



Solar Flare Effects on Navigation Services based on the X9.3 Flare of 6 September 2017

Jens Berdermann, Martin Kriegel, Daniela Banys, Frank Heymann, Mainul Hoque, Volker Wilken, Claudia Borries, Anja Hesselbarth, and Norbert Jakowski

German Aerospace Center, Navigation, Neustrelitz, Germany (jens.berdermann@dlr.de)

The influence of space weather with all its temporal and spatial variations in the ionospheric plasma is becoming an increasing challenge on the implementation of today's precision requirements and reliability of Global Navigation Satellite System (GNSS)-based navigation services. Next to the effects of nominal space weather changes, which are mainly of interest in certain business domains for precise navigation, the analysis of strong solar events allows an insight into the threat situation on impacted navigation services. In September 2017 a quite interesting period of solar activity occurred with an X9.3-class flare, the strongest solar flare in more than one decade, during its maximum phase. We present the impact of the flare-induced ionosphere changes on navigation and the positioning accuracy achievable by GNSS users. Several examples are given to demonstrate the solar flare effect on GNSS navigation services and applications in the aviation and maritime transportation domain.