An Introduction to Elevation and Azimuth Patterns using EZNEC

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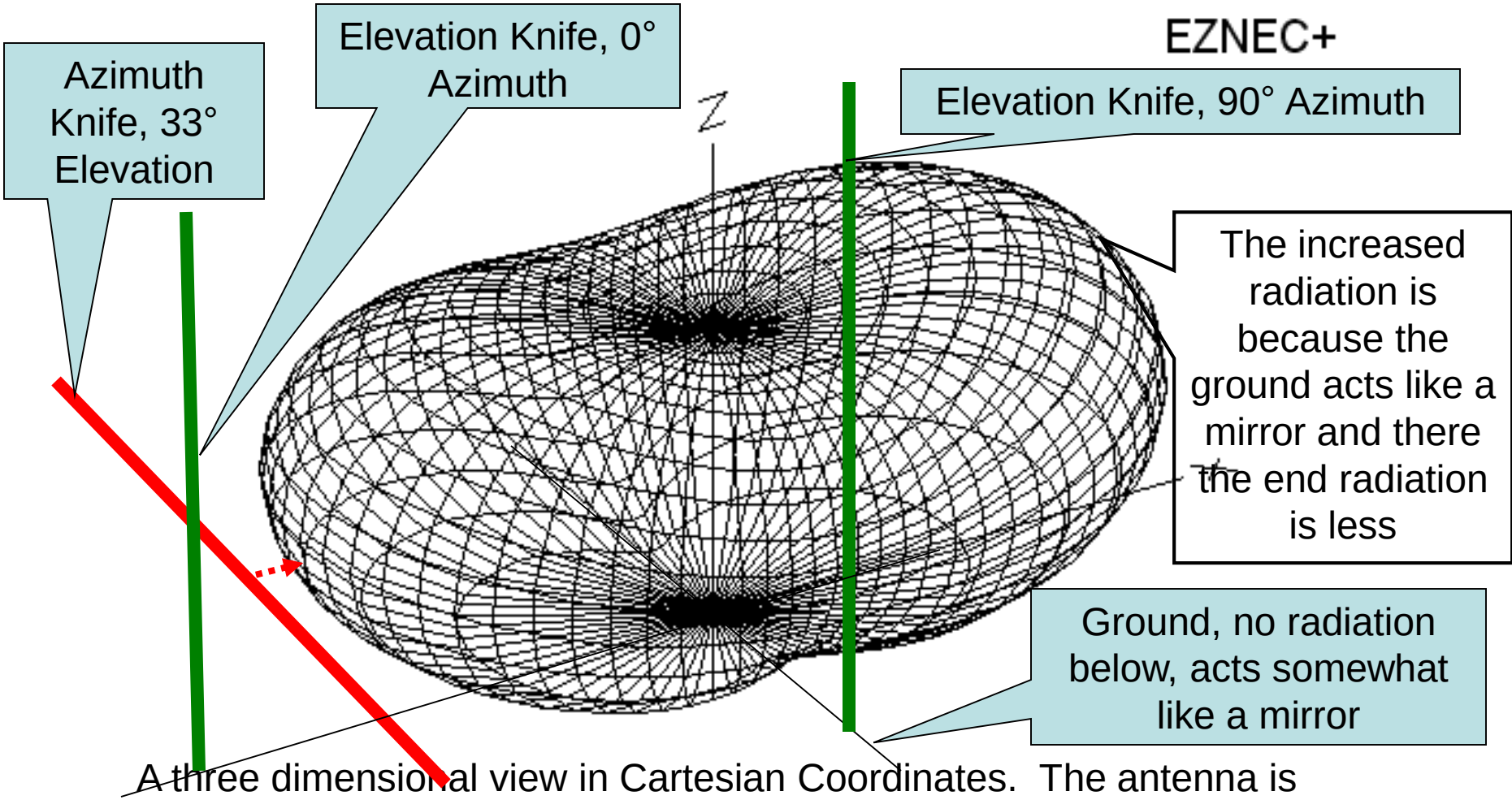
Introduction

- Mike KK6GLP pointed out it takes a lot of time to understand Antenna Azimuth and Elevation Plots
- This Tech-Ten presents a forum for discussing Antenna Azimuth and Elevation Plots
- A dipole will be used that is above a medium ground (less than ideal conductivity and permittivity). The dipole is referenced to an isotropic antenna

Antenna Patterns are Multidimensional

- They fill Space from a fixed spatial location and can represent the far field, there is a near field not to be discussed
- A reference antenna is used to create the charts. The reference antenna is called Isotropic, which radiates equally in all directions, think of an RF star (lot lower power (watts or W/cm^2)
- Without a reference antenna, the pattern would be calculated at a specified distance and be in power
- The first Graphic display is in Cartesian Coordinates (X, Y, Z), to create an introduction. The Azimuth and Elevation comparative measurements are given using angles and a dBi magnitude scale

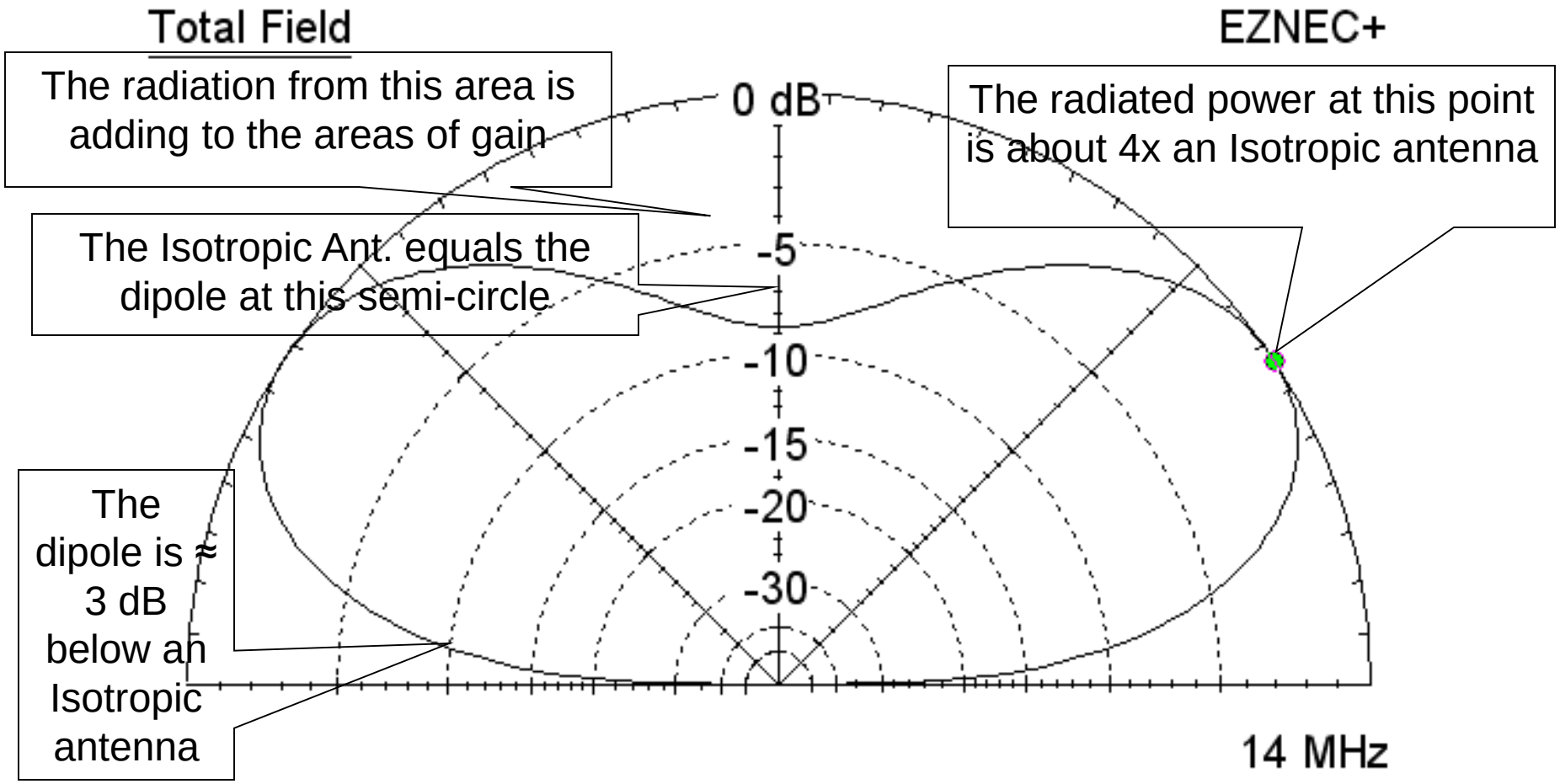
Dipole over a Medium Flat Ground



A three dimensional view in Cartesian Coordinates. The antenna is located 30 feet above the X-Y plane along the X axis

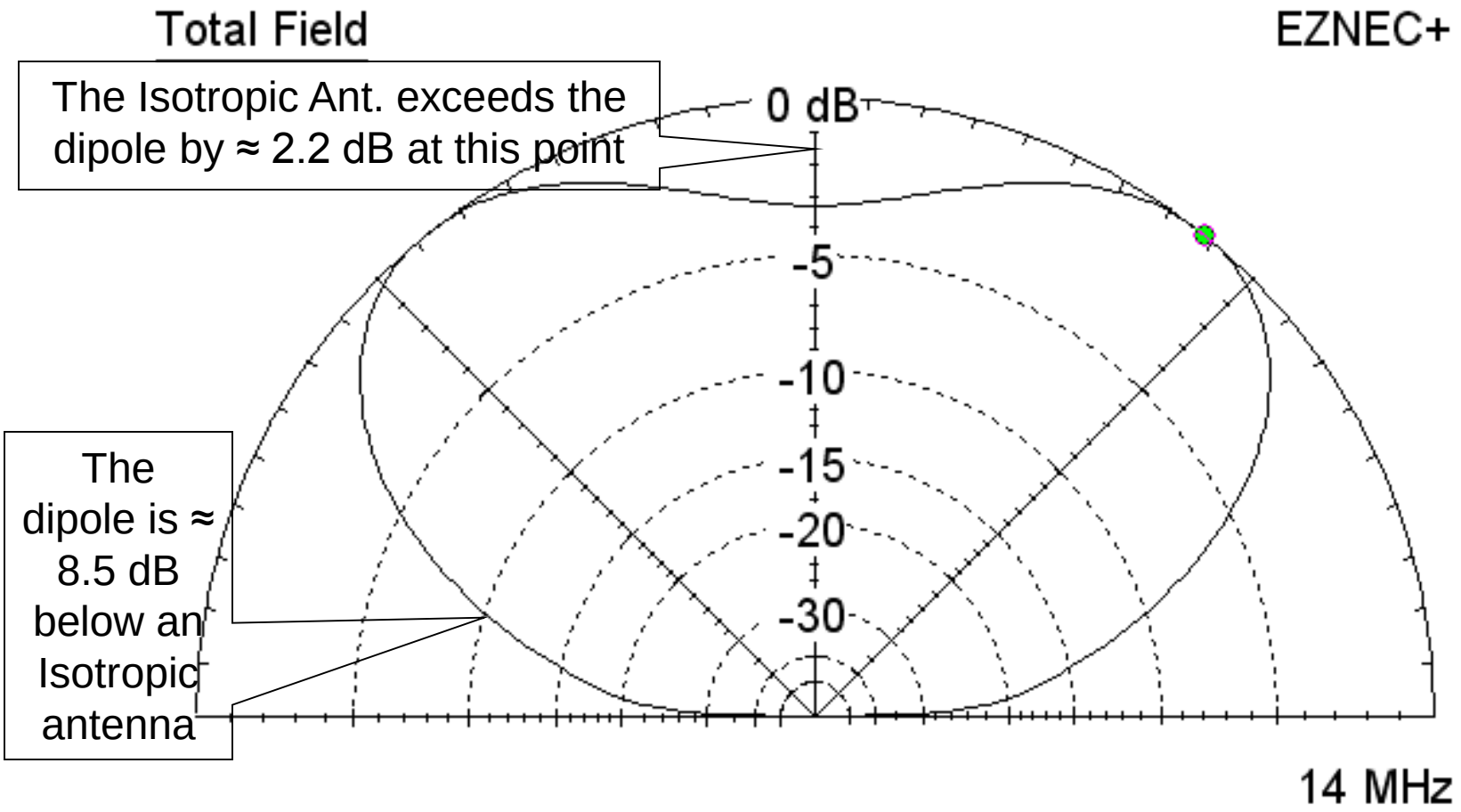
This graphic is a ratio of a dipole to an isotropic reference

Elevation Plot, Azimuth 0°



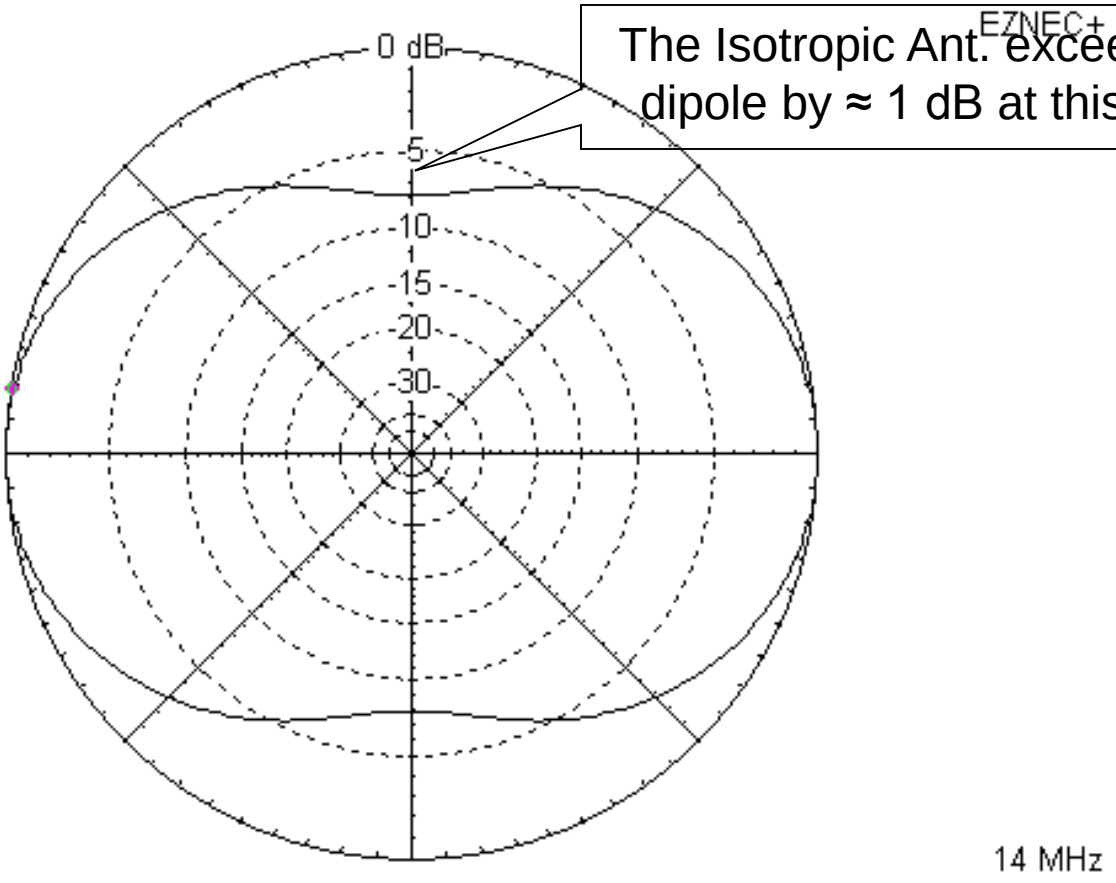
This is a Z-X slice of the Three Dimensional Plot looking down the X Axis. The maximum gain is 6.82 dBi at an angle of 33°

Elevation Plot, Azimuth 90°



This is a Z-Y slice of the Three Dimensional Plot looking down the Y Axis. The maximum gain is 1.45 dBi at 51°

Azimuth Plot, Elevation 33°



Empty Regions outside the inside envelope add to the power inside the inner envelop

This is a X-Y slice of the Three Dimensional Plot looking down the -Z Axis at 33° Elevation. The maximum gain is 6.38 dBi

Summary

- The Azimuth and Elevation Plots are slices of a three dimensional pattern
- The actual radiated power varies as a function of Azimuth and Elevation Angles
- The Azimuth and Elevation plots are generated by creating a ratio of the desired antenna pattern to an Isotropic Reference Antenna