

Earth's space environment is highly variable, changing in ways that we are currently unable to predict. Specifically, the ionosphere exhibits remarkable day-to-day changes that cannot be attributed to any known source, though forcing from the lower atmosphere is now considered of key importance. NASA's Ionospheric Connection Explorer, a mission designed to discover the causes of this variability, is in development for a June 2017 launch. Concurrent with the build of the instruments comprising the science payload and the spacecraft, now all delivered and integrated, a science validation effort has tracked the expected performance of the observatory. The predicted performance of the science retrieval algorithms developed for ICON is reported. The current performance models show that ICON will have outstanding scientific capability and be able to address and resolve the open questions in space plasma physics that pertain to space weather. With this high-performance scientific observatory, the dynamic interaction of the ionosphere with the neutral gas of the atmosphere will be measured precisely and evaluated to understand the mysterious drivers of variability in our space environment.