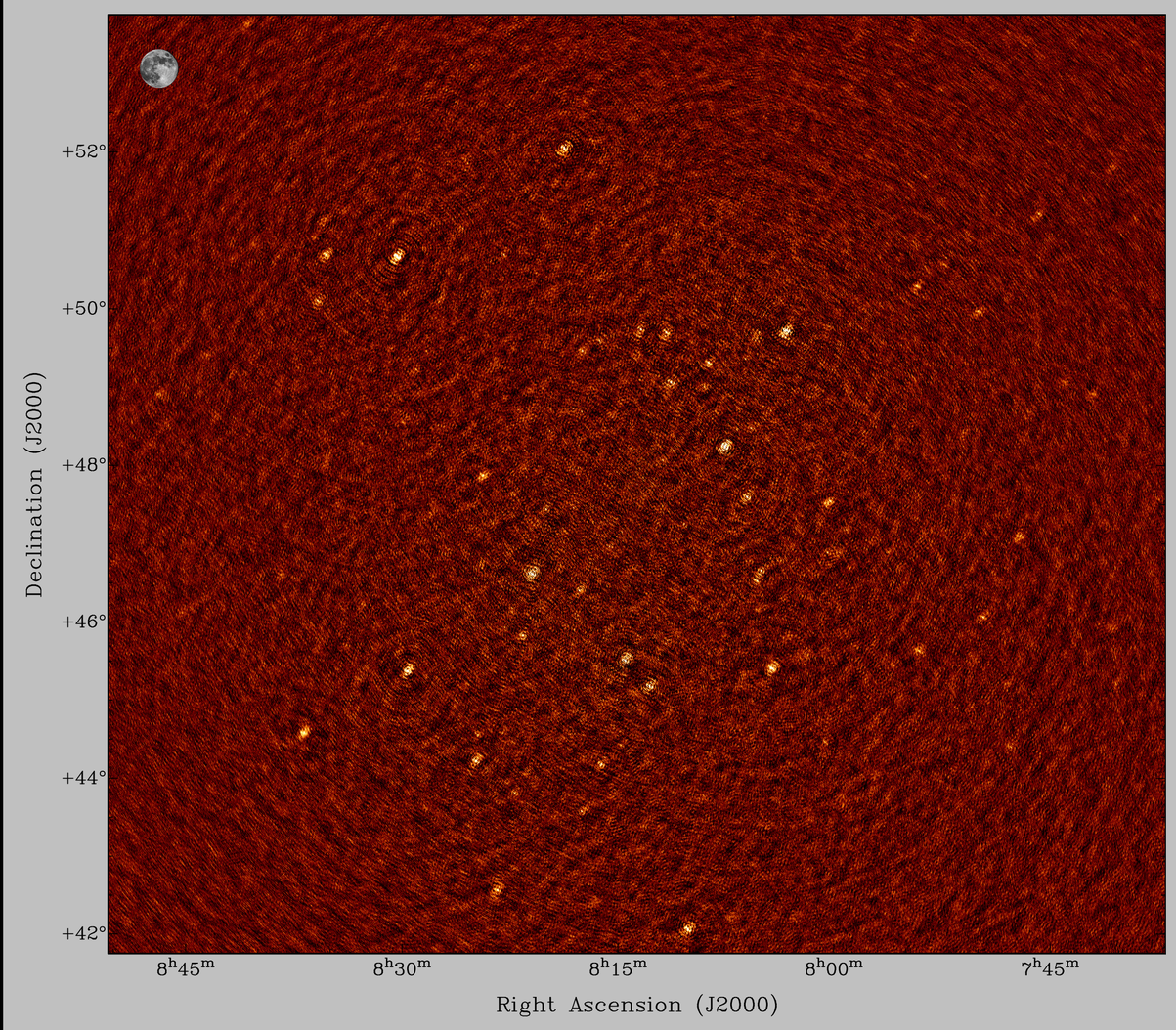
LOFAR MULTIFREQUENCY SNAPSHOT SKY SURVEY (MSSS)

Widefield MSSS Imaging



This LOFAR 60 MHz LBA_INNER image is centered on the bright calibrator source 3C196 (which was subtracted prior to imaging). The image has not been deconvolved. The field-of-view and depth indicated in this image are typical of the MSSS-LBA observations. The full moon is shown, to scale, in the upper-left corner.

MSSS: First observations

The first MSSS observations have been taken in both the LBA and HBA bands, and are being used to exercise and develop the calibration and imaging pipelines. Each set of test observations covers 200 square degrees.

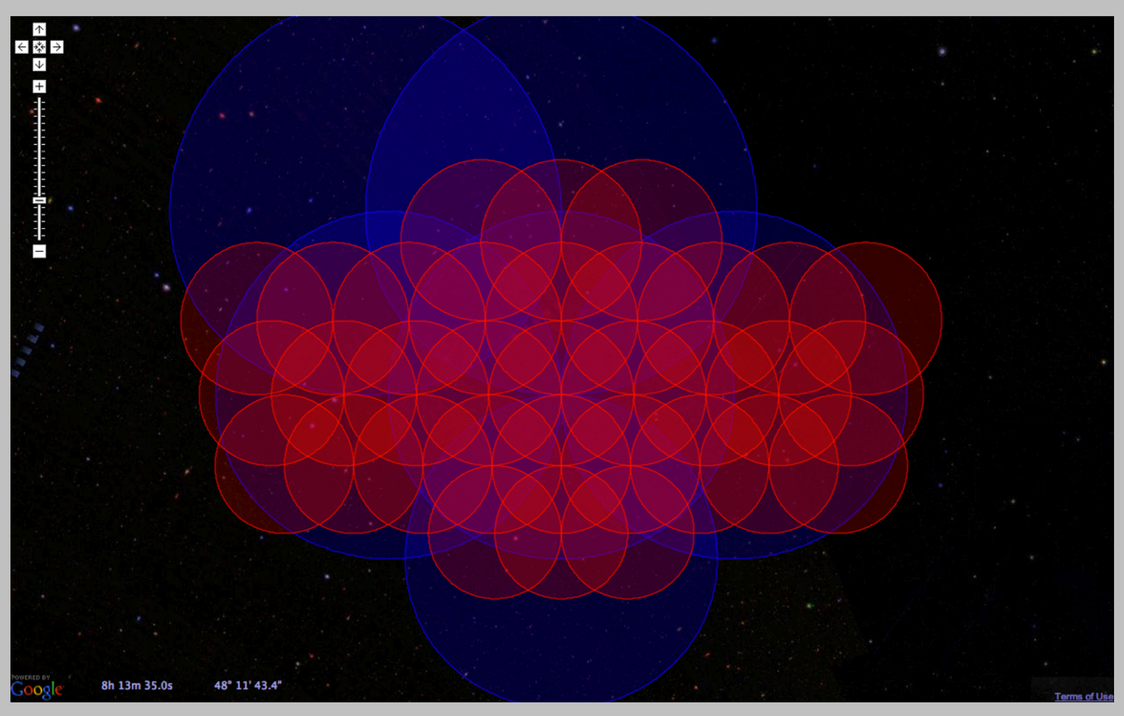
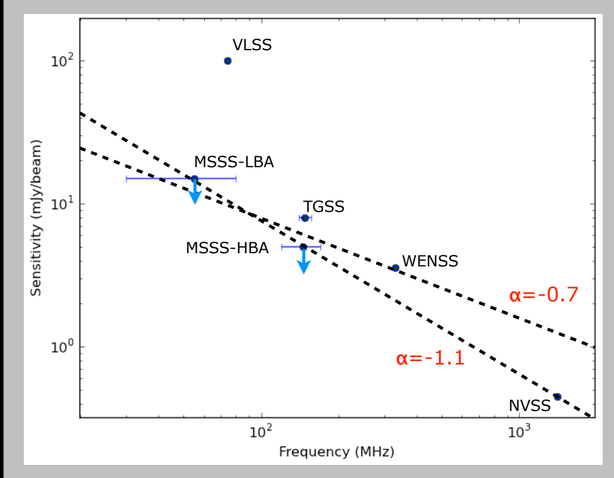


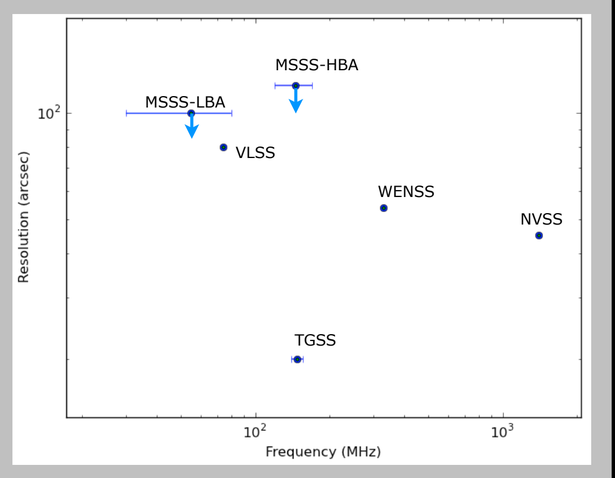
Illustration of the first set of MSSS test observations. Blue circles indicate the six MSSS-LBA fields, and red circles indicate the thirty-three MSSS-HBA fields. The MSSS-LBA fields were observed in nine epochs each, and the MSSS-HBA fields were each observed in only one epoch. Future MSSS-HBA observations will visit each field twice. The beam visualization was created using Google Sky.

MSSS Survey Parameters

Table 1 shows a comparison of MSSS survey parameters with those of other important radio surveys. Note that the sensitivity and resolution values are *upper limits* based on processing only data from the center of the LOFAR array.

Survey	Frequency (MHz)	Sensitivity (mJy beam^{-1})	Resolution (arcsec)	Area (sq deg)
MSSS-LBA	30-78	<15	<100	20,000
VLSS	74	100	80	30,000
MSSS-HBA	120-170	<5	<120	20,000
TGSS	140-156	7-9	20	32,000
WENSS	330	3.6	54	10,000
NVSS	1400	0.45	45	35,000





Plots showing the survey parameters listed in Table 1. In the sensitivity plot, lines representing sources with spectral indices of -0.7 and -1.1 are shown to guide the eye. MSSS will detect all steep spectrum NVSS sources.

MSSS Added Scientific Value

MSSS observations are being planned and executed along with "piggybacking" applications to increase the scientific output of the survey. Key added-value programs focus on:

- Transients (each field is observed in >1 epoch)
- High angular resolution imaging with long baselines
- Very high energy cosmic rays
- Search program for polarized sources

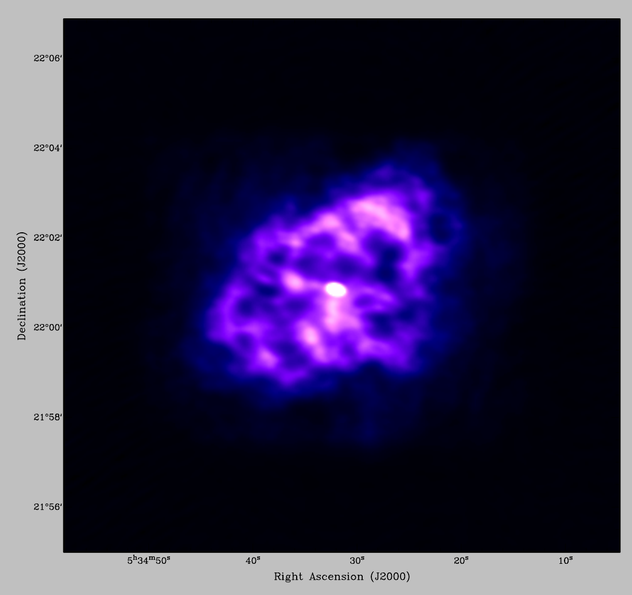


Image of the Crab nebula at 130 MHz (courtesy Olaf Wucknitz). The calibration was done with international baselines. MSSS will find more compact calibrator sources.

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