



Height biases and scale variations in VLBI networks due to antenna gravitational deformations

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The impact of signal path variations (SPVs) caused by antenna gravity deformations on geodetic VLBI results is evaluated for the first time. Elevation-dependent models of SPV for Medicina and Noto (Italy) telescopes were derived from a combination of terrestrial surveying methods to account for gravitational deformations. After applying these models, estimates of the antenna reference point (ARP) positions are shifted upward by 8.9 mm and 6.7 mm, respectively. The impact on other parameters is negligible. To infer the impact of antenna gravity deformations on the entire VLBI network, lacking measurements for other telescopes, we rescaled the SPV models of Medicina and Noto for other antennas according to their size. The effects are changes in VLBI heights in the range $[-3, 73]$ mm and a significant net scale increase of 0.3 – 0.8 ppb. This demonstrates the need to include SPV models in routine VLBI data analysis.