



# The JWST North Ecliptic Pole Survey Field for Time-domain Studies



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[#438.04]



## ABSTRACT

The JWST North Ecliptic Pole (NEP) Survey field is located within JWST's northern Continuous Viewing Zone (CVZ), will span  $\sim 14'$  in diameter ( $\sim 10'$  with NIRISS coverage) and will be roughly circular in shape (initially sampled during Cycle 1 at 4 distinct orientations with JWST/NIRCam's  $4.4' \times 2.2'$  FoV – the JWST “windmill”) and will have NIRISS slitless grism spectroscopy taken in parallel, overlapping an alternate NIRCam orientation. This is the *only* region in the sky where JWST can observe a clean extragalactic deep survey field (free of bright foreground stars and with low Galactic foreground extinction  $A_V$ ) at *arbitrary cadence* or at *arbitrary orientation*. This will crucially enable a wide range of new and exciting time-domain science, including high redshift transient searches and monitoring (e.g., SNe), variability studies from Active Galactic Nuclei to brown dwarf atmospheres, as well as proper motions of extreme scattered Kuiper Belt and Oort Cloud Objects, and of nearby Galactic brown dwarfs, low-mass stars, and ultracool white dwarfs. We therefore welcome and encourage follow-up through GO programs of the initial GTO observations to realize its potential as a JWST time-domain *community field*. The JWST NEP Survey field was selected from an analysis of WISE 3.4+4.6  $\mu\text{m}$ , 2MASS JHKs, and SDSS *ugriz* source counts and of Galactic foreground extinction, and is one of very few such  $\sim 10'$  fields that are devoid of sources brighter than  $m_{AB} = 16$  mag. We have secured deep ( $m_{AB} \sim 26$  mag) wide-field ( $\sim 23' \times 25'$ ) *Ugriz* images of this field and its surroundings with the LBCs on the  $2 \times 8.4$  m Large Binocular Telescope. We also expect that deep ground-based *JHK* images, deep 3 and 10 GHz VLA radio observations (pending), and possibly *HST* ACS/WFC and WFC3/UVIS ultraviolet-visible images will all be available before JWST launches in Oct 2018.

