

## ***Interactive comment on “Two-dimensional performance of MIPAS observation modes in the upper-troposphere/lower-stratosphere” by M. Carlotti et al.***

**M. Carlotti et al.**

carlotti@fci.unibo.it

Received and published: 8 October 2010

### **Answer to SC by von Clarmann**

#### ***General comment***

The argumentations of Dr. von Clarmann refer to Sect. 3 of the discussion paper (entitled mathematical tools) whose intent is to provide, for convenience of the reader, a summary of the mathematical tools used in the subsequent sections. Within this  
C1676

purpose we did not consider appropriate to discuss about approximations that, in our opinion, are justified in the context of this study. Nevertheless Dr. von Clarmann is correct when stating that our reference to the Rodgers book is inappropriate; we have deleted this reference before Eq. (3) in the revised text where, instead, we specify that our code makes use of those equations.

#### ***Specific comments***

Dr. von Clarmann states that “Eq. (2) of the discussion paper holds only for  $\mathbf{R} = \mathbf{S}_a^{-1}$  i.e. a climatological covariance matrix; this expression is not valid for other regularization matrices”.

Actually, as stated in Sect. 5.1 of the discussion paper, we use “weak a-priori information in order to stabilize the retrieval of atmospheric continuum parameters”. In the revised text we have added, in this section, details about the a-priori climatological profiles and their uncertainty within  $\mathbf{R}$ .

In the discussion paper we never mention the use of regularization for our retrieval tests. However, in order to avoid misunderstanding, in the revised text we have eliminated “shape or curvature” within parentheses at line 7 of page 2867.

The aim of Eq. (2) is to provide a general form of the VCM that (as in Carlotti and Magnani 2009) is used, without terms of constraints, in Eq. (5) to justify the quadratic summation as combination rule in the definition of  $\Omega$ .

In the discussion paper, the VCM of the retrieval parameters is never used to derive ESDs. In the simulations reported in Sect. 5 the retrieval precision is evaluated exploiting the difference between reference and retrieved values.

The presence of the term  $\lambda I$  in the VCM and AK of operational retrievals is questionable (see the authors's answer to von Clarmann SC in ACPD, 9, C10551-C10558, 2010). It is an approximation that, however, is adopted to produce the ESA level 2 products of MIPAS. Furthermore, in this paper we do not report results of operational retrievals; we compare the performance of different observation strategies using the same approximations for all of them.

The formalism proposed by *Ceccherini and Ridolfi* (ACP, 10, 3131-3139, 2010) is relatively recent (31 March 2010); its implementation within our codes is in progress.

---

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 2861, 2010.