The paper by Gu et al. reconciles the GOME2- and OMI-based emission estimates by using a 'local derivative' approach. Such reconciliation is important for use of either satellite instrument. The paper is easy to read and appropriate for publication after some revisions.

The local derivative approach or its variants have been proposed by many previous studies. It appears that the real strength of the current paper is to demonstrate the success of the approach to reconcile emission estimates based on different satellite instruments. The paper may benefit from further clarification of its key contribution to the literature (title, abstract, introduction, etc.)

The wording in the introduction appears that alpha in Eq2 is applied to Eq1, which is not appropriate, as Eq2 assumes local mass balance and is not derived from Eq1. Please clarify.

The inverse modeling process is not clear. Is the averaging kernel applied? How are model results sampled according to the satellite products? What is the spatial resolution of inverse emissions and how is the regridding of satellite and/or model data done? Is it possible to briefly elaborate on the model errors and its implications on the emission inversion? Previous studies have revealed various model uncertainties for emission inversion (e.g., Lin et al., 2012; Stavrakou et al., 2013).

The description of the differential approach could be further clarified. First, satellite data contain both systematic and random biases (Boersma et al., 2004), and currently it is not clear which portion of satellite biases is systematic. The key merit of the differential approach is to reduce the effect of systematic (and common) biases in the satellite products at different times of day. Secondly, please clarify that the Eq4 here is an approximation of the original Lin et al. (2010) formulation, and please discuss the implication of this simplification for the inversion results. Thirdly, Lin and McElroy (2010) already shows that because the differential approach is based on the weighted difference between NO2 columns at different times of day, it may lead to emissions lower or higher than single-instrument-based emissions retrieved from both satellite products.

The interpretation of Fig. 1 should be cautioned. That more emissions may be associated with less NOx, shown in the figure, reflects the spatial dependence of NOx lifetime and NO2/NOx ratio. This spatial dependence may not be simply interpreted as the nonlinear relation between NO2 column and NOx emissions IN A GIVEN GRID CELL. This is because the spatial dependence may be a result of differences in other

factors such as VOC emissions, meteorology, etc. For example, it would not be realistic that increasing emissions in a given grid cell leads to a reduction in NO2 column in that grid cell. Please clarify.

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