Latest validation of the Electron Density Assimilative Model (EDAM)

Natasha K Jackson-Booth[(1)], Luke A Selzer* [(1)], Joseph Reid[(1)], Richard Penney[(1)] and Matthew Angling[(2)]
(1) QinetiQ, Malvern, UK, http://www.QinetiQ.com
(2) SERENE, The University of Birmingham, UK

The Earth's atmosphere, particularly the ionosphere and troposphere, often has detrimental effects on the performance of many radio frequency systems. In order to ensure the effective operation, planning, and management of such systems, comprehensive, global, and timely specifications of the atmosphere must be obtained; this includes detailed observations of the refractivity profiles of the aforementioned regions. Ionospheric refractivity information can be accurately acquired by employing an assimilation system; 3D images of the ionosphere can be produced using data gathered from a range of measurement techniques, such as GPS receivers and ionosondes.

QinetiQ has developed the Electron Density Assimilative Model (EDAM), in order to assimilate disparate ionospheric measurements into an existing background model (in this case IRI2007). These measurements include: ionosonde and incoherent scatter radar generated height profiles; Total Electron Content (TEC) measurements from systems based both on the ground and in space; and electron density data obtained from in-situ sensors. The philosophy driving EDAM is to provide a system that operates on a single PC, continually providing physical results using very sparse data. EDAM does this, exploiting optimal data assimilation techniques recently developed by the meteorological community, and provides a platform from which to develop products targeting a range of RF systems.

This paper will present work on the comparison of electron density profiles produced by EDAM and ionograms recorded in the Marshall Islands. IRI will be used as a control electron density profile to validate the impact of assimilating sparse data into EDAM.