

A regional GPS receiver network for monitoring equatorial scintillation and total electron content

Abstract

A network of Global Positioning System (GPS) single-frequency (L1) receivers has been installed in Australia and Southeast Asia for the purpose of monitoring equatorial ionospheric scintillation during the current peak in solar cycle activity. Dual-frequency receivers to measure total electron content are also operating at some stations and will be described in a later paper. With respect to equatorial scintillation our long-term intention is to characterize its statistical properties and its effect on GPS link performance within the Asian-Australian longitude zone (approximately from 100degrees to 150degrees E) as a function of time of day, season, sunspot number, and magnetic latitude, for comparison with available models such as WBMOD and in order to quantify the potential for navigational degradation, especially during times of elevated solar activity. In this paper, the scintillation receiver network is described, and preliminary results are presented from the first two years of operation (1998 and 1999). Our initial results include measurements of diurnal and seasonal variations in S-4 and an analysis of the performance of multiple satellite links which indicates that just prior to solar maximum, GPS can approach marginal performance because of scintillation.