

## ***Interactive comment on “High-resolution air quality monitoring from space: a fast retrieval scheme for CO from hyperspectral infrared measurements” by N. Smith et al.***

### **Anonymous Referee #2**

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This paper provides a description of a scheme for IASI CO retrieval. This scheme, which uses modeled CO profiles as input, is limited to total column retrievals and assumes linearity in the inverse problem.

Unfortunately, the paper does not present original results. In fact, considering the science heritage of CO retrievals from MOPITT, TES, AIRS and even IASI, the results themselves are insufficient. The method presented here also relies on several rough assumptions. Worse, the paper contains a series of misleading statements related to other work and does not properly credit previous IASI achievements in measuring CO.

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The paper is in my opinion not suitable for publication in a peer-reviewed journal.

Major objections for publication:

**Paucity of results:** there is a single Figure showing CO distribution over a very small ocean area. It is compared to MOPITT, the RAQMS model and the IASI L2 CO from NOAA. This figure is hardly discussed. Of course the overpass time between IASI and MOPITT makes the comparison difficult but from the Figure, the agreement between both sensors seems bad, probably close to a factor of 2, which is much higher than previous comparisons (e.g. George 2009, Illingworth 2010). Considering that there are now 4 years of global CO observations from IASI, with several published results and comparisons with other instruments, this is insufficient.

**Misleading statements:** The argument is made in the paper (or at the very least strongly suggested) that the FLITS algorithm is the only that takes advantage of the IASI spatial resolution. It sounds also as if the algorithm is more stable and suitable than others for near-real-time applications. This cannot be concluded with the results presented here. On one hand because there are several groups which have developed the tools for a NRT treatment of IASI data (globally) and on the other hand because the retrieval schemes set up by these groups are probably more evolved than FLITS, providing CO profiles rather than columns, using wavenumber-dependent emissivity, simultaneously fitting several ancillary parameters (H<sub>2</sub>O columns, surface temperature) etc. Furthermore, contrary to what the authors suggest, CO retrievals using these methods are of course done on single FOV. They have been analyzed in earlier works on much larger scale and/or on well documented events (Turquety 2009, Coheur 2009, Pommier 2010, Illingworth 2010); spatial averaging is done on purpose (for intercomparison with other instruments, for identifying large-scale features or trends), not to improve the stability.

**Lack of innovation:** If the FLITS is aimed to be the original part of the paper, then the authors should show what the advantages are in comparison to other IASI retrieval schemes (see above). The combination with the model to work in the linear approxima-

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tion is new but again there is nothing reported here that shows the benefit over other methods, and if it can easily be applied on larger scales (and including continental surfaces).

There are several shortcomings in the retrieval scheme (Surface temperature is not adjusted, while this is a crucial parameter. Emissivity is not accounted for -although of course it is not that critical over ocean surfaces-, impact of water?).

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Interactive comment on Atmos. Meas. Tech. Discuss., 4, 3787, 2011.

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