



The Netherlands-China Low-frequency explorer (NCLE)

A. Vecchio^{*(1,2)}, C. Brinkerink⁽¹⁾, S. Karapakula⁽¹⁾, M. Klein-Wolt⁽¹⁾, H. Falcke⁽¹⁾, A.J. Boonstra⁽³⁾, M. Bantum^(4,3), M. Ruiter⁽³⁾, J. Rotteveel⁽⁵⁾, E. Bertels⁽⁵⁾, J. Ping⁽⁶⁾, L. Chen⁽⁶⁾

- (1) Radboud Radio Lab, Astrophysics Department Radboud University, PO Box 9010 6500 GL Nijmegen, NL
- (2) LESIA, Observatoire de Paris, Université PSL, CNRS, Sorbonne Université, Université de Paris, Paris, FR
- (3) Netherlands Institute for Radio Astronomy (ASTRON), PO Box 2, 7990 AA Dwingeloo, NL
- (4) Eindhoven University of Technology, Faculty of Electrical Engineering, 5600 MB Eindhoven, NL
- (5) ISIS - Innovative Solutions in Space, Motorenweg 23, 2623 CR, Delft, NL
- (6) National Astronomical Observatories (NAOC, CAS), Chaoyang District, Beijing 100012, CN

Extended Abstract

The Netherlands- China Low-Frequency Explorer (NCLE) is a radio instrument, on the Chinese spacecraft Queqiao, launched on May 2018. NCLE is orbiting around the Earth-Moon L2 point at about 64000 km from the Moon. NCLE has a wealth of science objectives:

the detection of the pristine and very weak signals from the neutral hydrogen in the Cosmological Dark Ages and Cosmic Dawn, the investigation of Solar activity and space weather phenomena at low frequencies, the study of the auroral radio emission from planets in the Solar system, the measure of the radio background spectrum at the Earth-Moon L2 point, the development of a low-frequency map of the radio sky and the detection of astrophysical radio transient phenomena at very low frequencies.

The instrument works in the 80 kHz to 80 MHz frequency band and is designed to have a number of dedicated science modes with different bandwidth and spectral resolutions. The analogue and digital chains have been designed and developed by ASTRON and the Radboud Radio Lab (Radboud University), respectively. NCLE is equipped with three custom-made design carbon fiber antennas, each five-meter-long and fully deployable and retractable, mounted on the spacecraft wall (Figure 1), produced by the Dutch Industry Partner ISISpace.

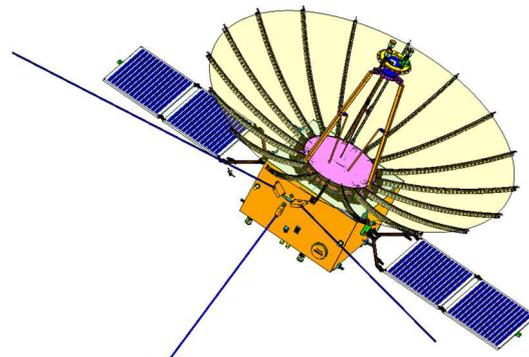


Figure 1: Drawing of the Chang'e 4 relay satellite with the three monopole antennas in the foreground.

Currently NCLE antennas have been partially deployed, the instrument is ending the commissioning phase and on-ground calibration activities have started.