

## TSUKUYOMI: the Lunar Astronomical Observatory to Realize a Meter-Wave Radio Interferometer

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The highly accurate observation in the lower frequency band below about 10 MHz is yet to be realized, so that this range is remarkable as one of the last frontiers for astronomy. This is mainly because that the terrestrial ionosphere prevents us from observing radio waves below the ionospheric cut-off frequency on the ground. It is, moreover, difficult to observe the faint radio waves from planets and celestial objects even on the earth's orbit because of the interference caused by solar bursts, artificial noises and terrestrial aurora emissions. The lunar far-side is a suitable site for such the lower frequency astronomical observations because noises from the Earth can always be avoided and radio waves from the Sun can be shielded during the lunar night. Considering these advantages, we propose TSUKUYOMI, Lunar (=TSUKU in Japanese)-Yonder Meter-wave Interferometric array.

One of the major targets of the astronomy on the lunar far-side is to realize the first detection of the 21-cm line of the neutral hydrogen from, so cold, the dark age of the universe. TSUKUYOMI will also contribute to elucidation of planetary radio waves and understanding of the lunar environment, such as ionosphere, dust accretion, and subsurface structures. Emissions from extrasolar planets are also expected to be observed.

TSUKUYOMI observes radio wave at the frequency of 1~45 MHz which corresponds to the red-shifted HI 21cm line at  $z = 140\sim 30$ . The final scientific goal can be realized by the radio interferometer with about 100 antennas of the maximum baseline of over 100 km, which provides the spatial resolution of about 1 arc-min at 10 MHz. In the prototype phase, three extendable dipole antenna units will be installed. In this paper, we report the progress of a conceptual study on TSUKUYOMI, including the design and trial production of antenna unit and components.

Keywords: the Artemis program, lunar astronomical observatory, radio interferometer