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## Benefits for the terrestrial reference frame with VLBI observations to Genesis

**Johannes Böhm**, Helene Wolf, and Lisa Kern

TU Wien, Department of Geodesy and Geoinformation, Vienna, Austria (johannes.boehm@tuwien.ac.at)

Mission Genesis of the European Space Agency (ESA) has been approved for launch in 2027. Genesis will be the first satellite in orbit to have a dedicated Very Long Baseline Interferometry (VLBI) transmitter on board, next to Global Navigation Satellite System (GNSS) and Doppler Orbitography and Radiopositioning Integrated on Satellite (DORIS) receivers as well as a Satellite Laser Ranging (SLR) reflector; consequently, Genesis will realize a space tie combining all geometric space geodetic techniques. If perfectly calibrated, the space tie will enhance and improve local ties measured on the ground. The following scenario is possible: If the orbit of Genesis is determined from the satellite techniques alone, the station coordinates of the VLBI radio telescopes in the "satellite frame" can be derived by VLBI observations to Genesis, thereby assessing the tie with the "VLBI frame", realized with decades of VLBI observations to quasars.

We present our plans to devise observing strategies for VLBI to reach accuracies as defined in the Genesis white paper. We start with our findings for VLBI transmitters on Galileo satellites, before we show the simulation results for the VLBI transmitter on Genesis. We illustrate the advantages of the Genesis satellite at 6000 km altitude compared to Galileo satellites in terms of sky coverage and accuracy of station coordinates, but also in terms of orbit estimation. Furthermore, we provide an outlook on geodetic parameters, which could not be determined with VLBI so far but will be possible with Genesis.