Evaluating the Static Relative Positioning Accuracy of GPS Equipment By Linear Models

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Abstract. The insucess of proceeded baselines of considerable length, when the ionospheric and tropospheric delays are not properly modeled, is a serious problem. In order to minimize such problem, some models have been proposed to minimize the biases. For example, the combination of L_1 and L_2 carrier-phase can vanish 98% of the first-order ionospheric biases. Generally, the LGO device, the equipment under evaluation, uses this solution to the majority of the baselines considered in our work. But it is not enough, the tropospheric bias still needs to be minimized or vanished. The objective of this study, is to verify and quantify the improvements, by the evaluation of the rate of successful processed baselines when an improved tropospheric bias mitigation strategy is used in opposition to a tropospheric bias mitigation approach. LGO equipment uses as a priori tropospheric model the simplified Hopfield model. The main aim of the investigations presented in this work was to determine the increase, or not, in the rate of baselines successfully produced by adopting an advanced tropospheric bias mitigation strategy as opposed to a simpler one. In the first case, LGO uses an improved strategy with a zenith tropospheric scale factor per station. We built some models by general least squares (GLM) to evaluate the performance of the equipment. We are aware that 1D and 2D present different behaviors, we analyzed both cases individually with each strategy. In this article, we present such analysis for 2D case.

Keywords: Baselines, Bias, General Least Squares, Performance, GPS equipment