

D-VLBI (SCHU 1103/4-1)

The goal of this project is the realization of frame ties between the dynamic reference frames of space probes like satellites, spacecrafts, the Moon or other planetary bodies, the kinematically defined International Celestial Reference Frame (ICRF) consisting of precise coordinates of extragalactic radio sources (radio galaxies or quasars), and the International Terrestrial Reference Frame (ITRF) realized on Earth. This can be done best by using the differential Very Long Baseline Interferometry (D-VLBI) method, connecting a space probe to a close-by quasar by alternately observing signals of those two sources. Although NASA, ESA, and JAXA have already successfully used D-VLBI observations on some of their space missions, all three agencies follow different strategies and just opened up the great possibilities of D-VLBI. In the project, a general concept for future applications will be presented. The newly developed Vienna VLBI Software (VieVS) will be expanded by the possibility of processing D-VLBI data and providing results that can be used to determine and link the different reference frames. Detailed simulations will lead to profound knowledge on D-VLBI itself, especially with regard to future signal structure and observation configuration. At the end of the first three years of the project we will be able to process real measurement data from current and upcoming space missions, an important step towards the determination of the ties in question on a routine basis needed for all kinds of navigation in space.