Title: ***Radio Propagation ~ Principles and Practice***
Author: I. Poole
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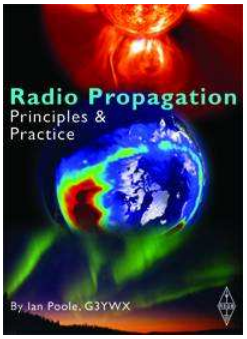
Reviewer: Whitham D. Reeve



Radio propagation is an important subject for radio astronomers and radio operators, among others. ***Radio Propagation ~ Principles and Practice*** was written from the perspective of high frequency terrestrial communications as are almost all amateur radio books on this subject. Someone new to radio astronomy could use this book to learn the fundamentals of radio propagation from the bottom up. They could then move to more advanced books or professionally written online materials that discuss propagation through the ionosphere from the top down.

As printed on the back cover, the author is "*an electronics and engineering consultant and journalist at Adrio Communications*". He also publishes the Radio Electronics website at http://www.radio-electronics.com/, "*Resources and analysis for electronics engineers*", which is a source of numerous highly simplified electronics tutorials. His writing style is British English (not unexpectedly).

Radio Propagation ~ Principles and Practice has 10 chapters: **Electromagnetic waves**; **The atmosphere**; **The Sun**; **Propagation near the ground**; **Ionospheric propagation**; **Ionospheric disturbances, storms and auroras**; **Predicting, assessing and using ionospheric propagation**; **Tropospheric propagation**; **Meteor scatter**; and **Space communications**. The chapters are compact, fairly well-illustrated and easy to read but readers should not expect a lot of depth. Even though the processes that form the ionosphere are very complex, and even today are not completely understood, this book shows that it is possible to skirt the math and provide relatively simple explanations. I spotted only a few simple equations.

The book starts out by describing electromagnetic waves, the atmosphere (and ionosphere) and the Sun. These set the stage for discussions of the various types of high frequency propagation discussed later. I noted some discussions that were either too simplified or only partially correct. For example, in chapter 3 – **The Sun**, the author first states that the Sun rotates faster at its equator and low latitudes than high latitudes and then on the next page says the Sun's equator rotates slower (the former is correct).

The next two chapters cover ground wave and sky wave propagation and include a little history on how the ionosphere was discovered (readers wanting more historical detail should see ***Probing the Sky with Radio Waves ~ From Wireless Technology to the Development of Atmospheric Science*** by Chen-Pang Yeang, which I will review in the near future). Chapter 4 – **Ionospheric Propagation** describes refraction and reflection of radio waves in Earth's upper atmosphere, which is ionized by the Sun's radiation. Refraction, or bending, through the ionized medium at altitudes of a few hundred kilometers allows radio waves to travel far beyond the visible horizon. However, the ionosphere is quite variable throughout the day and changes drastically at night, which affects the maximum and minimum usable frequencies for any given path. The author's discussions of the Maximum Usable Frequency (MUF) and Lowest Usable Frequency (LUF) could have been better written. A

reader unfamiliar with these terms, in other words, the target audience for this book, might find the discussion confusing.

Many radio astronomers are interested in detecting meteor trail reflections, the subject of chapter 9 – **Meteor scatter**. When a meteor encounters the resistance of Earth's atmosphere, heat from friction ionizes the thin air and the molecules in the meteor body and leaves an ionized trail that refracts or reflects terrestrial radio waves. The electron density in these trails can exceed the density of the normal ionosphere. The trails usually last only a short time before they dissipate, but they may be used for terrestrial communications (meteor communications), which is the focus of this chapter.

I was a little disappointed in the last chapter on **Space Communications**. While the primary purpose of the book is terrestrial radio propagation, as a radio astronomer I am interested in reception of radio waves from celestial sources through Earth's ionosphere, the equivalent of receiving from a spacecraft or satellite. I was hoping for more details than provided in this chapter. Faraday rotation and scintillation are very briefly discussed in terms of Earth-Moon-Earth (EME) communications (but too briefly to be of any use). This chapter yielded little else besides what seemed to be a focus on satellite orbits. Of course, in a small book like this, there is little opportunity to provide very many technical details, but I still think it should have been more to the point.

I found some passages repetitious, but the discussions are adequate for purposes of amateur radio. The book provides many rules of thumb that could provide a stepping stone for further study. Unfortunately, like almost all books written for the radio amateur market, there are no references or even a list of books for further study. This is a serious impediment to someone wanting to learn more and makes this book easily disposable.

This small book may be purchased directly from RSGB. The American Radio Relay League (ARRL) also sells the book but their price is far too high. Interestingly, when I started writing this review (June 2014), used copies were selling for a shocking US$300. The book is not a so-called classic and that price is off by a factor of at least 30. More recently (January 2015) I have seen used prices from 14 to US$35, still too high for a used book of this type.

In conclusion, ***Radio Propagation ~ Principles and Practice*** provides an adequate introduction but it lacks depth. Although the book has little direct applicability to radio astronomy, it would help a newcomer to amateur radio astronomy to understand some of the characteristics of high frequency propagation and contribute to their overall knowledge. The inconsistencies that I mentioned along with several editing mistakes are minor flaws. However, at US$30 plus shipping, the book is overpriced for US buyers unless they order directly from RSGB at a lower price or are able to find an inexpensive used copy.

Reviewer - Whitham Reeve presently is a contributing editor for the SARA journal, *Radio Astronomy*. He worked as an engineer and engineering firm owner/operator in the airline and telecommunications industries for more than 40 years and has lived in Anchorage, Alaska his entire life.

Radio Propagation Explained draws on material from the hugely popular Radio Propagation Principles & Practice book previously published by the RSGB and enhances it with the latest advances in the field of propagation. Steve shows how radio amateurs can by studying propagation can gain a more rewarding experience and increase their chances of making the on-air contacts they want. Radio Propagation Explained is thoroughly recommended reading for everyone who wants to understand radio propagation and make the most of their radio activities. Product Details Softcover: 128 pages Publisher: Radi...

Radio propagation is a vital topic for any radio amateur or anyone with an interest in radio communications. This book provides a fascinating description of all the relevant information about radio propagation from HF to VHF, UHF and beyond. The book includes everything you need to know including radio waves and how they travel, the atmosphere, the Sun, ionospheric propagation (with the important modes and information), ionospheric storms and aurora, how to predict and assess ionospheric propagation, tropospheric propagation, meteor scatter, and space communications.Â Radio Propagation - Practice and Principles is an essential read for anyone associated with radio communications. Customer reviews. 3.0 out of 5 stars. - Selection from Wireless Communications Principles and Practice, Second Edition [Book].Â Small-scale fading, or simply fading, is used to describe the rapid fluctuations of the amplitudes, phases, or multipath delays of a radio signal over a short period of time or travel distance, so that large-scale path loss effects may be ignored. Fading is caused by interference between two or more versions of the transmitted signal which arrive at the receiver at slightly different times. These waves, called multipath waves, combine at the receiver antenna to give a resultant signal which can vary widely in amplitude and phase, depending on the distribution of the intensity and relative prop... Radio Propagation Tutorial Includes: Radio propagation basics Radio signal path loss Free space propagation & path loss Link budget Radio wave reflection Radio wave refraction Radio wave diffraction Multipath propagation Multipath fading Rayleigh fading The atmosphere & radio propagation. Radio signals can travel over vast distances. However radio signals are affected by the medium in which they travel and this can affect the radio propagation or RF propagation and the distances over which the signals can propagate. Some radio signals can travel or propagate around the globe, whereas o Radio propagation is the behavior of radio waves as they travel, or are propagated, from one point to another, or into various parts of the atmosphere. As a form of electromagnetic radiation, like light waves, radio waves are affected by the phenomena of reflection, refraction, diffraction, absorption, polarization, and scattering. Understanding the effects of varying conditions on radio propagation has many practical applications, from choosing frequencies for international shortwave broadcasters, to Radio Wave Propagation. Aurora: A favorite propagation. When more than the usual levels of charged particles arrive at the earth (i.e., increased solar wind), as a result of a CME or coronal stream, many of these charged particles penetrate the weakest parts of the GMF near the polar regions. This is because the GMF field lines guide these charged particles into these regions; at these polar regions, extreme ionization can result at altitudes up to 1000km.Â TEP: Trans-Equatorial Propagation. This is another form of mysterious radio wave propagation which occurs during the spring and fall months during the sunspot minimum.Â In practice, "cusp" and "cleft" are often used interchangeably. However, "cleft" implies greater extension in longitude (local time) and hence a wedge-shaped structure. D.