

High Altitude ISR Experiments at Jicamarca USNC-URSI National Radio Science Meeting

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The plasmasphere is the layer of the earth's atmosphere found immediately above the plasmapause, beginning at a height where the H⁺ composition exceeds 50% of the total ion composition, and acting as a bridge between the ionosphere and the magnetosphere. It is a poorly understood region, and one which has been relatively unexplored using ISR. A thorough and more detailed characterization of this layer is of prime importance for a better understanding of our planet's space weather as well as our ability to improve our existing models.

In the present project, we introduce some of the advances made in characterizing the lower section of the plasmasphere using ISR data from Jicamarca. We discuss some current and proposed techniques that allow the extraction of parameters from progressively higher altitudes. Some of these methods involve modifying the shape and frequency of the transmitted pulse with the intent of increasing the measured SNR.

Ionospheric parameter profile curves (Ne, Te, Ti, H⁺ and He⁺ ion composition) will be presented that span heights of up to 2500km. We will elaborate on the experimental setup (hybrid long pulse experiment) and inverse methods (full profile analysis) with which we are able to extract the above curves. Full profile analysis is the optimization technique used for decoding the transmitted pulses of mixed length into parameter estimates.

Comparisons of the ionospheric models (SAMI2 & SAMI2-PE) with experimental data also prompt some revisions to the models. These revisions aim in particular to reduce the discrepancies between pre sunrise and post noon electron temperatures observed between the models and experiments.