



## **A 3D ray-tracing software for OTH radar simulations**

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We present a 3D electromagnetic wave ray-tracing software (TDR) based on the geometric optic linear theory. Ray propagation through a 3D heterogeneous ionosphere (e.g., NeQuick, IRI) above an ellipsoidal Earth (WGS-84) is solved using fourth-order Runge-Kutta method for the solution of the eikonal equation. Modeling is specifically developed for mono-static over-the-horizon (OTH) radar with co-located emitters and receivers (e.g., French OTH-Radar Nostradamus).

The two 3D ionospheric models used to calculate the local index of refraction along the ray-path, nominally IRI and NeQuick, present different characteristics. Here we explore the sensitivity of ray propagation to the theoretical seasonal/geographical/solar activity variations of the ionosphere. Our simulations are supported by three years of Nostradamus OTH-radar data.