REFRACTIVITY INVERSION CALIBRATION

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Algorithms for making inferences about atmospheric refractivity from observations of radar clutter have been described in the literature (e.g. Gerstoft *et al.*, *Radio Science*, **38** no. 3, MAR18-1-22, 2003). Most of this work has focused on developing a maximum likelihood (ML) or maximum *a posteriori* (MAP) estimate. We now focus our attention on an ultimate goal of having our algorithms generate a correctly adjusted *a posteriori* distribution. For the present time, we will settle for our *a posteriori* distributions having one property of a correctly adjusted distribution: that over an ensemble of inversion runs, the true value of our parameter of interest u (for "usage" variable) falls in the 0 to 20^{th} percentile 20% of the time, in the 20^{th} to 40^{th} 20% of the time, and so on. This talk describes a simulation-based method for achieving *a posteriori* distributions with this property.

The method is implemented as follows:

1. We define the usage variable u to be a scalar statistic that is strongly related to vector quantity that we are trying to estimate in the first place.
2. Synthetic environments are used generate the true value of u and to generate a noise-corrupted clutter observation $\mathbf{d}^o$, from $\mathbf{m_{real}}$.
3. The noise-corrupted synthetic clutter observation is fed into the inversion algorithm which returns a sample representation of the *a posteriori* distribution of the environments. These are mapped into a posterior distribution of u.
4. The value of $u(\mathbf{m_{real}})$ is ranked within the values of u generated from the inversion algorithm results.
5. This process is repeated 1000 times and the ensemble behavior of the *a posteriori* distribution is examined to assess whether it satisfies the ensemble behavior described above.

The above procedure is used to tune the inversion algorithm to generate correctly adjusted posterior distributions.

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2. F - Wave Propagation and Remote Sensing
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