

## ***Interactive comment on “The impact of different nitrous acid sources in the air quality levels of the Iberian Peninsula” by M. Gonçalves et al.***

**Anonymous Referee #3**

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This manuscript presents an ambitious attempt to use a regional chemical transport model to explore the impact of several parameterized sources of HONO on air quality in Spain and Portugal. It is increasingly realized that HONO is an important OH source in both urban and rural regions, and that the chemistry of HONO is not well treated in most air quality and chemical transport models. In defense of such models, it is probably also safe to say that this chemistry is not yet well enough understood. Thus, the topic of this investigation is timely and should be of interest to several scientific communities.

Unfortunately, the present study has a significant number of shortcomings. I note that referees 1 and 2 have pointed out many such issues, which I largely agree with. On the highest level I feel that critical issues that must be addressed before publishing this

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work include:

recognition and consideration of the importance of daytime sources of HONO to support relatively high mixing ratios seen through most sunlit hours in essentially all recent observational campaigns;

explicit consideration of multiple heterogeneous sources recently shown to important in some situations;

model output must be assessed against observations.

This last point may be the most important, as noted several times by referee 2 (how can one claim that one model scenario is "better" than another with no objective truth for comparison?). The authors suggest that it is not possible to validate the different model runs due to lack of HONO observations in the study region (and specifically during the one day episode of interest). While it would doubtless be informative to simulate Oct/Nov 2008 and compare model estimates to DOMINO observations, it is not clear that this would help to establish model skill in urban areas with stronger sources. Therefore, it may be that simulating HONO on regional scale as large as the Iberian Peninsula may be premature, pending observational data base for the same region.

However, even if HONO observations were already available to test the model, leaving it out multiple likely sources is bound to overestimate the importance of the favored sources that are implemented (e.g., direct emissions).

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