**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "On the accuracy of integrated water vapor observations and the potential for mitigating electromagnetic path delay error in InSAR" by D. Cimini et al.

Anonymous Referee #2

Received and published: 10 February 2012

The manuscript provides a detailed comparison of different measurements and models of the atmospheric integrated water vapor (IWV). This inter-comparison is particularly rich (data from four different sources and two types of meteorological models), all performed in a restricted area (Roma, Italy) and during a restricted period of time, which allow the authors to perform a triple collocation analysis between the various IWV sets and thus analyse relative scaling factors and variances. Assessment of the accuracy on IWV sets is of primary importance for using them in DInSAR applications, and for other measurements based on the electromagnetic wave delay trough the troposphere. The paper is well written and informative. As such, this work appears rather unique and worth being published with minor revisions.

Comments: * Dry delay : the delay versus elevation due to variation of T stratification (Temperature lapse rate) induces non negligible phase delay patterns in interferograms (Doin et al., 2009). The term d(dry delay)/dz can be related to P0,T0 and dT/dz through the hydrostatic equation, but dT/dz is not so "easily predicted". The related paragraph in introduction could be changed accordingly, and values for typical variability of d(dry delay)/dz in Roma area should be given (possibly negligible there if dT/dz and T0 variations are small).

* Data set : Please only cite the data acquisition from the metawave project used in the paper. It will be easier to follow.

*GPS : How are the ZTD, ZWD, ZDD computed ? Different methods are cited in the litterature with different claimed accuracies. Are the Vienna Mapping function used for example ?

* Figure 1 : Replace with two dedicated subfigures (not google earth), with scales indicated, and with all labels used in text (PDM, DIESAP for example).

* Map comparison of IWV for MM5 and ECMWF: Using ECMWF, due to the knowledge of vertical stratification, one can compute the IWV as a function of elevation at a much finer spacing than the coarse ECMWF grid. Of course this vertical stratification varies laterally with the 25km grid ECMWF resolution. Could you please change Fig 5a with a figure where elevation is taken into account to compute IWV. The patterns then may appear much closer to MM5 and MERIS. Comments on text could then be added/changed.

Technical comments :

Abstract: analised: ==> analysed

"the sensitivity to water vapour....": this sentence is not clear and should be re-written: It is not here a problem of "sensitivity" or accuracy of measurements of IWV with respect to InSAR, but on the stochastic nature of turbulent atmospheric contribution that would

need a measure of IWV patterns at the same time and spatial spacing as InSAR (if I understand correctly).

Introduction sismic ==> seismic InSar ==> InSAR

Methodology: The paragraph " It must be considered ....soil moisture estimates" could, in my opinion, be reduced.

Integrated water vapor: "The two panels show..." ==> "the top panel shows.."

I did not really understand the difference between IWVi and IWVm, may be reformulate ? IWVm is an average stratification for a long period of time ?

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 839, 2012.