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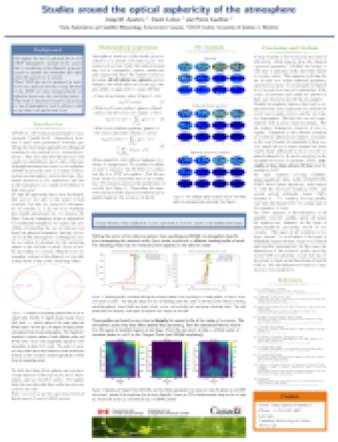
Poster
The standard framework for radio occultation operators, which estimate the expected observations given atmospheric conditions, is still strongly tied to the assumption that the atmosphere is spherically symmetric near the occultation. Considerable work has been done along several directions to depart from local sphericity, with considerable success from a user point of view, but the question is still open for the possible balances between end-to-end coherence of the approach, along all stages of processing, the practical applicability of any solution, the computational cost, and the accuracy.

This standard framework developed since the measurement is a 1D observation, which naturally links to a 1D (vertical) description of the atmosphere, in a relationship that is nearly perfectly bijective. This bijective nature is also at the core of the high impact per observation of radio occultations, as it strengthens the univocal nature of the information that is provided. If the atmosphere is non-spherical, additional degrees of freedom come into play, beyond those of a perfectly layered column, and bijectivity is lost. Similarly to the degree of freedom associated to the (T,q) ambiguity, allowing multiple interpretations of the observations, weakens the information that is provided.

Using the background fields of the Canadian weather forecast system, we have studied some climatological properties of the asphericity, and tried to find the main degrees of freedom that are relevant, their size and distribution. It was found that a very large fraction of the atmospheric asphericity appears in the form of a locally linear gradient. This fact helps to reduce the number of added degrees of freedom that is required to a moderate number. This applies to nearly all the atmosphere, except the tropical troposphere, where, mostly as a result of moisture, the asphericity contains a large fraction of strongly irregular structure, very difficult to describe in any compact way. Tests were done around the use of exactly those select simple degrees of freedom to build a forward operator around them, and explore the behavior of this operator. It appears to be simple and inexpensive.
We found that it helps gaining some useful insight of the effect of asphericity in the

observation.

As a by-product of the estimation of those degrees of freedom, the seemingly random residual is also evaluated. It concentrates in the moist troposphere, and is interesting as a measure of the small scale irregular structure of the atmosphere that will affect the observation, and its representativity error.



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