



Reprocessing the Elliptical Orbiting Galileo Satellites E14 and E18: Preliminary Results

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In August 2014, the two Galileo satellites FOC-1 (E18) and FOC-2 (E14) were – due to a technical problem – launched into a wrong, elliptic orbit. In a recovery mission a series of orbit maneuvers were performed to raise the perigee to an altitude where both spacecrafts could be introduced to the Galileo navigation service. After this period of orbit maintenance both satellites started to transmit navigation signals at November 29, 2014 (E18) and March 17, 2015 (E14). However, as it was not possible to recover the nominal orbits due to propellant limitations, both spacecrafts orbit the Earth with a numerical eccentricity of 0.16 and an inclination of 50.2° . Very soon, it was assumed that both satellites could be highly useful for studies on general relativity, especially as the Galileo spacecrafts are equipped with very stable passive hydrogen masers. A prerequisite for dedicated studies in this field are highly accurate satellite orbits and clock corrections. Preliminary results for orbit and satellite clock determination will be presented based on an initial reprocessing over the past 2.5 years. The presentation focuses firstly on orbit modeling aspects with respect to the elliptically orbits. Secondly the derived clock corrections for the on-board passive clocks are assessed with respect to the reference clock at ground stations. The results will be discussed also with respect to the proposed Galileo-based studies on the gravitational redshift.