

Visit 221: Bill Cotton

The overall objective of this visit was to evaluate the potential for the application of an ionospheric calibration technique developed for VLA 74 MHz observations, Field-based Calibration, to LOFAR observations. Is this technique applicable to, and useful for, correcting ionospheric distortions in LOFAR data? The technique also needs extension to the wide bandwidths of the LOFAR electronics.

Several data-sets have been analyzed using this technique which appears to be applicable to LOFAR baselines of order of 10 km but is generally inadequate for the full range of LOFAR baselines (of order 100 km) which are strongly affected by the ionosphere. In at least a subset of data-sets evaluated, a direction dependent calibration (e.g. Field-based calibration) gave demonstrably better results than the traditional directions independent calibration ("self-calibration").

The final goal of the visit is to analyze a data-set which is also being investigated for ionospheric effects by ASTRON staff and to derive the differential electron column densities needed to correct for the ionospheric distortions using the LOFAR imaging software. This will verify both the usefulness of results from the field-based method and of the application of this calibration in imaging. Work on this goal is ongoing.