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An investigation on the stability of VLBI telescope's invariant point

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Co-location sites are essential in computing ITRF and other combined geodetic products. The potential of such sites is entirely exploited when reliable local ties are regularly and accurately performed and provided.

One of the crucial tasks of local surveys is the proper identification and measurement of space geodetic instruments' Reference Point (RP) by means of terrestrial observations: this is essential to perform accurate eccentricity vectors' estimation. This task is not trivial; if, on one hand, the general guidelines that should be adopted when measuring a RP are those based on the RP definition provided by each technique's service, on the other hand, this latter definition does not allow an accurate connection between the space geodetic and the local tie observations. The reason is rather simple: RPs are loosely defined. A RP can be regarded as a "conventional point" when it is defined by each technique's service; though, when this definition is adopted in the local tie procedure based on e.g. indirect methods, the estimated "theoretical point" will hardly coincide, for several reasons, with the "conventional" one; furthermore, both points differ from the "physical point", being this latter the point where the measurements are acquired during the space geodetic observation.

Any discrepancy between "theoretical" and "physical" points will show up as a "site tie problem".

In VLBI telescopes, a closer link between physical and theoretical points can be realized studying, quantifying and, eventually, modeling the deformations of the VLBI telescope; they determine the actual position of the "physical point" during the observations. In order to investigate the impact of gravity on VLBI telescope's reference point's location, terrestrial, geodetic and astronomic observations can be used as a source of information for evaluating VLBI signal path length variations during the observations and eventually define an e.g. elevation dependent correction model.

The contribution of deformations induced by gravity on different parts of VLBI telescopes' structure to signal path variations will be reviewed; these deformations will be quantified with different and, sometimes, complementary surveying approaches. Results will be compared and their combination will be illustrated as a base for proposing signal path correction models for Medicina and Noto VLBI radiotelescopes.