



Reducing MeerKAT data of the Galactic Plane

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SKA and the data

SKA is designed to be the most sensitive radio interferometer ever:

- large collecting area distributed over “hundreds” of dishes (SKA-MID) or stations (SKA-LOW)
- large bandwidth ($\Delta\nu/\nu \sim 1$)

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SKA1-MID

About 200 dishes operating between 0.35 and 15 GHz.

Why a so huge quantity of data?

Number of antennas (N)

data output $\propto N^2 \times C$

Number of frequency channels (C)

... and small antenna diameter means large field of view

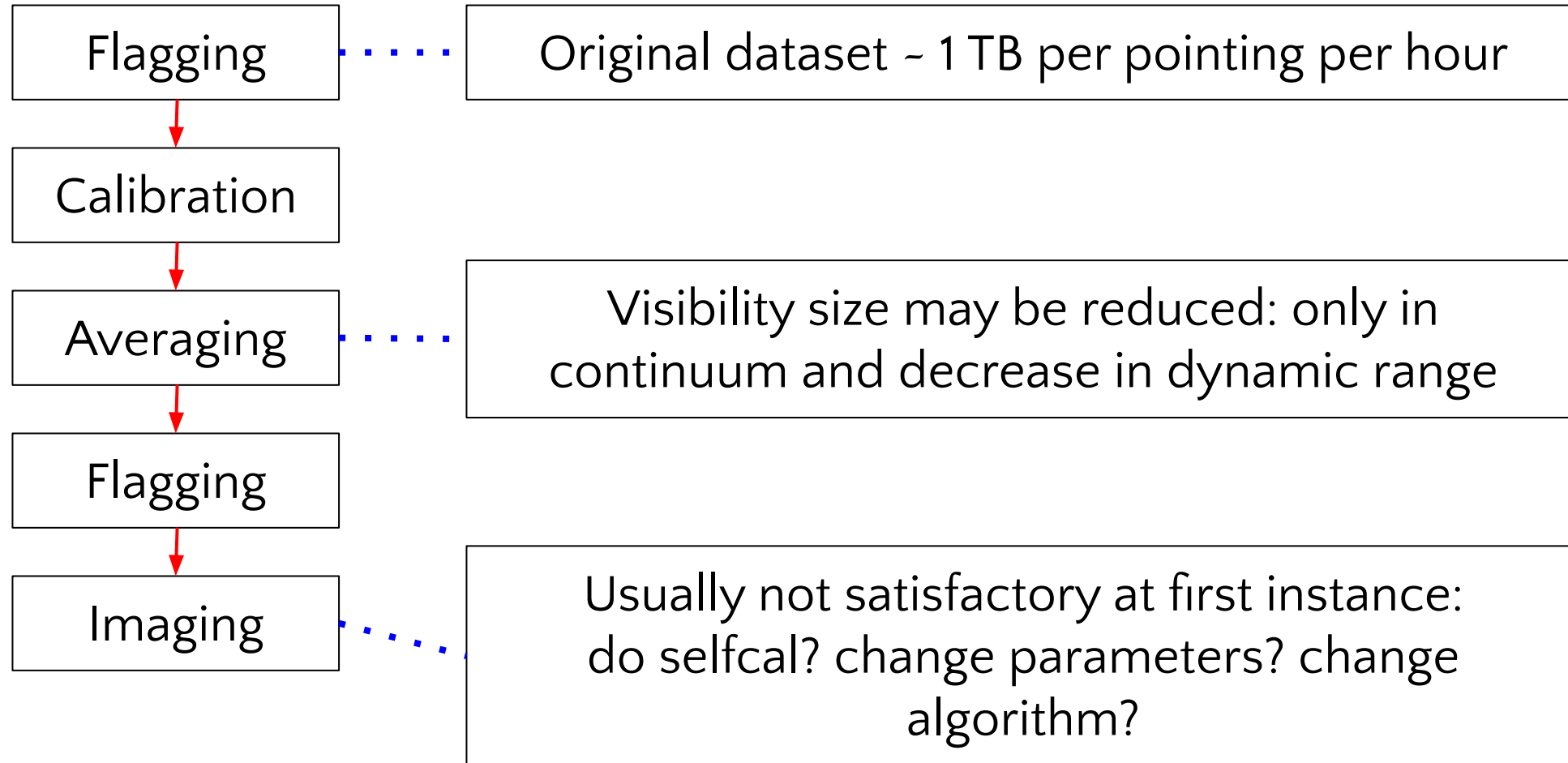
MeerKAT

Precursor of SKA1-MID: 64 (80) dishes

A Galactic plane survey was completed in L -band:

- sky coverage: $250^\circ < l < 60^\circ$ and $-1^\circ < b < 1^\circ$
- frequency range: 0.8 – 1.6 GHz
- sensitivity: theoretical $10 \mu\text{Jy}/\text{beam}$; achieved 20–500 $\mu\text{Jy}/\text{beam}$
- dynamic range: locally around 1000

MeerKAT: Galactic data reduction



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Currently, the SARA0 MeerKAT Galactic plane survey is mainly limited by the data reduction:

- imaging artifacts around extended sources
- imaging artifacts around bright sources
- unreliable in-band spectral indices

MeerKAT: Galactic data reduction

The impossibility to reach the target sensitivity, dynamic range and reliability in final images severely hampers fulfilling science goals.

Part of these MeerKAT data will be reduced again from scratch within the framework of a INAF mini-grant with a partnership between INAF and SRAO.

The project will make use of SRAO pipelines to be run on the PLEIADI cluster at Observatory of Catania. The aim is to develop software and hardware expertise to deal with MeerKAT data, looking at MeerKAT+ and SKA1-MID.

Astronomy vs. ICT

How does this project fit within the INAF/SKAO efforts in computing?

Astronomy vs. ICT

How does this project fit within the INAF/SKAO efforts in computing?

It doesn't.

Astronomy vs. ICT

There is the serious risk that the needs of the scientific community and the “computing resources” misalign.

What kind of software will be used?

How do the hardware solutions comply with the scientific requirements?

Conclusions

SKA will certainly represent a major challenge in every aspect concerning data handling (transfer, reduction, analysis, simulations...).

The highest priority shall be assigned to the fulfillment of the scientific goals (which have already been downscaled several times).

There is the need for a tight cooperation between the astronomy and the ICT community.