

Some thoughts on commissioning surveys

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Survey KSP: A three tier wedding cake

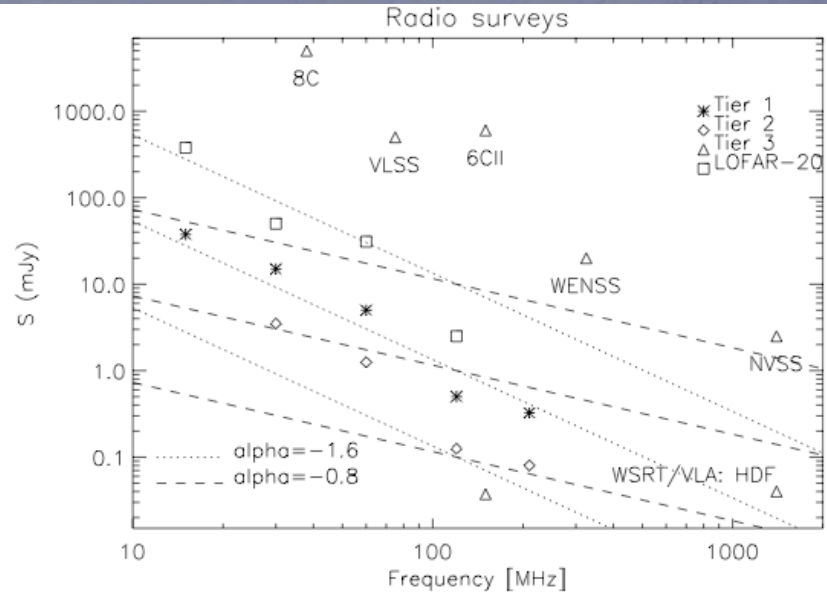


Figure 7: Flux limits (5 sigma) of the proposed LOFAR surveys compared to other existing radio surveys. The triangle represent existing surveys: HDF (VLA Richards et al. 2000; WSRT Garrett et al. 2000), Wenss, NVSS, 6C, VLSS and 8C. The lines represent different power-law ($S \sim \nu^\alpha$, with $\alpha = -1.6$ and -0.8) to illustrate how, depending on the spectral indices of the sources, the LOFAR surveys will compare to other surveys.

LOFAR-20 commissioning surveys

Aims

Help understand the system

Validate the pipelines

Get a good GSM

Do scientific prep work

Do some science

Questions

What range of frequencies, depths, areas, dynamic ranges ?

A minimum?

1. deep observation in two fields

7 overlap pointing at all frequencies

test for: rfi, beams, ionosphere, all kinds of dynamic range issues

2. Global sky surveys

Detectability sweet spots 45-60 MHz and 150 MHz

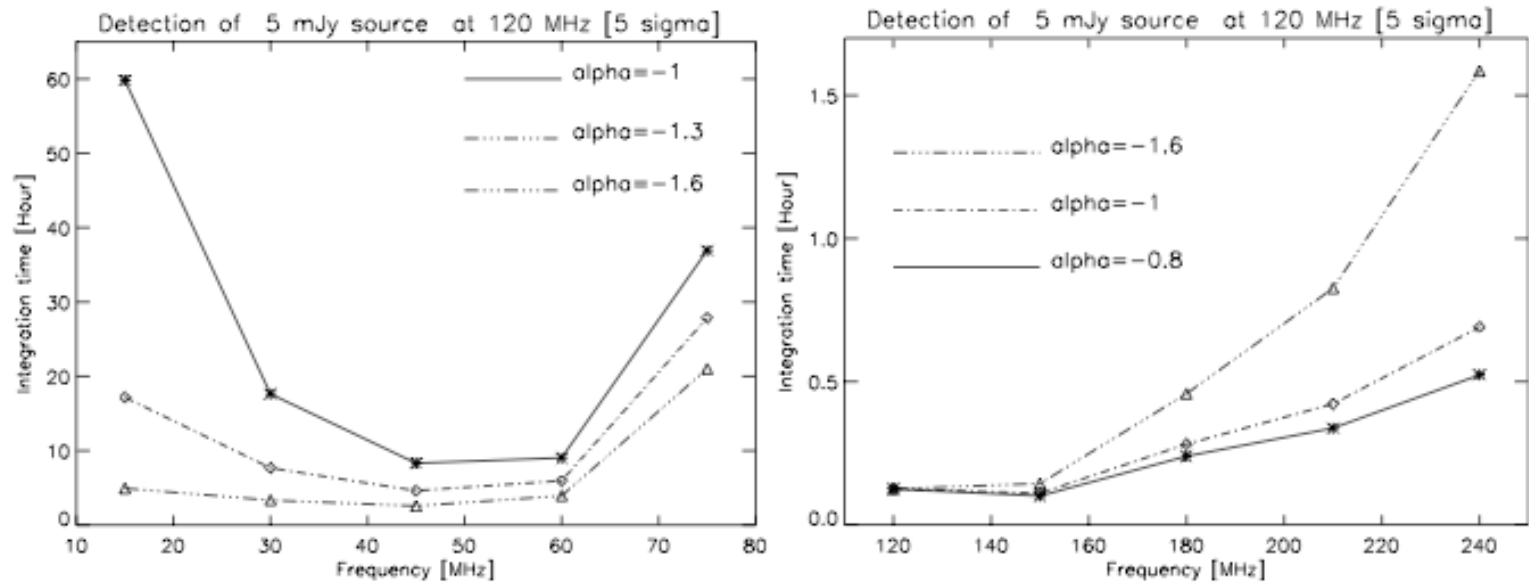


Figure 1: Integration time using an 8 MHz beam versus frequency to detect a 5 mJy radio sources at 120 MHz at the 5 sigma level for the indicated spectral indices. (left) Low-band system, (right) High-band system.

Survey speed

Sweet spots: 15-60 MHz (!) and 120 MHz

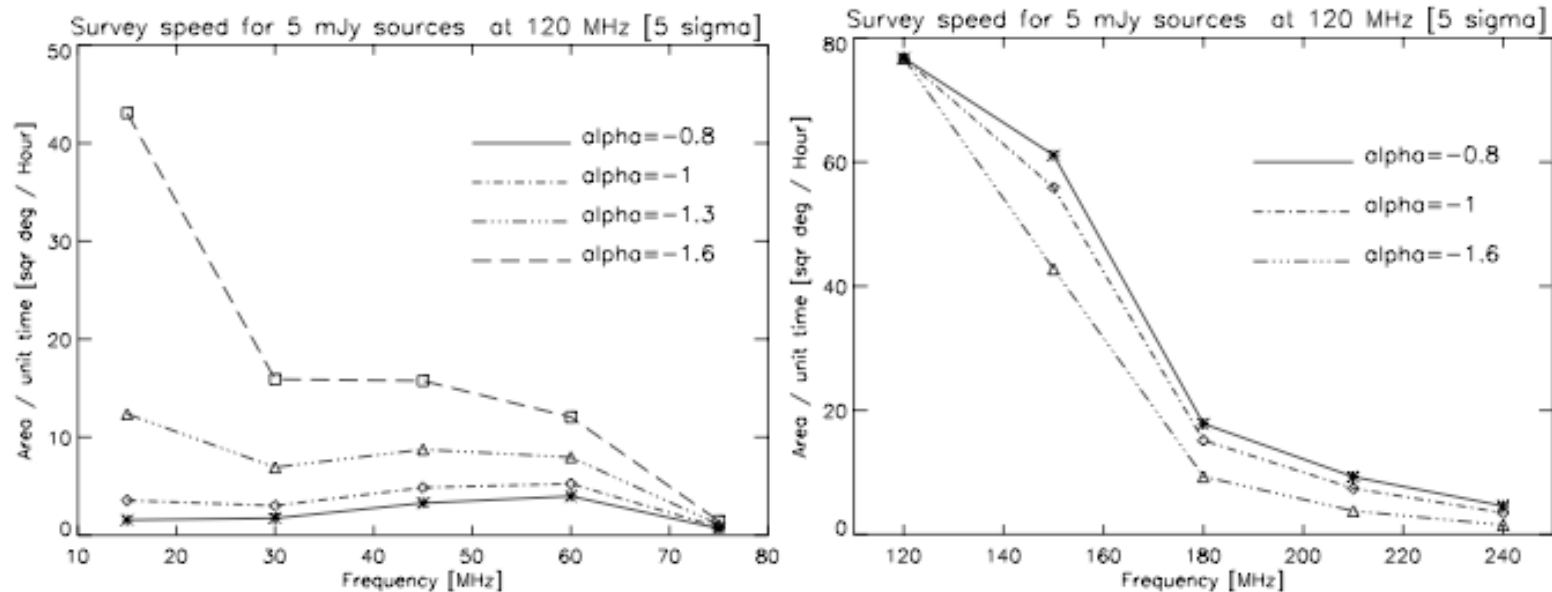


Figure 2: Using one 8 MHz beam, the survey speed taken as the area on the sky covered per unit time deep enough to detect a 5 mJy source at 120 MHz at the 5 sigma level as a function of frequency. (left) Low-band system, (right) High-band system.

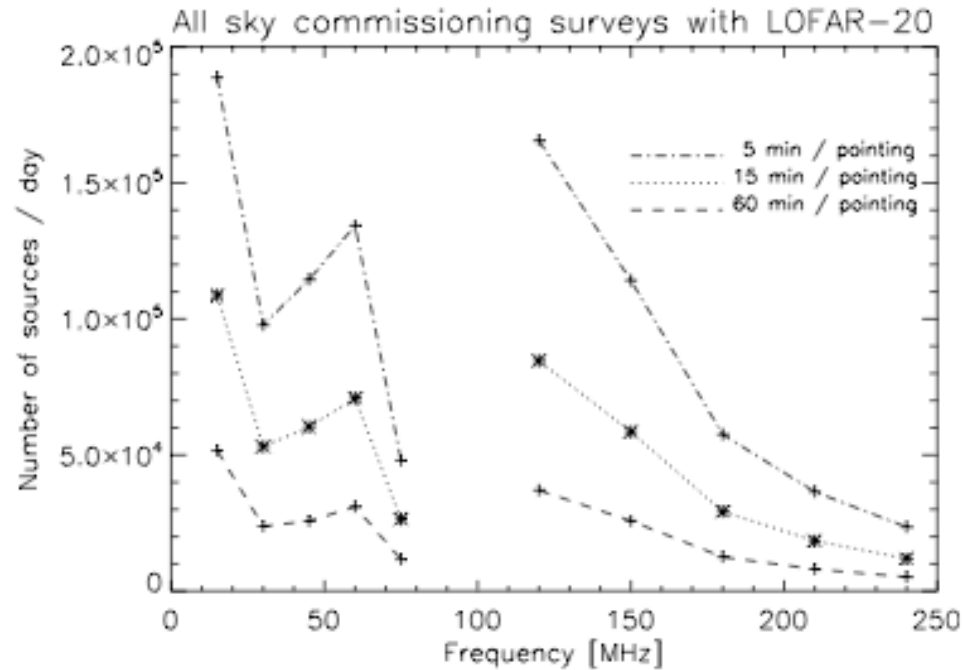


Figure 8: *The number of sources per day detected at a signal to noise ratio of larger than 5 as a function of frequency for surveys with integration times per pointing of 5, 15 and 60 minutes.*

GSM: shallow, but many frequencies ?

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All needs more discussion

set aside an time at the Lorentz center meeting Dec 10-12 ?

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Table 6: *The “Deep” commissioning survey*

f MHz	Area deg ²	thermal rms mJy	BW MHz	Sources/ ¹ beam	Integr. time ² hrs	Number pointings	Total ³ hrs	Total ¹ sources
15	2974	64	8	3222	1.9	14	2.2	4.6e+04
30	743	6	8	3262	15.7	14	18.6	4.6e+04
45	565	1.6	8	5507	46.2	14	54.9	7.8e+04
60	663	1	8	9301	72.3	14	85.8	1.3e+05
75	424	1.37	8	3815	100.7	14	119.6	5.4e+04
120	134	0.1	8	9481	22.7	14	26.9	1.4e+05
150	85	0.085	8	7928	19.5	14	23.1	1.1e+05
180	59	0.075	8	5506	44.4	14	52.8	7.8e+04
210	43	0.065	8	4045	65.2	14	77.5	5.8e+04
240	33	0.060	8	2962	95.9	14	113.9	4.2e+04

¹ Number of sources in the beam with a signal to noise ratio larger than 5, where sigma is the quadratic sum of the confusion and thermal noise. ² The integration time is quoted for 1 beam of 8 MHz. ³ The total number of days needed to complete the survey assuming the availability of 12 beams of 8 MHz.