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Connecting IMAGE RPI plasmasphere profiles to the F2 layer peak

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Polar cap and plasmasphere electron density profiles recently measured with the radio plasma imager (RPI) on the IMAGE satellite extend downward to about $\sim$2000 km altitude. Comparing these profiles with the IRI topside profiles reveals incompatible density values and scale heights in the 2000 km boundary region. We have developed a possible new approach of modeling the IRI topside profile with an α-Chapman function. Construction of the scale height as function of altitude makes use of the well-described bottomside profiles and of the plasmasphere profiles measured by RPI. The bottomside profile determines the Chapman scale height at hmF2, the F2 layer peak, with typical values around 80 km. In order to assure a continuous transition into the RPI-measured profiles, the scale height values increase steadily to values of $\sim$400 km at 2000 km altitude. Comparisons with incoherent scatter radar profiles from the Madrigal Database seem to justify the use of Chapman functions above hmF2. The use of an α-Chapman function with constant scale height, as proposed by Reinisch and Huang [JASR, 2002], must be limited to heights below $\sim$700 km since it underestimates the densities above this height.