Stanford



Kristen Davis

Associate Professor of Oceans, by courtesy, of Civil and Environmental Engineering and Senior Fellow, by courtesy, at the Woods Institute for the Environment

Curriculum Vitae available Online

Bio

BIO

I am an engineer and oceanographer who is interested in studying how physical processes shape coastal waters – combining principles of fluid mechanics, oceanography, and ecology. I use both field observations and numerical tools to examine circulation in the ocean, its natural variability, and influence on marine ecosystems and human-nature interactions. I joined Stanford department of Oceans in 2024. Before that, I was an Associate Professor in the Department of Civil & Environmental Engineering at the University of California, Irvine.

ACADEMIC APPOINTMENTS

- Associate Professor, Oceans
- Associate Professor (By courtesy), Civil and Environmental Engineering
- Senior Fellow (By courtesy), Stanford Woods Institute for the Environment

LINKS

- Coastal Dynamics Lab: https://coastaldynamics.stanford.edu/

Teaching

COURSES

2026-27

- Introduction to Physical Oceanography: EARTHSYS 164, ESS 148, OCEANS 162D, OCEANS 262D (Spr)

2025-26

- Dynamics of Stratified Flows: OCEANS 201 (Spr)
- Introduction to Physical Oceanography: CEE 162D, CEE 262D, EARTHSYS 164, ESS 148, OCEANS 162D, OCEANS 262D (Win)

2024-25

- Introduction to Physical Oceanography: CEE 162D, CEE 262D, EARTHSYS 164, ESS 148 (Win)
- Introduction to Physical Oceanography: OCEANS 162D, OCEANS 262D (Win)
- Quals Prep Workshop: OCEANS 304 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Hannah Clayton, Jayde Meng

Postdoctoral Faculty Sponsor

Griffin Srednick

Doctoral Dissertation Advisor (AC)

Madolyn Kelm

Doctoral Dissertation Co-Advisor (AC)

Cameron Hallett

Doctoral Dissertation Reader (NonAC)

Matthew Illing

Publications

PUBLICATIONS

- **Spatial Portfolios in Coral Metapopulations Are Shaped by Spatiotemporal Asynchrony in Environmental Conditions.** *Ecology letters*
  Srednick, G., Davis, K., Edmunds, P. J.
  2026; 29 (2): e70324
- **Climate-Driven Stratification Intensifies Internal Wave Cooling on a Shallow Island Reef** *GEOPHYSICAL RESEARCH LETTERS*
  Rogers, J. S., Tan, S., Davis, K. A., Pawlak, G., Fringer, O. B.
  2025; 52 (14)
- **Relative phase between tidal and solar cycles influences the heating of a coral atoll lagoon** *LIMNOLOGY AND OCEANOGRAPHY*
  Merrigan, S., Pawlak, G., Sinnett, G., Fu, K., Davis, K. A.
  2025
- **Intensification of future subsurface marine heatwaves in an eddy-resolving model** *NATURE COMMUNICATIONS*
  Guo, X., Gao, Y., Zhang, S., Cai, W., Chen, D., Leung, L., Zscheischler, J., Thompson, L., Davis, K., Qu, B., Gao, H., Wu, L.
  2024; 15 (1): 10777
- **Insights Into Internal Solitary Waves East of Dongsha Atoll From Integrating Geostationary Satellite and Mooring Observations** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Cheng, Y., Chang, M., Yang, Y., Jan, S., Ramp, S. R., Davis, K. A., Reeder, D.
  2024; 129 (8)
- **Nutrient Replenishment by Turbulent Mixing in Suspended Macroalgal Farms** *GEOPHYSICAL RESEARCH LETTERS*
  Bo, T., McWilliams, J. C., Frieder, C. A., Davis, K. A., Chamecki, M.
  2024; 51 (14)
- **Large global variations in the carbon dioxide removal potential of seaweed farming due to biophysical constraints (vol 4, 185 , 2023)** *COMMUNICATIONS EARTH & ENVIRONMENT*
  Arzeno-Soltero, I. B., Saenz, B. T., Frieder, C. A., Long, M. C., Deangelo, J., Davis, S. J., Davis, K. A.
  2024; 5 (1)
- **Seaweed blue carbon: Ready? Or Not?** *MARINE POLICY*
  Fujita, R., Augyte, S., Bender, J., Brittingham, P., Buschmann, A. H., Chalfin, M., Collins, J., Davis, K. A., Gallagher, J., Gentry, R., Gruby, R. L., Kleisner, K., Moritsch, et al
  2023; 155
- **Large global variations in the carbon dioxide removal potential of seaweed farming due to biophysical constraints** *COMMUNICATIONS EARTH & ENVIRONMENT*
  Arzeno-Soltero, I. B., Saenz, B. T., Frieder, C. A., Long, M. C. C., DeAngelo, J., Davis, S. J., Davis, K. A.
  2023; 4 (1)
- **Author Correction: Economic and biophysical limits to seaweed farming for climate change mitigation.** *Nature plants*
  DeAngelo, J., Saenz, B. T., Arzeno-Soltero, I. B., Frieder, C. A., Long, M. C., Hamman, J., Davis, K. A., Davis, S. J.

2023

- **Economic and biophysical limits to seaweed farming for climate change mitigation.** *Nature plants*
  DeAngelo, J., Saenz, B. T., Arzeno-Soltero, I. B., Frieder, C. A., Long, M. C., Hamman, J., Davis, K. A., Davis, S. J.
  2022
- **Seasonal hypoxia and temperature inversions in a tropical bay** *LIMNOLOGY AND OCEANOGRAPHY*
  Adelson, A. E., Altieri, A. H., Boza, X., Collin, R., Davis, K. A., Gaul, A., Giddings, S. N., Reed, V., Pawlak, G.
  2022; 67 (10): 2174-2189
- **On Internal Tides Driving Residual Currents and Upwelling on an Island** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Rogers, J. S., Mayer, F. T., Davis, K. A., Fringer, O. B.
  2022; 127 (7)
- **Diurnal Thermally Driven Cross-Shore Exchange in Steady Alongshore Currents** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Safaie, A., Pawlak, E., Davis, K. A.
  2022; 127 (4)
- **Solitary Waves Impinging on an Isolated Tropical Reef: Arrival Patterns and Wave Transformation Under Shoaling** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Ramp, S. R., Yang, Y., Jan, S., Chang, M., Davis, K. A., Sinnett, G., Bahr, F. L., Reeder, D. B., Ko, D. S., Pawlak, G.
  2022; 127 (3)
- **Seismic Detection of Oceanic Internal Gravity Waves From Subaerial Seismometers** *AGU ADVANCES*
  Shaddox, H. R., Brodsky, E. E., Ramp, S. R., Davis, K. A.
  2021; 2 (3)
- **Residual streaming flows in buoyancy-driven cross-shore exchange** *JOURNAL OF FLUID MECHANICS*
  Coenen, W., Sanchez, A. L., Felez, R., Davis, K. A., Pawlak, G.
  2021; 920
- **Direct measurements reveal instabilities and turbulence within large amplitude internal solitary waves beneath the ocean** *COMMUNICATIONS EARTH & ENVIRONMENT*
  Chang, M., Cheng, Y., Yang, Y., Jan, S., Ramp, S. R., Reeder, D., Hsieh, W., Ko, D. S., Davis, K. A., Shao, H., Tseng, R.
  2021; 2 (1)
- **Physical Processes Determine Spatial Structure in Water Temperature and Residence Time on a Wide Reef Flat** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Reid, E. C., Lentz, S. J., DeCarlo, T. M., Cohen, A. L., Davis, K. A.
  2020; 125 (12)
- **Distributed Temperature Sensing for Oceanographic Applications** *JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY*
  Sinnett, G., Davis, K. A., Lucas, A. J., Giddings, S. N., Reid, E., Harvey, M. E., Stokes, I.
  2020; 37 (11): 1987-1997
- **Fate of Internal Waves on a Shallow Shelf** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Davis, K. A., Arthur, R. S., Reid, E. C., Rogers, J. S., Fringer, O. B., Decarlo, T. M., Cohen, A. L.
  2020; 125 (5)
- **Turbulence and Coral Reefs.** *Annual review of marine science*
  Davis, K. A., Pawlak, G. n., Monismith, S. G.
  2020
- **Internal waves influence the thermal and nutrient environment on a shallow coral reef** *LIMNOLOGY AND OCEANOGRAPHY*
  Reid, E. C., DeCarlo, T. M., Cohen, A. L., Wong, G. T. F., Lentz, S. J., Safaie, A., Hall, A., Davis, K. A.
  2019; 64 (5): 1949-1965
- **Heterotrophy of Oceanic Particulate Organic Matter Elevates Net Ecosystem Calcification** *GEOPHYSICAL RESEARCH LETTERS*
  Kealoha, A. K., Shamberger, K. E. F., Reid, E. C., Davis, K. A., Lentz, S. J., Brainard, R. E., Oliver, T. A., Rappe, M. S., Roark, E., Rii, Y. M.
  2019; 46 (16): 9851-9860

- **Temporal Variability in Thermally Driven Cross-Shore Exchange: The Role of Semidiurnal Tides** *JOURNAL OF PHYSICAL OCEANOGRAPHY*
  Ulloa, H. N., Davis, K. A., Monismith, S. G., Pawlak, G.
  2018; 48 (7): 1513–31
- **Coral Reef Drag CoefficientsSurface Gravity Wave Enhancement** *JOURNAL OF PHYSICAL OCEANOGRAPHY*
  Lentz, S. J., Churchill, J. H., Davis, K. A.
  2018; 48 (7): 1555-1566
- **High frequency temperature variability reduces the risk of coral bleaching (vol 9, 2018)** *NATURE COMMUNICATIONS*
  Safaie, A., Silbiger, N. J., McClanahan, T. R., Pawlak, G., Barshis, D. J., Hench, J. L., Rogers, J. S., Williams, G. J., Davis, K. A.
  2018; 9: 2244
- **High frequency temperature variability reduces the risk of coral bleaching** *NATURE COMMUNICATIONS*
  Safaie, A., Silbiger, N. J., McClanahan, T. R., Pawlak, G., Barshis, D. J., Hench, J. L., Rogers, J. S., Williams, G. J., Davis, K. A.
  2018; 9: 1671
- **Spatial and Temporal Patterns of Chlorophyll Concentration in the Southern California Bight** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Nezlin, N. P., McLaughlin, K., Booth, J. T., Cash, C. L., Diehl, D. W., Davis, K. A., Feit, A., Goericke, R., Gully, J. R., Howard, M. D. A., Johnson, S., Latker, A., Mengel, et al
  2018; 123 (1): 231-245
- **Predicting persistence in benthic marine species with complex life cycles: linking dispersal dynamics to redistribution potential and thermal tolerance limits** *MARINE BIOLOGY*
  Sorte, C. J. B., Pandori, L. L. M., Cai, S., Davis, K. A.
  2018; 165 (1)
- **Coral Reef Drag Coefficients - Water Depth Dependence** *JOURNAL OF PHYSICAL OCEANOGRAPHY*
  Lentz, S. J., Davis, K. A., Churchill, J. H., DeCarlo, T. M.
  2017; 47 (5): 1061-1075
- **Mass coral mortality under local amplification of 2 °C ocean warming** *SCIENTIFIC REPORTS*
  DeCarlo, T. M., Cohen, A. L., Wong, G. T. F., Davis, K. A., Lohmann, P., Soong, K.
  2017; 7: 44586
- **Local diurnal wind-driven variability and upwelling in a small coastal embayment** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Walter, R. K., Reid, E. C., Davis, K. A., Armenta, K. J., Merhoff, K., Nidzieko, N. J.
  2017; 122 (2): 955-972
- **Community production modulates coral reef pH and the sensitivity of ecosystem calcification to ocean acidification** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  DeCarlo, T. M., Cohen, A. L., Wong, G. T. F., Shiah, F., Lentz, S. J., Davis, K. A., Shamberger, K. E. F., Lohmann, P.
  2017; 122 (1): 745-761
- **Deconstructing Demand: The Anthropogenic and Climatic Drivers of Urban Water Consumption** *ENVIRONMENTAL SCIENCE & TECHNOLOGY*
  Hemati, A., Rippy, M. A., Grant, S. B., Davis, K., Feldman, D.
  2016; 50 (23): 12557-12566
- **The characteristics and dynamics of wave-driven flow across a platform coral reef in the Red Sea** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Lentz, S. J., Churchill, J. H., Davis, K. A., Farrar, J. T., Pineda, J., Starczak, V.
  2016; 121 (2): 1360-1376
- **Surface gravity wave transformation across a platform coral reef in the Red Sea** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Lentz, S. J., Churchill, J. H., Davis, K. A., Farrar, J. T.
  2016; 121 (1): 693-705
- **Climate modulates internal wave activity in the Northern South China Sea** *GEOPHYSICAL RESEARCH LETTERS*
  DeCarlo, T. M., Karnauskas, K. B., Davis, K. A., Wong, G. T. F.

2015; 42 (3): 831-838

- **Seasonal and interannual oxygen variability on the Washington and Oregon continental shelves** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Siedlecki, S. A., Banas, N. S., Davis, K. A., Giddings, S., Hickey, B. M., MacCready, P., Connolly, T., Geier, S.
  2015; 120 (2): 608-633

- **Small Drains, Big Problems: The Impact of Dry Weather Runoff on Shoreline Water Quality at Enclosed Beaches** *ENVIRONMENTAL SCIENCE & TECHNOLOGY*
  Rippy, M. A., Stein, R., Sanders, B. F., Davis, K., McLaughlin, K., Skinner, J. F., Kappeler, J., Grant, S. B.
  2014; 48 (24): 14168-14177

- **Estuary-enhanced upwelling of marine nutrients fuels coastal productivity in the U.S. Pacific Northwest** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Davis, K. A., Banas, N. S., Giddings, S. N., Siedlecki, S. A., MacCready, P., Lessard, E. J., Kudela, R. M., Hickey, B. M.
  2014; 119 (12): 8778-8799

- **Hindcasts of potential harmful algal bloom transport pathways on the Pacific Northwest coast** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Giddings, S. N., MacCready, P., Hickey, B. M., Banas, N. S., Davis, K. A., Siedlecki, S. A., Trainer, V. L., Kudela, R. M., Pelland, N. A., Connolly, T. P.
  2014; 119 (4): 2439-2461

- **Two spatial scales in a bleaching event: Corals from the mildest and the most extreme thermal environments escape mortality** *LIMNOLOGY AND OCEANOGRAPHY*
  Pineda, J., Starczak, V., Tarrant, A., Blythe, J., Davis, K., Farrar, T., Berumen, M., da Silva, J. C. B.
  2013; 58 (5): 1531-1545

- **The Modification of Bottom Boundary Layer Turbulence and Mixing by Internal Waves Shoaling on a Barrier Reef** *JOURNAL OF PHYSICAL OCEANOGRAPHY*
  Davis, K. A., Monismith, S. G.
  2011; 41 (11): 2223-2241

- **Observations of the thermal environment on Red Sea platform reefs: a heat budget analysis** *CORAL REEFS*
  Davis, K. A., Lentz, S. J., Pineda, J., Farrar, J. T., Starczak, V. R., Churchill, J. H.
  2011; 30: 25-36

- **Atmospheric gravity waves in the Red Sea: a new hotspot** *NONLINEAR PROCESSES IN GEOPHYSICS*
  Magalhaes, J. M., Araujo, I. B., da Silva, J. B., Grimshaw, R. J., Davis, K., Pineda, J.
  2011; 18 (1): 71-79

- **Flow effects on benthic grazing on phytoplankton by a Caribbean reef** *LIMNOLOGY AND OCEANOGRAPHY*
  Monismith, S. G., Davis, K. A., Shellenbarger, G. G., Hench, J. L., Nidzieko, N. J., Santoro, A. E., Reidenbach, M. A., Rosman, J. H., Holtzman, R., Martens, C. S., Lindquist, N. L., Southwell, M. W., Genin, et al
  2010; 55 (5): 1881-1892

- **Effects of western boundary current dynamics on the internal wave field of the Southeast Florida shelf** *JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS*
  Davis, K. A., Leichter, J. J., Hench, J. L., Monismith, S. G.
  2008; 113 (C9)

- **Composition and flux of groundwater from a California beach aquifer: Implications for nutrient supply to the surf zone** *CONTINENTAL SHELF RESEARCH*
  Boehm, A. B., Paytan, A., Shellenbarger, G. G., Davis, K. A.
  2006; 26 (2): 269-282

- **Submarine groundwater discharge: An important source of new inorganic nitrogen to coral reef ecosystems** *LIMNOLOGY AND OCEANOGRAPHY*
  Paytan, A., Shellenbarger, G. G., Street, J. H., Gonneea, M. E., Davis, K., Young, M. B., Moore, W. S.
  2006; 51 (1): 343-348

- **Covariation of coastal water temperature and microbial pollution at interannual to tidal periods** *GEOPHYSICAL RESEARCH LETTERS*
  Boehm, A. B., Lluch-Cota, D. B., Davis, K. A., Winant, C. D., Monismith, S. G.

2004; 31 (6)