GIS and Satellite Visibility: Viewsheds from Space

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Thesis submitted to the Faculty of Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Master of Science
In
Geography

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April 28, 2005

Keywords: GIS, GPS, hillshade, satellite, urban canyon, viewshed, visibility

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ABSTRACT

The Global Positioning System (GPS) has recently become the significant mapping tool for millions of customers worldwide, providing its users with accurate terrestrial positions almost instantaneously. The functionality of a GPS receiver depends on the number of satellites to which it can establish an unobstructed line of sight. Current satellite availability prediction tools perform satellite visibility predictions without considering terrain or structures that block GPS signals, a major issue in mountainous and urban areas. This paper describes a new Geographic Information Systems (GIS) tool, a customization of ArcGIS named *Satellite Viewsheds*, which predicts satellite visibility for any place and time while considering line of sight obstructions. *Satellite Viewsheds* requires a raster surface model, the test date and time, and the orbital properties of the satellites. It produces grids depicting the number of visible satellites and optimal viewing time for every cell in the grid. *Satellite Viewsheds* allows users to avoid areas of signal loss and choose the best time to map using their GPS receivers. The field test of *Satellite Viewsheds* proved that the tool performs satellite visibility predictions consistently and accurately. The research outlined in this paper indicates that *Satellite Viewsheds* is the first tool of its kind.

Acknowledgements

I would like to sincerely thank my committee for their guidance with this project. I have learned far more than I expected to due to their patience. I would especially like to thank Dr. Bill Carstensen for equaling my enthusiasm for this research; the same enthusiasm that has earned him respect in the GIS field nationwide. I would also like to thank Chris Stahl, Patrick Jarvis, Peter Sforza, Dr. James Campbell and Jon Laird for their volunteering in assisting me with this project.

My fellow graduate students, you have made my time here very enjoyable; so enjoyable, in fact, that you kept me around for another semester. Keep in touch.

To my family, I would not have reached this point without you. This accomplishment was only made possible by the support I have gotten from you over the years. Mary, I love you and I appreciate you putting up with me through two years of graduate school.

Most importantly, God has led me to this point and His unconditional support never lets me down. I took a chance when I decided to switch fields two years ago, without knowing anything about GIS or anyone even in the Geography field. But the Lord was guiding me the whole time. Looking back now, I could not have made a better decision.

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