IMPROVED HEIGHT AND SHARPNESS MEASUREMENTS OF THE LOWEST EDGE OF THE EARTH'S IONOSPHERE

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Phase and amplitude changes along daytime VLF paths are used to find more accurate values for the height and sharpness (Wait's *H'* and) of the bottom edge of the D-region of the ionosphere. The phases were measured with respect to GPS 1-second pulses both near the transmitters (100-200 km away, where the sky wave contribution is fairly minimal) and at locations many Mm away over nearly all-sea, fully day lit paths, near midday. Although the transmitter phases are typically caesium stabilised, this procedure is necessary to deal with the arbitrary phase changes which take place during the transmitters' weekly maintenance periods and at some other (quasi-random) times. Amplitudes were also measured at the same times and places. The changes in phase and amplitude along the paths are then compared with those calculated with (a slightly modified version of) the US Navy's LWPC (Long Wave Propagation Capability) code using a range of appropriate values of *H'* and to determine the best values of *H'* and to fit the daytime (solar minimum) propagation measurements. The general height accuracy achievable appears to be ~ ±0.5 km or better for the longest paths. For a very long fixed path (>10 Mm), at a fixed frequency, long term changes in height appear to be measurable down to an accuracy of ~ ±0.2 km. Such measurements thus appear to have potential to serve as calibration heights, near *H'*~70 km altitude, for studying integrated global warming effects in the Earth's atmosphere (ie the integrated effects over the height range ~0-70 km).

D-region, ionosphere, VLF

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