

Rei Chemke

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Education

2013-2017 PhD Atmospheric Dynamics, Weizmann Institute of Science, Advisor: Yohai Kaspi
2012-2013 MSc Atmospheric Dynamics, Weizmann Institute of Science, Advisor: Yohai Kaspi
2009-2012 BSc Atmosphere, Ocean and Climate Sciences, Hebrew University

Professional Positions

2020-present Assistant Professor, Weizmann Institute of Science
2019-2020 Postdoctoral research scientist, Columbia University
2017-2019 Postdoctoral fellow, Columbia University

Academic Administration

2024-2025 Member Chemistry Board of Studies, Weizmann Institute of Science
2021-2025 Organizer Earth & Planetary Sciences Dept. seminar, Weizmann Institute of Science
2022 Organizer Symposium on Geophysical Fluid Dynamics VII, Sde Boker, Israel
2018-2019 Organizer Climate Science Colloquium, Columbia University

Other Appointments

2023, 2025 Teacher, Advanced topics in mid-latitude dynamics, Weizmann Institute of Science
2023-present Consultant, Climate Center Scientific Committee, Israeli Meteorological Service

Honors

2025 Scientific Council Prize in Chemistry
2025 The Krill Prize for Excellence in Scientific Research
2022 Princeton AOS-GFDL Visitors Research Scholar Fellowship
2017 The NOAA Climate and Global Change Postdoctoral Fellowship
2017 The Prof. Israel Dostrovsky Prize of Excellence, Weizmann Institute of Science
2016 The Rieger Foundation Fellowship
2015 The Lev-Zion Scholarship for Excellent Ph.D students
2015 The Rieger Foundation Fellowship
2014 The Dean's Prize for M.Sc Students, Weizmann Institute of Science
2010 The Dean's Prize for B.Sc Students, Hebrew University

Reviewing Activities

Grants: National Science Foundation, Israel Science Foundation, U.S.-Israel Binational Science Foundation, Israeli Ministry of Innovation, Science and Technology.
Peer-review journals: Science Advances, Nature Climate Change, Nature communications, npj Climate Atmos. Sci., Geophysical Research Letters, Journal of Atmospheric Sciences, Journal of Climate, Journal of Physical Oceanography, Fluids, Astrophysical Journal

Supervision of graduate students and postdocs

Current

2023-present Itamar Karbi (PhD), EPS Department, Weizmann Institute of Science
2023-present Noga Liberty (PhD), EPS Department, Weizmann Institute of Science
2023-present Or Hess (PhD), EPS Department, Weizmann Institute of Science
2024-present Ewelina Winiarska (Postdoc), EPS Department, Weizmann Institute of Science

Graduated

2021-2022 Itamar Karbi (MSc), Dept. of Earth & Planetary Sciences, Weizmann Institute of Science
2022-2023 Noga Liberty (MSc), Dept. of Earth & Planetary Sciences, Weizmann Institute of Science
2022-2023 Or Hess (MSc), Dept. of Earth & Planetary Sciences, Weizmann Institute of Science

Invited presentations

- EPESC - LEADER Science Meeting, South Korea, 2025
- CAOSeminar, The Earth Science Institute, Hebrew University, Israel, 2025
- Department of Marine Geosciences, University of Haifa, Israel, 2025
- Department of Geophysics, Tel Aviv University, Israel, 2024
- US CLIVAR Workshop on Confronting Earth System Model Trends with Observations, USA, 2024
- The Oceans: Impacts of climate and environmental change workshop, Hebrew University, Israel, 2023
- The American Geoscience Union General Assembly, 2022
- Midlatitude storm-tracks workshop, Oleron, France, 2022
- Program in Atmospheres, Oceans and Climate (PAOC) Colloquium, MIT, USA, 2023
- SEAS Colloquium in Climate Science (SCiCS), Columbia University, USA, 2023
- Physical Oceanography seminar, Woods Hole Oceanographic Institution, USA, 2022
- CAOSeminar, The Earth Science Institute, Hebrew University, Israel, 2021
- Geophysics Colloquium, Department of Geophysics, Tel Aviv University, Israel, 2021
- Geophysical Fluid Dynamics Laboratory seminar, GFDL, USA, 2020
- ClimaTea seminar, Harvard, USA, 2019
- Ocean and Climate Physics seminar, Columbia University, USA, 2019
- Earth and Planetary Sciences department seminar, Weizmann Institute of Science, Israel, 2018

Publications (members of my group are in bold)

46. **Liberty-Levi, N.** and **Chemke, R.**, 2025. The role of ocean processes in future Northern Hemisphere midlatitude winter precipitation changes, *J. Clim.*, 38, 6413–6426. [url](#)
45. **Karbi, I.** and **Chemke, R.**, 2025. Seasonally asymmetric projected changes in austral atmospheric waves, *Geophys. Res. Lett.*, 52, e2025GL117333. [url](#)
44. **Chemke, R.** and Grise, K., 2025. Seasonal emergence of human-caused expansion of the boreal tropical hydrological cycle, *npj Climate Atmos. Sci.*, 8, 313. [url](#)
43. **Hess, O.** and **Chemke, R.**, 2025. Forced Changes in the North Atlantic Storm Track Over the Last Millennium, *Geophys. Res. Lett.*, 52, e2025GL115894. [url](#)
42. **Karbi, I.** and **Chemke, R.**, 2025. Emergence of Winter Large-scale Transient Atmospheric Waves in the Northern Hemisphere, *Geophys. Res. Lett.*, 52, e2024GL113410. [url](#)
41. **Chemke, R.**, 2025. Historical and future mid-latitude storm changes in climate models, review chapter in: Encyclopedia of Climate System Science. [url](#)
40. **Chemke, R.**, 2025. Persistent austral winter storm track weakening beyond doubling of CO₂ concentrations, *Nature Communications*, 16, 1935. [url](#)
39. **Chemke, R.** and Yuval, J., 2025. Atmospheric circulation to constrain subtropical precipitation projections, *Nature Climate Change*, 15, 287-292. [url](#)
38. **Chemke, R.**, 2024. Centennial-scale recovery of the North Atlantic summer storm track weakening, *Geophys. Res. Lett.*, 51, e2024GL109801. [url](#)
37. Mitevski, I., **Chemke, R.**, Orbe, C. and Polvani, L. M., 2024. Southern Hemisphere winter storm tracks respond differently to low and high CO₂ forcings, *J. Clim.*, 37, 5355-5372. [url](#)
36. **Hess, O.** and **Chemke, R.**, 2024. Anthropogenic forcings reverse a simulated multi-century naturally-forced Hadley cell intensification, *Nature Communications*, 15, 4001. [url](#)
35. **Chemke, R.** and Coumou, D., 2024. Human influence on the recent weakening of storm-tracks in boreal summer, *npj Climate Atmos. Sci.*, 7, 86. [url](#)
34. Raiter D., Galanti, E., **Chemke, R.** and Kaspi, Y., 2024. Linking Future Tropical Precipitation Changes to Zonally-Asymmetric Large-Scale Meridional Circulation, *Geophys. Res. Lett.*, 51, 6, e2023GL106. [url](#)
33. **Karbi, I.** and **Chemke, R.**, 2023. A shift towards broader and less persistent Southern Hemisphere temperature anomalies, *npj Climate Atmos. Sci.*, 6, 200. [url](#)

32. **Chemke, R.** and Yuval, J., 2023. Human-induced weakening of the Northern Hemisphere tropical circulation, *Nature*, 617, 529-532. [url](#)
31. **Chemke, R.**, Ming Y. and Yuval, J., 2022. The intensification of winter mid-latitude storm tracks in the Southern Hemisphere, *Nature Climate Change*, 12, 553-557. [url](#)
30. **Chemke, R.**, 2022. The future poleward shift of Southern Hemisphere summer mid-latitude storm tracks stems from ocean coupling, *Nature Communications*, 13, 1730. [url](#)
29. **Chemke, R.**, Zanna, L., Polvani, L. M., Orbe, C. and Sentman, L., 2022. The Future Intensification of the North Atlantic Winter Storm Track: The Key Role of Dynamic Ocean Coupling, *J. Clim.*, 35, 8, p. 2407-2421. [url](#)
28. **Chemke, R.**, 2022. Large hemispheric differences in the Hadley cell variability due to ocean coupling, *npj Climate Atmos. Sci.*, 5, 1. [url](#)
27. Polvani, L. M., Banerjee, A., **Chemke, R.**, Doddridge, E. W., Ferreira, D., Gnanadesikan, A., Holland, M. A., Kostov, Y., Marshall, J., Seviour, W. J. M., Solomon, S. and Waugh, D. W., 2021. Interannual SAM Modulation of Antarctic Sea Ice Extent Does Not Account for Its Long-Term Trends, Pointing to a Limited Role for Ozone Depletion, *Geophys. Res. Lett.*, 48, e2021GL094871. [url](#)
26. **Chemke, R.**, Polvani, L. M., Kay, J. E. and Orbe, C., 2021. Quantifying the role of ocean coupling in Arctic amplification and sea-ice loss over the 21st century, *npj Climate Atmos. Sci.*, 4, 46. [url](#)
25. Mitevski, I., Orbe, C., **Chemke, R.**, Nazarenko, L. and Polvani, L. M., 2021. Non-monotonic response of the climate system to abrupt CO₂ forcing, *Geophys. Res. Lett.*, 48, 6, e2020GL090. [url](#)
24. **Chemke, R.** and Polvani, L. M., 2021. Elucidating the mechanisms responsible for Hadley cell weakening under 4xCO₂ forcing, *Geophys. Res. Lett.*, 48, 3, 2020GL0903. [url](#)
23. **Chemke, R.**, 2021. Future Changes in the Hadley Circulation: The Role of Ocean Heat Transport, *Geophys. Res. Lett.*, 48, 4, e2020GL091. [url](#)
22. **Chemke, R.** and Ming, Y., 2020. Large atmospheric waves will get stronger while small waves will get weaker, *Geophys. Res. Lett.*, 47, 22, e2020GL090. [url](#)
21. **Chemke, R.**, Previdi, M., England, M. R. and Polvani, L. M., 2020. Distinguishing the impacts of ozone and ozone depleting substances on the recent increase in Antarctic surface mass balance, *The Cryosphere*, 14, 11, p. 4135-4144. [url](#)
20. **Chemke, R.** and Polvani, L. M., 2020. Using multiple large ensembles to elucidate the discrepancy between the 1979–2019 modeled and observed Antarctic sea ice trends, *Geophys. Res. Lett.*, 47, e2020GL088339. [url](#)
19. **Chemke, R.**, Zanna L. and Polvani, L. M., 2020. Identifying a human signal in the North Atlantic warming hole, *Nature Communications*, 11, 1540. [url](#)
18. **Chemke, R.** and Polvani, L. M., 2020. Linking midlatitudes eddy heat flux trends and polar amplification, *npj Climate Atmos. Sci.*, 3, 8. [url](#)
17. **Chemke, R.** and Polvani, L. M., 2019. Opposite tropical circulation trends in climate models and in reanalyses, *Nature Geoscience*, 12, 528-532. [url](#)
16. **Chemke, R.** and Polvani, L. M., 2019. Exploiting the abrupt 4xCO₂ scenario to elucidate tropical expansion mechanisms, *J. Clim.*, 32, 859-875. [url](#)
15. Galperin, B., Sukoriansky, S., Young, R. M. B., **Chemke R.**, Kaspi, Y., Read, P. L. and Dikovskaya, N., 2019. Barotropic and zonostrophic turbulence, review chapter in: zonal jets, Cambridge University Press, Chap. 13. [url](#)
14. **Chemke, R.**, Polvani, L. M. and Deser, C., 2019. The effect of Arctic sea-ice loss on the Hadley circulation, *Geophys. Res. Lett.*, 46, 963–972. [url](#)
13. **Chemke, R.** and Polvani, L. M., 2018. Ocean circulation reduces the Hadley cell response to increased greenhouse gases, *Geophys. Res. Lett.*, 45, 9197–9205. [url](#)
12. **Chemke, R.** and Dagan, G., 2018. The effects of the spatial distribution of anthropogenic aerosols radiative forcing on atmospheric circulation, *J. Clim.*, 31, 7129-7145. [url](#)
11. **Chemke, R.** and Kaspi, Y., 2017. Dynamics of massive atmospheres, *Astrophys. J.*, 845, 1. [url](#)
10. **Chemke, R.** 2017. Atmospheric energy transfer response to global warming, *Quart. J. Roy. Meteor. Soc.*, 143, 2296–2308. [url](#)

9. **Chemke, R.**, Kaspi, Y. and Halevy, I., 2016. The thermodynamic effect of atmospheric mass on early Earth's temperature, *Geophys. Res. Lett.*, 43, 11,414–11,422. [url](#)
8. Dagan, G. and **Chemke, R.**, 2016. The effect of subtropical aerosol loading on equatorial precipitation, *Geophys. Res. Lett.*, 43, 11,048–11,056. [url](#)
7. **Chemke, R.**, Dror, T. and Kaspi, Y., 2016. Barotropic kinetic energy and enstrophy transfers in the atmosphere, *Geophys. Res. Lett.*, 43, 7725-7734. [url](#)
6. **Chemke, R.** and Kaspi, Y., 2016. The effect of eddy-eddy interactions on jet formation and macroturbulent scales, *J. Atmos. Sci.*, 73 (5), 2049-2059. [url](#)
5. **Chemke, R.** and Kaspi, Y., 2016. The latitudinal dependence of the oceanic barotropic eddy kinetic energy and macroturbulence energy transport, *Geophys. Res. Lett.*, 43, 2723-2731. [url](#)
4. **Chemke, R.** and Kaspi, Y., 2015. The Latitudinal Dependence of Atmospheric Jet Scales and Macroturbulent Energy Cascades. *J. Atmos. Sci.*, 72 (10), 3891–3907. [url](#)
3. **Chemke, R.** and Kaspi, Y., 2015. Poleward migration of eddy-driven jets, *J. Adv. Model. Earth Syst.*, 07, 1457-1471. [url](#)
2. Rosenfeld, D., **Chemke, R.**, Prather, K., Suski, K., Comstock, J.M., Schmid, B., Tomlinson, J. and Jonsson, H., 2014. Polluting of winter convective clouds upon transition from ocean inland over central California: Contrasting case studies. *Atmos. Res.*, 135, 112-127. [url](#)
1. Rosenfeld, D., **Chemke, R.**, DeMott, P., Sullivan, R.C., Rasmussen, R., McDonough, F., Comstock, J.M., Schmid, B., Tomlinson, J., Jonsson, H., Suski, K., Cazorla, A. and Prather, K., 2013. The common occurrence of highly supercooled drizzle and rain near the coastal regions of the western United States, *J. Geophys. Res.*, 118(17), 9819-9833. [url](#)