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An analysis of the effect of calculation interval length on scintillation parameters on high latitude scintillation.

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The σ_ϕ and S4 scintillation indices, calculated respectively on the phase and amplitude observables in Global Navigation Satellite System (GNSS) signals, are commonly used to quantify ionospheric scintillation. When calculating these indices, the current convention is to use a 60 second time interval to do so. This convention is not rigorously motivated nor well studied. For calculation purposes it is necessary to choose an interval containing enough points to properly calculate the variance, but short enough to assume stationarity over the entire interval. The current convention seems to strike a balance between these requirements, but this is not well tested, and the use of higher frequency receivers could suggest that a shorter time interval is more optimal when calculating these indices. In this study, we calculate the relevant scintillation indices over a range of different time interval lengths on 100Hz GNSS data, recorded from the Churchill and Fort Simpson Canadian High Arctic Ionospheric Network (CHAIN) stations, from December 2016 to April 2018. This paper will address the change in scintillation indices calculated by looking at individual events as well as the distribution of the scintillation index values over the entire set. In doing so, careful consideration is given to accurately classifying events as scintillation and eliminating the influence of other signal components. The discussion is then focused on the evolution of statistical parameters such as the standard deviation and the mean of the set, as well as the fit of several distribution functions. In addition, the number of identified events, as well as the duration of events is assessed.