

The authors describe results from a field measurement campaign held in summer 2013 at Cape Corsica. The intention is to figure out the relative importance of the different H<sub>2</sub>SO<sub>4</sub> production channels, i.e. either via OH + SO<sub>2</sub> or Cl(Criegee Intermediate) + SO<sub>2</sub>. H<sub>2</sub>SO<sub>4</sub> and OH radicals have been directly measured by means of a nitrate-CIMS. Overall steady-state Cl concentrations were estimated based on measured alkene concentrations considering the unimolecular Cl loss as well as bimolecular Cl reactions with water vapour and the water dimer. All needed rate coefficients were taken from the recent literature. For comparison, H<sub>2</sub>SO<sub>4</sub> produced via the OH + SO<sub>2</sub> channel has been calculated using  $k(\text{OH}+\text{SO}_2)$  from the IUPAC recommendation from 2004 and H<sub>2</sub>SO<sub>4</sub> from Cl + SO<sub>2</sub> in an analogous way using actual rate coefficients.

The authors came to the conclusion that at daytime 86±4% of the observed H<sub>2</sub>SO<sub>4</sub> are formed via the OH + SO<sub>2</sub> channel, and only 9±2% during night. The corresponding data from the Cl + SO<sub>2</sub> channel are 12±6% and 38±24%, respectively. Thus, at least at daytime the observed H<sub>2</sub>SO<sub>4</sub> is well explained by both reaction channels (although I think that the range of uncertainties must be clearly bigger).

All in all, it is a very nice work, easy to understand and well structured. This manuscript is suitable for publication in ACP. Some minor points should be considered before final acceptance:

- The authors consider OH + SO<sub>2</sub> and Cl + SO<sub>2</sub> for SO<sub>3</sub> production, and subsequent H<sub>2</sub>SO<sub>4</sub> formation, only. What about the possible direct route via oxidation of reduced-sulfur compounds (DMS etc.) as discussed by Berresheim et al., 2014, 10.5194/acp-14-12209-2014, and in a couple of other papers? Is a contribution of this direct route totally negligible at this coastal site? Please comment.
- I'm struggling a bit with the used  $k(\text{OH}+\text{SO}_2)$  from the IUPAC 2004 recommendation. The more recent value by Blitz et al., 2017, 10.1021/acs.jpca.7b01295, is clearly smaller. Consequently, also the H<sub>2</sub>SO<sub>4</sub> production from this channel will become smaller worsening the good agreement between measurement and calculation at daytime. But, a better agreement with any calculations is not an argument for a special parameter. So, it would be fine, if the authors could discuss the results based on both  $k(\text{OH}+\text{SO}_2)$ 's more in detail, not only very briefly as in paragraph 4.2.
- Line 80: "monomolecular"? unimolecular