

Average GPS Signal Availability Estimation

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CEM IR&D

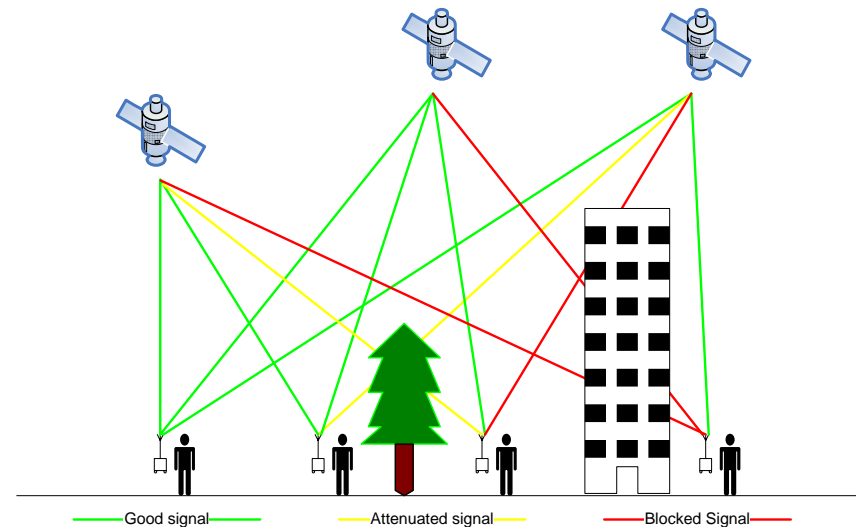
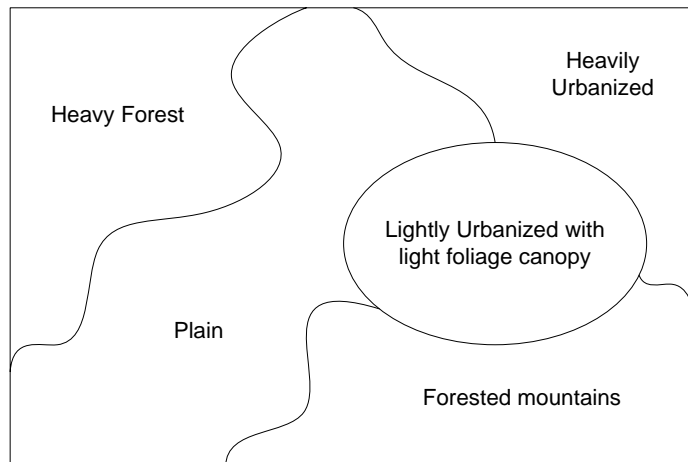


Problem

- **The effectiveness of the Global Positioning System (GPS) varies significantly based on terrain, location, and ground cover**
- **The performance of the GPS in urban and forested areas is difficult to predict**
- **Mission planners need to know in advance if GPS technology can meet their coverage and accuracy requirements**
- **A model is needed to provide good estimates of how well low-cost GPS will work in these areas**

Background

- What is the probability of getting an accurate GPS reading at various points within a given geographic area?



Objective

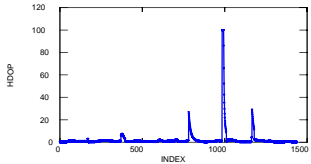
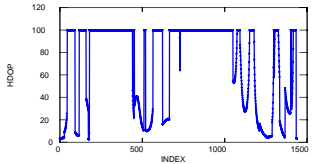
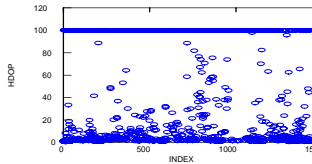
- **Develop and validate a statistical model that can provide a reasonably accurate estimate of low-cost GPS receiver performance based on the known characteristics of a given geographic area**

Activities

- Obtain actual GPS data in the field
- Use readily available geographic datasets to obtain characteristic data
- Determine if an estimator can be built
- Build an estimator
- Compare statistical estimates with actual data
- Refine the model
- Make results available for external use

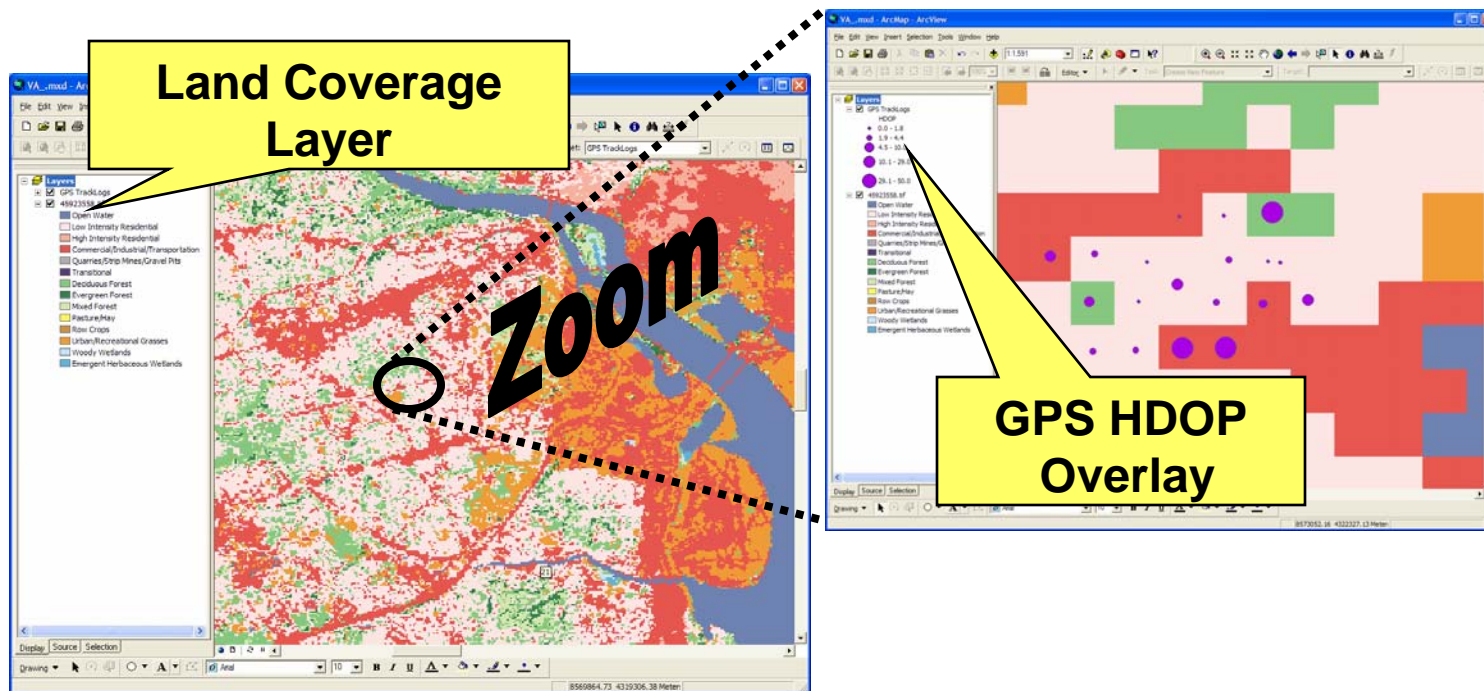
Highlight

Horizontal Dilution of Precision (HDOP) is a good measure of GPS performance and must be statistically characterized because it varies with time

Signal Blockage Profile	Clear Sky	Wall	Mesh (Tree cover)
HDOP versus time			
Fix probability	98%	38%	44%
Median	1.16	19.29	2.87
Mean	1.967	25.717	9.217
Standard deviation	4.571	21.706	15.705
C.V.	2.324	0.844	1.704

Highlight

Horizontal Dilution of Precision (HDOP) statistics are related to land coverage characteristics



Impacts

- **Research applies to any requirement for accurate and effective position data using low-cost GPS technology**
- **Research will help mission planners anticipate the limitations of GPS technology, avoid program delays, and reduce overall development costs**
- **Research may also help GPS developers identify enhancements needed to support applications requiring low-cost technology**

Future Plans

