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# Total failures of GPS-GLONASS functioning caused by the powerful solar radio emission

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We investigate the GPS-GLONASS performance quality of X6.5 and X3.4 solar flares, which produced a solar radio burst with unprecedented radio flux density on 6 and 13 December 2006. As deduced from the Owens Valley Solar Array and RSNS spectrograph Learmonth data, the level of solar radio noise exceeded $10^6$s.f.u. and $10^5$s.f.u. on 6 and 13 December. We use GPS data from the global network of two-frequency receivers (more then 1500 sites) and from the Nationwide GPS array of Japan GEONET (13 December; 1200 sites). We have found significant experimental evidence that the high precision GPS positioning was partially paralyzed on all sunlit sides of the Earth for more than 10 min. We prove that the high level of phase slips and count omissions are caused by the wideband solar radio noise emission. Comparison between the total slips of GPS performance and GLONASS for the 2006 December 6 and 13 solar flares shows that the signal-to-noise ratio for GLONASS is higher than that for GPS. Our results are serious ground for revision of the role of space weather factors in functioning of modern satellite systems and for more careful account of these factors by engineering development and operation. Another important conclusion of our study is that the continuous calibrated data on monitoring of the integrated flux level of the solar radio emission, obtained on a large number of solar radio spectrographs, which are located in all necessary longitudinal intervals, can be used to estimate a radio noise level of solar origin in the frequency range of GPS-GLONASS-GALILEO.