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# The COMPLEIK subroutine of the IONORT-ISP system for calculating the non-deviative absorption: A comparison with the ICEPAC formula

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The present study proposes to discuss the ionospheric absorption, assuming a quasi-flat layered ionospheric medium, with small horizontal gradients. A recent complex eikonal model [Settimi et al., 2013b] is applied, useful to calculate the absorption due to the ionospheric D-layer, which can be approximately characterized by a linearized analytical profile of complex refractive index, covering a short range of heights between h1= 50 km and h2= 90 km. Moreover, Settimi et al. [2013c] have already compared the complex eikonal model for the D-layer with the analytical Chapman's profile of ionospheric electron density; the corresponding absorption coefficient is more accurate than Rawer's theory [1976] in the range of middle critical frequencies. Finally, in this study, the simple complex eikonal equations, in quasi-longitudinal (QL) approximation, for calculating the non-deviative absorption coefficient due to the propagation across the D-layer are encoded into a so called COMPLEIK (COMPLex EIKonal) subroutine of the IONORT (IONOspheric Ray-Tracing) program [Azzarone et al., 2012]. The IONORT program, which simulates the three-dimensional (3-D) ray-tracing for high frequencies (HF) waves in the ionosphere, runs on the assimilative ISP (IRI-SIRMUP-P) discrete model over the Mediterranean area [Pezzopane et al., 2011]. As main outcome of the study, the simple COMPLEIK algorithm is compared to the more elaborate semi-empirical ICEPAC formula [Stewart, undated], which refers to various phenomenological parameters such as the critical frequency of E-layer. COMPLEIK is reliable just like the ICEPAC, with the advantage of being implemented more directly. Indeed, the complex eikonal model depends just on some parameters of the electron density profile, which are numerically calculable, such as the maximum height.