

# **Ionospheric Remote Sensing Using GPS: One Person's Signal Is Another Person's Noise**

**Dr. Attila Komjathy**  
**Senior Research Scientist**  
**Ionospheric and Atmospheric Remote Sensing Group**  
**NASA Jet Propulsion Laboratory**  
**Pasadena, California, USA**

The signals from the satellites of the Global Positioning System (GPS) must travel through the earth's ionosphere on their way to GPS receivers on or near the earth's surface. To achieve the highest possible positioning accuracies for geodetic and surveying applications, one must correct for the propagation delays imposed on the signals by the ionosphere. Whereas these effects may be considered a nuisance by most GPS users, they will provide researchers with an opportunity to use GPS as a tool to better understand the plasma surrounding the earth. The dispersive nature of the ionosphere makes it possible to measure its total electron content (TEC) using dual-frequency GPS observations collected by ground and space-borne GPS receivers.

In this presentation I will review the different techniques we can use to mitigate the ionospheric effect including global empirical and physics-based ionospheric models. I will also discuss the various GPS processing techniques we have at our disposal to achieve the best positioning accuracies. Furthermore I will discuss the state-of-art techniques researchers use to study the ionosphere for helping various exciting applications including e.g., ionospheric corrections for NASA's interplanetary spacecraft navigation, space weather monitoring during ionospheric and geomagnetic storms and the development of a tsunami early warning system using GPS-derived ionospheric signals.