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Combined processing of GIOVE-A and GPS measurements using zero- and double-differences

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We processed data from the global IGS network by including the GIOVE-A data from the GALILEO Experimental Sensor Station Network. Both networks are combined separately using zero- and double-differences and the global IGS parameters are estimated. GPS data from the IGS network help to stabilize the global solution and obtain good estimates of the station coordinates, troposphere and Earth-rotation parameters. We study performance of the GIOVE-A measurements separately for zero-and double-differences. Using zero-differences we evaluate performance of the GIOVE-A satellite clock as well as stability of the inter-receiver and the inter-frequency biases for different GIOVE-A observables. Using the Melbourne-Wübbena linear combination, we study the stability of GIOVE-A wide-lane ambiguities and the performance of code measurements. In addition, GIOVE-A observables are evaluated using the geometry-free linear combination between successive epochs, for the phase and the code observables individually. In this way, geometry-free phase ambiguities and ionosphere effect are removed and the noise and the multipath effects remain. We tested the performance of the double-differences between GPS satellites and GIOVE-A. If the inter-receiver biases are stable enough, all receiver/satellite clock effects should be removed by data differencing. Residuals of the estimated GPS/GIOVE-A float ambiguities should not indicate any drifts. The orbital dynamics of the GIOVE-A satellite is evaluated by combining microwave with SLR data and by looking at different modeling aspects of the solar radiation pressure. The possible anomalies in the GIOVE-A attitude are

analyzed by looking at the high-rate GIOVE-A phase clock solutions.