Satellite antenna phase center offsets for the Galileo In-Orbit Validation (IOV) and Full Operational Capability (FOC) satellites are estimated by two different analysis centers based on tracking data of a global GNSS network. The mean x- and y-offsets could be determined with a precision of a few centimeters. However, daily estimates of the x-offsets of the IOV satellites show pronounced systematic effects with a peak-to-peak amplitude of up to 70 cm that depend on the orbit model and the elevation of the Sun above the orbital plane. For the IOV y-offsets, no dependence on the orbit model exists but the scatter strongly depends on the elevation of the Sun above the orbital plane. In general, these systematic effects are significantly smaller for the FOC satellites. The z-offsets of the two analysis centers agree within the 10–15 cm level, and the time series do not show systematic effects. The application of an averaged Galileo satellite antenna model obtained from the two solutions results in a reduction of orbit day boundary discontinuities by up to one third—even if an independent software package is used.