

## Comparing HF Radar Backscatter From the Southern Ocean With Ray-Tracing Results Using the IRI Model

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### Abstract

In this paper, seasonal variations in backscatter from the sea measured with an Over-The-Horizon Radar (OTHR) designed for space weather research are compared to synthesized results generated using advanced numerical ray tracing techniques together with the International Reference Ionosphere (IRI) model. The synthesized results help us to understand changes in the various ionospheric layers causing the features commonly displayed in the real backscatter results. For a given feature, the numerical ray tracing can aid in determining whether it is backscatter from the sea detected via reflections from the E or F layers or sporadic E (Es), or whether it is a result of backscatter from ionospheric irregularities or meteors. Thus the high frequency (HF) radar backscatter, together with the numerical ray tracing technique, offers an important method of remotely sensing the distant ionosphere, and thereby extending our capability to monitor space weather.