

Survey KSP

Huub Röttgering
Leiden Observatory

The Exploration of the unknown

(Kellerman et al. Decadal White paper)

- The excitement of the next generation of astronomical facilities is not in the old questions which will be answered, but in the new questions that they will raise
- Major discoveries (AGN, pulsars masers, exo-planets etc.), were the results of building powerful new instrument and not the result of trying to test any particular model or trying to answer a previously posed question.

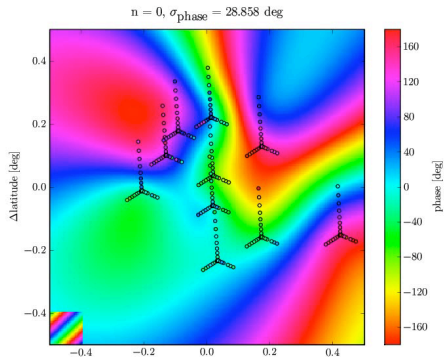
Overview

- Overview of some work
 - Ionosphere
 - 2D -> 3D
 - Residual PSF variation
 - Tiling the sky
 - Current survey plans
- Commissioning plans

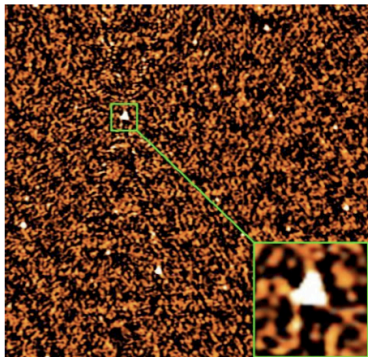
Ionospheric work in progress

- 2-d screen paper:
 - Intema et al. accepted and Being implemented in BSS
- 3-D screen paper: Intema et al.
- Observed ionospheric statistics from the 74 MHz survey - Cohen & HR, submitted
- Analytic fitting of disturbances - van der Tol et al.
 - thesis chapter
- Statistics of derived physical ionospheric parameters - Sridhar Rengswami
- Calibratability of LOFAR - report by Ilse van Bommel and Maaïke Mevius
- VLA 74 MHz ultra deep field – 36 hours
 - issues with mixing vla/evla imaging
- Next steps:
 - BSS implementation of the 3D model
 - Time evolution
 - Collaboration with Cathryn Mitchel (Bath)

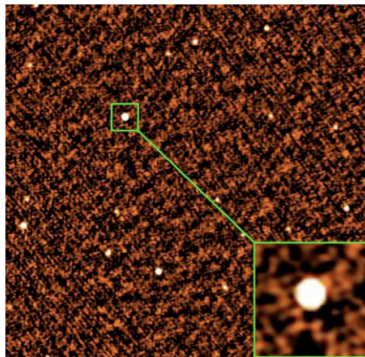
Ionospheric model fit
(PhD Intema)
VLA@74 MHz, 80" res.,
2 deg. FOV

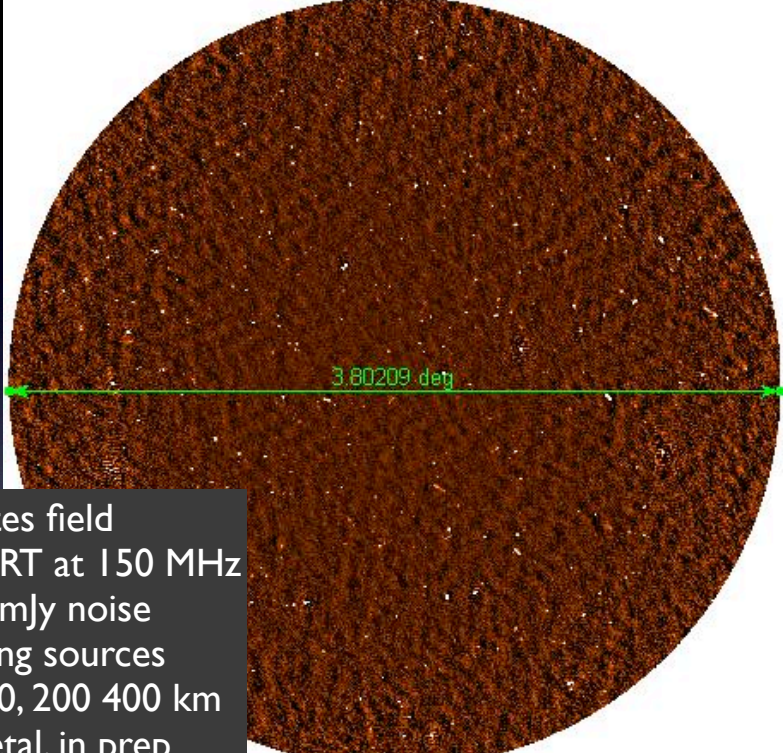


Old



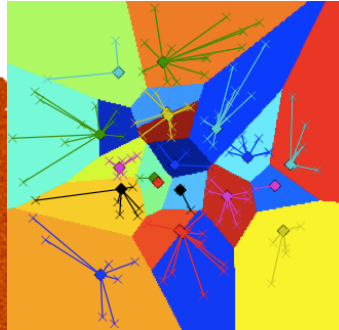
new





Bootes field
with the GMRT at 150 MHz
0.7 - 1 mJy noise
24 peeling sources
layers at 100, 200 400 km
Intema et al in prep

PSF variations due to
imperfect calibration -
Mohan



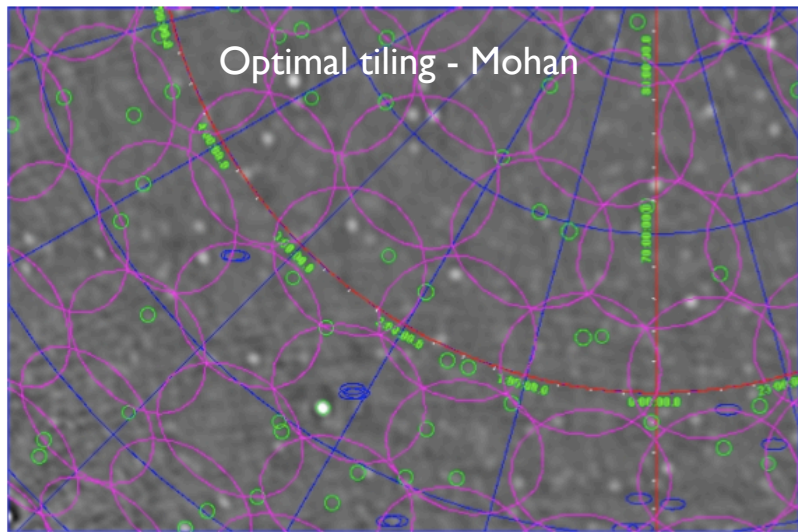


Figure 5: A blow-up of figure 4. Also indicated are in green galaxies from the list in the Appendix and in blue clusters of galaxies also from the list in the Appendix.

Proposed LOFAR Survey Specifications

H. J. A. Röttgering¹, P.N. Best², M.J. Jarvis³, P. N. Barthel⁴,
M. Brügger⁵, G. Brunetti⁶, K.T. Chyży⁷, J. Conway⁸, M. Lehnert⁹,
G. K. Miley¹, R. Morganti^{4,10}, I. Snellen¹
for the LOFAR survey team

Version 2.2
22-April-2009

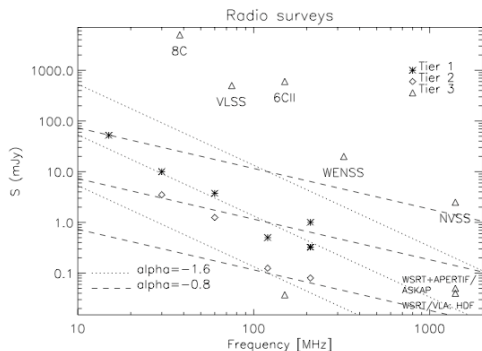


Table 6: *LOFAR survey frequency setups*

Nominal survey frequency (MHz)	Frequency range (MHz)	Total bandwidth MHz	LOFAR band pass
15	15 - 23	4	10 - 90
30	30 - 50	16	30 - 90
60	60 - 80	16	30 - 90
120	120 - 150 (90 %)	14.5	110 - 190
	150 - 190 (10 %)	1.5	
150	126 - 174	48	110 - 190
200	180 - 210	16	170 - 230

Usage of wide bandwidth defined in
collaboration with the magnetism KSP

Aims of Commissioning

- Which dipoles to use to optimize survey speed?
 - What tapering?
 - Trade-off between sensitivity, FOV and low side-lobe levels
 - Station beam stability, pointing accuracy
- Which frequency setups are best for our purpose?
 - RFI
 - spectral index, polarization and RM determination
- How to deal with the ionosphere
 - 2D / 3D models?
 - Time resolution?
- Quality of the final maps: uniformity of noise, detectability of extended structure, stability of the psf and sensitivity
 - all as a function of declination
- Overall issue: what limits the dynamic range?
- Long baseline to be included in any observations

First list of commissioning observations

- I. At the full range of frequencies: a low and high elevation field (Bootes and the XMM-LSS?)
 - Especially
 - at 30 MHz: different selections of dipoles, also combined with 60 MHz observations
 - at 120 MHz: range of bandwidths
 - how low can we go (in frequency and declination)?
 - how well at zero declination?
- At the survey frequencies
 - two deep fields
 - 5 pointings in a hexagonal grid
 - At a depth comparable to the proposed 'tier-1' all sky surveys
 - ~100 hours for the high declination and ~200 hours for low declination field
 - Lenc field
 - Coma cluster
 - A giant radio source
 - Deep observations at a very bright source
 - A simple galactic field (CTA-1 ?)
 - Galactic center
 - All the observations with long baselines at 0.25 sec.