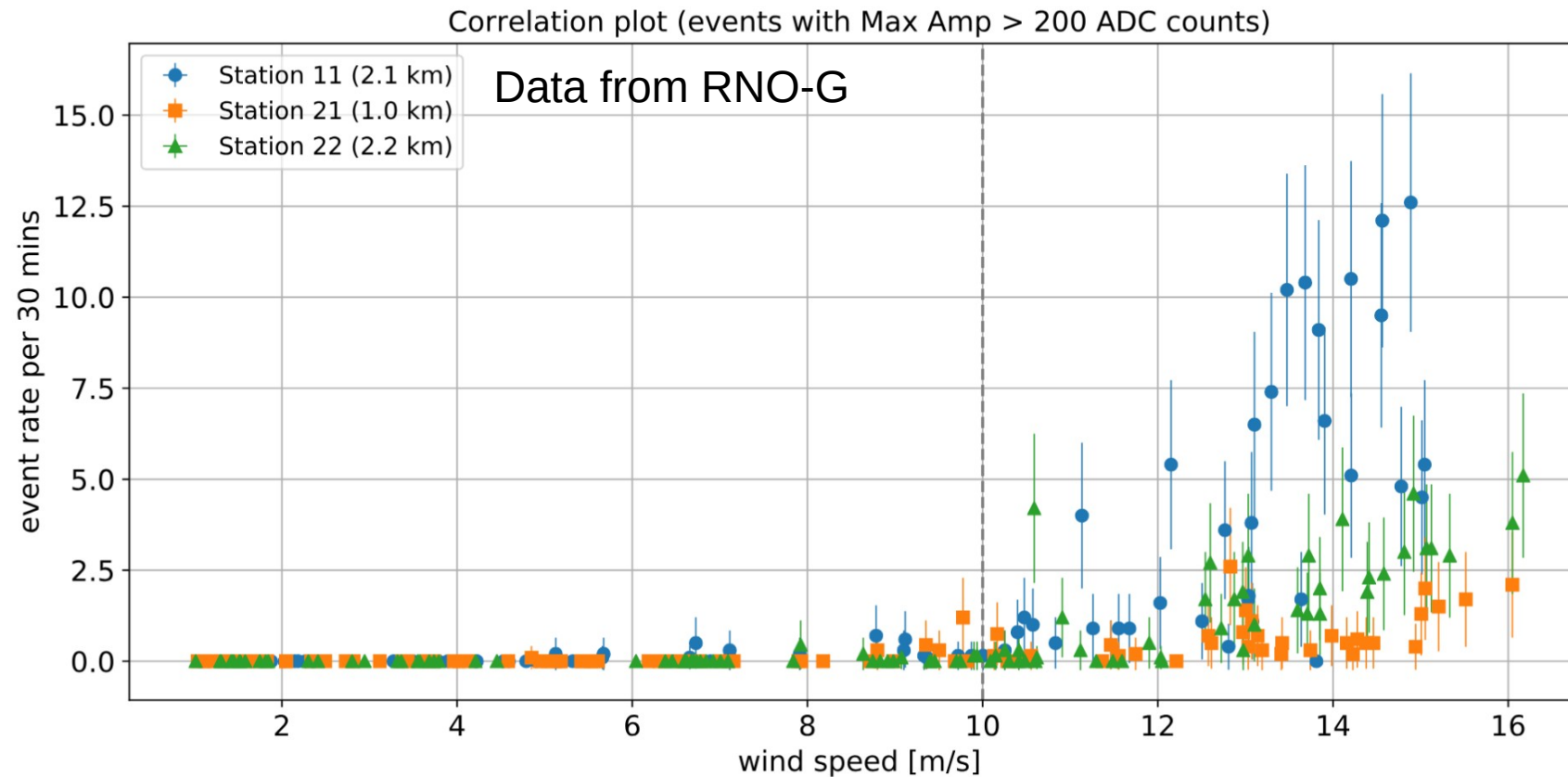


Wind-Related Background Radio Pulses at the Radio Neutrino Observatory in Greenland

Pascal Schriefer
Erlangen, 16.03.2026

Wind-Related Background Events

In-Situ Measurements

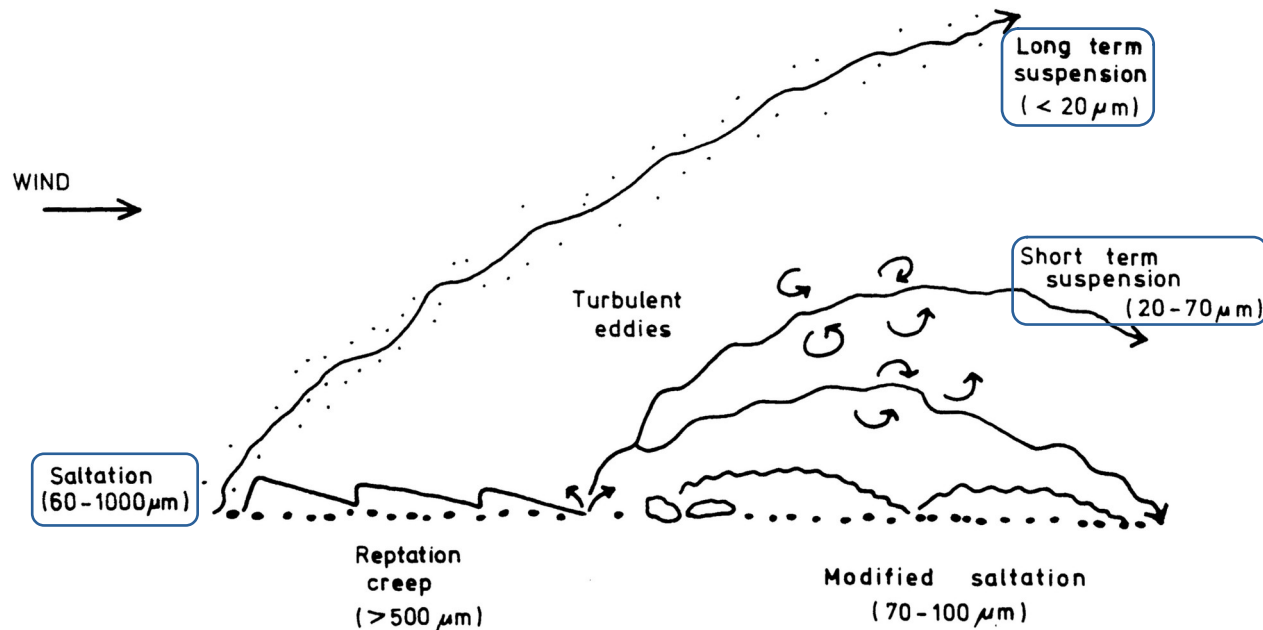


Astroparticle Physics 145 (2023) 102790

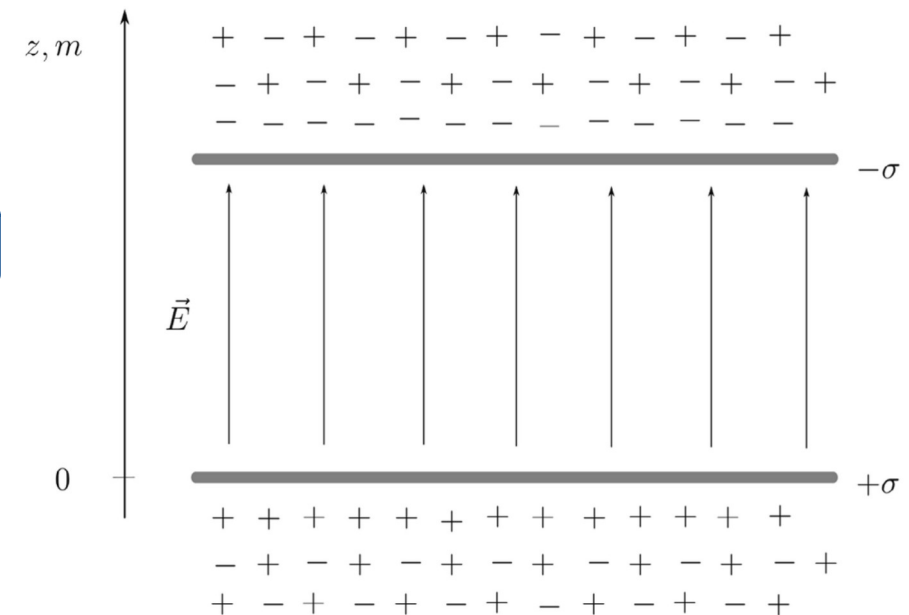
Not only RNO-G but also other at experiments: ANITA, ARIANNA, RICE, AURA, SATRA, ARA, TAROGE-M

Wind-Related Background Events

Triboelectric Effect



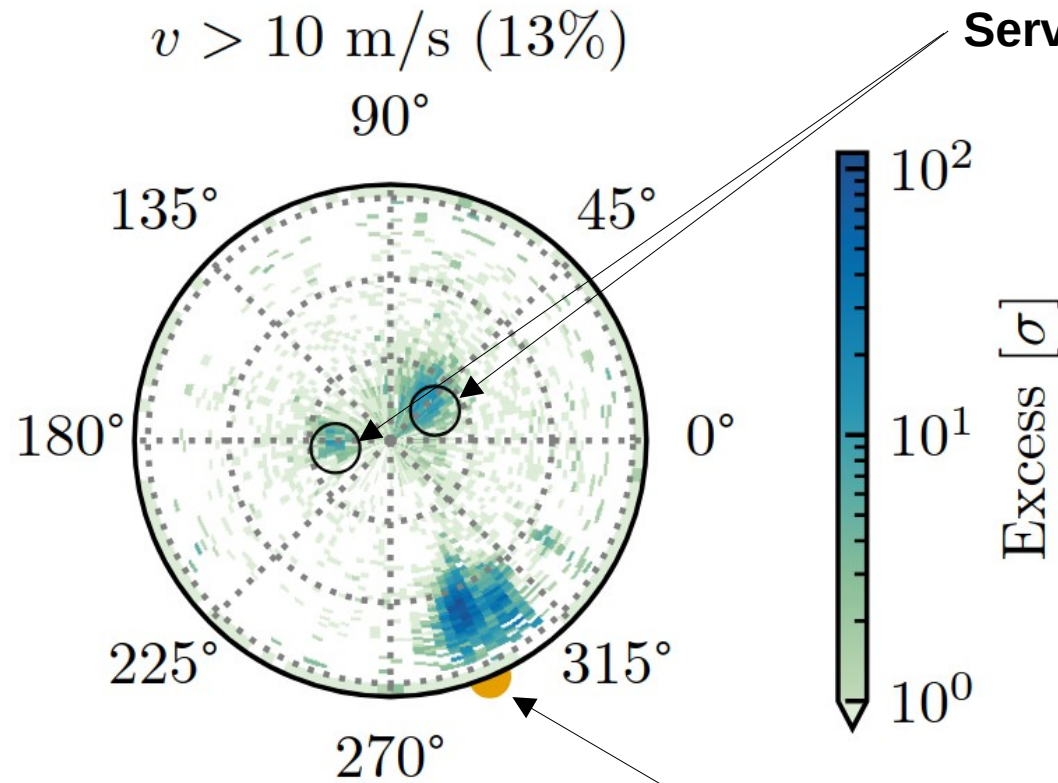
Aeolian sediment transport [Nickling and Neuman, 1994]



Adapted from Astroparticle Physics 145 (2023) 102790

Wind-Related Background Events

Direction Reconstruction



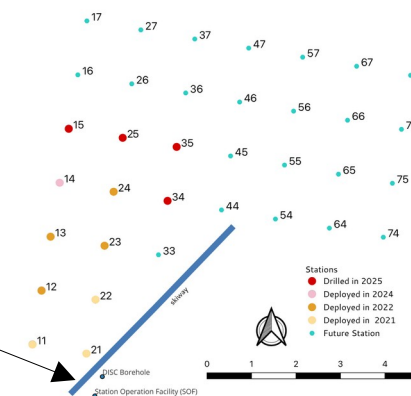
PhD Thesis, Sjoerd Bouma



RNO-G Collaboration

Direction reconstruction of wind events reveals preferred direction.

Potential discharges on metallic structures



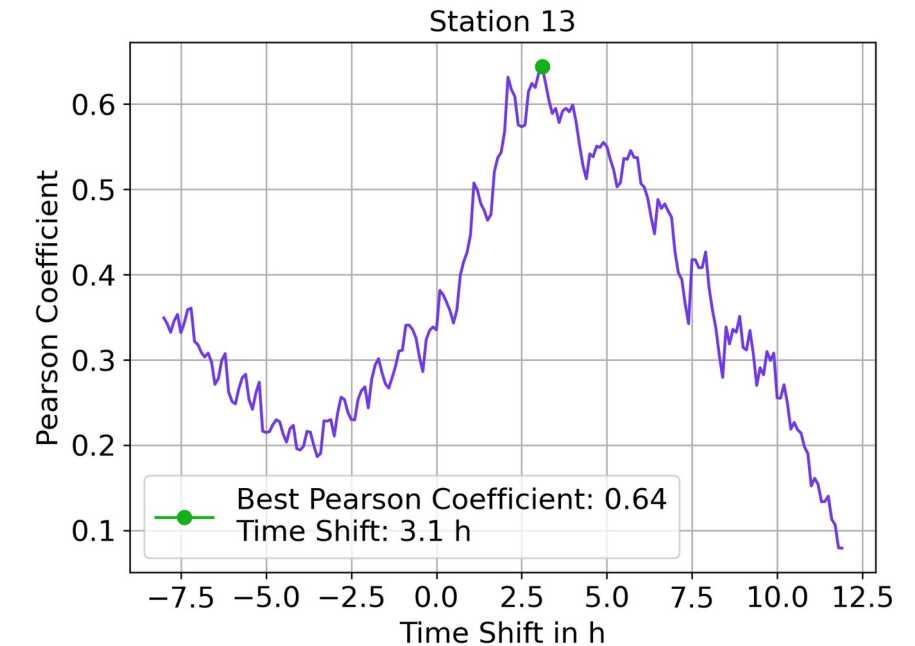
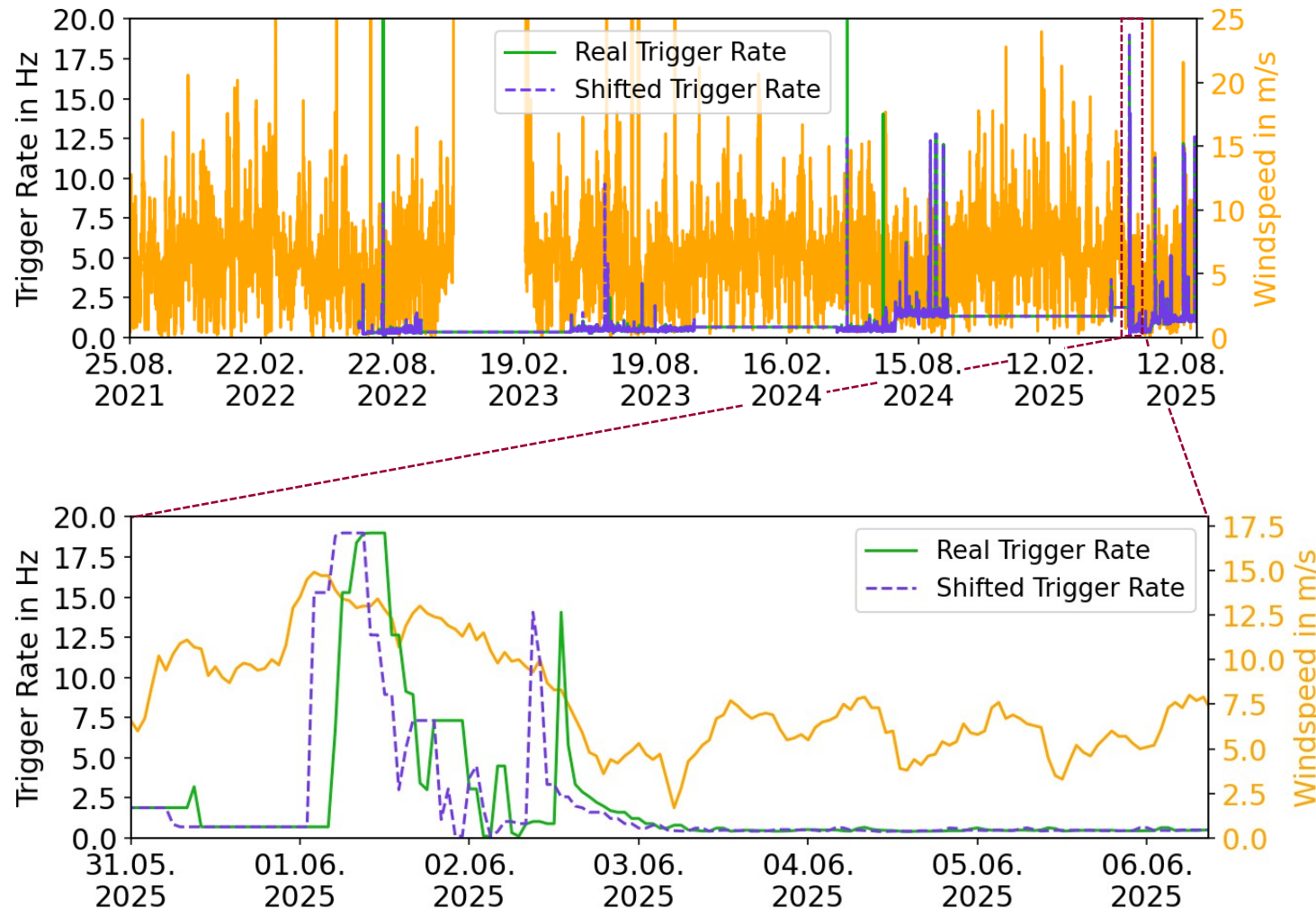
RNO-G Collaboration



Summit Camp, Wikipedia, Dr. Hannes Grobe

Wind-Related Background Events

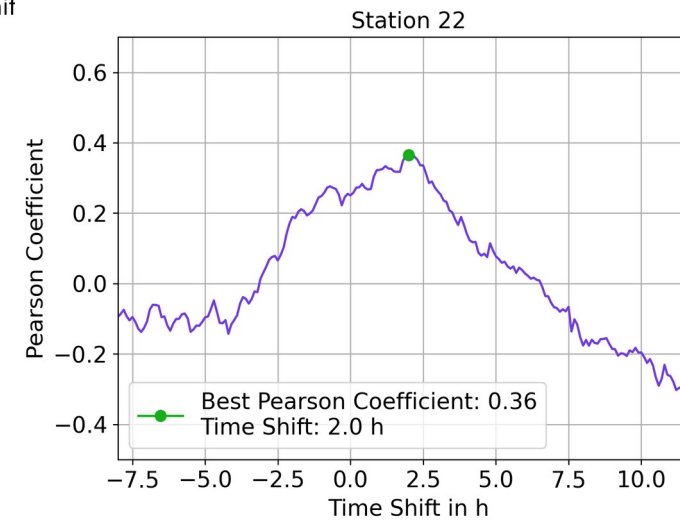
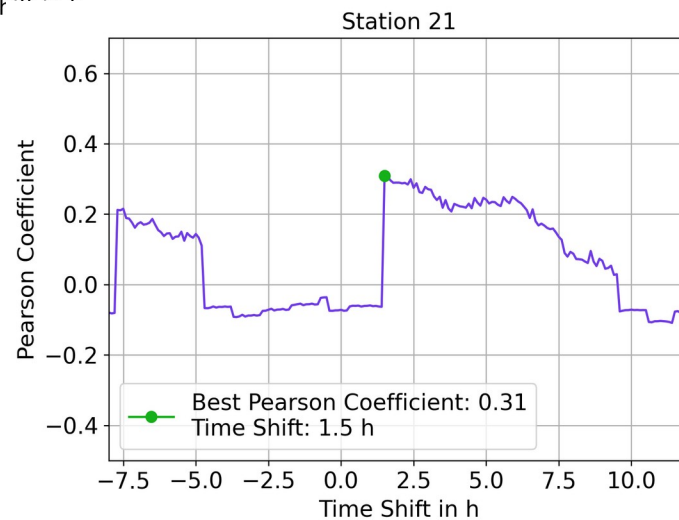
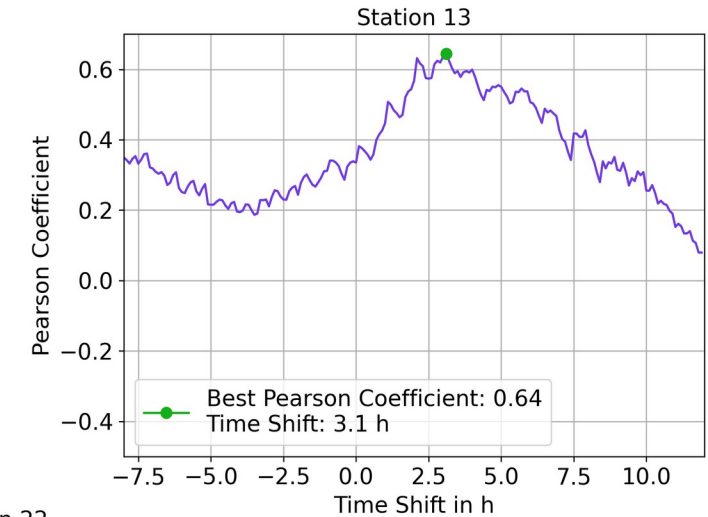
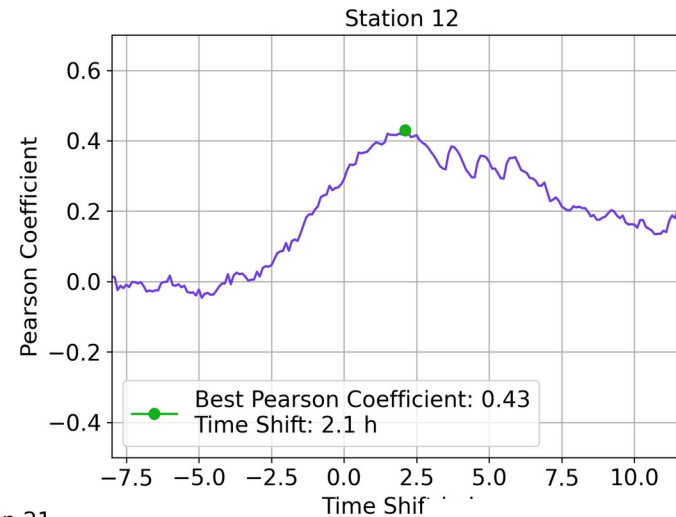
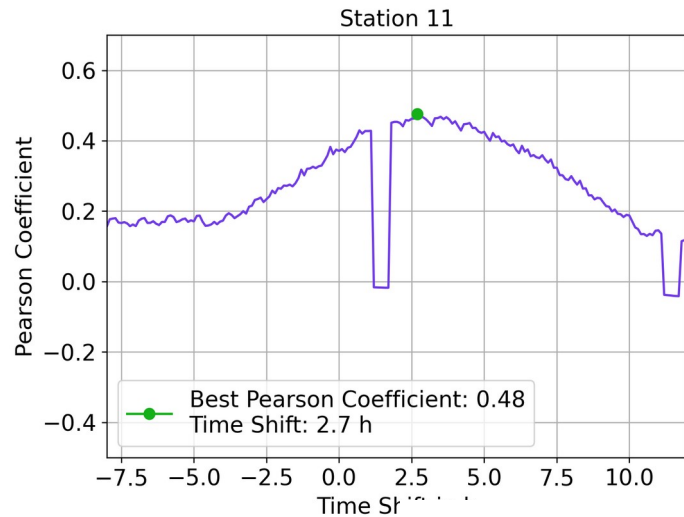
Time delay



Shifting the trigger data backwards in time yields better correlation to wind speed.
(according to the Pearson coefficient)

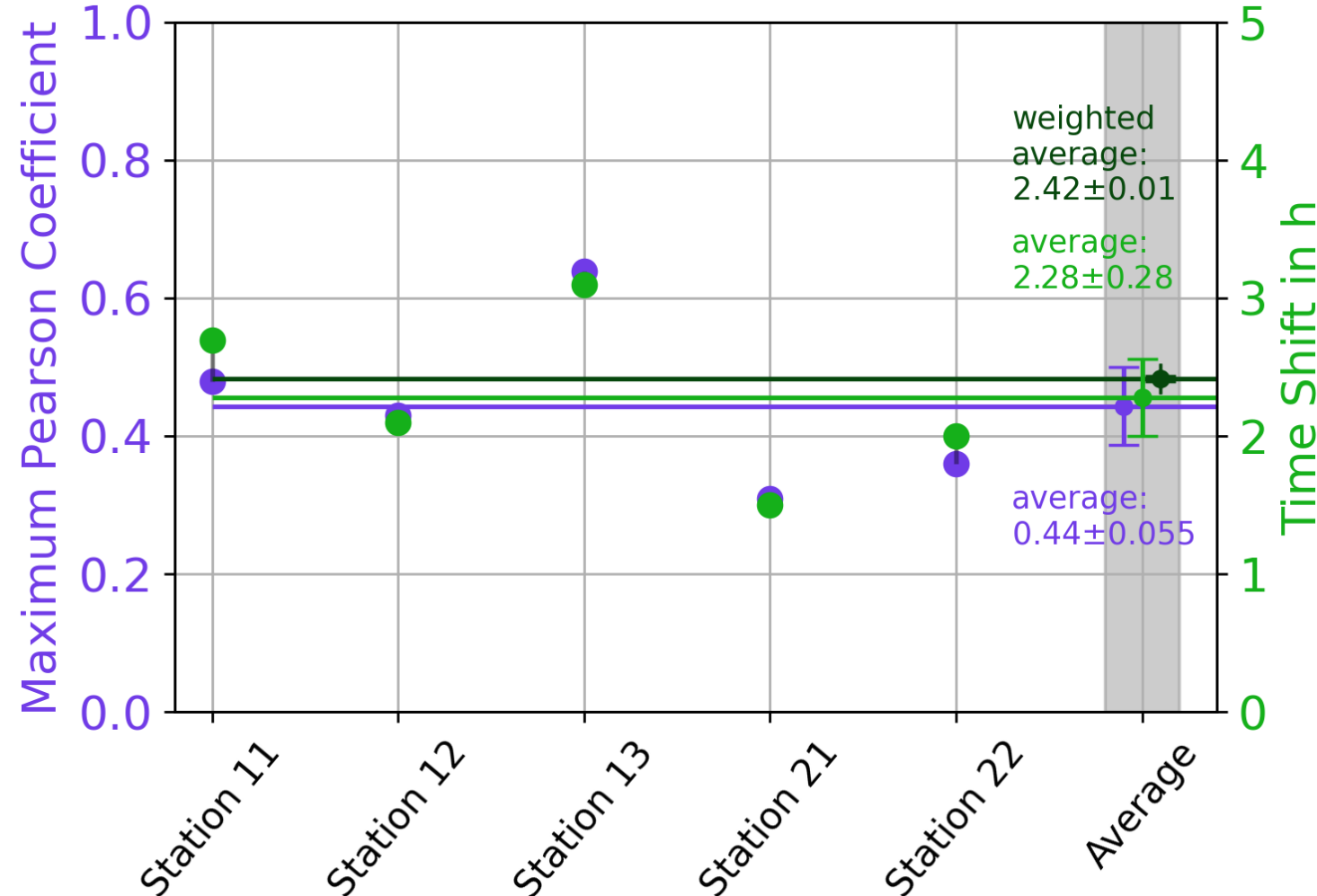
Wind-Related Background Events

Time delay



Wind-Related Background Events

Time delay

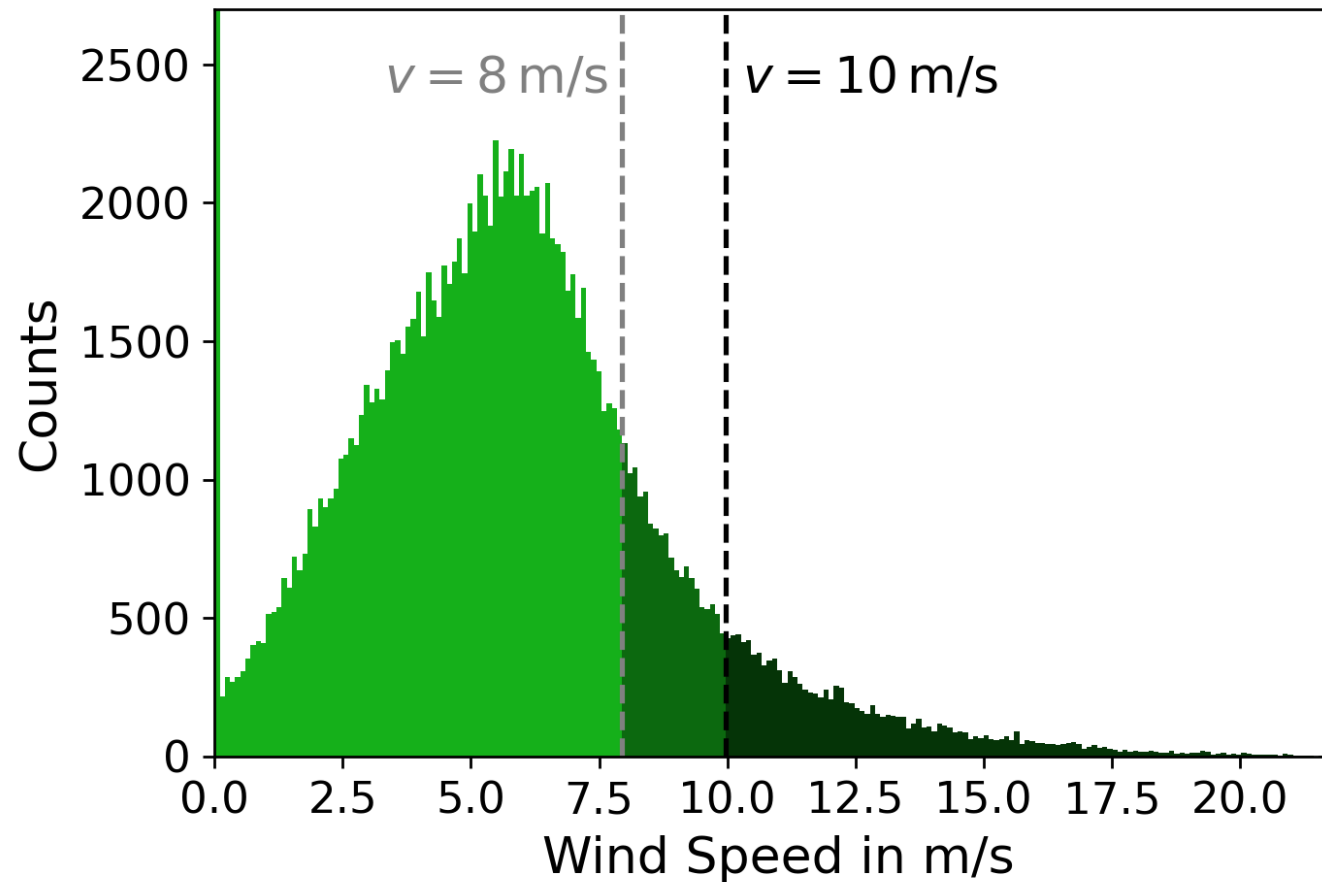


Possible reasons for time delay:

- Snow drift takes time to develop
- Charge build-up is not instant

Wind-Related Background Events

Wind speed cut



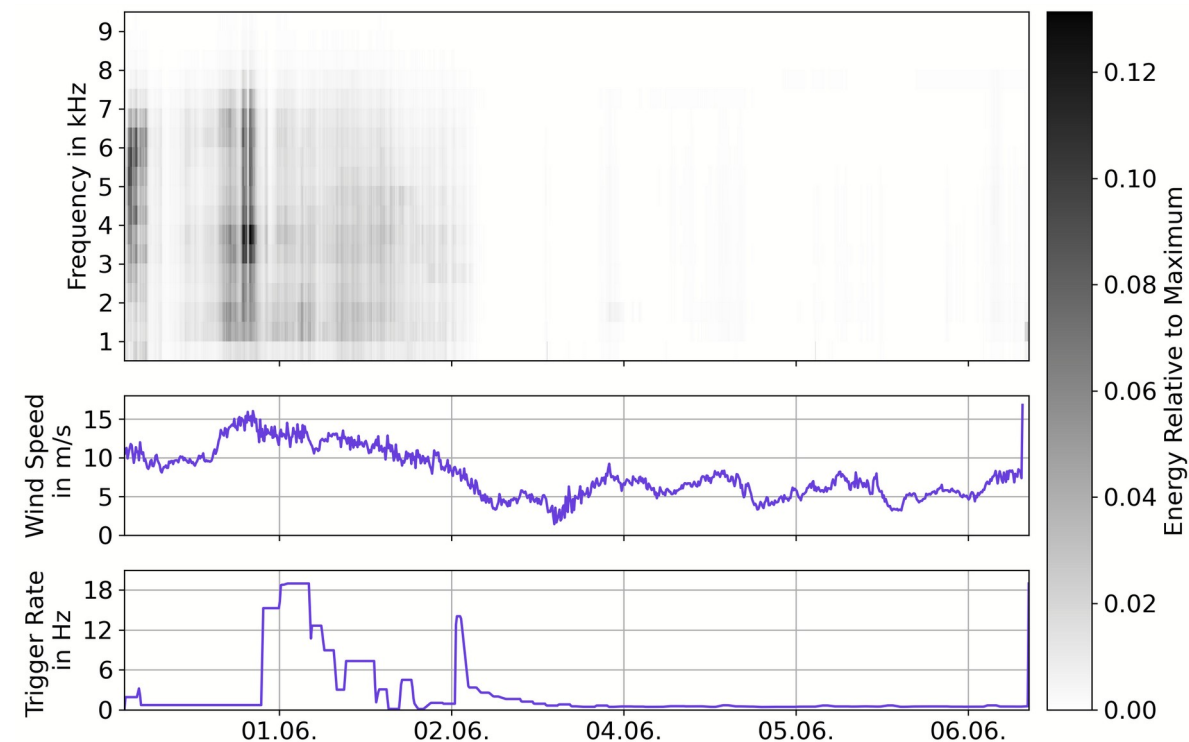
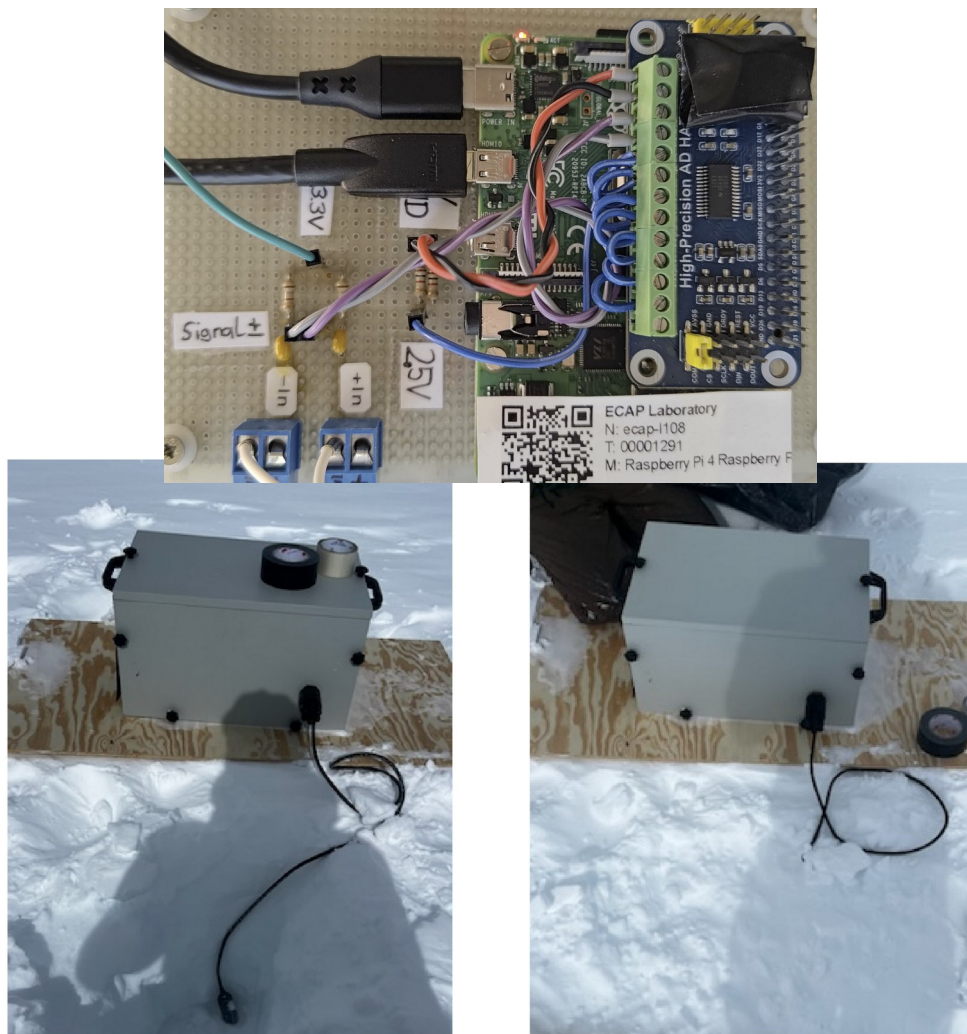
Removing events with
windspeeds above **10m/s**
reduces up-time by **8.9%**

Removing events with
windspeeds above **8m/s**
reduces up-time by **19.6%**

Histogram of available data points depending on measured wind speed

Acoustic Background Tagging

Ongoing Research – Glaciophone Recording



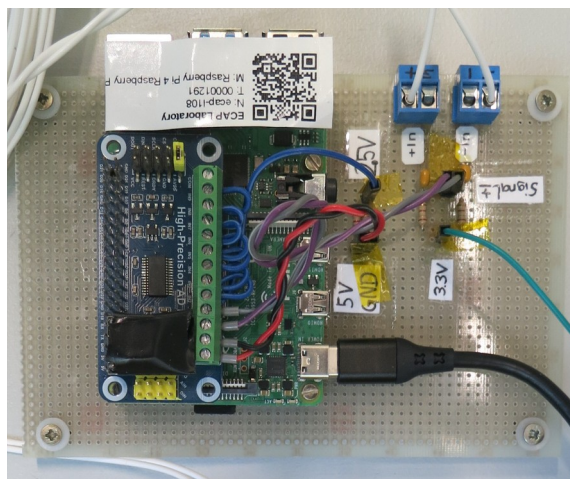
Acoustic Noise, wind speed and trigger rate of station 13 from last years experiment. (2025)

Pascal Schriefer. “RNO-G’s Perspective on Wind – Power Generation and Background Tagging”

Acoustic Background Tagging V2.0

Ongoing Research

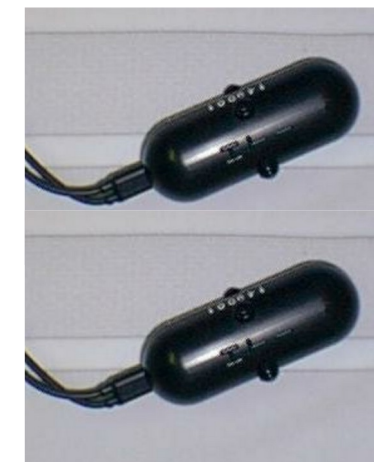
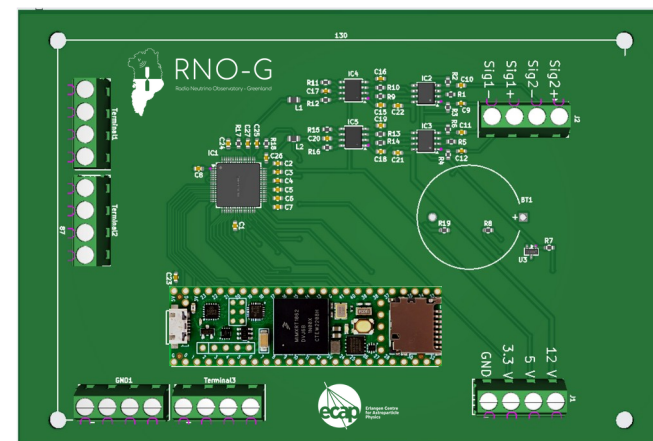
Old:



- Raspberry Pi 4
- **3W** power usage
- **Single hydrophone** input
- **19.2 kHz** sampling frequency
- **10 bit** resolution
(0.029 MB/s)



New:



- Teensy 4.1 Microcontroller
- **0.3W** power usage
- **Double hydrophone** input
- **200 kHz** sampling frequency (each)
- **Real time logging**
- **16 bit** resolution
(0.8 MB/s)

End goal: Find a way to eliminate or exclude neutrino-like wind events

- Ideally, there is correlation between acoustic noise and radio noise.
 - Helps to identify wind events in the detector.
- Wind speed does not have perfect correlation with trigger/event rates. Both [high wind - regular trigger rate] periods as well as sudden, unreasonably high event rate spikes with no increase in wind speed exist.
 - There might be other factors in play than purely wind speed. i.e. Humidity, temperature, or other processes entirely.



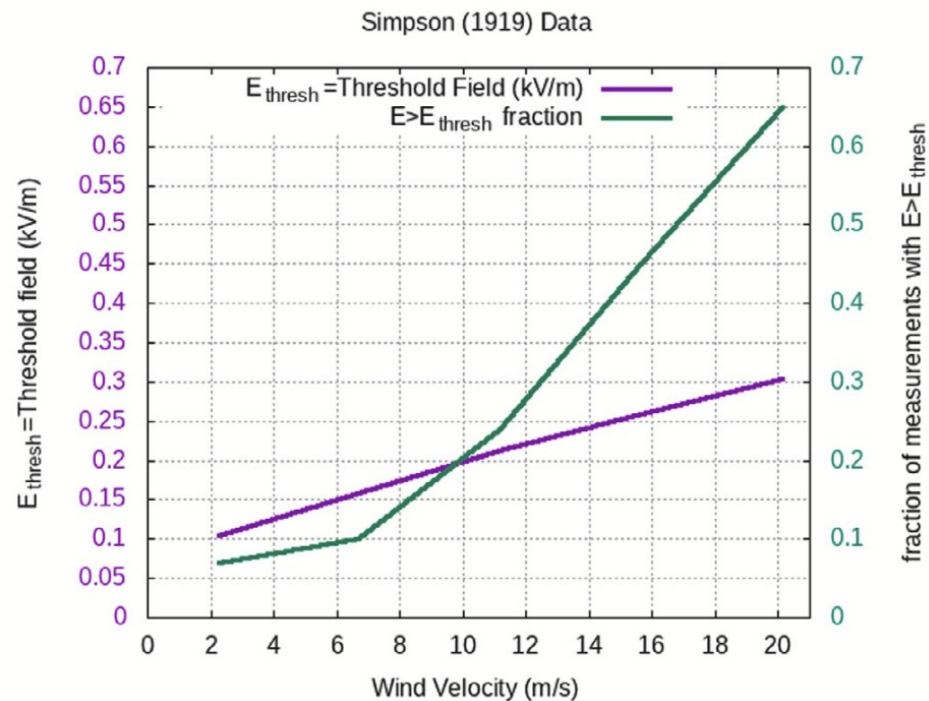


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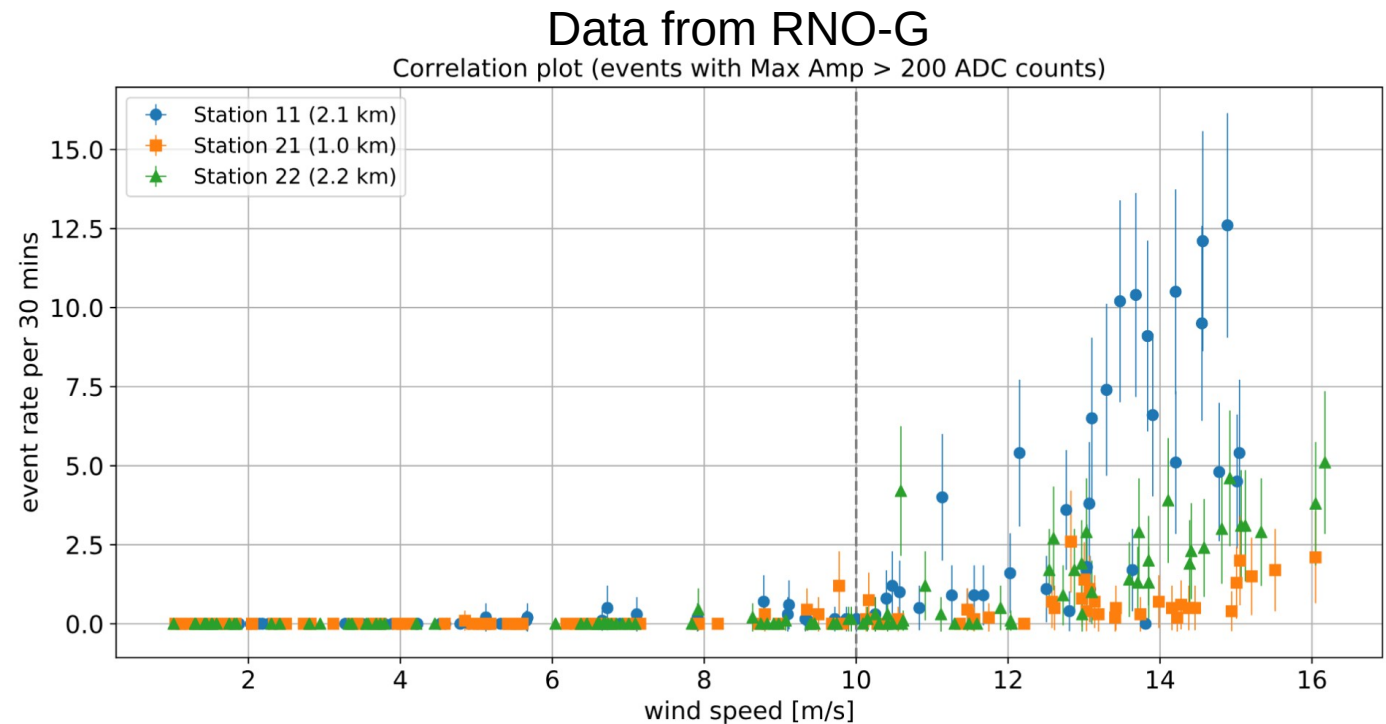
Pascal Schriefer
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Wind-Related Background Events

In-Situ Measurements



G.C. Simpson, British Antarctic Expedition 1910–1913



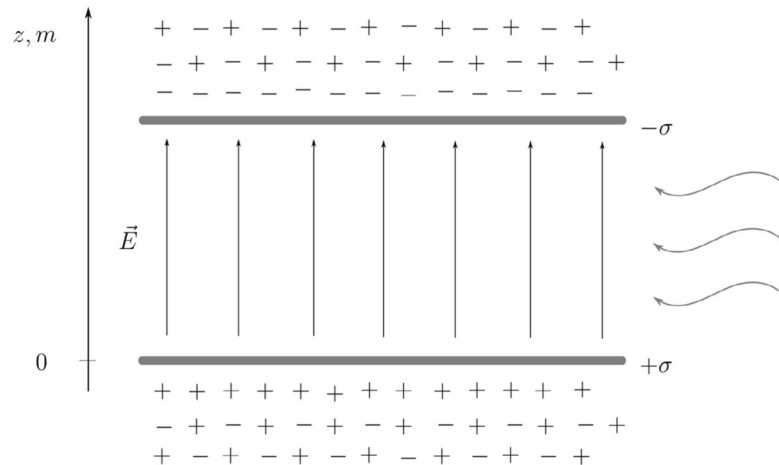
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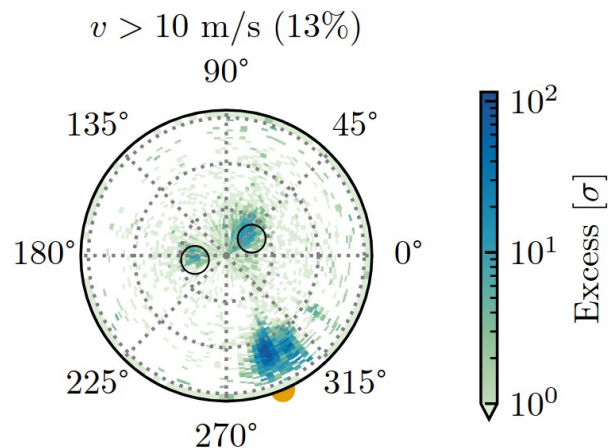
Wind-Related Background Events

Phenomenon overview

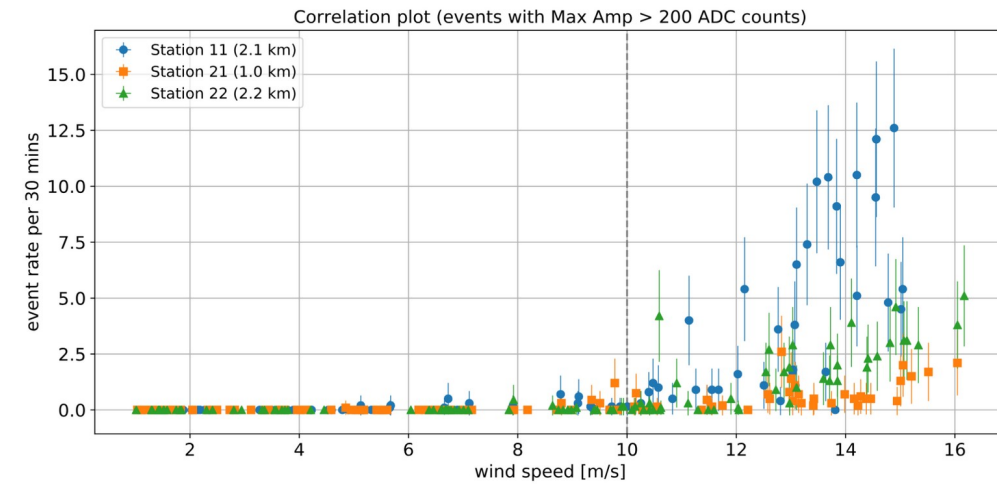
Triboelectric Charge Generation



Direction Reconstruction



Event Rates During High Winds



Time Delay Phenomenon

