

Boundary Shift: The Air-Sea Interface in a Changing Climate



Credit: R. Murdoch, NIWA Wellington, New Zealand

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For the last 2 decades, the Surface Ocean-Lower Atmosphere Study (SOLAS) has played a major role in facilitating global collaborative research on ocean-atmosphere interaction. Over this time, this interface has only become more important and relevant with climate change and increasing awareness of science-social dimensions relating to use of the oceans. This Special Feature is a collection of invited papers that assess the current state of air-sea exchange science, highlight critical future research directions, and identify emerging opportunities for new collaborations, technologies, and discoveries.

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Papers:

- *Advances in understanding of air-sea exchange and cycling of greenhouse gases in the surface ocean*; Bange, Mongwe, Shutler et al.
- *The air-sea interface and fluxes of mass and energy*; Zappa, Bell et al.
- *The Aerosol Odyssey: Navigating Nutrient Flux Changes to Marine Ecosystems*; Hamilton, Baker, Yamamoto et al.
- *Interconnections between marine ecosystems, aerosols and clouds: recent findings and perspectives*; Sellegri, Simó, Wang et al.
- *Impacts of ocean biogeochemistry on atmospheric chemistry*; Tinel, Abbatt, Saltzman et al.
- *Ocean-atmosphere coupling in major boundary upwelling systems: processes and vulnerability to global change*; Lachkar, Cornejo, Singh et al.
- *Polar Oceans and Sea Ice in a Changing Climate*; Willis, Lannuzel, Else et al.
- *Surface ocean-lower atmospheric processes in the Indian Ocean: Current understanding, knowledge gaps and future directions*; Kumar, Tegtmeier, Fernandes et al.
- *Implementation of marine CO₂ removal for climate mitigation: the challenges of additionality, predictability, and governability*; Bach, Vaughan, Law, & Williamson
- *Perspectives from ship stacks: air pollutant emissions and their impacts on the surface ocean and lower atmosphere*; Shi, Endres, Rutgersson et al.
- Can coastal and marine carbon dioxide removal contribute to climate mitigation? The urgency of integrated policy, legal, knowledge, and monitoring frameworks to facilitate beneficial action; Johnson, van Doorn, Marandino et al.
- *Science, international law, and policy across the air-sea interface*; van Doorn, Marandino, Peters, & Keywood

Submitted, in review

Submitted, in revision

Support requested

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- Theme 1; Bange, Mongwe, Shutler, Arévalo-Martínez, Bianchi, Lauvset, Liu, Löscher, Martins, Rosentreter, Schmale, Steinhoff, Upstill-Goddard, Wanninkhof, Wilson, Xie
- Indian Ocean; Kumar, Tegtmeier, Fernandes, Biswas, Girach, Roxy, Kurian, Marandino, Sarma, Shenoy (still need \$1150)
- Climate Intervention; Bach, Vaughan, Law, & Williamson
- Blue carbon governance; Johnson, van Doorn, Hilmi, Marandino, McDonald, Thomas, Allemand, Lebleu, Ho, Oloyede, Safa, Swazarenski
- Governance & Policy; van Doorn, Marandino, Peters, & Keywood

Dissemination

AGU Fall Meeting, 11-15 December, 2023, San Francisco

Proposed session titled: *SOLAS (Surface Ocean-Lower Atmosphere Study): 20-years of progress and developments in Ocean-Atmosphere science*

Conveners: Douglas Hamilton, Julie Dinasquet, Lei Xue

WCRP Open Science Conference

Keynote address in session on: *Ocean-Atmosphere Interactions: Energy, Water, and Carbon*

"New challenges in transcending the boundary: The Surface Ocean-Lower Atmosphere Study at 20", Lisa Miller & Cliff Law

Theme 1:

Hermann W. Bange^{1*}, N. Precious Mongwe^{2*}, Jamie D. Shutler^{3*}, Damian L. Arévalo-Martínez^{1,4,5}, Daniele Bianchi⁶, Siv K. Lauvset⁷, Chunying Liu⁸, Carolin R. Löscher⁵, Helena Martins¹⁰, Judith A. Rosentreter¹¹, Oliver Schmale¹², Tobias Steinhoff^{1,7}, Robert C. Upstill-Goddard¹³, Rik Wanninkhof¹⁴, Samuel T. Wilson¹³, and Huixiang Xie^{15,16}

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