

## Original Paper

# INRIM Tool for Satellite Clock Characterization: Frequency Drift Estimation and Removal

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### Abstract

In Global Navigation Satellite Systems (GNSS), atomic clocks are fundamental for their excellent stability. Being the distance measured from the time, any error on the measure of time leads to an error in the positioning: accurate and stable atomic clocks need to be employed on board satellites. Hence, the on board clock behaviour has to be continuously monitored and any malfunctioning has to be immediately detected. In this work, we illustrate a software tool developed at the National Institute of Metrological Research (INRIM) for GNSS clock characterization and monitoring. In particular we focus on the functionality of frequency drift estimation and removal, including the uncertainty evaluation. Actually, the frequency drift evaluation and the monitoring of its evolution over time is extremely important in GNSS applications to ensure the adequacy of the timing system to the integrity requirements of the positioning service. The software has been optimized for space clock data, which are different from the ones from timing laboratories, since often present missing data and outliers. The tool allows to easily handle satellite clock data, and get a quick estimate and graphic representation of clock key parameters, such as the clock frequency drift.

### Keywords

GNSS – Atomic clocks – Frequency drift