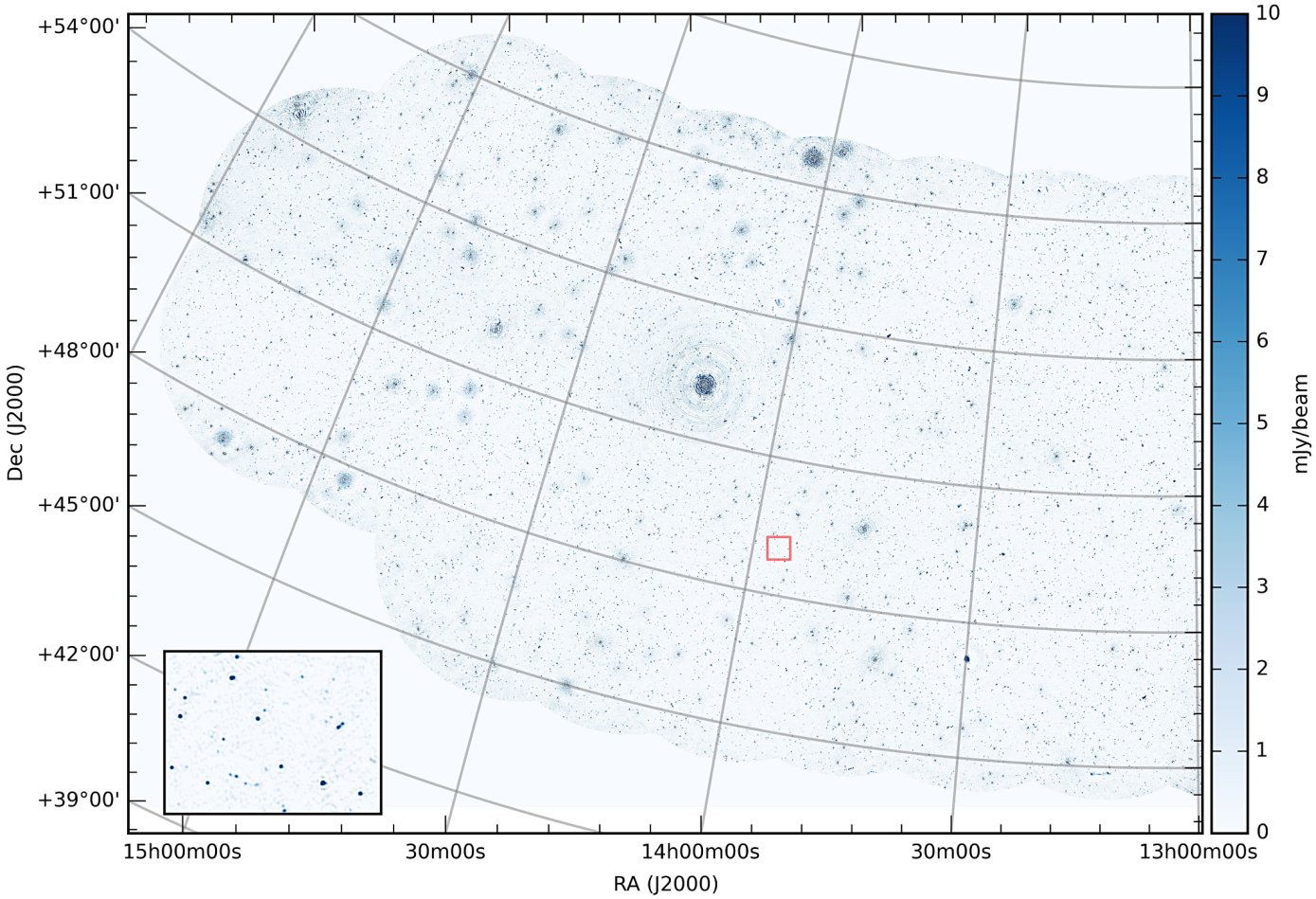

Fig. 17. Eastern half of the HETDEX Spring Field. A 0.5° × 0.5° image of the region outlined in red is shown in the bottom left corner.

The main challenge of the survey is to robustly and efficiently perform a complex direction-dependent calibration of very large datasets. This is crucial in order to exploit the full potential of our LOFAR datasets. To demonstrate that such a reduction can reach our observational aims, we used the facet calibration technique, which was developed by van Weeren et al. (2016a) and Williams et al. (2016), to perform a direction-dependent calibration on one of the LoTSS datasets. The result is a high-fidelity 120–168 MHz image with a resolution of 4.8″ × 7.9″ and a sensitivity of 100 μJy/beam. These final high-resolution, high-fidelity LoTSS images will facilitate significant contributions to a wide variety of astronomical research areas and we intend to release such images to the wider scientific community in the future once our reduction strategy is finalised and we have processed a large area of the sky. In this publication we instead publicly released preliminary images and catalogues from a completely automated direction-independent calibration of 63 datasets in the region from right ascension 10h45m00s to 15h30m00s and declination 45°00′00″ to 57°00′00″. We provided a brief summary of the scientific potential of these preliminary images and whilst they have lower fidelity, resolution, and sensitivity than those that we will make using a direction-dependent calibration strategy, they are still significantly more sensitive than those produced by any other existing large-area low-frequency survey and can allow for many scientific objectives of the LoTSS to be partially or completely realised (see e.g. Brienza et al. 2016; Harwood et al. 2016; Heesen et al. 2016; Mahony et al. 2016; Shulevski et al. 2015a,b, for examples).

The images we released cover an area of over 350 square degrees and contain over 44 000 radio sources when a detection threshold of seven times the noise is used. We used a Monte Carlo simulation to estimate that the catalogue is 90% complete for sources with a flux density in excess of 3.9 mJy/beam. Our astrometry checks of the catalogue revealed that the positional error is approximately 1.70″ and our photometry measurements indicated that our integrated flux density measurements are accurate to within 20%.

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