

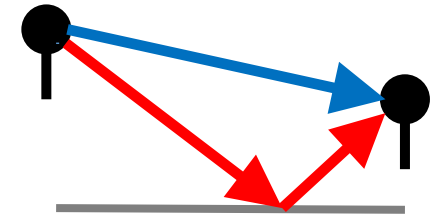
Identifying Dominant Multiple Scattering Paths for Propagation Model Evaluations and Improvements

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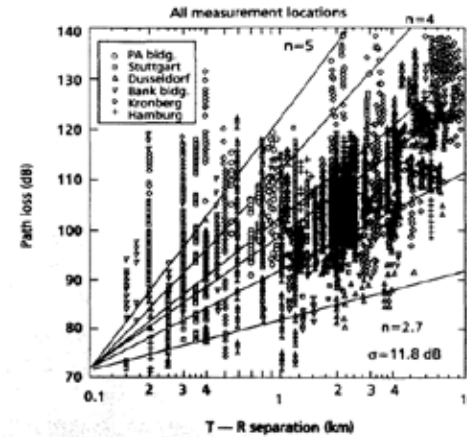
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Model Classes



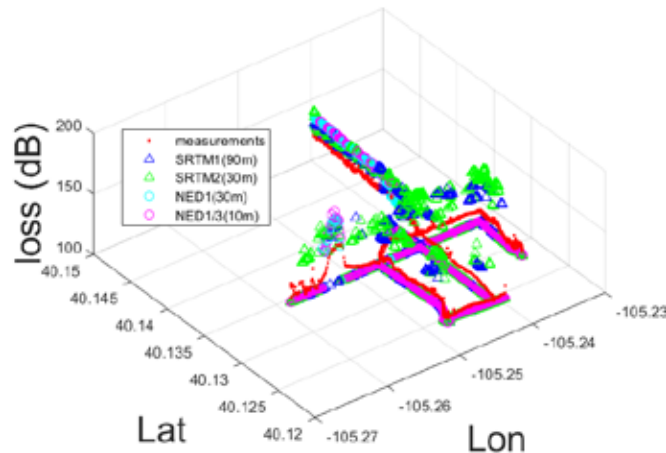
Simple physics models,
most suitable in
idealized geometries



Models that parametrize
propagation to be accurate, on
average, in specified
conditions; abscissa typically

$$|R_{Tx} - R_{Rx}|$$

(Figure from Andersen, Rappaport, &
Yoshida, IEEE Comm. Mag., Jan '95)

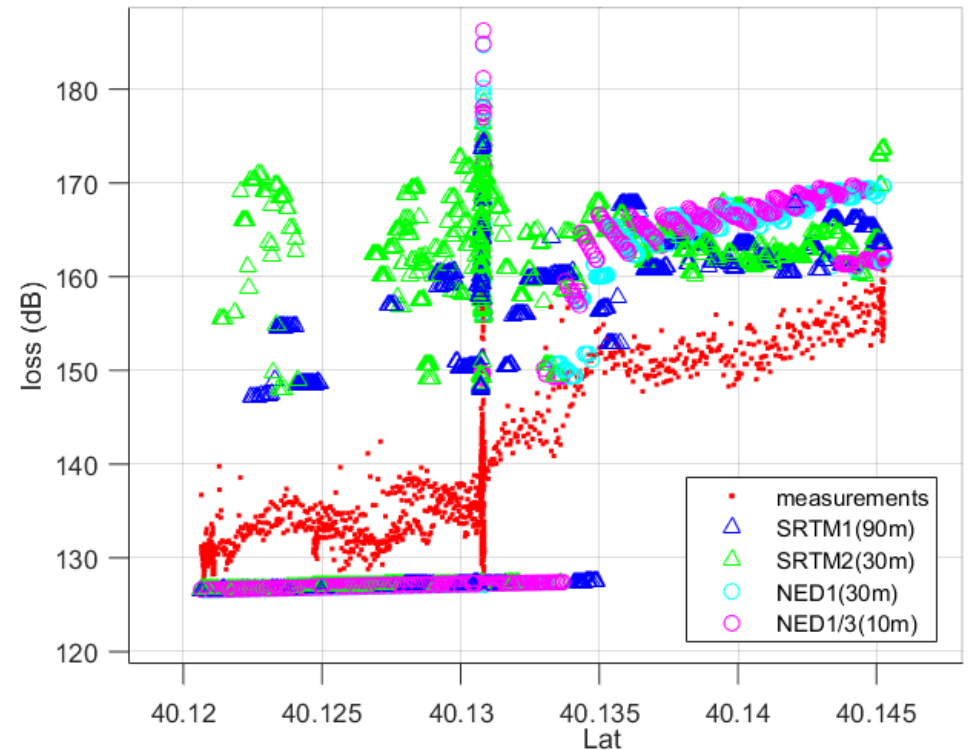


Models that compute losses based on
detailed characteristics of the
environment, such as digital surface
models (DSMs); dependent on R_{Tx} , R_{Rx}

Evaluating Models

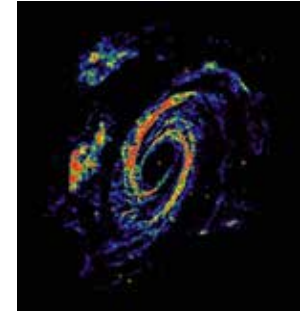
- Models typically evaluated by estimating the path loss between transmitter and receiver
- Models that account for DSMs consider detailed effects and multiple scattering paths, yet the evaluation is determined by a single path loss measurement
- 10db (or higher) errors are not surprising

If a model is not correctly identifying dominant multiple scattering sources, it will get the wrong answer or get right answer for the wrong reason



“Show your work”

- Evaluate models based on proper identification of the dominant scattering paths in a propagation estimate
- Will require additional measurements beyond path loss; possible approaches:
 - RF imaging techniques, such as those used by radio astronomers
 - Measurements of knife edge diffraction effects in appropriate terrain
- Provides insight into whether the propagation model is properly identifying multipath sources at a given R_{Tx} , R_{Rx}



NRAO image of M81 galaxy at 21 cm

