# A study of Planetodesy using Multi-frequency Inverse VLBI

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Precise determination of orbits of lunar and planetary probes perturbed by mass distribution allows determination of the gravity field, which can be observed using a spherical surface harmonic expansion. Inverse VLBI is one of the most prices methods for orbiter positioning, which is useful for deep space probes. A single radio telescope observes several coherent radio sources to measure the baseline between the sources. We propose a multi-frequency inverse VLBI mission which is composed by a main orbiter and a relay satellite. A ground station switches to observe signals directly transmitted from the main orbiter and relayed by the relay satellite in order. The frequency distributions in the 8GHz microwave-band are selected to solve ambiguities in the phase delay. The positioning accuracy of 8cm can be achieved using an ultra stable oscillate on board, which improve those of hitherto RARR (ranging and ranging rate) and differential VLBI methods.