High-precision astrometry of the Cassini spacecraft orbiting Saturn has been carried out for the past decade by the Very Long Baseline Array (VLBA). These observations, combined with Cassini orbit solutions from Deep Space Network (DSN) doppler tracking, provide accurate positions for the Saturn system barycenter in the inertial International Celestial Reference Frame. This program has improved the orientation of Saturn's orbit in the planetary ephemeris by nearly an order of magnitude. Now that Juno is orbiting Jupiter, the same observation technique is being applied to improve our knowledge of Jupiter's orbit. VLBA observing epochs for Cassini have been chosen to combine times of signal downlink to the DSN Goldstone tracking station with times when Cassini was within two degrees of a compact extragalactic radio source suitable to use as a phase reference. This combination typically occurs every few months. In contrast, Juno's orbital mission will last less than two years, with downlinks to Goldstone at periodic intervals during perijove passages. Doppler tracking during perijove will produce the more accurate Juno orbit solutions. This means that VLBA observations need to occur during periods when only weaker phase reference sources are available. In general these sources will not have accurate a priori ICRF positions, so separate VLBA observations are being carried out to improve their positions and determine the complexity of their morphological structures. By the end of Juno's mission we hope to reduce the uncertainty in the orientation of Jupiter's orbit by a factor of several.