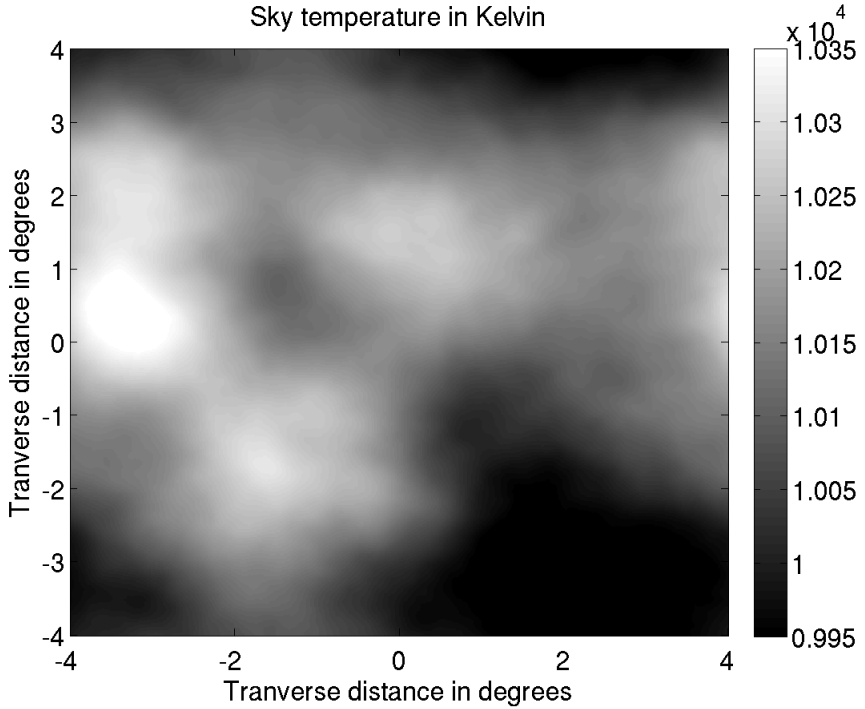
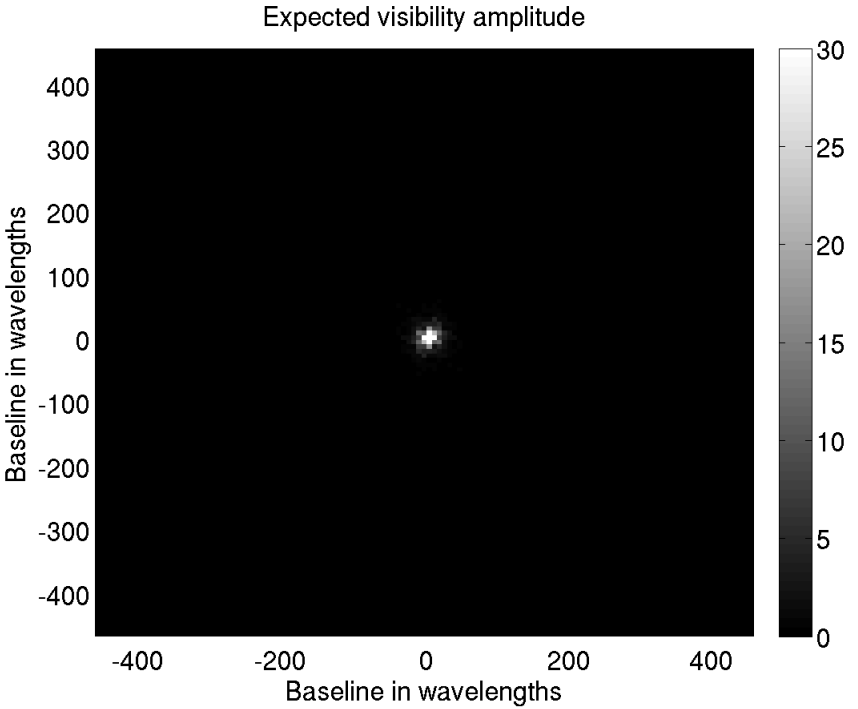
Using lunar occultation to measure the global redshifted 21 cm signal between 36 and 84 MHz

Harish Vedantham

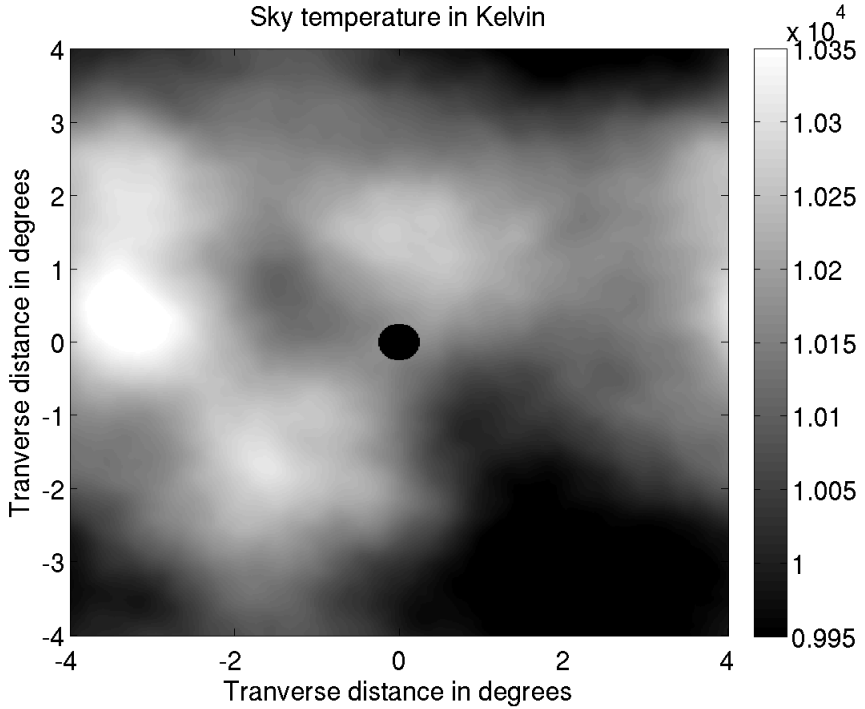
The basic idea

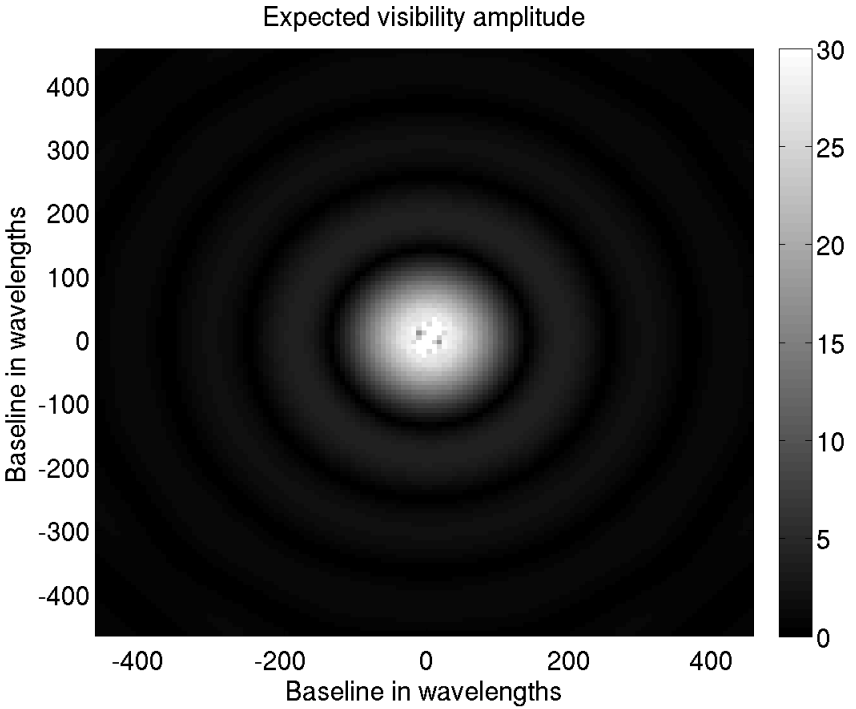




An interferometer is insensitive to a global signal ...

The basic idea





... but any occultation induces correlations on non-zero baselines

The moon is a negative source (-20 Jy) at 60 MHz

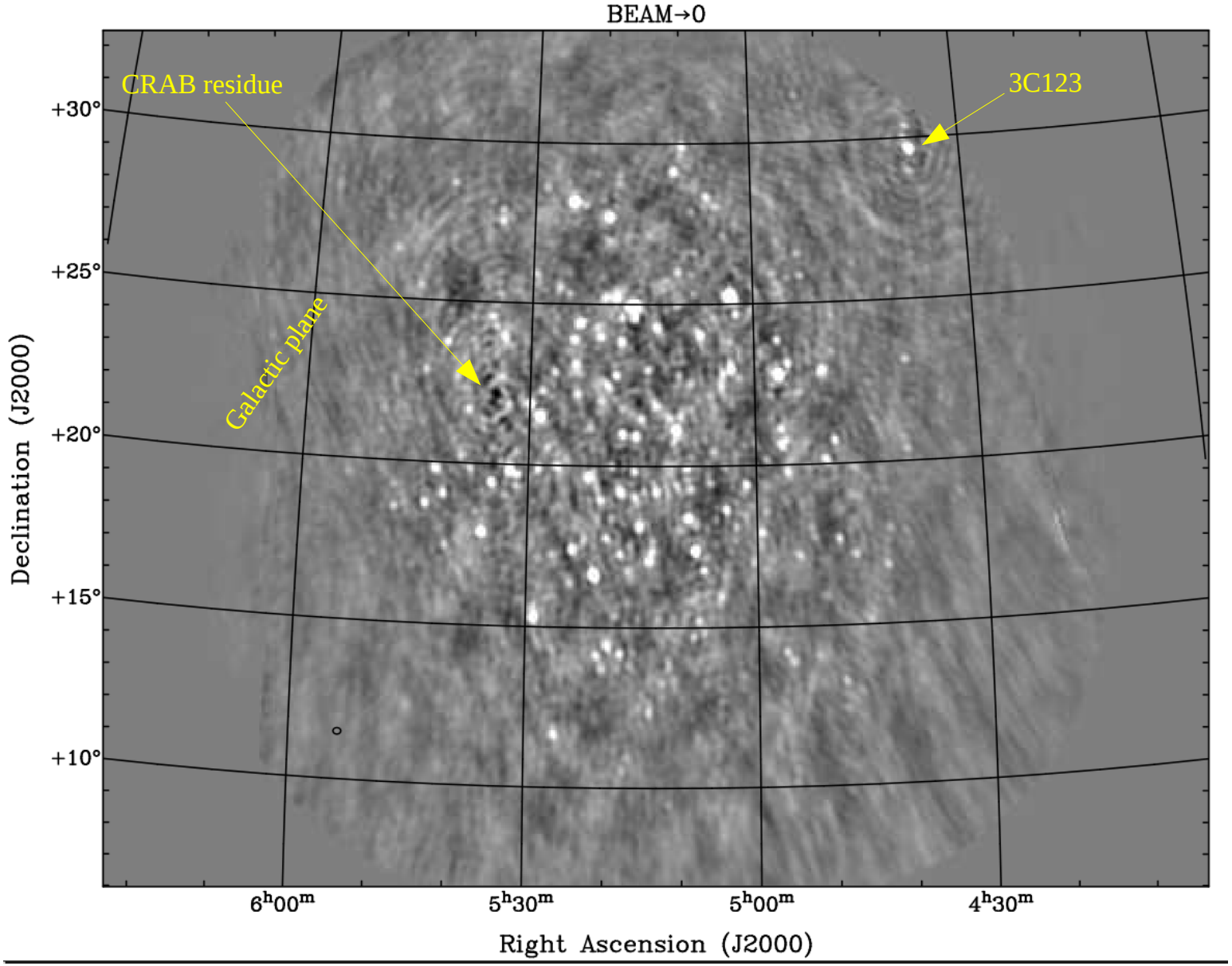
The observations

Antennas	:	LBA (inner)
Stations	:	All Dutch stations
Polarization	:	Full stokes
Fields	:	2 simultaneous beams
Tracking center 1	:	Center of the moon at transit
Tracking center 2	:	3C123 (RA0437 Dec+29)
Frequency coverage	:	36 MHz to 84 MHz
Exposure time	:	$>$ 4 hours (preferable 6 hours) per night around lunar transit
No. of nights	:	2
Possible dates for night 1	:	2012-11-29, 2012-12-26, 2013-01-23
Possible dates for night 2	:	2 to 3 nights after night 1
Integration time	:	1 sec
Frequency resolution	:	3 kHz (64 chan per sub-band)

Half of the awarded time has been utilised for observations

Will request second night of observations this autumn

Short baseline image (< 200 lambda)



RMS noise (far away) = 150 mK

Weight = uniform

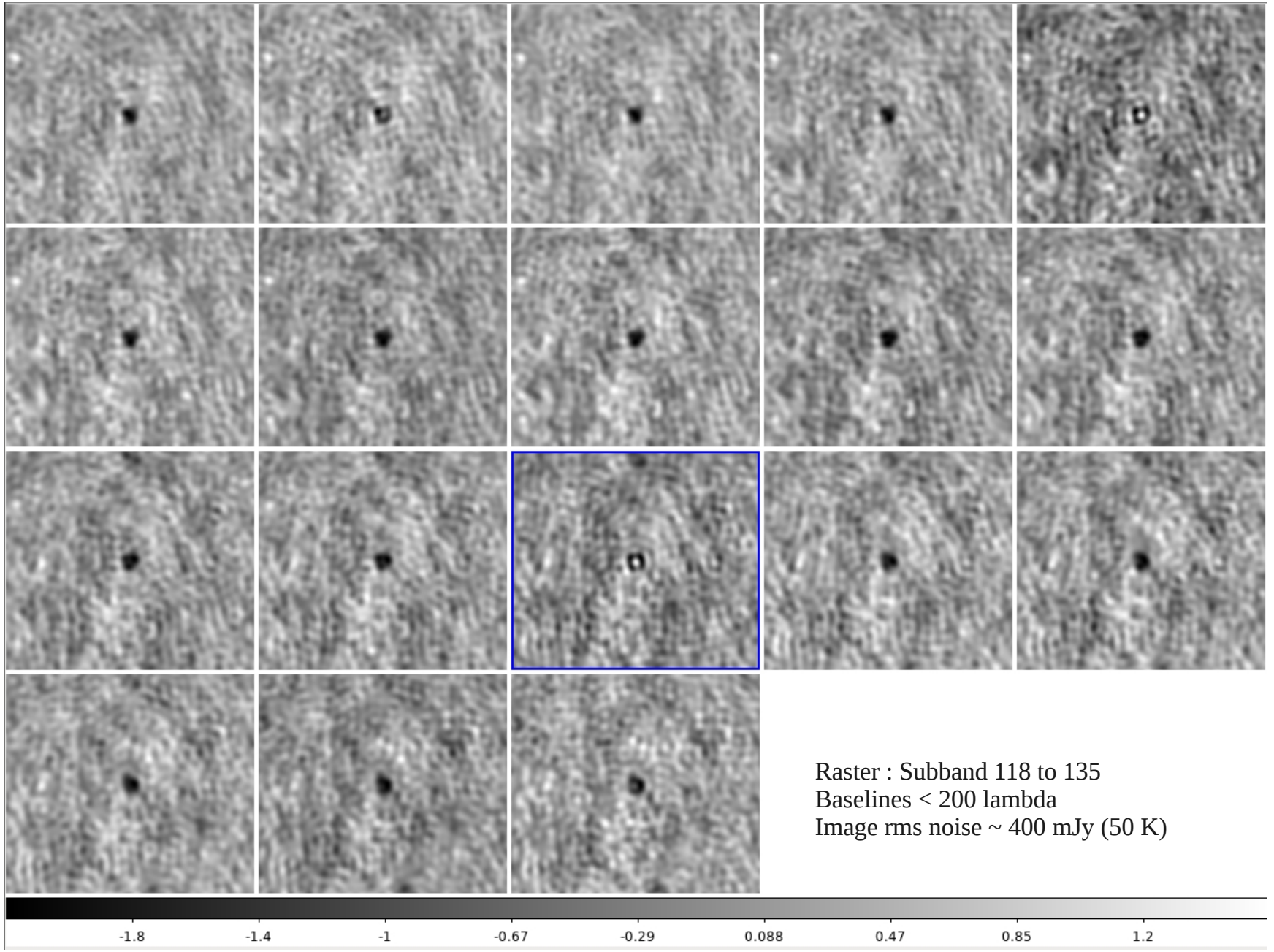
Baselines < 200 lambda

Imager : awimager

Subbands: 18

We may be hitting the 115 mJy sidelobe confusion limit

Hole in the sky !



Raster : Subband 118 to 135
Baselines < 200 lambda
Image rms noise ~ 400 mJy (50 K)

In the near-future ...

(1) Deconvolve these images and get meaningful flux estimates

(2) Finish processing the remaining sub-bands

(3) Process HBA data from Stijn Buitink et al. commissioning proposal

(4) Reduce sidelobe confusion from out-of-field sources

(5) Write up results and prepare for more data this autumn