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Poster
Empirical and first principles models of the atmosphere and ionosphere can be improved through the use of data assimilation (DA). However, the most common form of data assimilation is the variational approach, which uses linear estimation theory. In linear estimation theory, each type of information is given a weight proportional to the inverse of its specified error covariance. Analysis systems are therefore dependent on appropriate estimates of observation and modeling errors. Unfortunately, those statistics are not easy to obtain perfectly and remain a major challenge for assimilation systems. In ionospheric data assimilation, a major source of information comes from Total Electron Content (TEC) observations. For errors on these observations, one can estimate the phase leveling errors, but other sources of error, e.g. multipath and forward modeling errors, are much more difficult to estimate. Here we consider ways to estimate the appropriateness of the errors using statistical metrics derived for terrestrial weather models (Desroziers and Ivanov, 2001; Desroziers, et al., 2005; Daley and Barker, 2001) and apply them to ionospheric assimilation. We will show how these can be used to tune the error sizes in assimilation to optimize the ionosphere specification. We consider here both ground GPS and Radio Occultation measurements of TEC and find optimum estimates of error for the variational data assimilation program IDA4D (Bust and Datta-Barua. 2014).

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