

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
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SPACECRAFT VLBI TRACKING USING S/X DUAL-BAND SIGNALS

**Abstract**

In deep space exploration, accurate spacecraft angular position in the plane-of-sky can be obtained from Very Long Baseline Interferometry (VLBI) observations after phase referenced to a known quasar nearby. However, a large number of antennas, e.g. the Very Long Baseline Array, are required to generate a reliable and clear radio image of the spacecraft before determining its location within a short observation-interval. To improve the image quality and obtain an accurate spacecraft angular position when only a few antennas are available, S/X dual-band VLBI tracking for spacecrafts is investigated. The UV coverage formed by several minutes' observation has been simulated with the Chinese VLBI Network, which consists of four radio telescopes, and the image quality was evaluated. The results show that, when dual-band signals are used, an improvement of 80% of the dynamic range can be achieved, leading to a more reliable radio image and a more accurate spacecraft position. This method could be applied into future interplanetary missions, especially China's first independent Mars exploration around 2020.