Lightning Interferometry
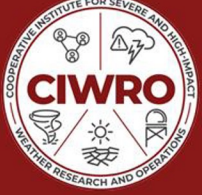## With the Sevilleta Long Wavelength Array
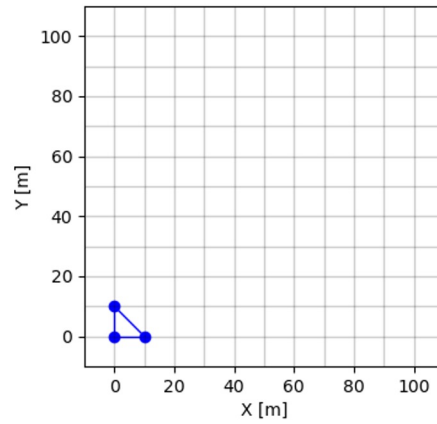
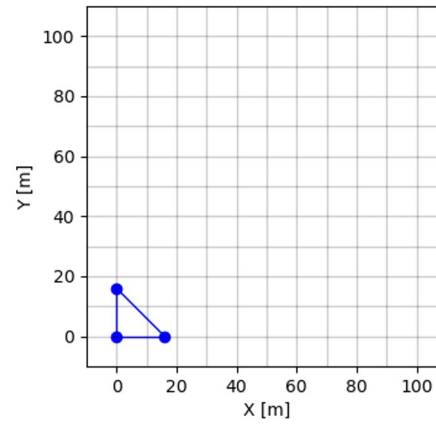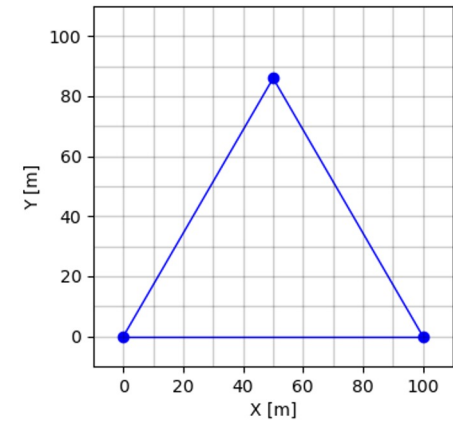Michael Stock, Julia Tilles, Greg Taylor, Jayce Dowell
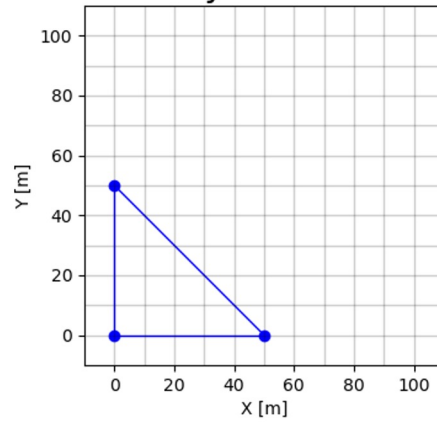
A Brief History of Recent Interferometry
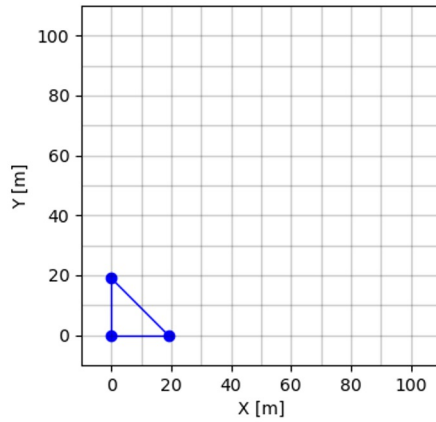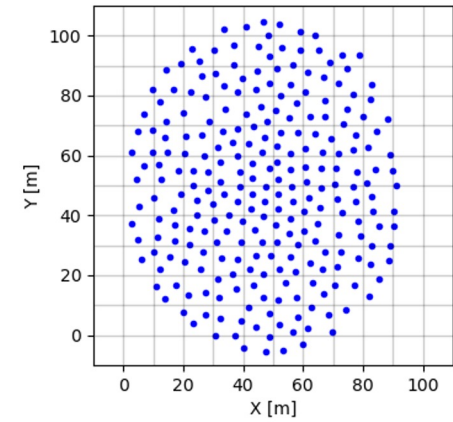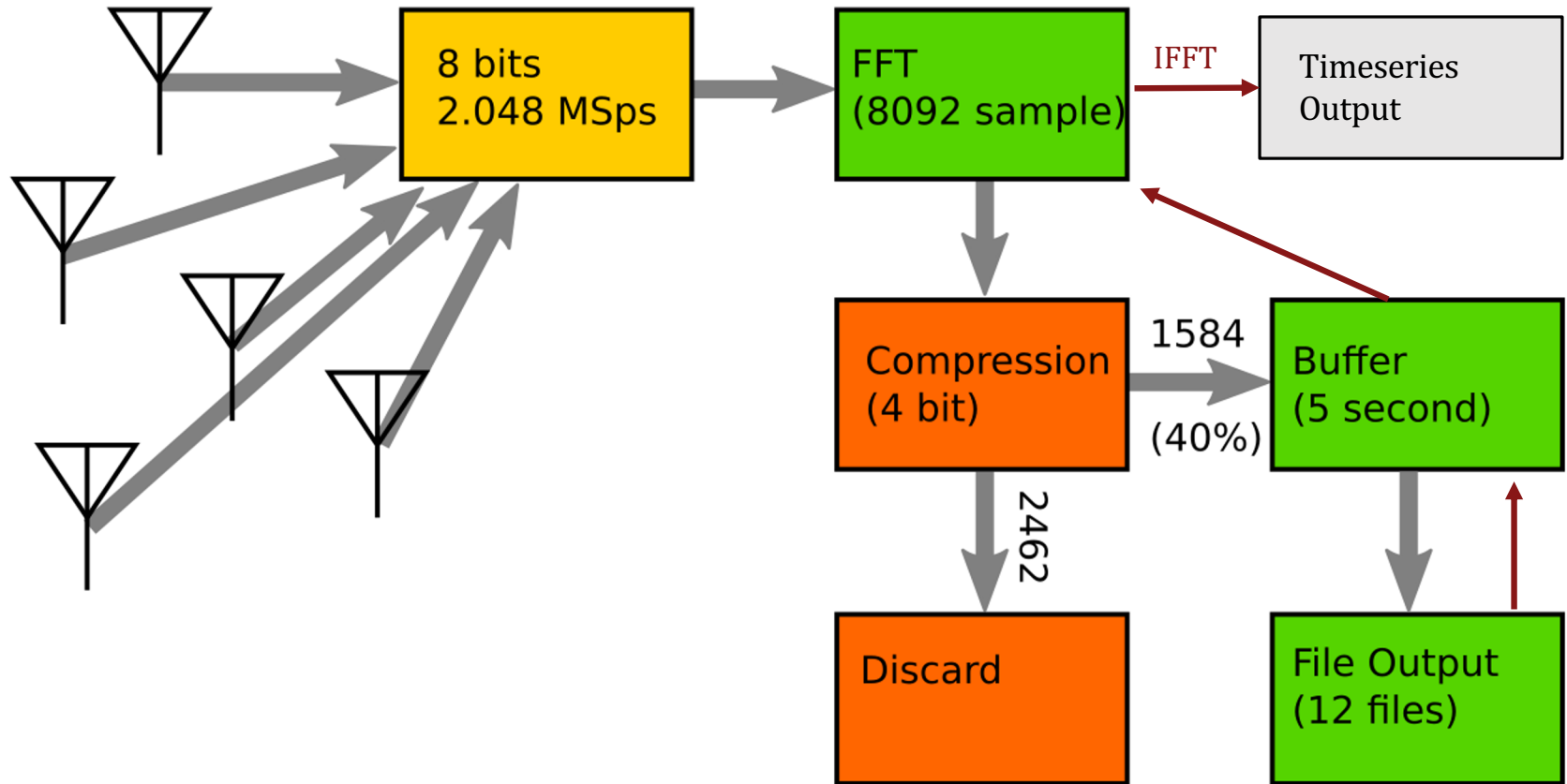

Stock 2014

Rison 2016

Tilles 2019

Lyu 2019

Shao 2020

LWA SV

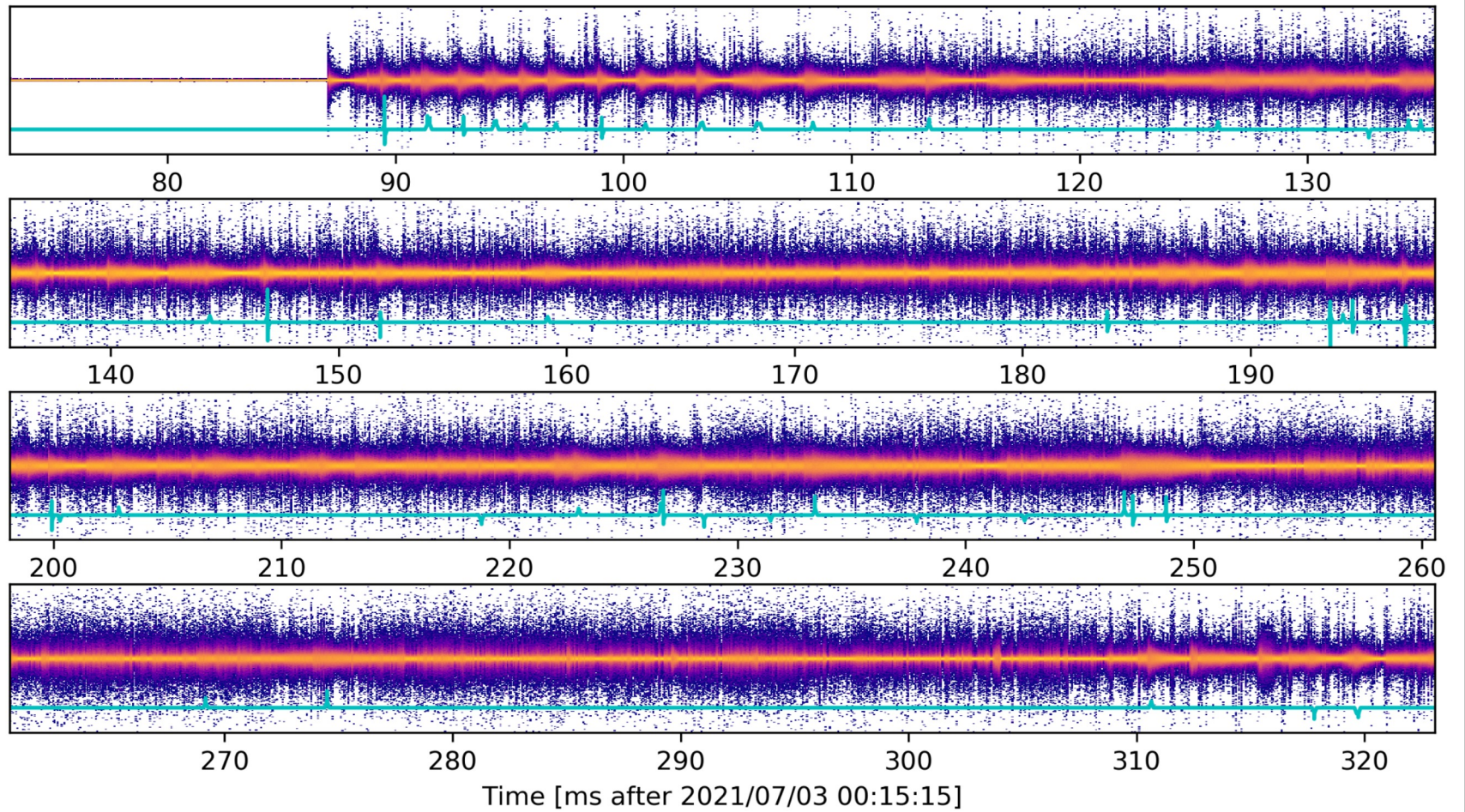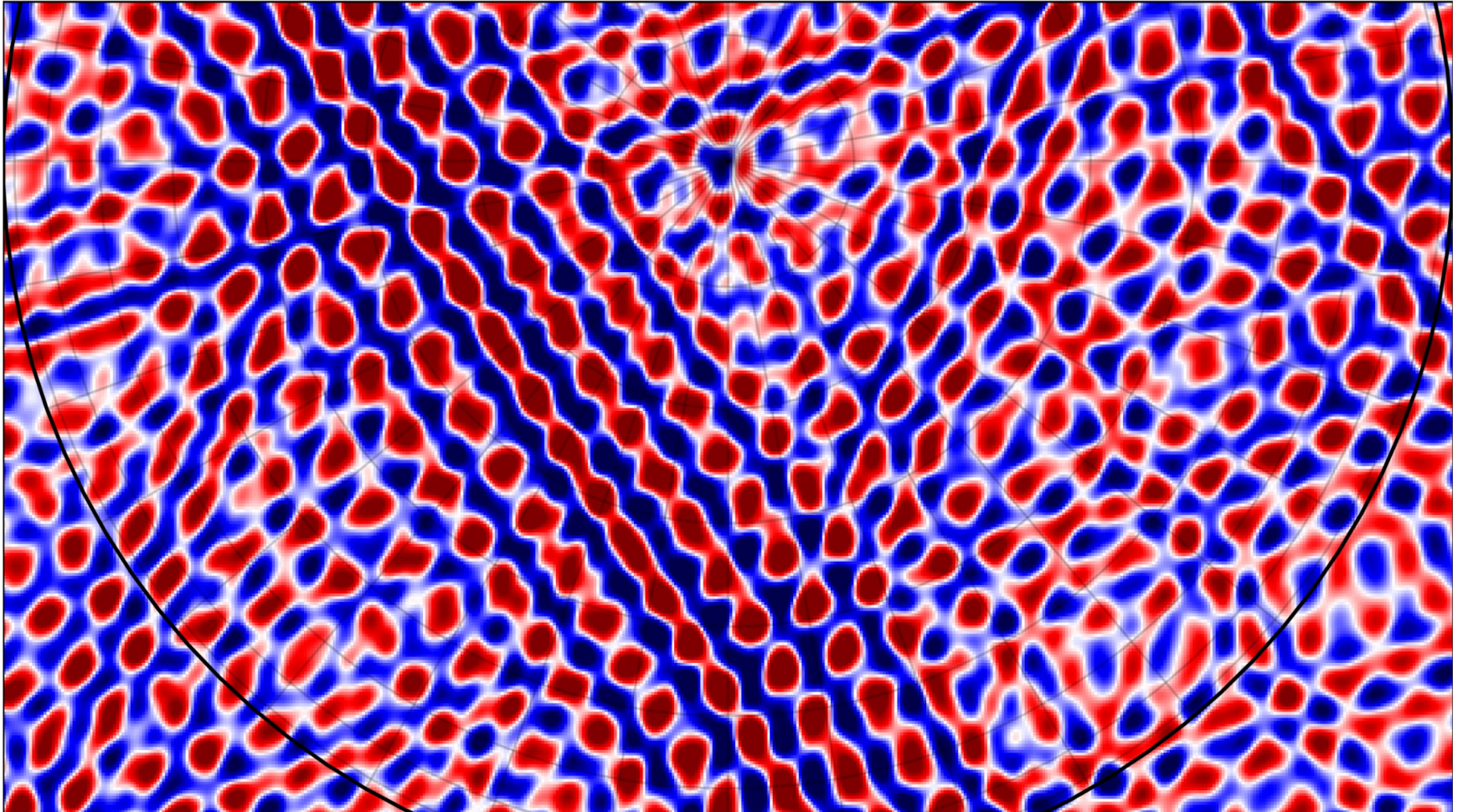# LWA - Data Collection

LWA - Time Series

Time [ms after 2021/07/03 00:15:15]
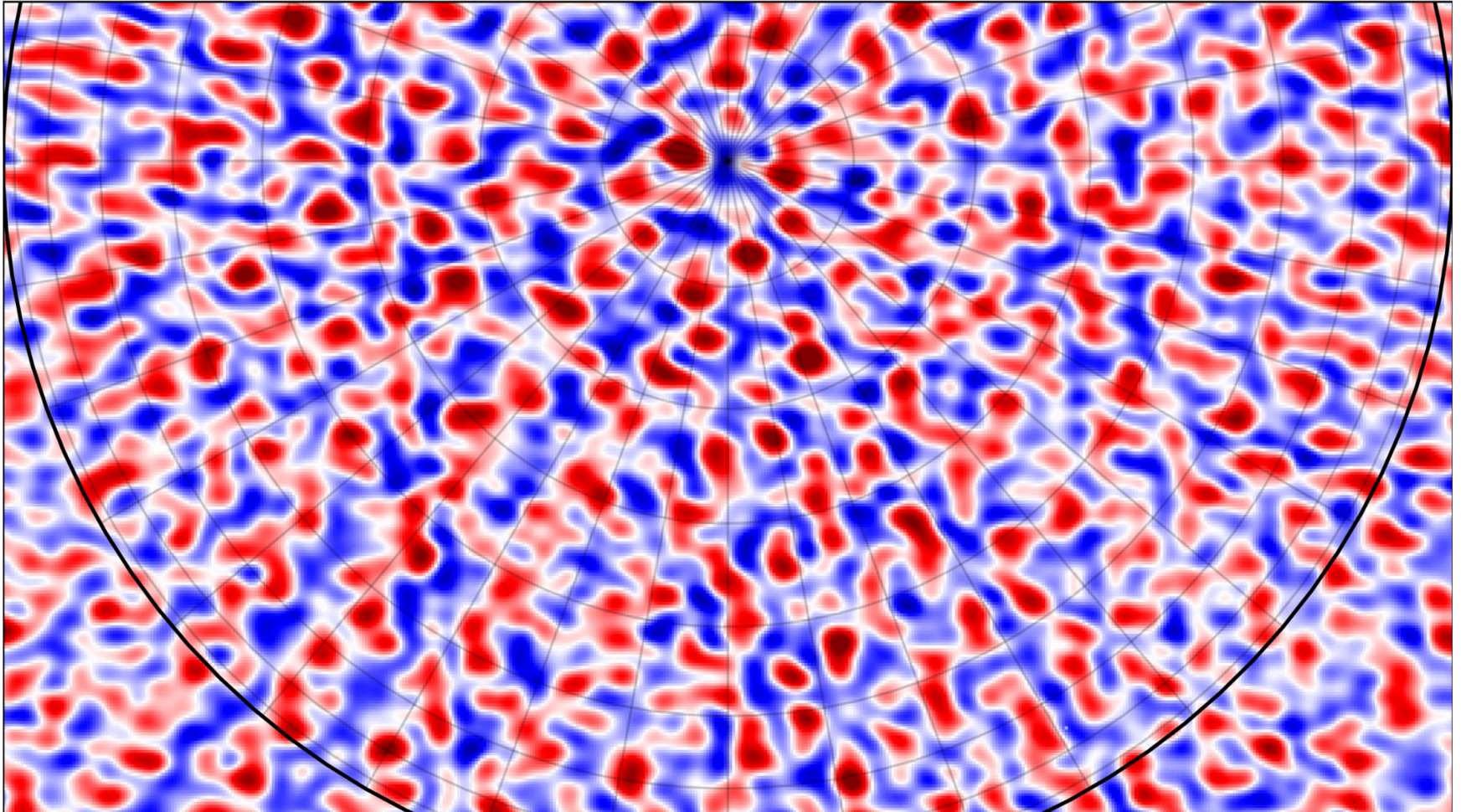
Imaging Multiple Sources

Imaging Multiple Sources
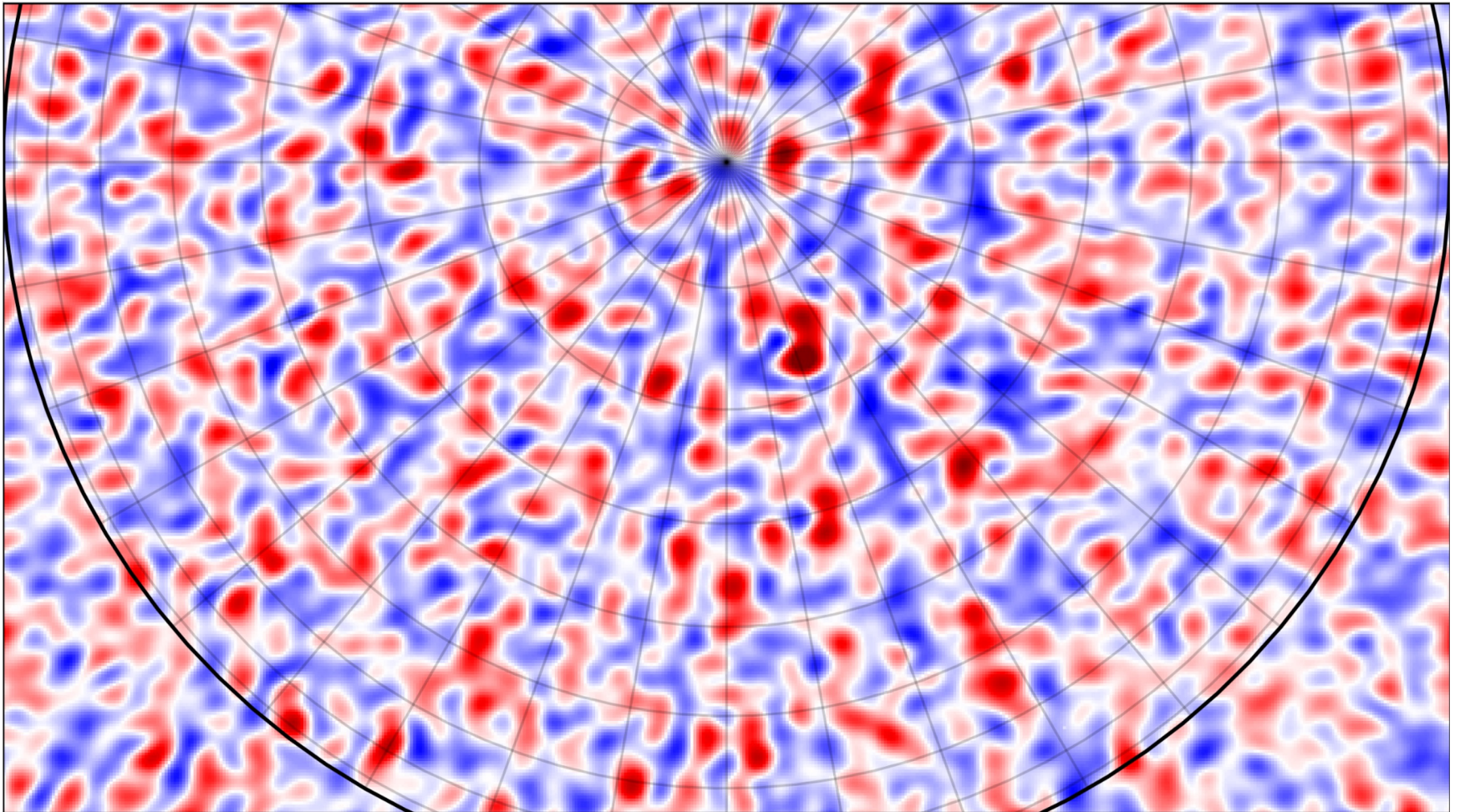
Imaging Multiple Sources
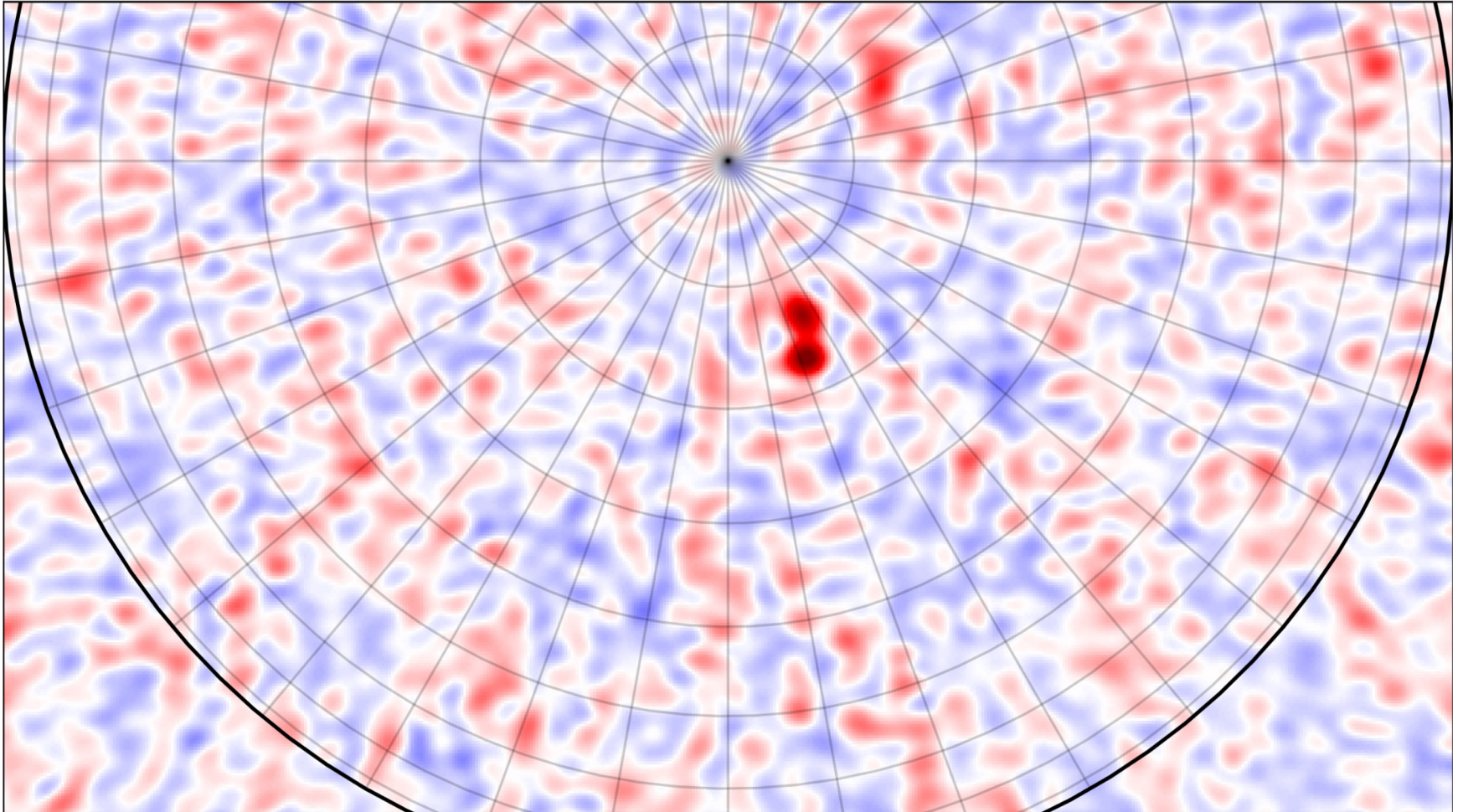
Imaging Multiple Sources
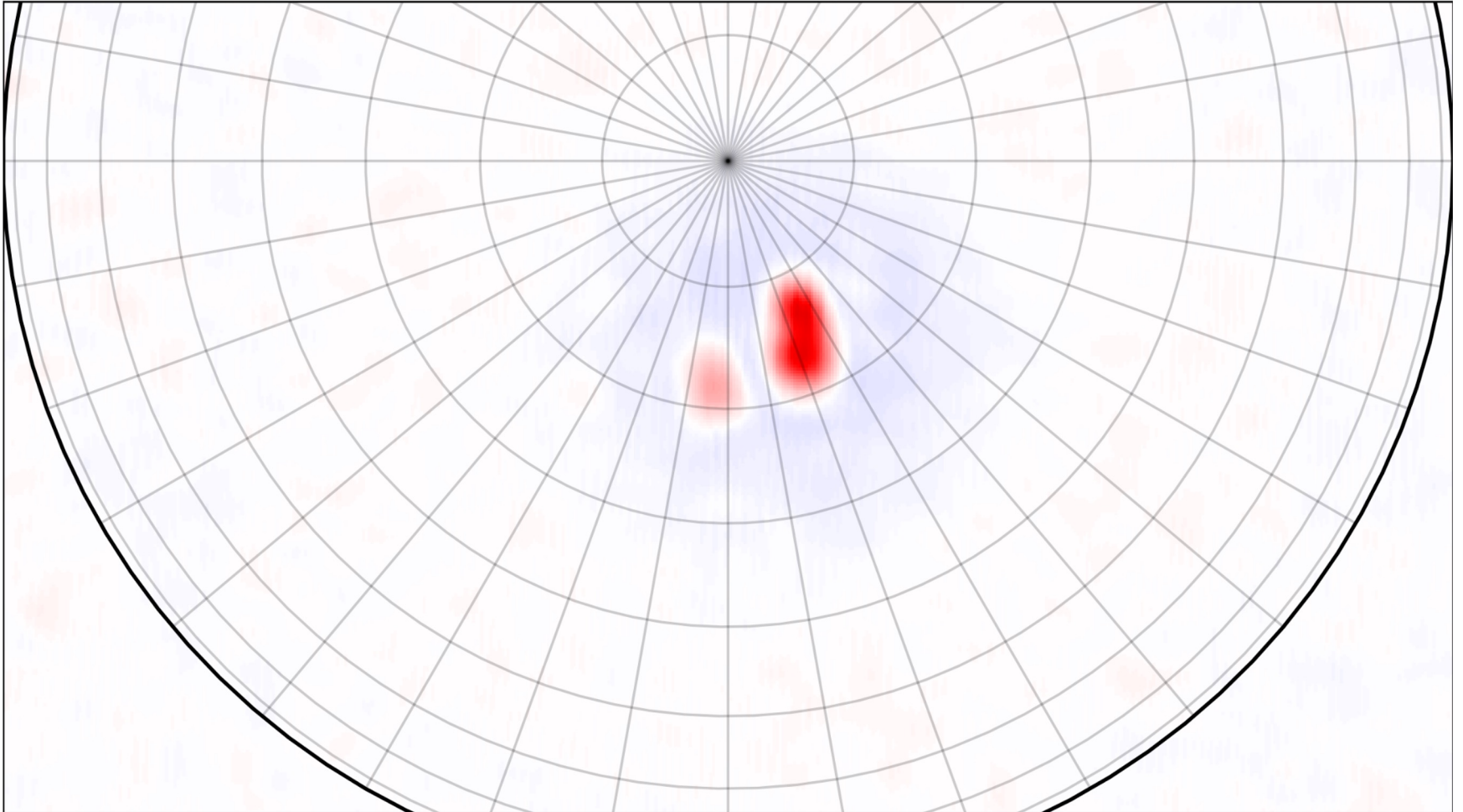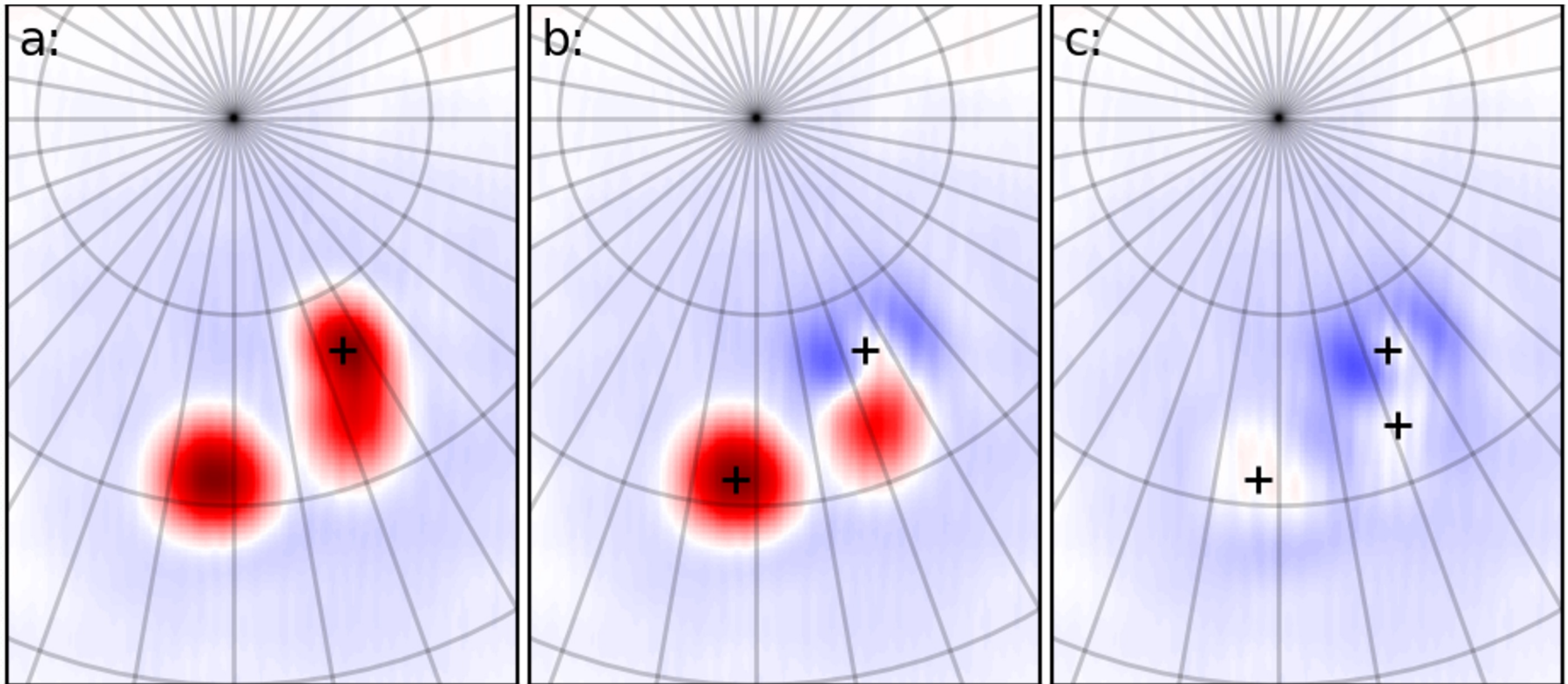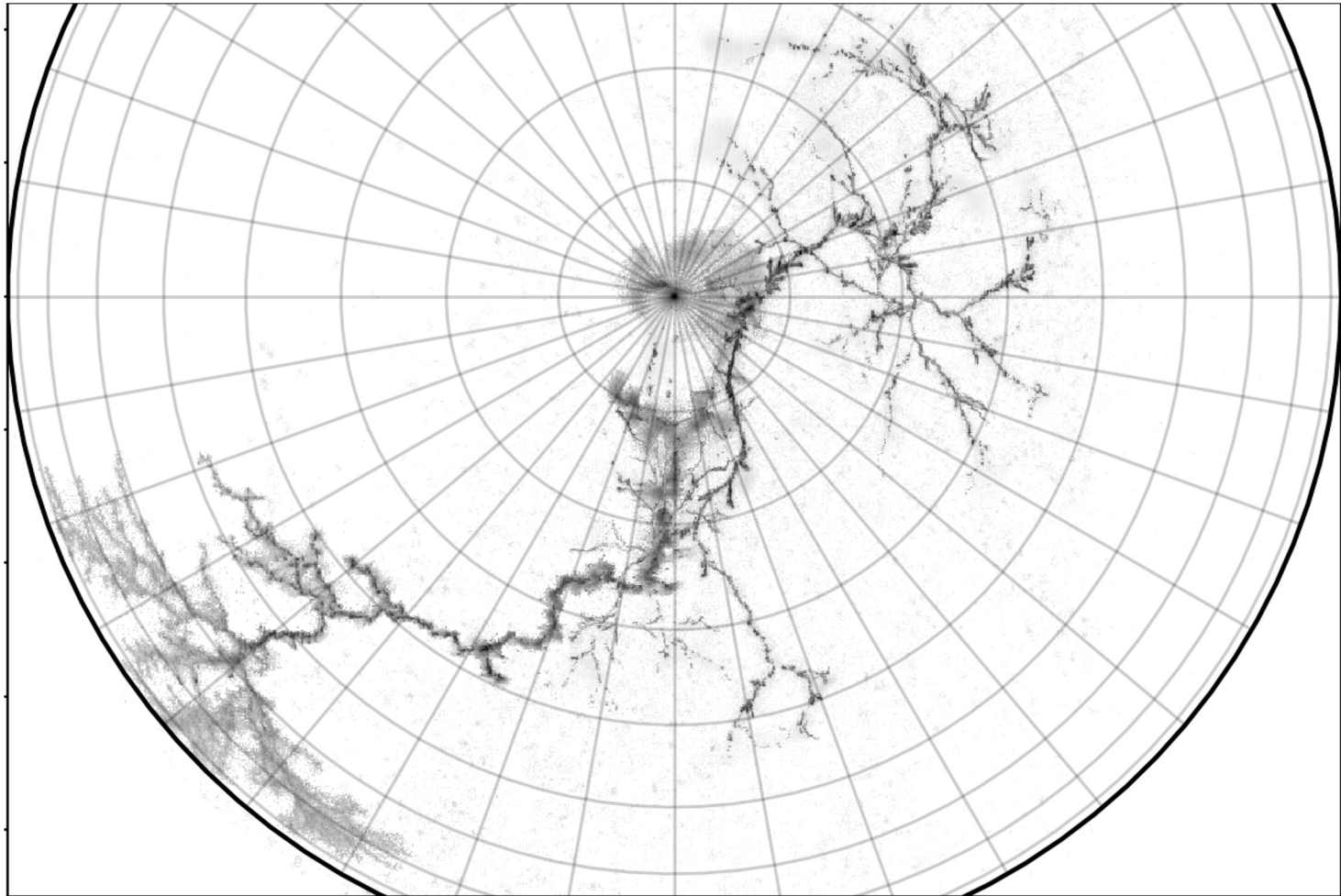
Imaging Multiple Sources

Finding Centroids for Multiple Sources
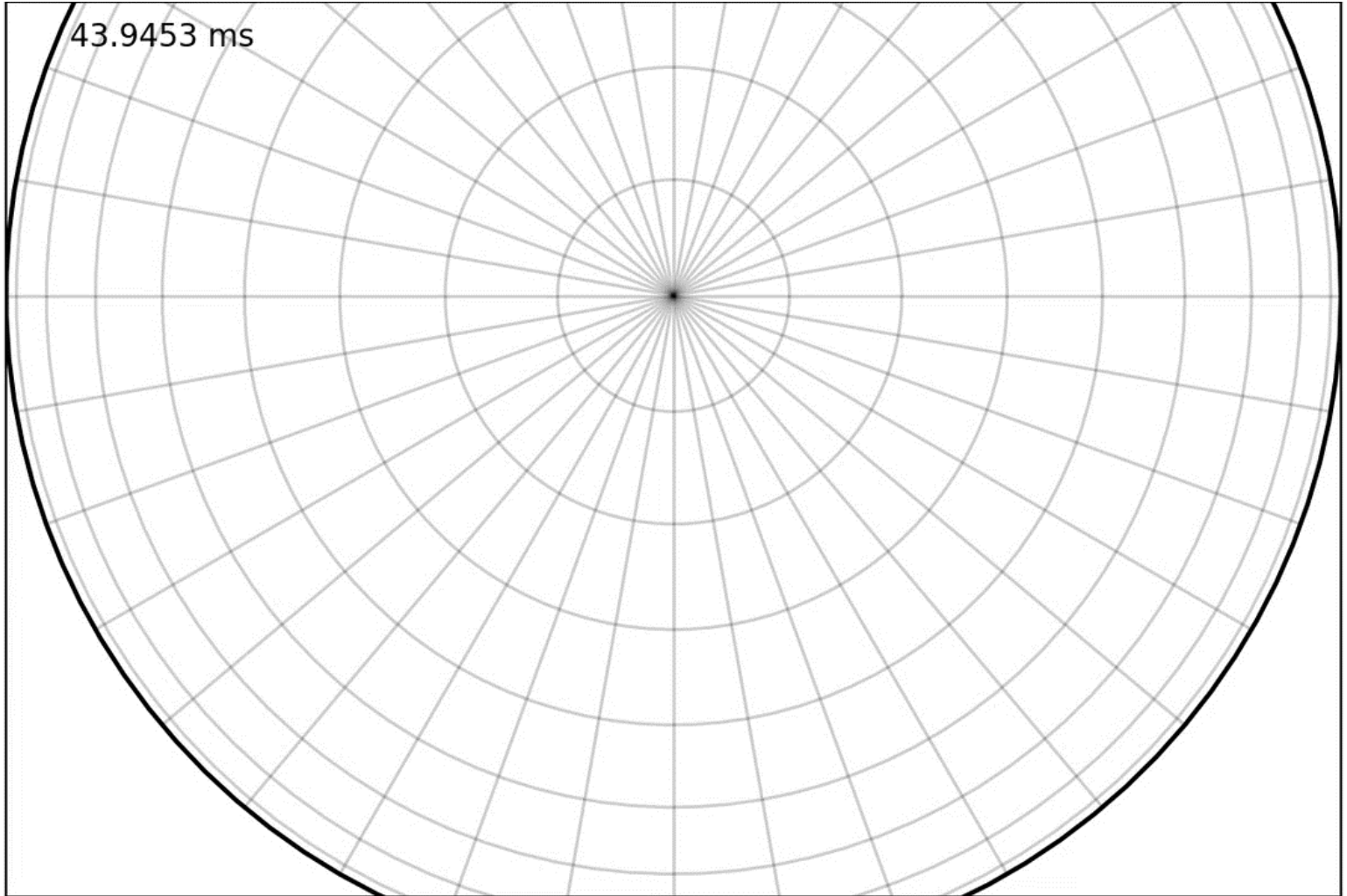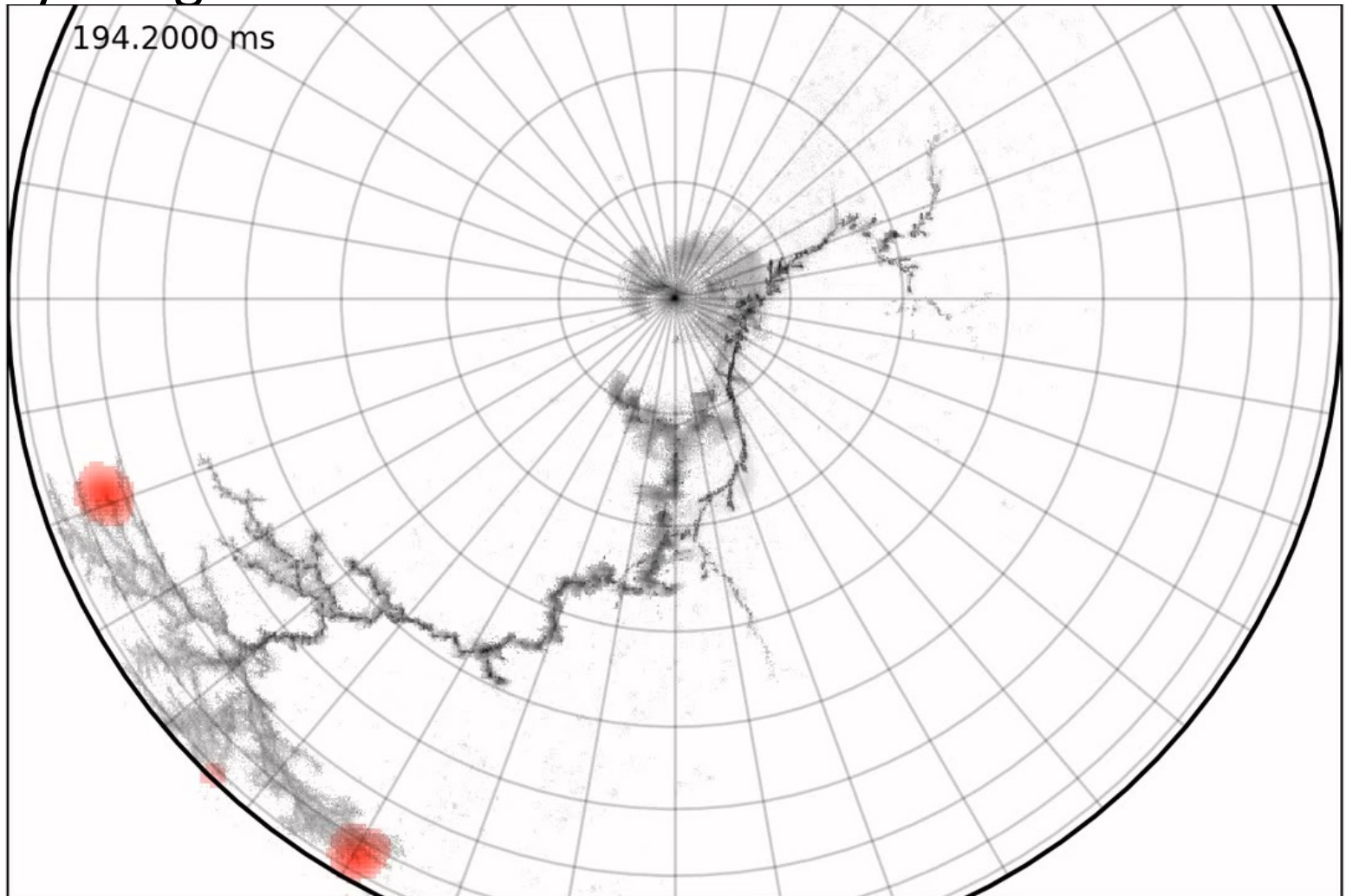
Map of a CG

1,093,329 point sources in 252 ms

Animation of a CG

43.9453 ms

Dirty Images for CG Return Stroke
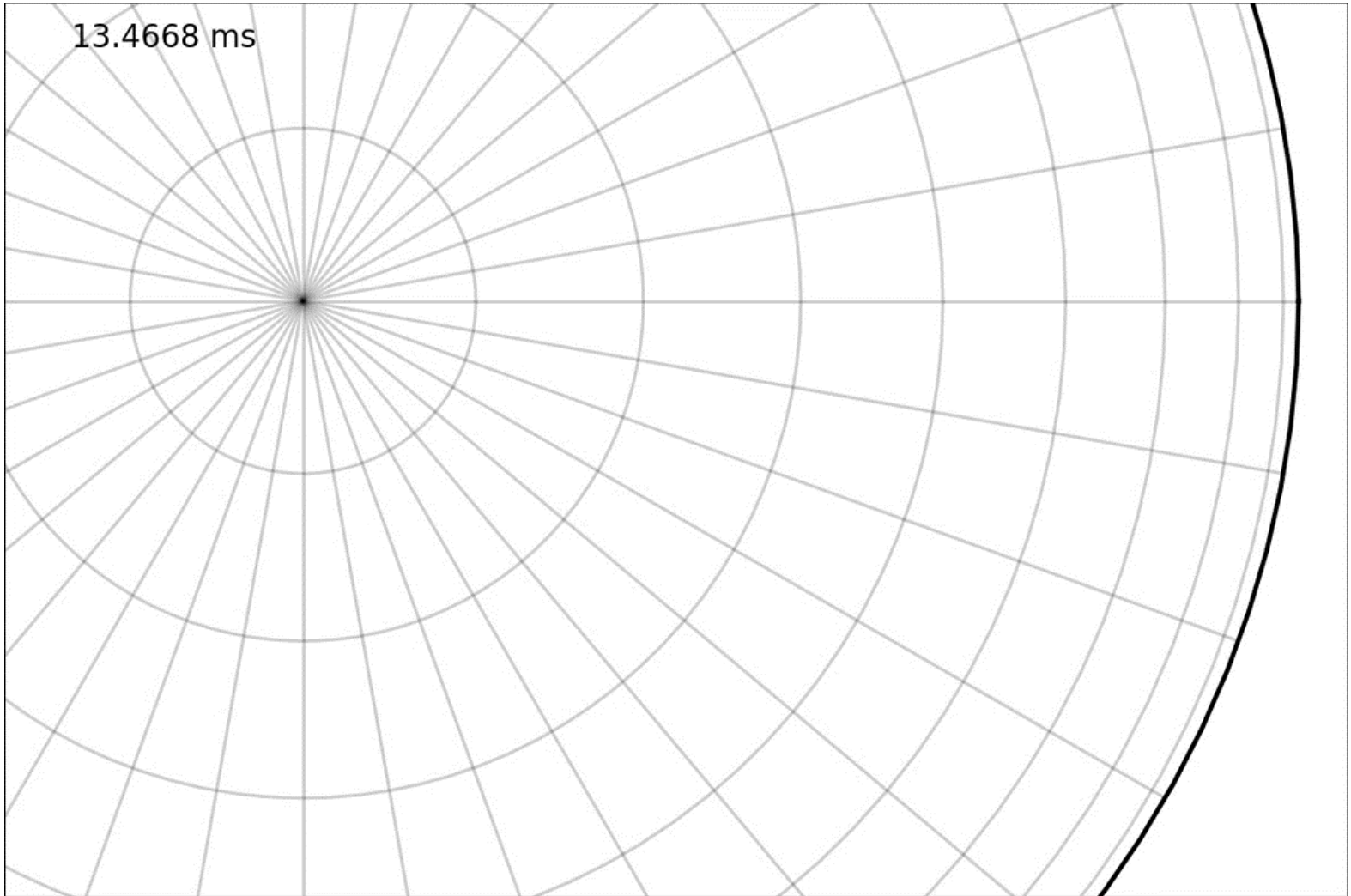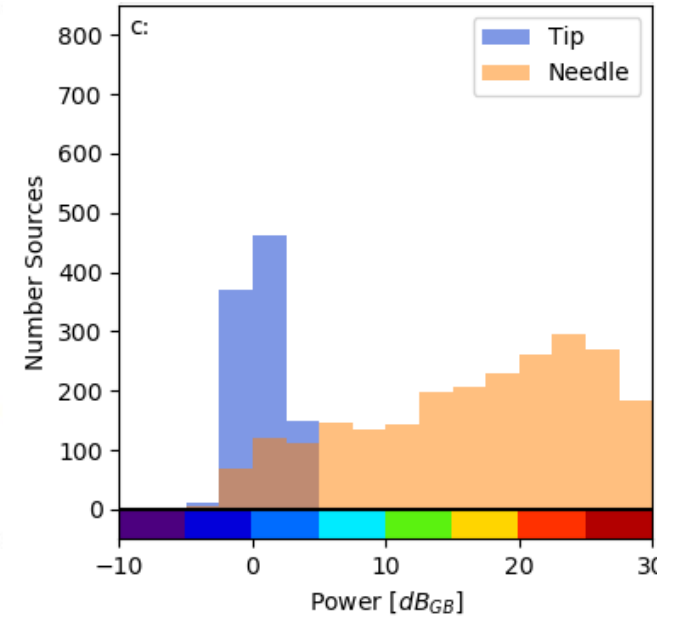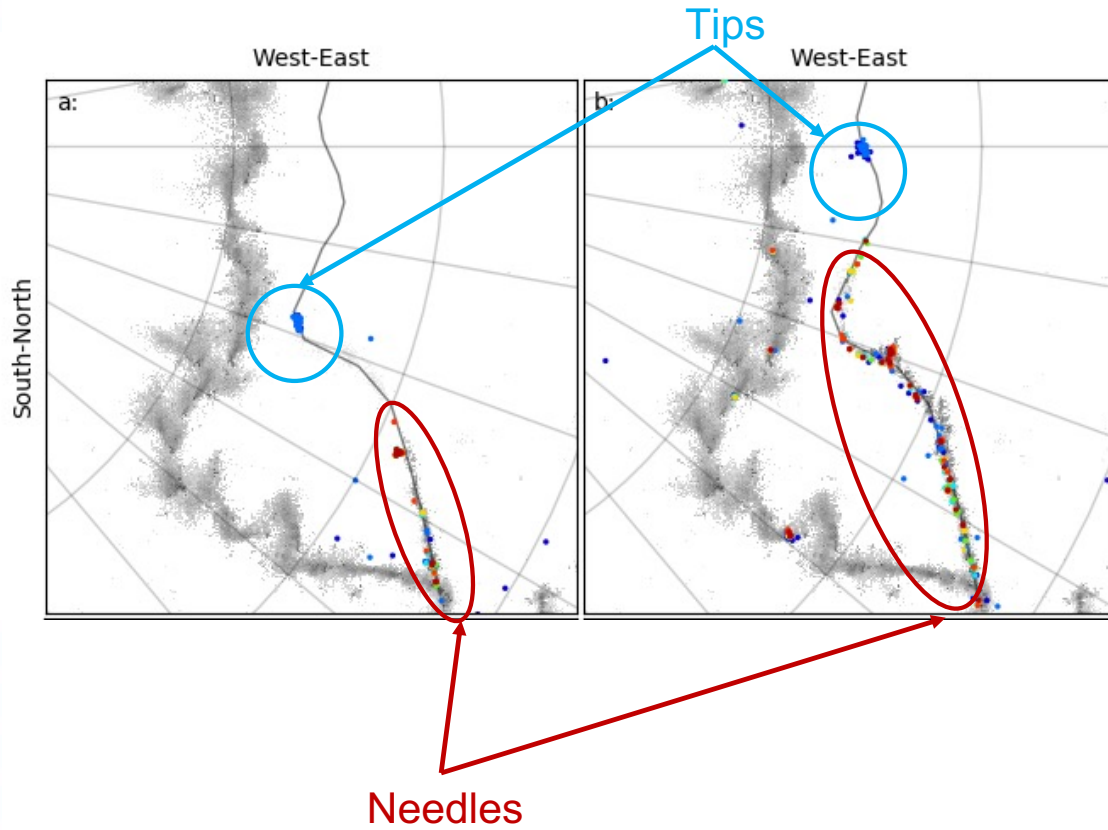

194.2000 ms

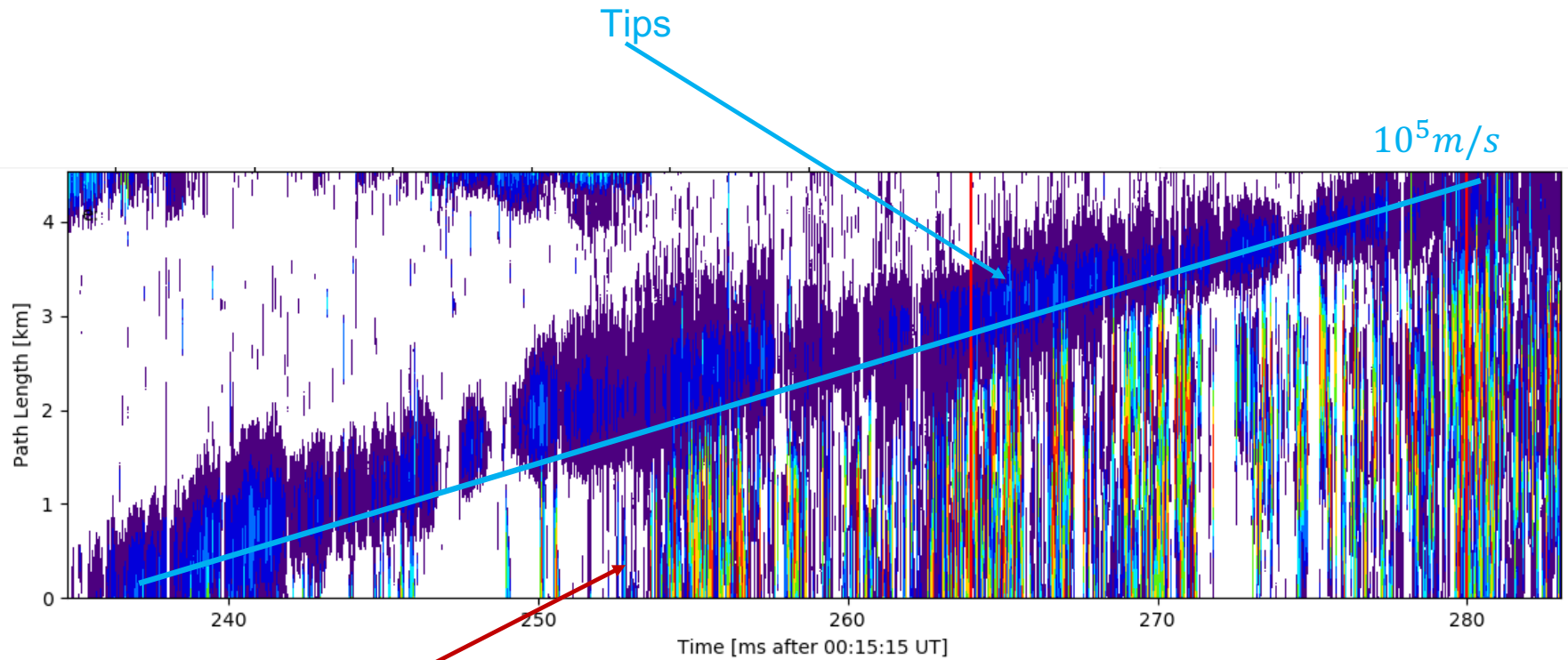# Map of an IC
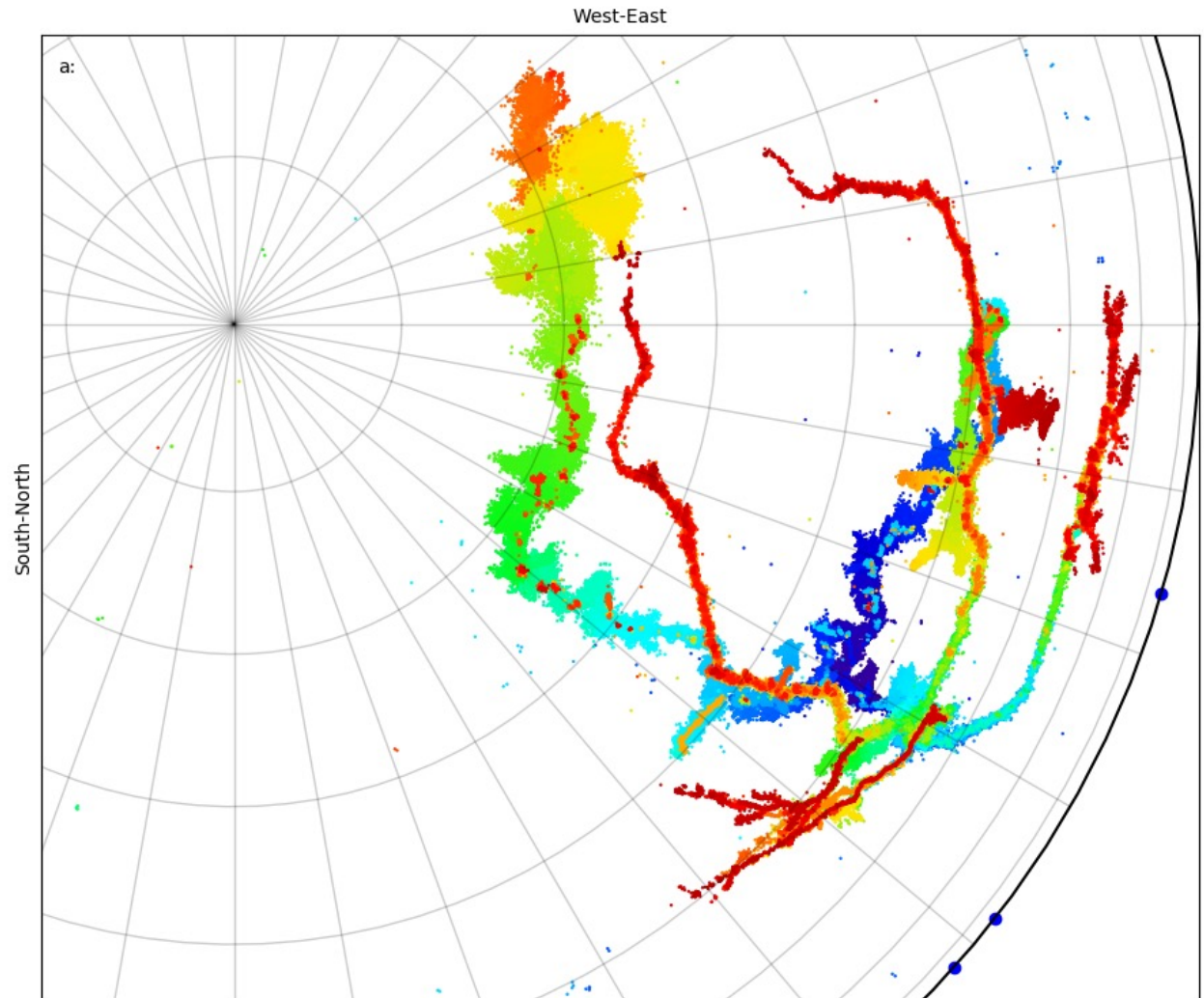
Animation of an IC

13.4668 ms

Positive Leader Tips

Positive Leader Tips

Summary

Implemented
- Time Series Reconstruction
- Imaging
- Arbitrary Configurations
- Beam Steering
- Centroid Based Deconvolution
- Various Visualizations

Not Implemented (yet)
- Good Deconvolution
- Flagging/Filtering
- Non-linear Corrections
- Dual Polarization
- A fast imaging algorithm

Pros
- 256 Antennas!
- Very High Sensitivity
- Very High Time Resolution
- Calibrated Antennas
- Dual Polarizations
- No Overhead Null

Cons
- Poor Dynamic Range
- Compression Artifacts
- 'Only' 40MHz bandwidth
- 'Only' 100 meter baselines