

Multi-frequency analysis of the Lockman Hole

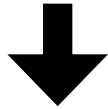
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=> Nature and properties of the faint radio population.

Multi-wavelength information and radio spectral indices to constrain the origin of the radio emission

Well studied field => **Lockman Hole**



observe the sub-mJy source population at different radio frequencies, in particular very low frequencies (30-200 MHz), where self-absorption phenomena are expected to be very important.

Lockman Hole WSRT Mosaic @ 1.4 GHz

30'

59°00'

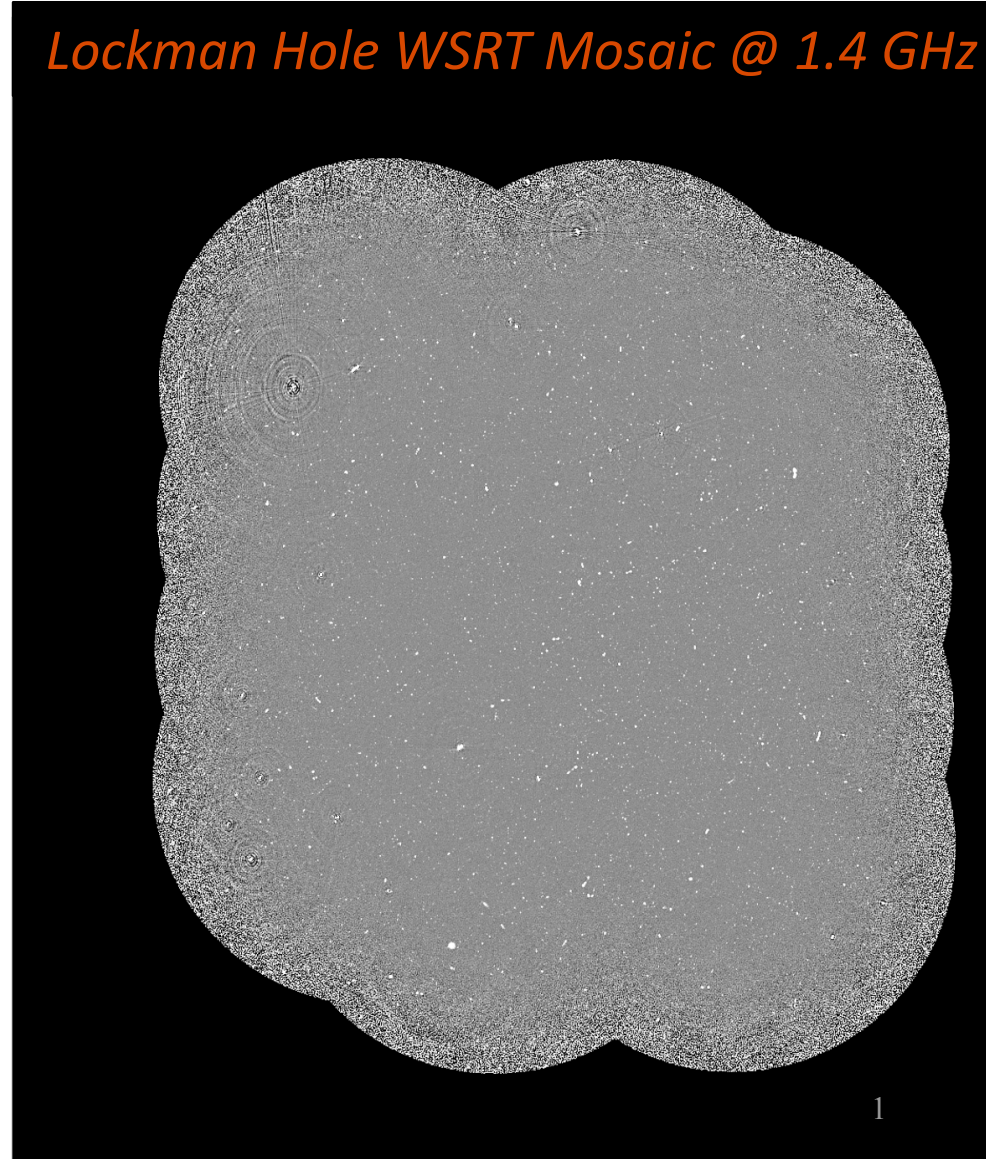
30'

58°00'

30'

57°00'

56°30'



Lockman Hole WSRT Mosaic @ 1.4 GHz

WSRT image @ 1.4 GHz:

16 WSRT pointings (6.6 sq. degr.)
taken over 208 hrs

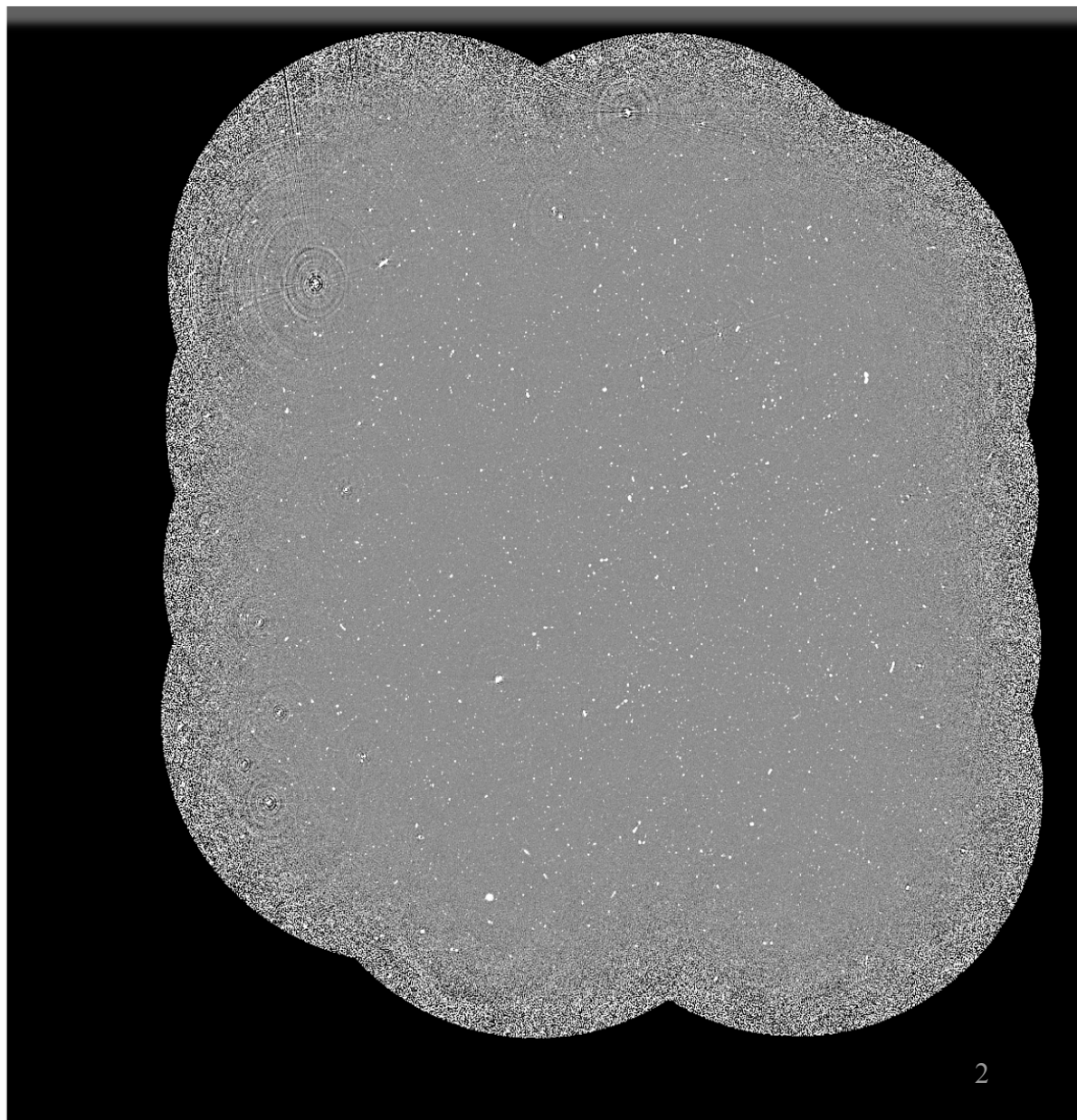
The rms noise rises from $11 \mu\text{Jy}/b$
(central 2 sq. degr.) to $200 \mu\text{Jy}/b$ at
the very border.

Source Catalog: 6002 sources with
 $S > 55 \mu\text{Jy}/b$

Source Counts: Complete down to
 $70\text{--}80 \mu\text{Jy}/b$

Multi-frequency analysis →

- WSRT 325 MHz observation
- existing 610 GMRT observations
- Lofar deep observations, as part
of Tier 3 Survey KSP



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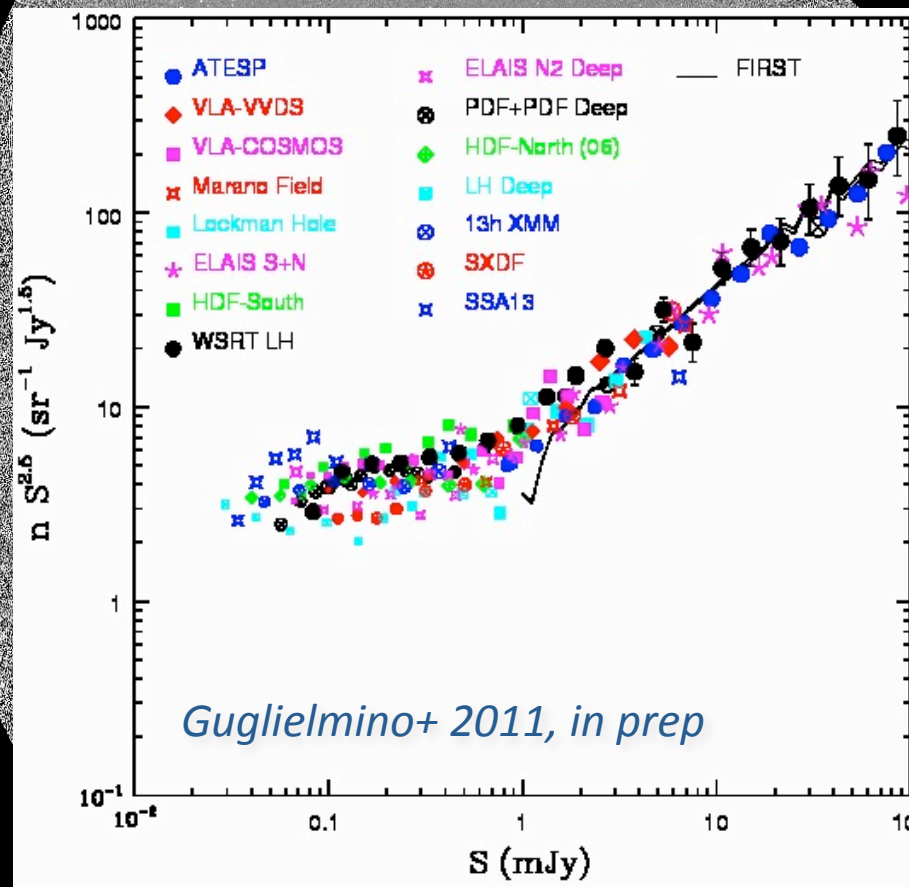
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Lockman Hole with Lofar

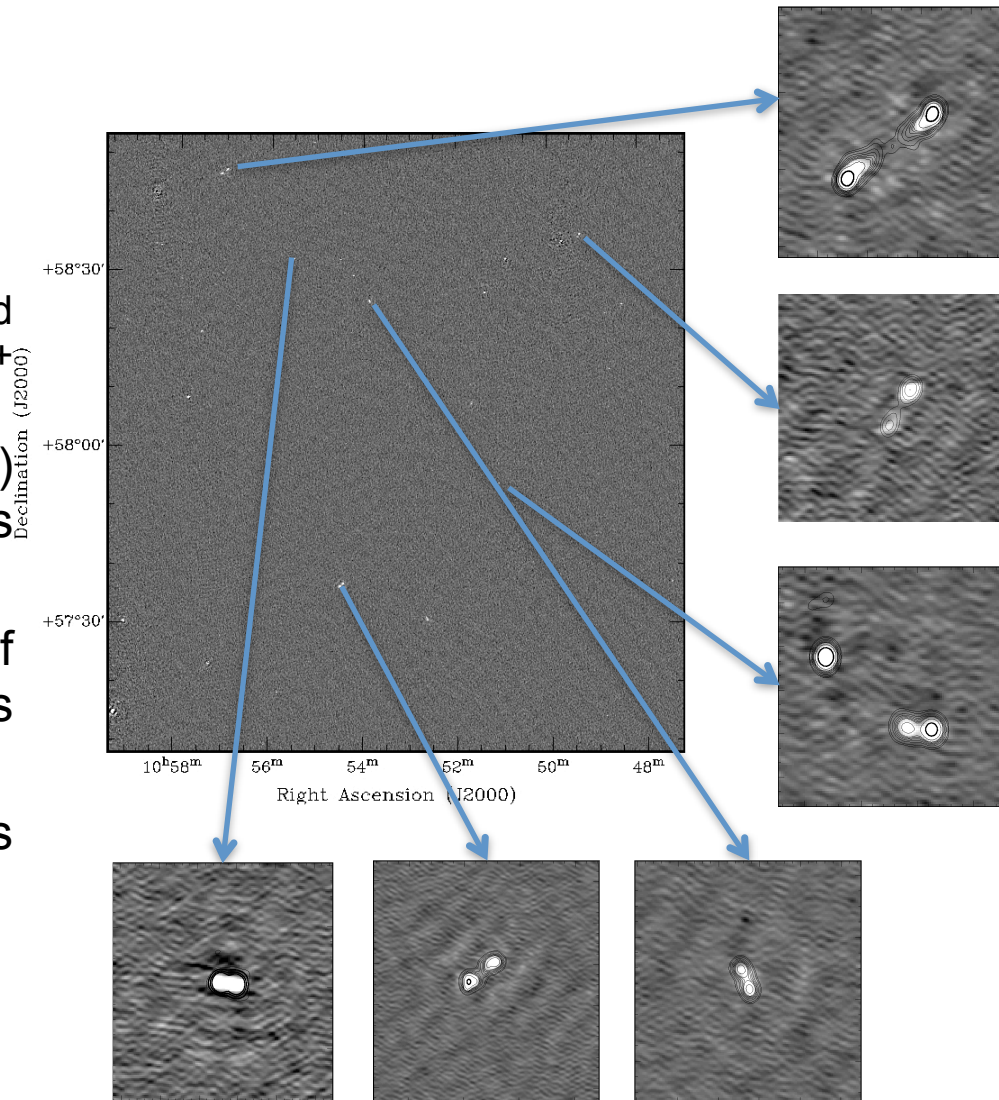
During Lofar commissioning, 6 hrs obs.

Ad hoc observing strategy to obtain good calibration: two beams (3C244.1 and LH) + calibrator (3C196)

Image shown (150 MHz, $\sim 10''$ res.) obtained from 3 of the 120 SBs, rms noise ~ 4 mJy/b

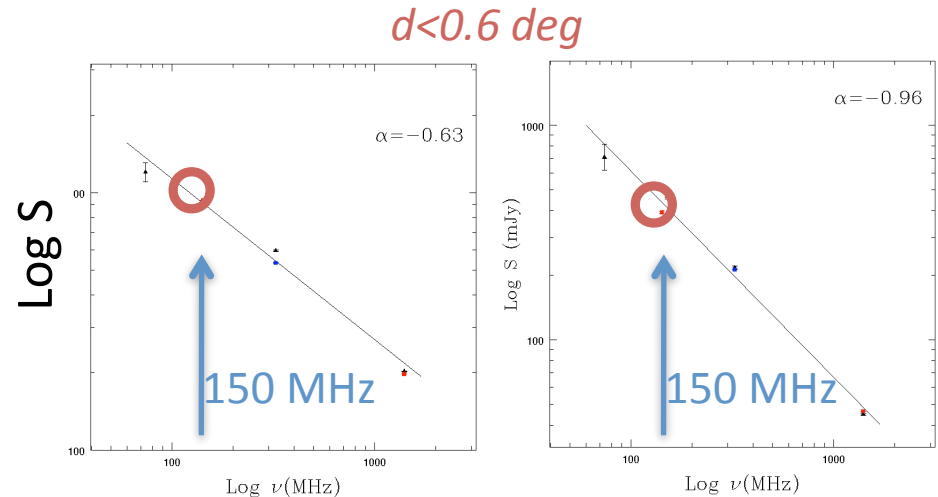
Several low frequency counterparts of the brightest WSRT 1.4 GHz sources are already clearly visible.

Ongoing: combining 120 sub-bands (expected noise 0.6 mJy).



Work in progress.....

Ongoing: check of the 150 MHz fluxes wrt distance from centre, still some corrections to be made



We will combine the 1.4 GHz, 325 and 150 MHz Lockman Hole data with existing 610 MHz data => in order to characterize the spectral index of the faint radio sources as a function of flux density => probing the physical mechanisms that dominate this radio population: optically thin (steep spectrum) or self-absorbed (flat spectrum) synchrotron emission.

Optical, mid/far infrared and X-ray bands will be added to classify the host galaxies, derive redshifts and derive physical and evolutionary properties of the mixed (AGN + SFGs) faint radio population.