



## Kristen Davis

Associate Professor of Oceans and, by courtesy, of Civil and Environmental Engineering

 Curriculum Vitae available Online

### Bio

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#### 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

#### LINKS

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

### Teaching

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#### COURSES

##### 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

##### 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

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### 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., 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*  
Shaddock, 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., Rippey, 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*  
Rippey, 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., Gonnee, 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)