

# Jia-Rui (Ray) Shi

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## **EDUCATION**

- 2021      **Ph. D. in Oceanography**  
Scripps Institution of Oceanography, UC San Diego  
Advisors: Lynne D. Talley and Shang-Ping Xie  
*Dissertation: "Responses of the Southern Ocean in a Changing Climate"*
- 2018      **M.S. in Oceanography**  
Scripps Institution of Oceanography, UC San Diego
- 2015      **M.Eng. in Ocean Engineering** with Honors  
Shanghai Jiao Tong University
- 2012      **B.Eng. in Ocean Engineering** with Honors  
Shanghai Jiao Tong University

## **EMPLOYMENT**

- 2021 -- present      Postdoctoral Investigator, Woods Hole Oceanographic Institution
- 2015 -- 2021      Graduate Research Assistant, Scripps Institution of Oceanography
- 2012 -- 2015      Graduate Research Assistant, Shanghai Jiao Tong University
- 2011 -- 2012      Undergraduate Research Assistant, Shanghai Jiao Tong University

## **PROPOSAL EXPERIENCE**

- 2021      Awarded NSF proposal, "*The Oceanic Fingerprint of the Forced Response to Anthropogenic Aerosols*" OCE-2048336, \$885,724, 3/1/2021-2/29/2024, PIs: Susan E. Wijffels (WHOI), Young-Oh Kwon (WHOI), and Jia-Rui Shi\*.  
(\*I conceived the ideas and led writing this proposal while still at SIO as a graduate student, but was not able to be named as PI due to the policy of WHOI, the grant awardee. This situation has been explicitly described in the proposal text.)

2023            Awarded proposal from Research Council of Norway, “*The role of gene flow in the evolution of Antarctic icefishes*”. PI: Michael Matschiner (University of Oslo). I am collaborating on this project with no request for funding. 2023-2027.

## **PUBLICATIONS**

### **Peer-reviewed:**

17. **Shi, Jia-Rui\***, Benjamin D. Santer\*, Young-Oh Kwon, Susan E. Wijffels. (2024) “The Emerging Human Influence on the Seasonal Cycle of Sea Surface Temperature”. *Nature Climate Change*. <https://doi.org/10.1038/s41558-024-01958-8>.
16. Long, S.-M.\*, S. Zhao, Z. Gao, S. Sun, **J.-R. Shi**, J. Ying, G. Li, L. Cheng, J. Chen, X. Cheng, S. Lu. (2024) “Weakened seasonality of the ocean surface mixed layer depth in the Southern Indian Ocean during 1980-2019”. *Geophysical Research Letters*. <https://doi.org/10.1029/2023GL107644>.
15. **Shi, Jia-Rui\***, Susan E. Wijffels, Young-Oh Kwon, Lynne D. Talley, Sarah T. Gille. (2023). “The Competition Between Anthropogenic Aerosol and Greenhouse Gas Climate Forcing is Revealed by North Pacific Water Mass Changes”. *Science Advances*. <https://doi.org/10.1126/sciadv.adh7746>.
14. **Shi, Jia-Rui\***, Susan E. Wijffels, Young-Oh Kwon, Shang-Ping Xie. (2023). “Interhemispheric Contrasts of Ocean Heat Content Change Reveal the Distinct Fingerprints of Anthropogenic Forcings”. *Geophysical Research Letters* **50**. <https://doi.org/10.1029/2023GL102741>.
13. **Shi, Jia-Rui\***, Young-Oh Kwon, Susan E. Wijffels. (2023). “Subsurface Ocean Temperature Responses to the Anthropogenic Aerosol Forcing in the North Pacific”. *Geophysical Research Letters* **50**, 1-16. <https://doi.org/10.1029/2022GL101035>.
12. Li, S., W. Liu\*, R. J. Allen, **J.-R. Shi**, L. Li. (2023). “Anthropogenic Aerosols and Greenhouse Gases Driven Ocean Heat Uptake and Redistribution”. *Nature Geoscience*. <https://doi.org/10.1038/s41561-023-01219-x>.
11. Antarctic and Southern Ocean [in “State of the Climate in 2022”]. (2023). L. Pezzi, R. Beadling, M. du Plessis, S. Gille, S. A. Josey, **J.-R. Shi**, M. Santini, E. Souza, G. MacGilchrist, and C. Schultz. *Bull. Amer. Meteor. Soc.*, **104**, S322–S365, <https://doi.org/10.1175/BAMS-D-23-0077.1>.
10. W. Cai\*, L. Gao, Y. Luo, X. Li, X. Zheng, X. Zhang, X. Cheng, F. Jia, A. Purich, A. Santoso, Y. Du, D. M. Holland, **J.-R. Shi**, B. Xiang, S.-P. Xie. (2023). “Southern Ocean warming and its climatic impacts”. *Science Bulletin*. **68**, 946–960. <https://doi.org/10.1016/j.scib.2023.03.049>.

9. Gao, Z., S.-M. Long\*, **J.-R. Shi**, L. Cheng, G. Li, J. Ying. (2023) “Indian Ocean mixed layer depth changes under global warming”. *Frontiers in Climate*. <https://doi.org/10.3389/fclim.2023.1112713>.
  8. **Shi, Jia-Rui\***, Young-Oh Kwon, Susan E. Wijffels. (2022). Two Distinct Modes of Climate Responses to the Anthropogenic Aerosol Forcing Changes. *Journal of Climate* **35**, 3445-3457. <https://doi.org/10.1175/JCLI-D-21-0656.1>.
  7. Antarctic and Southern Ocean [in “State of the Climate in 2021”]. (2022). R. L. Beadling, N. M. Freeman, G. A. MacGilchrist, M. Mazloff, **J.-R. Shi**, A. F. Thompson, and E. Wilson. *Bull. Amer. Meteor. Soc.* **103**, S307-S340. <https://doi.org/10.1175/BAMS-D-22-0078.1>.
  6. Peng, Q., S.-P. Xie\*, D. Wang\*, R.-X. Huang, G. Chen, Y. Shu, **J.-R. Shi** and W. Liu. (2022) Global Acceleration of Upper Ocean Currents due to Anthropogenic Surface Warming. *Science Advances* **8**, 1–13. <https://www.science.org/doi/10.1126/sciadv.abj8394>.
  5. **Shi, Jia-Rui\***, Lynne D. Talley, Shang-Ping Xie, Qihua Peng, Wei Liu. (2021). Acceleration of the Southern Ocean Zonal Flow. *Nature Climate Change*. **11**, 1090-1097. <https://doi.org/10.1038/s41558-021-01212-5>. [[News&Views in NCC](#)] [[Nature Climate Change Cover Story](#)].
  4. **Shi, Jia-Rui\***, Lynne D. Talley, Shang-Ping Xie, Wei Liu, Sarah T. Gille. (2020). Effects of Buoyancy and Wind Forcing on Southern Ocean Climate Change. *Journal of Climate* **33**, 10003–10020. <https://doi.org/10.1175/JCLI-D-19-0877.1>.
  3. **Shi, Jia-Rui\***, Shang-Ping Xie, and Lynne D. Talley. (2018). Evolving Relative Importance of the Southern Ocean and North Atlantic in Anthropogenic Ocean Heat Uptake. *Journal of Climate* **31** (18): 7459–79. <https://doi.org/10.1175/JCLI-D-18-0170.1> [[Nature Climate Change highlight](#)]
  2. **Shi, Jia-Rui**, Wen-Yong Tang\*, Jin Wang, Chen-Jun Yang (2015). Ultimate Strength Reliability Analysis of Deep-water Spar Drilling Production Storage Offloading platform. (in Chinese). *Ship Engineering*, 2015(4): 79-83.
  1. **Shi, Jia-Rui**, Wen-Yong Tang\* (2014). Ultimate Strength Reliability Analysis of Titanium Alloy Spherical Pressure Shell in HOV. (in Chinese). *Ship & Ocean Engineering*, **43** (2): 114-118.
- (\*corresponding author)

**Manuscripts accepted, in revision and submitted:**

Shi, Jia-Rui, Shang-Ping Xie, Lynne D. Talley. “Narrow Meridional and Zonal Structure of Southern Ocean Warming north of the Antarctic Circumpolar Current”. *Journal of Geophysical Research: Oceans* (in revision).

Antarctic and Southern Ocean [in “State of the Climate in 2023”]. *Bull. Amer. Meteor. Soc.* (In Prep).

## **Other publications:**

**Shi, Jia-Rui** (2021): “Responses of the Southern Ocean in a Changing Climate.” Ph.D. thesis at Scripps Institution of Oceanography, University of California, San Diego. [[Link](#)]

**Shi, Jia-Rui**, L. D. Talley, S.-P. Xie, (Spring 2022): “Observing Human Footprints in the Southern Ocean”. *Environment Coastal & Offshore*, Physical Ocean special issue. <http://digital.ecomagazine.com/publication/?i=739300&ver=html5&p=36>.

## **MEDIA COVERAGE**

**BBC** news on Shi et al. *Nature Climate Change*, 2024 - [Link](#)

Press release on Shi et al. *Nature Climate Change*, 2024 from *Woods Hole Oceanographic Institution* - [Link](#)

*Woods Hole Oceanographic Institution* highlighted publication on Shi et al. *Science Advances* 2023 – [Link](#)

*Woods Hole Oceanographic Institution* highlighted publication on Shi et al. *Geophysical Research Letters*, 2023 – [Link](#)

**The Washington Post** news on Shi et al. *Nature Climate Change*, 2021 – [Link](#)

**Forbes** news on Shi et al. *Nature Climate Change*, 2021 – [Link](#)

**Nature Climate Change** cover story on Shi et al. *Nature Climate Change*, 2021 – [Link](#)

Press release on Shi et al. 2021 from *Scripps Institution of Oceanography* – [Link](#)

**Nature Climate Change** highlights on Shi et al. 2018 – [Link](#)

Press release on Shi et al. *Journal of Climate*, 2018 from *Scripps Institution of Oceanography* – [Link](#)

## **TEACHING**

2019	Teaching Assistant, Scripps Institution of Oceanography <i>Introduction to Physical Oceanography</i> (graduate course), Instructor: Dr. Lynne D. Talley
2013-2014	Teaching Assistant, Shanghai Jiao Tong University <i>Ocean Engineering</i> (undergraduate course)
2012-2013	Teaching Assistant, Shanghai Jiao Tong University <i>Ocean Engineering</i> (undergraduate course)

## **MENTORING**

Benjamin Taylor, University of California San Diego, PhD student	2021-present
Kiera Furey, University of Massachusetts Amherst, undergraduate	Summer 2021

## **AWARDS & GRANTS**

2024	Funding for accommodation and travel to attend the US CLIVAR Confronting Climate Model Trends Workshop at NCAR
2023	Funding for accommodation and travel to attend the ForceSMIP Hackathon at NCAR
2022	Chancellor's Dissertation Medal, UC San Diego
2013	Tung Orient Overseas Container Line (OOCL) Scholarship
2015	Outstanding Graduate, Shanghai Jiao Tong University
2013-2015	Shanghai Jiao Tong University Merit Scholarship
2012	Excellent (Top 1%) Thesis of Shanghai Jiao Tong University
2012	Outstanding Graduate, Shanghai Jiao Tong University
2011	Lloyd's Register Scholarships

## **PRESENTATIONS**

Invited presentations:

- Shi, J.-R. (2024). "The Oceanic Fingerprint of the Forced Response to Anthropogenic Aerosols". Invited Talk. National Oceanography Centre Seminar, UK.
- Shi, J.-R. (2023). "Climate change in the Southern Ocean: the rising temperature and enhanced zonal velocity". Invited Talk. International Symposium on Polar Ocean and Global Change, Qingdao, China.
- Shi, J.-R. (2023). "Ocean Warming and Accelerating Southern Ocean Zonal Flow". Invited Talk, British Antarctic Survey Polar Oceans Seminar, UK.
- Shi, J.-R. (2022). "Ocean Warming and Accelerating Southern Ocean Zonal Flow". Invited Talk, Institute of Atmospheric Physics, Beijing.
- Shi, J.-R. (2022). "Ocean Warming and Accelerating Southern Ocean Zonal Flow". Invited Talk, State Key Laboratory of Marine Environmental Science, Xiamen University.

Selected talks:

- Shi, J.-R., S. E. Wijffels, Y.-O. Kwon, L. D. Talley, S. T. Gille (2024). The Competition Between Anthropogenic Aerosol and Greenhouse Gas Forcing is Revealed by North Pacific Water-mass Changes. EGU General Assembly, Vienna.
- Shi, J.-R., S. E. Wijffels, Y.-O. Kwon, S.P. Xie (2024). Interhemispheric Contrasts of Ocean Heat Content Change Reveals Distinct Fingerprints of Anthropogenic Climate Forcings. Ocean Sciences Meeting, New Orleans, USA.

- Liu, W., S. Li, R. J. Allen, J.-R. Shi, L. Li (2024). Anthropogenic aerosols and greenhouse gases drive ocean heat uptake and interbasin redistribution. Ocean Sciences Meeting, New Orleans, USA.
- Taylor, B. A., J.-R. Shi, L. D. Talley, S.-P. Xie, M. Luongo, Q. Peng (2024). Warming in Mid-latitude Southern Ocean's Indian Sector Tied to Poleward Shift of the Agulhas Return Current. Ocean Sciences Meeting, New Orleans, USA.
- Shi, J.-R. (2024). "The Oceanic Fingerprint of the Forced Response to Anthropogenic Aerosols". Woods Hole Oceanographic Institution PO Seminar, USA.
- Shi, J.-R., S. E. Wijffels, Y.-O. Kwon, S.-P. Xie (2023). Distinct Fingerprints of Ocean Heat Content Change Driven by Different Anthropogenic Climate Forcings. Poster. AGU Fall Meeting, San Francisco, USA.
- Shi, J.-R. (2023). Fingerprints of Anthropogenic Aerosols in the Ocean. 2023 CESM Annual Workshop, Boulder, USA.
- Shi, J.-R., Y.-O. Kwon, S. E. Wijffels. (2023). Subsurface Ocean Temperature Responses to the Anthropogenic Aerosol Forcing in the North Pacific. CESM CVCWG Winter Meeting, Boulder, USA.
- Shi, J.-R., Y.-O. Kwon, S. E. Wijffels. (2022). Subsurface Ocean Temperature Responses to the Anthropogenic Aerosol Forcing in the North Pacific. Poster. AGU Fall Meeting, Chicago, USA.
- Shi, J.-R. (2022). Subsurface Ocean Temperature Responses to the Anthropogenic Aerosol Forcing in the North Pacific. WHOI Postdoctoral Symposium.
- Shi, J.-R., L. D. Talley, S.-P. Xie, Q. Peng, W. Liu (2022). Ocean Warming and Accelerating Southern Ocean Zonal Flow. Oral Presentation. Ocean Sciences Meeting 2022.
- Shi, J.-R. (2022). Two Distinct Modes of Climate Responses to the Anthropogenic Aerosol Forcing Changes. Poster. CLIVAR Climate Dynamics Panel annual workshop.
- Shi, J.-R., L. D. Talley, S.-P. Xie (2022) Narrow Meridional and Zonal Structure of Southern Ocean Warming North of the Antarctic Circumpolar Current. Poster. Ocean Sciences Meeting 2022.
- Taylor, B., J.-R. Shi, S.-P. Xie, L. D. Talley (2022). Understanding the Dynamical Adjustments that Intensify Warming in Indian Sector of the Subantarctic Zone. Poster. Ocean Sciences Meeting 2022.
- Shi, J.-R., Y.-O. Kwon, S. Wijffels (2022). Distinct Contributions from the Two Leading Modes of Forced Climate Responses to the Anthropogenic Aerosols. Oral Presentation, the 102th AMS Annual Meeting, Houston, USA.
- Shi, J.-R., Y.-O. Kwon\*, S. Wijffels (2022). Distinct Contributions from the Two Leading Modes of Forced Climate Responses to the Anthropogenic Aerosols. CESM Climate Variability And Change Working Group Meeting.

- Shi, J.-R., Y.-O. Kwon, S. Wijffels (2021). Two Distinct Modes of Climate Responses to Anthropogenic Aerosol Forcing Changes. Poster, AGU Fall Meeting, New Orleans, USA.
- Shi, J.-R. (2021). Acceleration of the Southern Ocean Zonal Flow. SOCCOM Annual Meeting 2021, Princeton, USA.
- Shi, J.-R. (2021). Ocean Warming and Accelerating Southern Ocean Zonal Flow. Postdoc Symposium, Woods Hole Oceanographic Institution.
- Shi, J.-R. (2021). Ocean Warming and Accelerating Southern Ocean Zonal Flow. SOCCOM Modeling Teleconference, Princeton, USA.
- Shi, J.-R. (2020). Zonal Asymmetry of Southern Ocean Subsurface Warming. SOCCOM Annual Meeting 2020, Princeton, USA.
- Shi, J.-R., L.D. Talley, S.-P. Xie, W. Liu, S.T. Gille (2020). Relative Roles of Buoyancy and Wind Forcing in Southern Ocean Climate Change. AGU Ocean Sciences Meeting, San Diego, USA.
- Shi, J.-R. (2019). Effects of Buoyancy and Wind Forcing on Southern Ocean Climate Change under Abrupt Quadrupling CO<sub>2</sub>. Physical Oceanography Seminar, Woods Hole Oceanographic Institution, USA.
- Shi, J.-R., L.D. Talley, S.-P. Xie, W. Liu (2019). Relative importance of the buoyancy and wind forcing in the Southern Ocean under abrupt quadrupling CO<sub>2</sub> by using CESM. SOCCOM Annual Meeting, Princeton, USA.
- Shi, J.-R., L.D. Talley, S.-P. Xie (2018). North Atlantic and Southern Ocean Heat Uptake: Structure and Model Uncertainty. Oral Presentation, AGU Fall Meeting, Washington D.C., USA.
- Shi, J.-R., S.-P. Xie and L.D. Talley (2018). The AMOC's role in the changing relative importance of the North Atlantic and Southern Ocean in anthropogenic ocean heat uptake. Oral Presentation, International AMOC Science Meeting, Coconut Grove, Florida.
- Shi, J.-R., S.-P. Xie and L.D. Talley (2018). Changing Roles of the Southern Ocean and Subpolar North Atlantic in Anthropogenic Ocean Heat Uptake. Oral Presentation, AGU Ocean Sciences Meeting, Portland, USA.

## **SERVICE & ACTIVITIES**

### Editorship:

Associate Editor, *Journal of Climate* (2023-present)

### Journal Review:

*Nature* (1), *Nature Climate Change* (1), *Journal of Climate* (6), *Proceedings of the National Academy of Sciences* (1), *Geophysical Research Letters* (6), *Climate Dynamics* (3), *EGUsphere* (1), *Communications Earth & Environment* (1),

*Geoscientific Model Development* (2), *Journal of Geophysical Research – Oceans* (2), *Proceedings of the Royal Society A* (2), *Advances in Atmospheric Sciences* (1), *Dynamics of Atmospheres and Oceans* (1), *Polar Science* (1).

Book Review:

MDPI Books monograph review (1)

Membership:

American Meteorology Society (AMS)

American Geophysical Union (AGU)

Other Activities:

Judge for Outstanding Student and PhD candidate Presentation (OSPP) at EGU General Assembly, 2024

Confronting Earth System Model Trends with Observations Workshop at National Center for Atmospheric Research, 2024

ForceSMIP Hackathon at National Center for Atmospheric Research, 2023

NASA Summer School, 2021

Judge for Outstanding Student Presentation Awards (OSPA) at AGU Meeting, 2021,2022

Community Earth System Model (CESM) Tutorial, 2018