



Introduction to the GBT Mapping Calculator

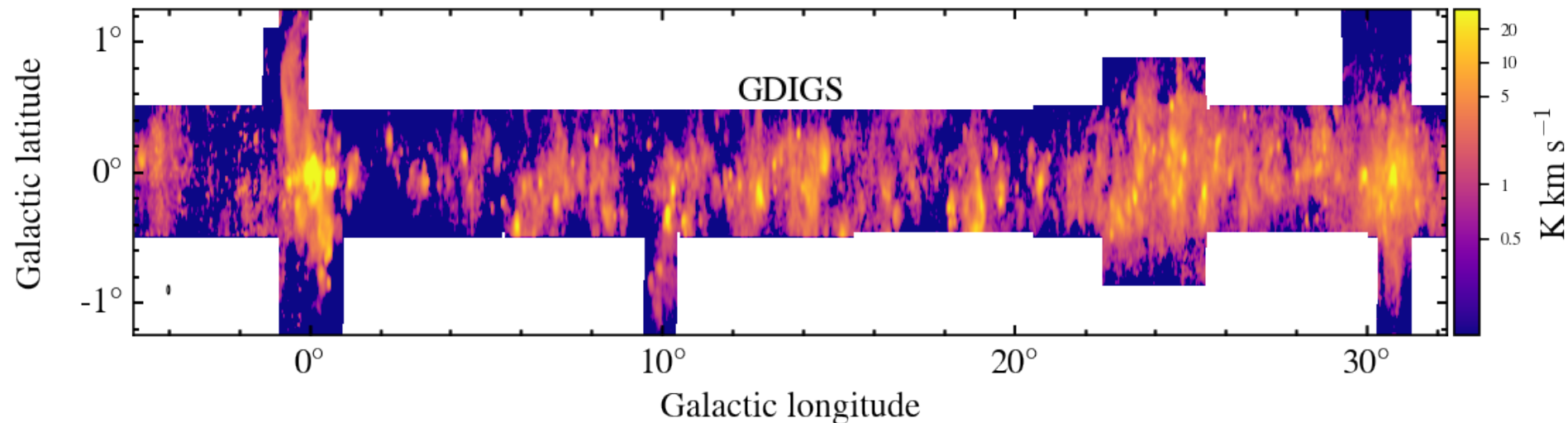
Speaker: Pedro Salas



Mapping?

“Record in detail the spatial distribution of (something).”

For example, if you want to know how the radio recombination line emission changes over the Galactic plane.



Adapted from Anderson et al.
2021



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When should you map?

There's no unique answer, it depends on your science goals.

SHOULD I MAP?

IS YOUR SOURCE BIGGER THAN THE BEAM?

NO

YES

IS THERE ANYTHING INTERESTING AROUND IT?

NO

YES

DO YOU NEED SPATIAL INFORMATION?

NO

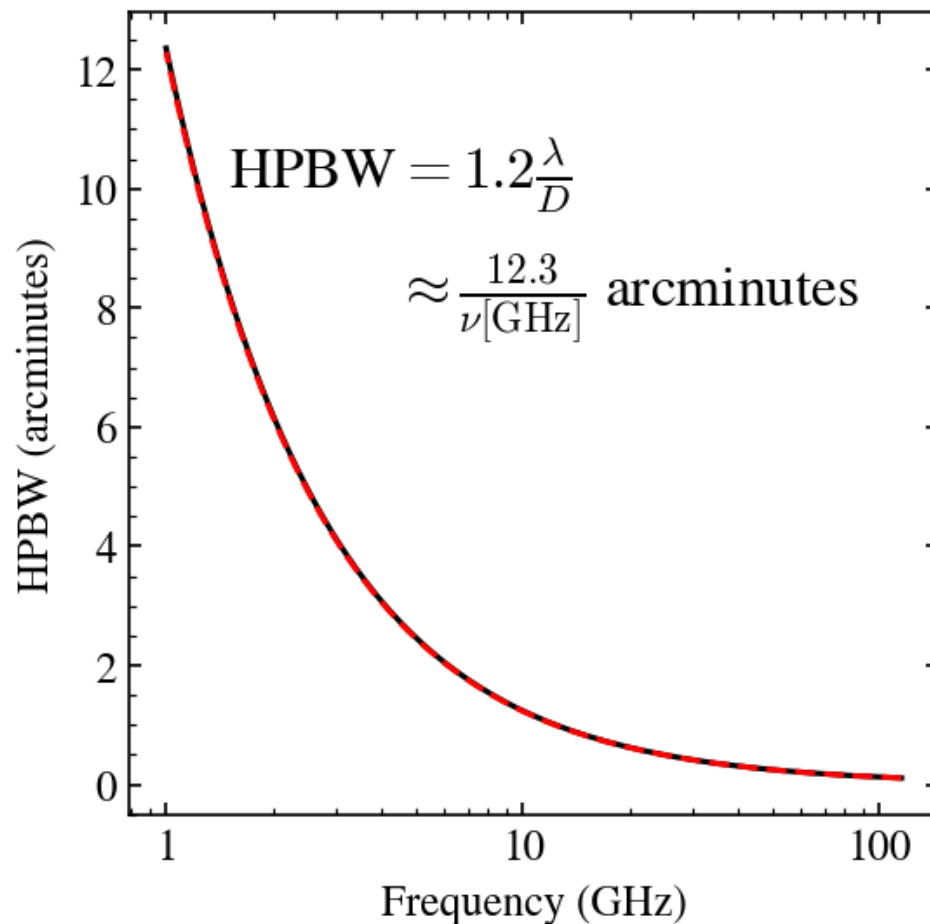
YES

DO YOU WANT TO MAP?

NO

YES

MAP!



How long will it take to map?

The GBT's mapping calculator provides a standard way of determining the time required for mapping observations.

<https://www.gb.nrao.edu/~rmaddale/GBT/GBTMappingCalculator.htm>

!



GBT Mapping Calculator

Last Modified: December 31, 2014
Ronald J Maddalena

Calculates the time needed to map an area including overhead, based on the integration time per beam area (e.g., the results from the [Sensitivity Calculator](#)) and the area to be mapped. Provides example ASTRID commands as well as other mapping parameters. Supports the typical mapping commands for on-the-fly (OTF) rectangular maps, OTF Daisy maps, and point rectangular maps.

Reset

Submit

Input Values

Instructions

Backend and Observing Modes

Digital Continuum Receiver

Used by the calculator to provide values for the minimum time resolution, minimum switch period, and minimum integration time. Minimum switch periods for VEGAS are derived from Tables 2, 3, and 4 in [GBT Memo 288](#), plus the values you



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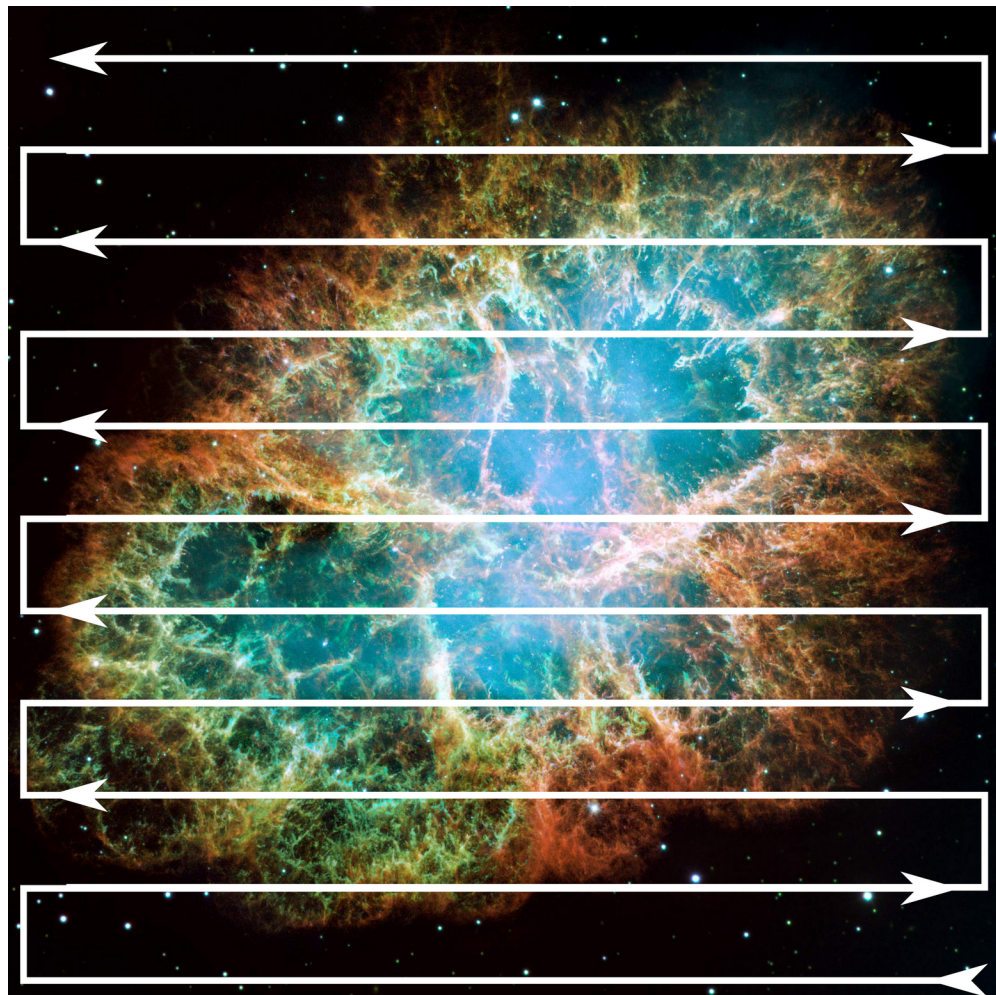


On-the-Fly Rectangle Mapping

Uniform sensitivity across the whole map.

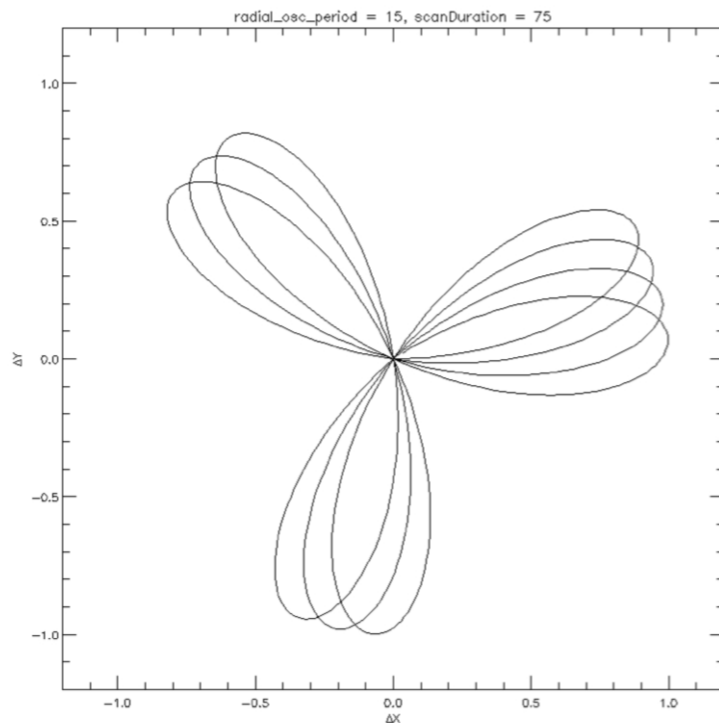
Can use RALongMap (rows) or DecLatMap (columns).

Can use position switching or frequency switching.

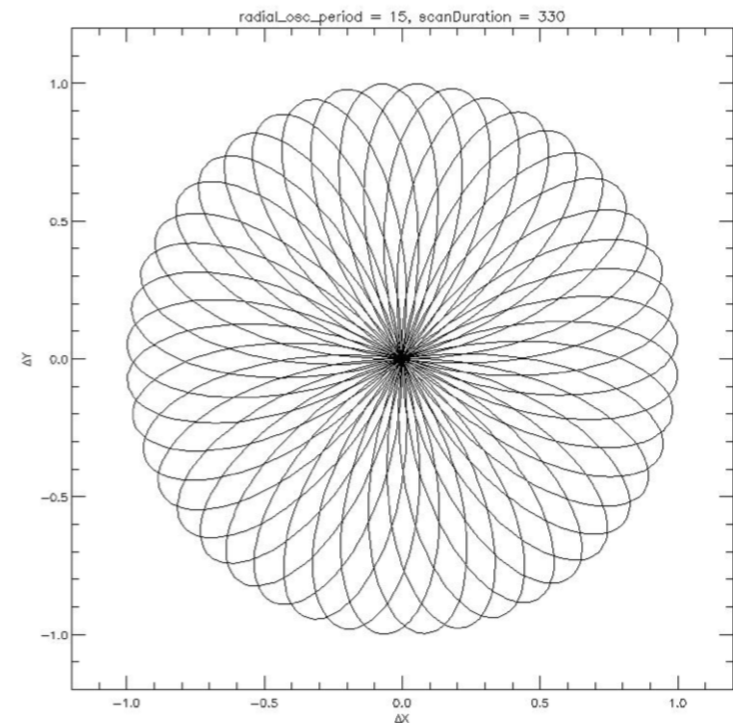


On-the-Fly Daisy Mapping

Great sensitivity at the center, but poor sensitivity near the edges.



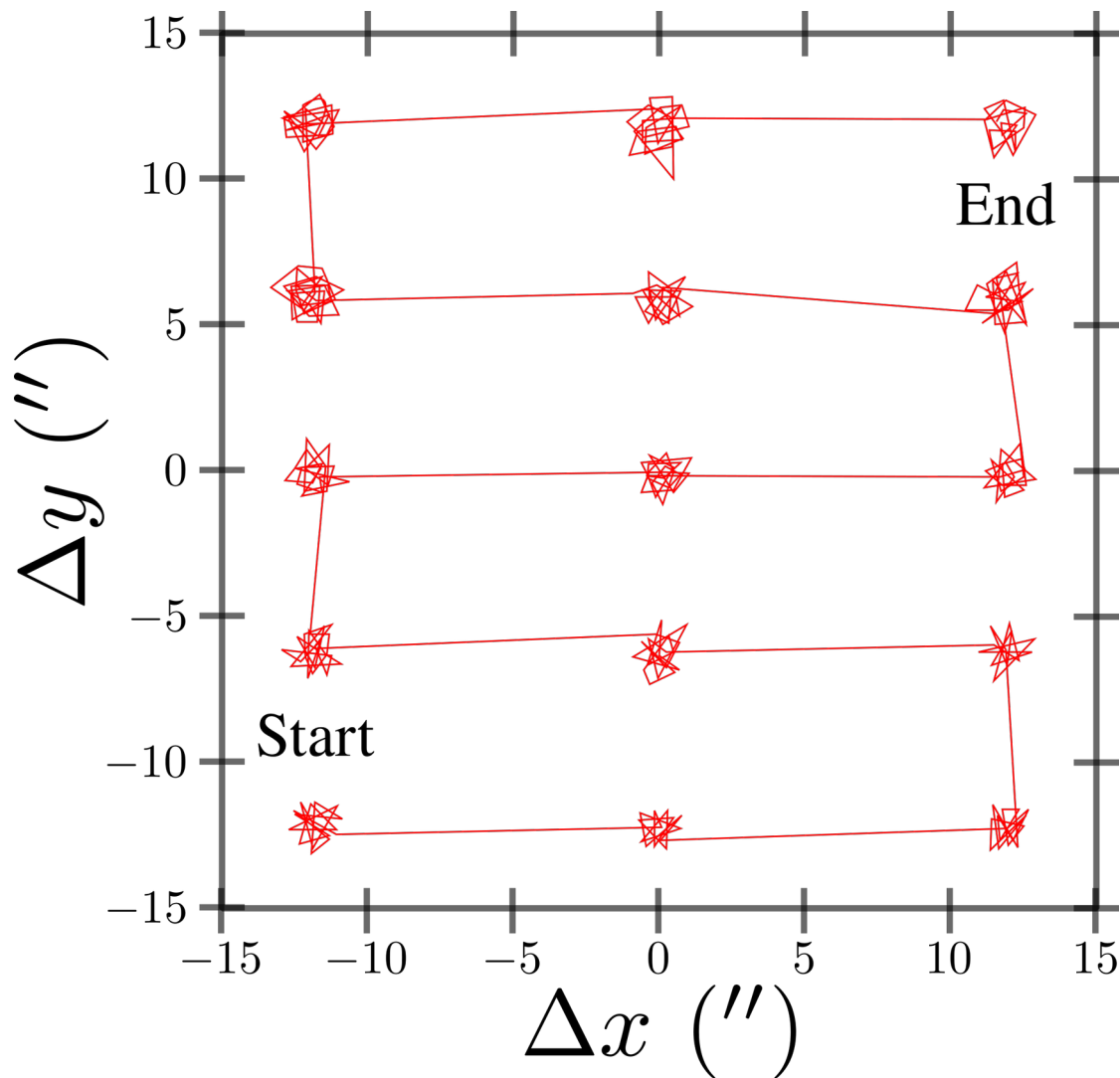
(a) Daisy scan with $\text{scanDuration} = 5 \times \text{radial_osc_period}$.



(b) Daisy scan with $\text{scanDuration} = 22 \times \text{radial_osc_period}$.

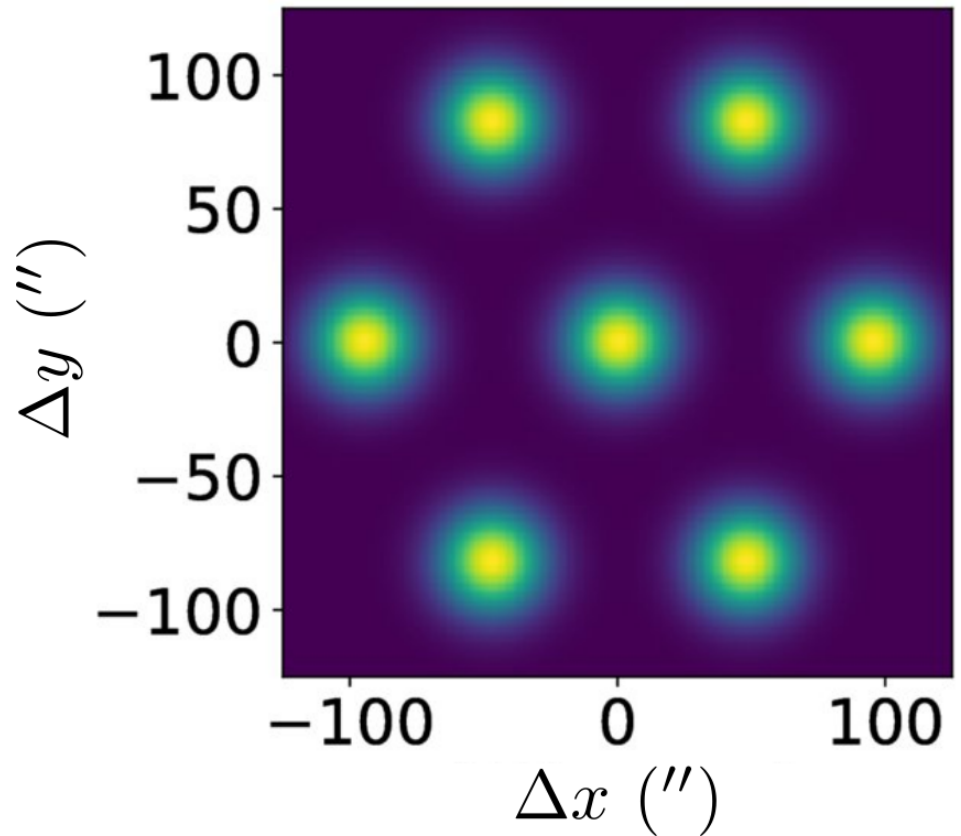
Point Rectangle Mapping

Map of a rectangular region where the telescope moves to a map position, sits for a specified amount of time, moves to the next position



Caveats with the Mapping Calculator

- Multiple pixel receivers:
 - Argus
 - KFPA
 - Integration time values should be divided by the number of beams used in the observation
- Make sure you use the correct values from the sensitivity calculator!



Processing your mapping data

- Data reduction tools: GBTIDL & gbtpipeline
- Data gridding tool: GBTgridder
- All these tools support the use of SDFITS files (default data format for spectral line observations)



Live Demo

We will now continue
with a live demo 😊





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