ABSTRACT

Monsoon circulations are major features of the tropical troposphere. Associated with large- scale seasonal reversals of pressure, temperature and winds, these monsoons are caused by the larger amplitude of the land temperature in comparison to that of the nearby oceans. As the non-dispersive atmosphere is characterized by adiabatic lapse rate, vertical wind motion and heterogeneous water vapour content during varying monsoon periods, the propagation speed of satellite-to-receiver signals propagation are equally reduced due to the induced variability of refractive indices with respect to free-space radio wave propagation. Often denoted as a nuisance among space-based radio navigation satellites practitioners especially when the utmost possible accuracy is greatly demanded, the resulting decrease in velocity increases the time taken for the signal to reach a receiver's antenna, thereby increasing the equivalent path length, which in turn affects the accuracy of the derived positioning information. This paper aims to analyze the impact of monsoons and Inter monsoon periods on the performance of space-based radio navigation satellites positioning for surveying applications. Conducted within a network of continuously operating Global Positioning System (GPS) reference stations and ground weather stations in Peninsular Malaysia, larger amount of satellite-to- receiver signal propagation delay were obtained during the Northeast Monsoon: 2.9853 m in comparison to the Inter Monsoon: 2.9755 m and the Southwest Monsoon: 2.9631 m. Poor estimated three-dimensional vectors of GPS baseline solution on the basis of ratio, reference variance and Root Mean Square (RMS) were as well detected especially during the Northeast Monsoon followed by the Inter Monsoon and the Southwest Monsoon. With about 52 percent to 55 percent of accuracy discrepancies detected compared to the Easting and the Northing positioning vectors, the Height component is the most variable and inconsistent components resulting from the varying monsoon circulations.