Possible strategies to optimize the GMTR code for the analysis of MIPAS/ENVISAT measurements

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MIPAS, the Michelson Interferometer for Passive Atmospheric Sounding, is a mid-infrared emission spectrometer which is onboard the ENVISAT Satellite launched the 1th march 2002. It is a limb sounder, i.e. it scans across the horizon detecting atmospheric spectral radiances which are inverted to vertical temperature, trace species and cloud distributions. MIPAS measurements are usually analysed with 1D retrieval codes that invert limb-scanning sequences one by one.
The GMTR (Geo-fit Multi-Target Retrieval) analysis tool [1] is an open source code based on the Geo-fit approach (the 2D tomographic retrieval of a complete orbit). It enables to take into account the horizontal atmospheric inhomogeneities that are modeled using a 2D discretization of the atmosphere. In the Geo-fit approach each limb observation contributes to determining the unknown quantity at a number of different locations among those spanned by its line of sight. The algorithm adopted by the GMTR code allows to obtain more precise results but leads to an increase of both the computing time and the memory requirements. An analysis performed in a time comparable to the time required by the Satellite to complete one orbit (Near Real Time, NRT) would be desirable but is currently prevented in pure 2D sequential algorithms. Furthermore, new generation of Satellite instruments will provide more measurements per orbits making this problem even worse. Here the most critical parts of the GMTR code are illustrated along with possible strategies to reduce the computing time and/or the memory requirements.

References

1) Carlotti, M., Brizzi, G., Papandrea, E., Prevedelli, M., Ridolfi, M., Dinelli, B.M. and Magnani, L.: GMTR: Two-dimensional geo-fit multitarget retrieval model for Michelson Interferometer for Passive Atmospheric Sounding/Environmental Satellite observations, *Applied Optics*, **45**, pp. 716-727, 2006.