



## **Aliasing and high frequency noise in GPS data: a warning for current GPS applications and specifications of future GNSS systems**

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The development of GPS networks is due to the wide use of GNSS systems for military, civil and scientific applications. Current GPS receivers cover the globe and many data are freely available thanks to the international services like International GNSS Service (IGS), and regional data centers like European Reference Frame (EUREF), Scripps Orbit and Permanent Array Center (SOPAC), etc... These services promote the use of GNSS by civil and scientific community. We propose to call attention to limitations for scientific applications, like ionospheric monitoring and tectonic applications, that are induced by aliasing of high frequency noise in 30 seconds sampling rate GPS data. We demonstrate that the high frequency noise in GPS data can seriously contaminate 30s sampling data due to the high noise level for some receivers and to the absence of anti-aliasing filters before 30s sampling decimation. We present an experiment characterizing the HF noise level of GPS data for different GPS receivers and antennas of various types and brands. We assess the effects of this HF noise on ionospheric free and geometry free combinations, and discuss its consequences for GNSS applications using 30s GPS data. Moreover, we locate the source of this HF noise by using simple differences and various experimental setups. Finally, we conclude on some warnings on the actual 30s GPS data, and specifications for future GNSS ground hardwares and data processing softwares.