

Monitoring Gravitational Deformations of Radio Telescopes Using 3D Point Clouds

Background and state-of-the-art

- Radio telescopes and VLBI are used to determine the earth's reference frame, position in space and local tie vectors
- Focal lengths of the radio telescopes' vary with pointing direction
- The shape and its variation can be derived from laser scan data

Research questions

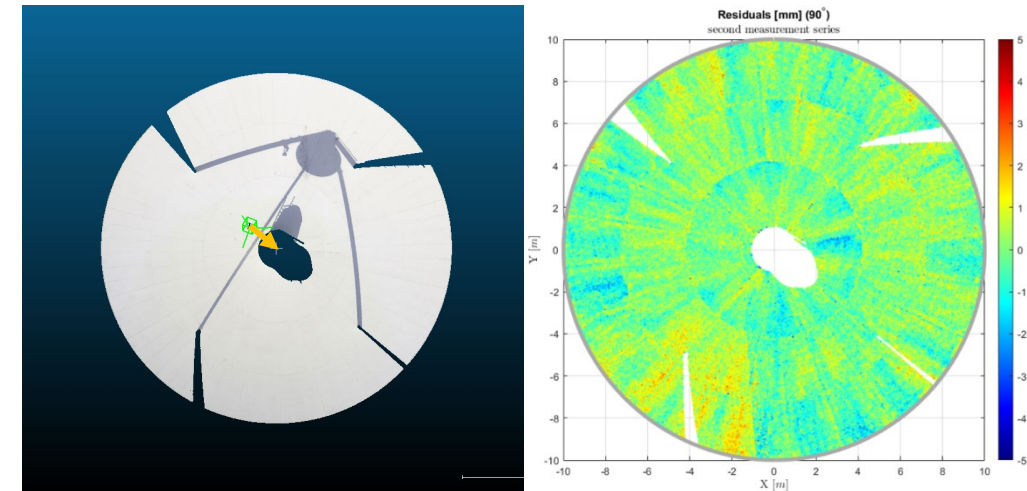
- Which workflow can be implemented to efficiently determine focal length changes of large and medium size radio telescopes?
- How to eliminate laser scanner misalignments during the processing?
- Which scanning instrumentation do we need for detecting those deformation?

Research methods

- In-situ calibration during focal length estimation
- Shape parametrization of radio telescopes surface
- Areal smoothing algorithms



Mounting of Laserscanner in 20 m Radiotelescope Wettzell



Left: Transformation of Different Coordinate Systems, Right: Residuals