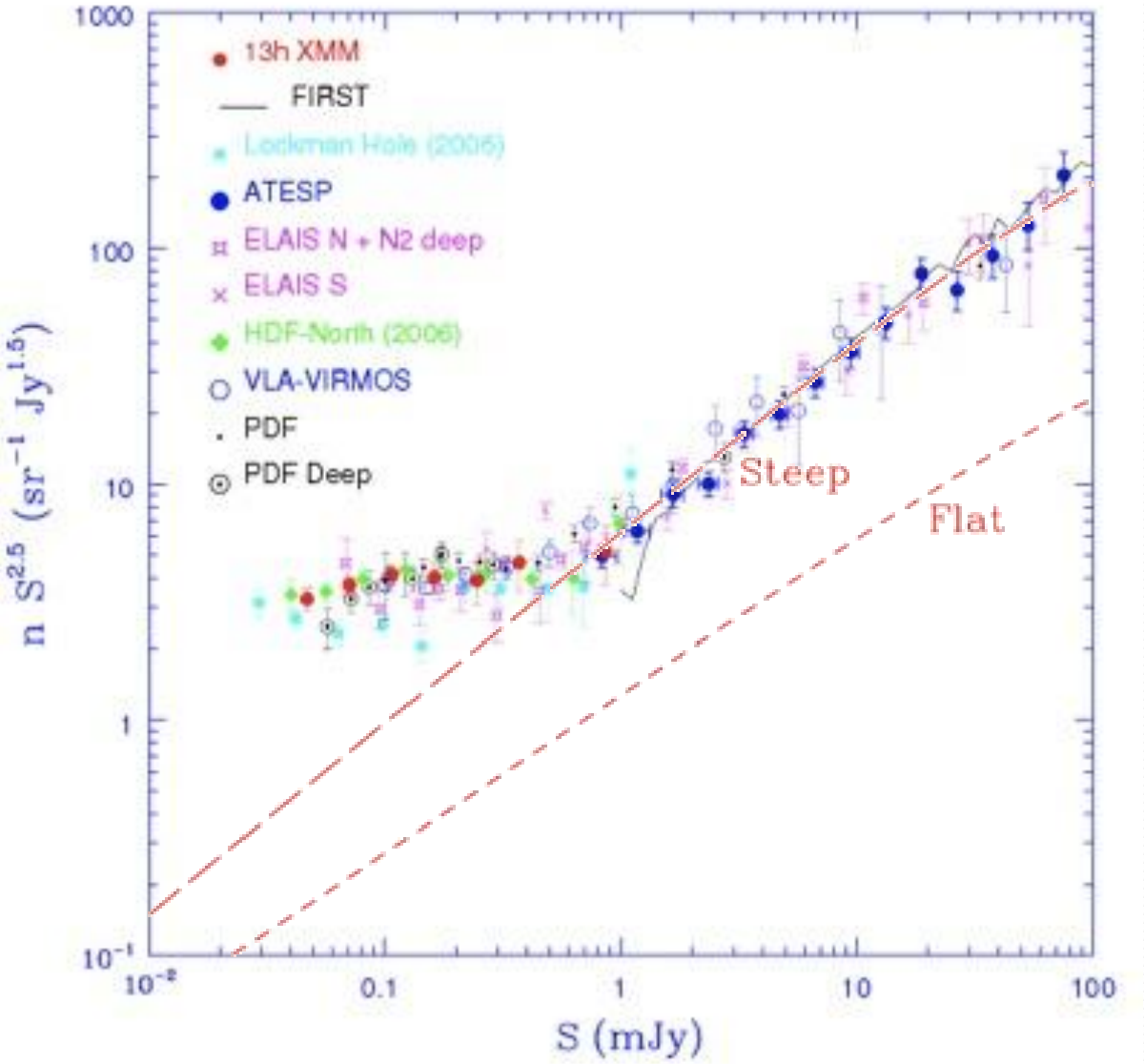
WSRT and Lofar observations of the Lockman Hole

Radio sources counts



The Nature of the faint radio sources

- Star Forming Galaxies (Simpson et al. 2006, Seymour et al. 2008, Smolcic et al. 2008)
- Low Luminosity Radio AGN (Mignano et al. 2008, Prandoni et al. 2010)
- AGN Radio Quiet ??? (Jarvis & Rawlings 2004, Wilman et al. 2008, Padovani et al. 2009, Prandoni et al. 2009)

Aims of this work

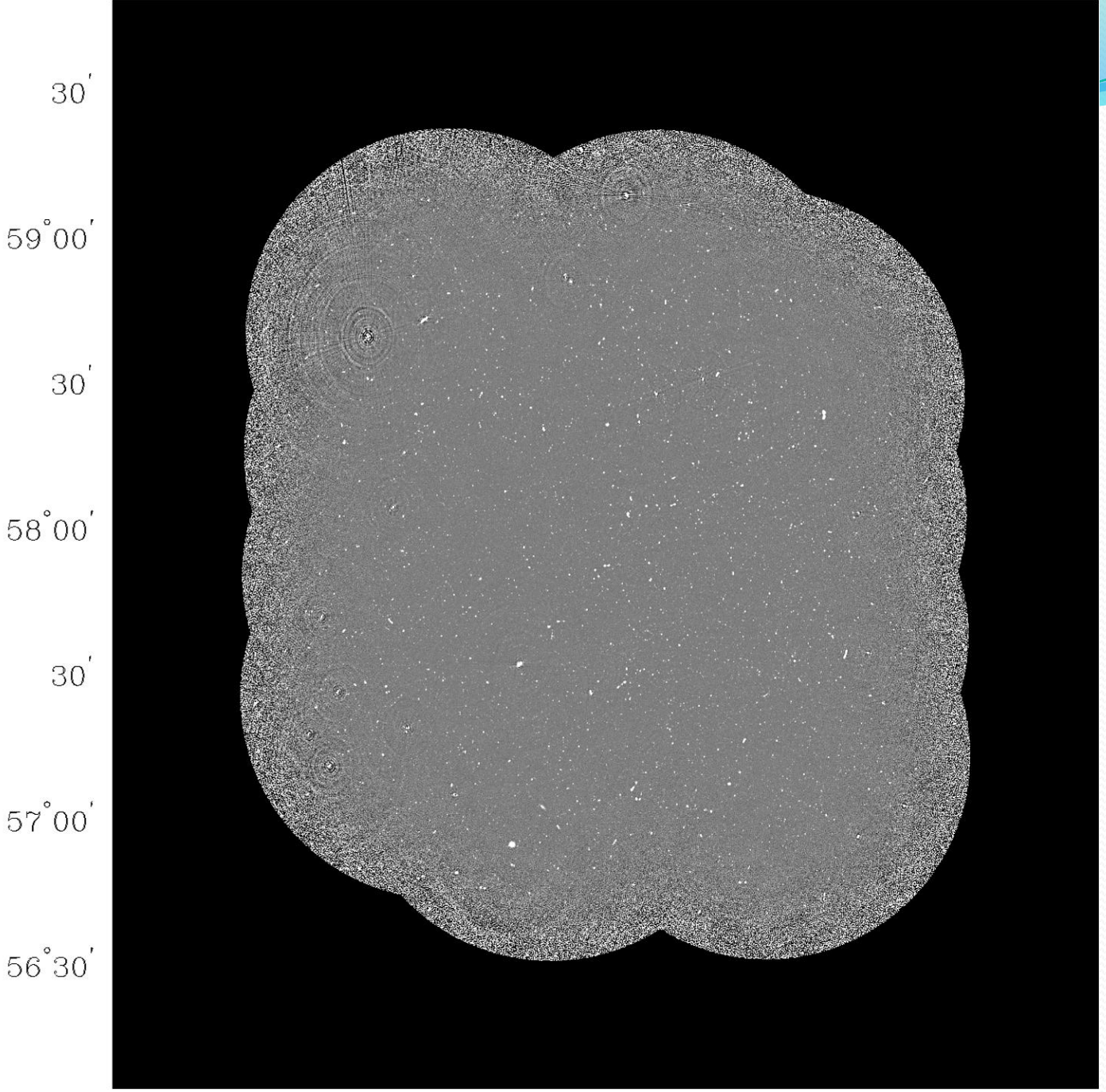
- Nature and evolution of submJy radio population (relative contribution of low luminosity radio loud AGN and radio quiet AGN)
- Radio spectra at low frequencies (30 MHz-1.4 GHz)
- Multiλ studies (opt/IR/FIR) including optical spectra
- 30 – 200 MHz Lofar and 1.4 GHz WSRT data (joint PhD Astron/IRA)

The WSRT observation

- The observations covered an area of ~ 6 square degrees, centered at R.A. = 10:52:16.6 Dec = +58:01:15.
- The area are covered with 16 fields, with spacing of 22' in RA and 25' in DEC. Each field was observed for 12h. This field geometry is expected to result in a rather uniform noise in the central part of the final mosaic.
- The primary calibrator (3C48) was observed for 15min at the beginning of each 12h run.
- The secondary calibrator (J1035+5628), unresolved on VLBA scale, was observed for 3min every hour.

Data reduction

- For the data reduction I used the *Multichannel Image Reconstruction, Image Analysis and Display* (MIRIAD) software package (Sault & Killeen, 1995).
- Each field was calibrated and imaged separately and subsequently all images were combined together to produce a mosaic. Imaging and deconvolution was performed in multifrequency synthesis mode and we take into proper account the spectral variation of the dirty beam over the image during the cleaning process.
- All the images were produced using uniform weighting to get the maximum spatial resolution. The synthesized beam is 11” x 9”.


30′
59°00′
30′
58°00′
30′
57°00′
56°30′
11h4m
11h0m
56m
52m
48m
44m

Sources extraction

- To take into proper account both local and radial noise variation, sources were extracted from a signal-to-noise map produced by dividing the mosaic by its noise map.

- A preliminary list of 6137 sources with S/N > 5 was derived using the MIRIAD task Imsad.

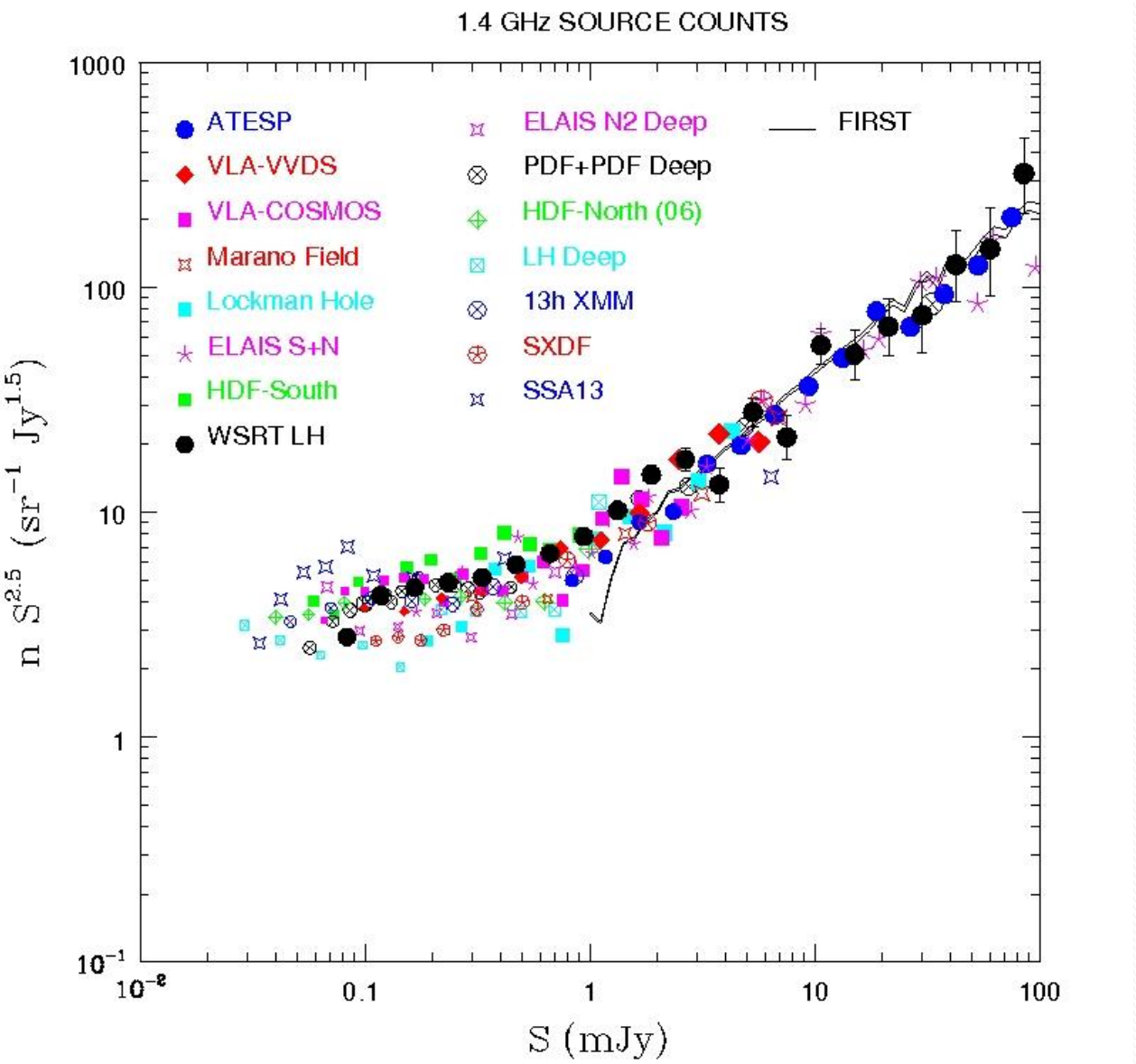
- All the source candidates were then visually inspected through an automatic procedure. Typical problems arise whenever:
  - Sources are fitted by Imsad with a single Gaussian but are better described by two or more Gaussian;
  - Sources are extended and are not well described by a Gaussian fit.

The catalogue

- Once the final catalogue was produced, we used the local noise measurement to transform the peak and integrated flux densities from S/N units to mJy units.

- After accounting for the multiple components the final catalog lists 6002 sources, most (5377) being sub-milliJy sources.

The sources counts

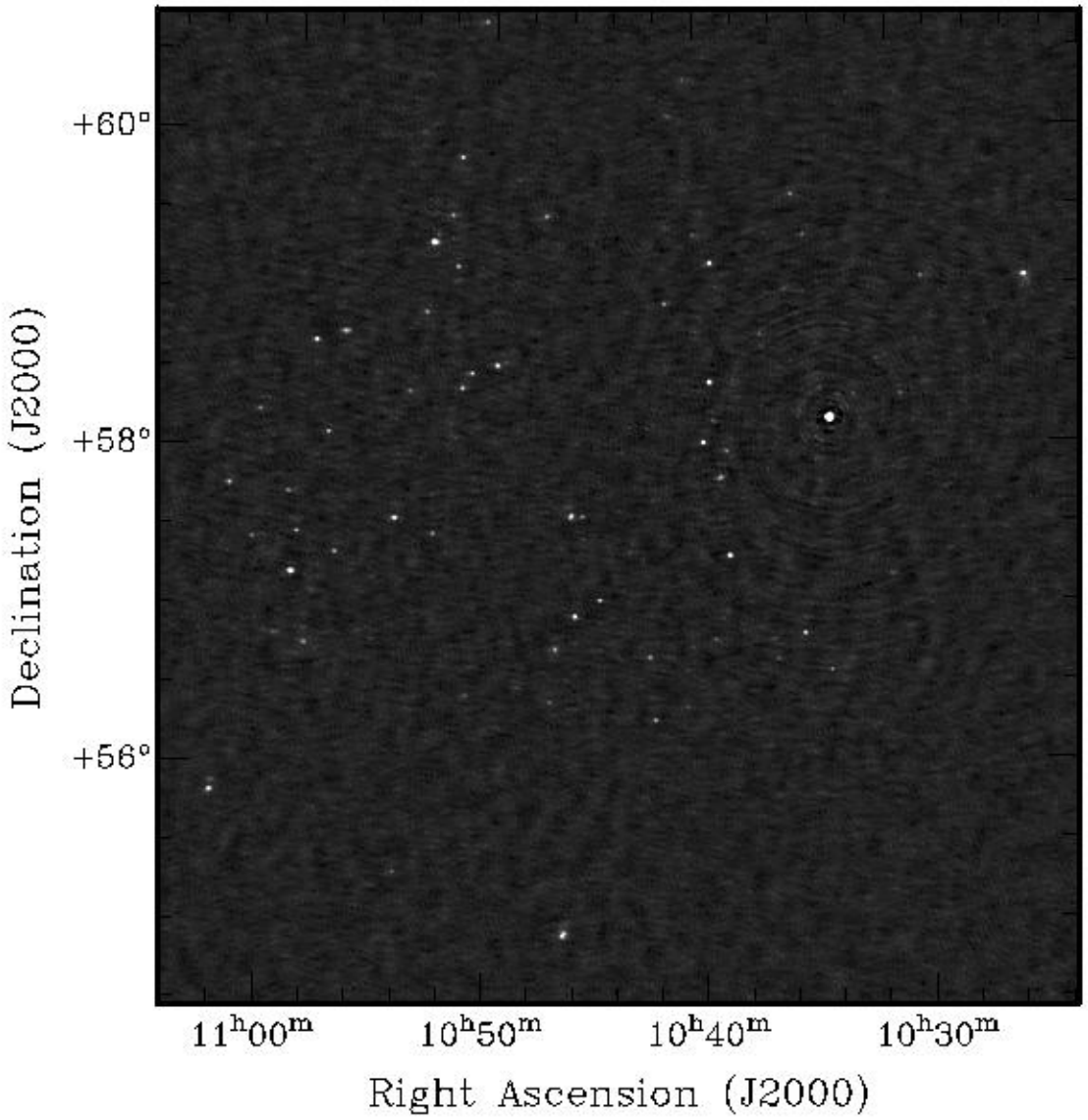


The Lofar observation

- The Lockman Hole was observed with Lofar at 58 MHz in the April 2011 as part of the commissioning of the telescope.

- The observations covered an area of ~ 20 square degrees, centered at R.A. = 10:45:00.0 Dec = +58:00:00.

- This is the first Lofar observation of a deep field.


+60°
+58°
+56°
Declination (J2000)
11h00m
10h50m
10h40m
10h30m
Right Ascension (J2000)

Coming soon

- This dataset will be combined with :
  - Optical, NIR and FIR observation ;
  - Spectroscopic observation are on going (FMOS);
  - GMRT observations at 610 MHz.

- New Lofar observations of the Lockman Hole at 150 MHz are planned as part of the commissioning of the telescope.