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## A numerical evaluation of global oceanic emissions of $\alpha$ -pinene and isoprene

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**Abstract.** A numerical evaluation of global oceanic emissions of  $\alpha$ -pinene and isoprene based on both "bottom-up" and "top-down" methods is presented. We infer that the global "bottom-up" oceanic emissions of  $\alpha$ -pinene and isoprene are  $0.013 \text{ TgC yr}^{-1}$  and  $0.32 \text{ TgC yr}^{-1}$ , respectively. By constraining global chemistry model simulations with the shipborne measurement of Organics over the Ocean Modifying Particles in both Hemispheres summer cruise, we derived the global "top-down" oceanic  $\alpha$ -pinene source of  $29.5 \text{ TgC yr}^{-1}$  and isoprene source of  $11.6 \text{ TgC yr}^{-1}$ . Both the "bottom-up" and "top-down" values are subject to large uncertainties. The incomplete understanding of the in-situ phytoplankton communities and their range of emission potentials significantly impact the estimated global "bottom-up" oceanic emissions, while the estimated total amounts of the global "top-down" oceanic sources can be influenced by emission parameterizations, model and input data spatial resolutions, boundary layer mixing processes, and the treatments of chemical reactions. The global oceanic  $\alpha$ -pinene source and its impact on organic aerosol formation is significant based on "top-down" method, but is negligible based on "bottom-up" approach. Our research highlights the importance of carrying out further research (especially measurements) to resolve the large offset in the derived oceanic organic emission based on two different approaches.

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