Juno direction-finding measurements of Jupiter's narrowband kilometric radiation

Masafumi Imai*[1], William S. Kurth[1], George B. Hospodarsky[1], Scott J. Bolton[2], John E. P. Connerney[3], and Steven M. Levin[4]

[1] University of Iowa, Iowa City, Iowa, USA
[2] Southwest Research Institute, San Antonio, Texas, USA
[3] NASA Goddard Space Flight Center, Greenbelt, Maryland, USA
[4] Jet Propulsion Laboratory, Pasadena, California, USA

Jupiter's volcanic satellite Io plays a role in supplying the dominant plasma in the Jovian magnetosphere, thereby forming the dense plasma called the Io plasma torus. One of the strong radio emissions from the Io plasma torus is known as the Jovian narrowband kilometric (nKOM) radiation. The smooth nKOM radiation is thought to be generated in the torus by mode conversion from waves at the upper hybrid resonance frequency or electron plasma frequency into the free space left-hand ordinary (L-O) mode. The nKOM frequency ranges from 50 to 200 kHz with a narrow bandwidth of 50 kHz. The first direction-finding measurements of the nKOM radiation were performed by the Ulysses spacecraft during its Jupiter encounter in 1992, showing that five distinct nKOM radio sources were widely distributed in longitude on the outer edge of the Io plasma torus. 24 years later, the Juno spacecraft provides another opportunity to investigate the nKOM radio source properties using the onboard radio and plasma wave (Waves) instrument with direction-finding capability. The Waves instrument consists of one electric dipole antenna, one magnetic search coil sensor, and three on-board receivers that record the electric fields of waves from 50 Hz to 41 MHz and the magnetic fields of waves from 50 Hz to 20 kHz. Recently, *Imai et al.* [2017, *GRL*] analyzed two strong nKOM emissions during the outbound portion of the first scientific perijove (PJ1) on August 27, 2016, finding that the nKOM radio sources are located beyond the Io orbit in a radial distance range of 11 to 20 Jovian radii. Therefore, these source locations can be used for plasma diagnostics in Jupiter's inner magnetosphere. We show some results of recent nKOM radio observations by Juno on the basis of the direction-finding technique.