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RESEARCH ABSTRACT FORM

TITLE: Global Positioning System Observation Data Analysis

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GPS observation data is typically in the form of a Receiver Independent Exchange Format (RINEX) file and a Precise Ephemeris SP3 file from the International GPS Service (IGS). There are four primary GPS observables, two phase measurements; L1 and L2, and two range measurements; P1 and P2. Disruptions in observed quantities that convey loss of lock on satellite L1 and L2 signals are known as cycle slips. Cycle slip detection is more easily performed using derived quantities, pseudo-observables, rather than the actual observations themselves. The ionosphere residual is one linear combination of observables used because the delay incurred from the ionosphere is frequency dependent. The Melbourne-Wübbena wide-lane is one of the more precise and convenient positioning methods used to detect cycle slips. Translate/Edit/Quality Check (TEQC), the industry standard for cycle slip detection, uses its own set of pseudo-observables; MP1, MP2, and the Ionosphere delay. The Kalman Filter is a fundamental and widely used technique in data analysis used in conjunction with pseudo-observables. The Kalman filter's predicted and updated values, based on the observed values are computed by a series of time update equations and measurement update equations. At the end of the update stage, a more accurate state estimate is formed for each datum point.