

## The End-to-End simulation of SKA1-Low observation for Cosmic Dawn and Reionization: Overview and Data Release 1

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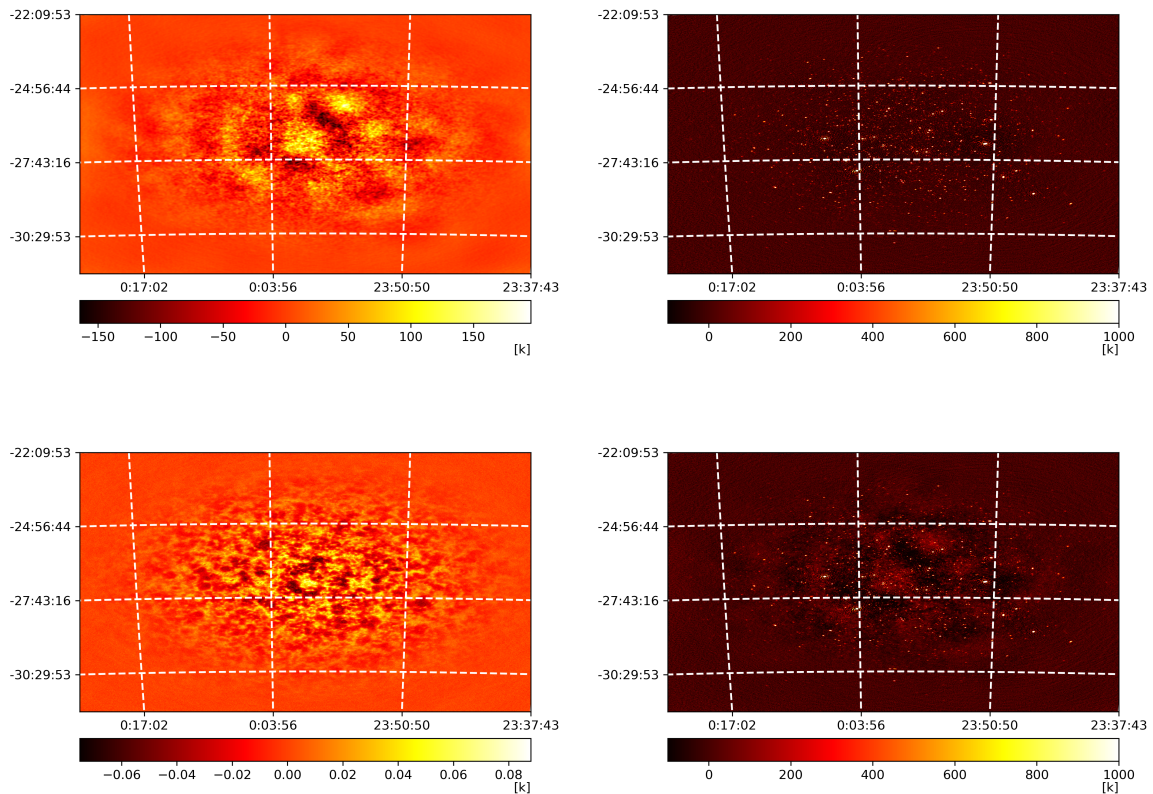
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Detection of the 21cm signal from cosmic dawn and the epoch of reionization is one of the primary goals of SKA. However, extracting the weak signal from the infant universe is a great challenge for data analysis. An end-to-end simulation is urgently needed for the community to get prepared. Orders of magnitude larger than the data challenge released by SKAO, we would like to release the end-to-end simulation data from the Chinese SKA science team to the world, which consists of about 200 TB of visibility and sky map data.

We used a modified OSKAR software and spent around 30k GPU hours to simulate SKA1-Low observation at 60-70 MHz, 110-120 MHz and 160-170 MHz, with a pixel size of 5" and a frequency resolution of 20 kHz, for a 100 square degrees FoV. We considered galactic synchrotron and free-free emission, extragalactic point source, radio halo from galaxy clusters, 21cm signal from the early universe, antenna's thermal noise, gain and phase error, and interference from the ionosphere.

The dirty map generated from our visibility data at 110 MHz is shown in Fig. 1. Details of our project, data release, and further plan will be covered in the oral presentation. All the simulation data is publicly available.



**Figure 1.** We show the dirty map constructed from our visibility data at 110 MHz for galactic foreground (upper left), extragalactic foreground (upper right), 21cm signal (lower left), and the total radio signal (lower right). The color of the maps represents the brightness temperature in the unit of Kelvin. RA and DEC shown along the axis illustrate the position of the sky area.