

## Curriculum Vitae

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### William R. Young

Distinguished Professor of Oceanography  
Scripps Institution of Oceanography  
University of California at San Diego  
La Jolla, California  
USA.

**Born:** 21<sup>st</sup> November 1955 in Brisbane, Australia.

**Citizenship:** Australia and USA (since 2003).

### Education

1981 Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program in Oceanography. Ph.D. Dissertation: *Vertical structure of the Wind-driven circulation*.

1977 Australian National University, Applied Mathematics M. Sc. Dissertation: *Modes of Optical Waveguides*.

1976 Australian National University, Theoretical Physics B. Sc.

### Honors and Awards

1976 University Medal in Theoretical Physics, Australian National University

1982 Carl-Gustav Rossby Award, Massachusetts Institute of Technology

1989 McElwane Medal, American Geophysical Union

1989 elected Fellow of the American Geophysical Union

1998 Houghton Lecturer, Massachusetts Institute of Technology

2006 G.K. Batchelor Lecturer, University of Cambridge

2009 elected Fellow of the American Meteorological Society

2012 elected Fellow of the National Academy of Sciences

### Professional experience

1991– 2013 Professor of Physical Oceanography Scripps Institution of Oceanography (SIO)

1988 – 1991 Associate Professor of Physical Oceanography, SIO

1984 –1987 Assistant Professor, Massachusetts Institution of Technology

1982 –1984 Postdoctoral investigator, SIO

1981 Postdoctoral investigator, Woods Hole Oceanographic Institution

### Professional service

2000-2010 visiting review committee, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology

2002–present, external review committee, Center for Nonlinear Science, Los Alamos National Laboratory

2000–2006, Associate Editor, *Journal of Fluid Mechanics*

2011–present, Associate Editor, *Fluid Dynamics Research*

1995–present, Associate Editor, *Journal of Marine Research*

## Publications

1. Snyder, A.W., and W.R. Young, 1978. Modes of optical waveguides. *J. Opt. Soc. Am.*, **68**, 297-309.
2. Young, W.R., and P.B. Rhines, 1980. Rossby wave action, energy, and entropy in forced mean flows. *Geophys. Astrophys. Fluid Dyn.*, **15**, 39-52.
3. Rhines, P.B., and W.R. Young, 1982. Homogenization of potential vorticity in planetary gyres. *J. Fluid Mech.*, **122**, 347-367.
4. Rhines, P.B., and W.R. Young, 1982. A theory of the wind-driven circulation, I-mid-ocean gyres. *J. Mar. Res.*, **40**, Supp. 559-596.
5. Young, W.R., and P.B. Rhines, 1982. A theory of the wind-driven circulation, II-circulation models and western boundary layers. *J. Mar. Res.*, **40**, 849-872.
6. Young, W.R., P.B. Rhines, and C. J.R. Garrett, 1982. Shear-flow dispersion, internal waves, and horizontal mixing in the ocean. *J. Phys. Oceanogr.*, **12**, 515-527.
7. Rhines, P.B., and W.R. Young, 1983. How rapidly is passive scalar mixed within closed streamlines? *J. Fluid Mech.*, **133**, 135-145.
8. Young, W.R., 1983. Topographic rectification of tidal currents. *J. Phys. Oceanogr.*, **13**, 716-721.
9. Ierley, G.R., and W.R. Young, 1983. Can the western boundary layer affect the potential vorticity distribution in the Sverdrup interior of a wind gyre? *J. Phys. Oceanogr.*, **13**, 1753-1763.
10. Pedlosky, J., and W. R. Young, 1983. Ventilation, potential vorticity homogenization and the structure of the ocean circulation. *J. Phys. Oceanogr.*, **13**, 2020-2037.
11. Young, W.R., 1984. The role of western boundary layers in gyre scale ocean mixing. *J. Phys. Oceanogr.*, **14**, 478-483.
12. Dewar, W.K., P.B. Rhines, and W.R. Young, 1984. The nonlinear spin-up of a stratified ocean. *Geophys. Astrophys. Fluid Dyn.*, **30**, 169-197.
13. Young, W.R., 1985. Some interactions between small numbers of baroclinic vortices. *Geophys. Astrophys. Fluid Dyn.*, **33**, 35-61.
14. Pierce, B.P., and W.R. Young, 1986. Lycaenid butterflies and ants: two-species stable equilibria in mutualistic, commensal and parasitic interactions. *G Am Naturalist*, **128**, 216-227.
15. Broutman, D., and W.R. Young, 1986. On the interaction of small-scale oceanic internal waves with near inertial waves. *J. Fluid Mech.*, **166**, 341- 358.
16. Young, W.R., 1986. Elliptical vortices in shallow water. *J. Fluid Mech.*, **171**, 101-119.

17. Hayashi, Y.Y., and W.R. Young, 1986. Stable and unstable shear modes of rotating parallel flows in shallow water. *J. Fluid Mech.*, **184**, 477-504.
18. Young, W.R., and G.R. Ierley, 1986. Eastern boundary conditions and weak solutions of the ideal thermocline equations. *J. Phys. Oceanogr.*, **16**, 1884-1900.
19. Abarbanel, H.D.I., and W.R. Young, 1987. *The General Circulation of the Ocean*. Springer-Verlag, New York, 291pp.
20. Young, W.R., 1987. Baroclinic Circulation Theories. In: *The General Circulation of the Oceans.*, ed. by H.D.I. Abarbanel and W. R. Young, Springer-Verlag.
21. Young, W.R., 1987. Selective decay of entropy and the excitation of barotropic waves in a channel. *J. Atm. Sci.*, **44**, 2804-2812.
22. Cessi, P., G.R. Ierley, and W.R. Young, 1987. A model of the inertial recirculation driven by potential vorticity anomalies. *J. Phys. Oceanogr.*, **17**, 1640-1652.
23. Ierley, G.R., and W.R. Young, 1988. Inertial recirculation in a beta-plane corner. *J. Phys. Oceanogr.*, **18**, 683-689.
24. Young, W.R., 1988. Arrested shear dispersion and other models of anomalous diffusion. *J. Fluid Mech.*, **193**, 129-149.
25. Young, W.R., A. Pumir, and Y. Pomeau, 1989. Anomalous diffusion of tracer in convection rolls. *Phys. Fluids*, **A-1**, 462-469.
26. Thompson, L., and W.R. Young, 1989. An upper bound on the size of sub-mesoscale coherent vortices. *J. Phys. Oceanogr.*, **19**, 233-237.
27. Childress, S., G.R. Ierley, E.A. Spiegel and W.R. Young, 1989. Blow-up of unsteady two-dimensional Euler and Navier-Stokes solutions having stagnation point form. *J. Fluid Mech.*, **203**, 1-22.
28. Vallis, G.K., G.F., Carnevale, and W.R. Young, 1989. Extremal energy properties and construction of stable solutions of the Euler equations. *J. Fluid Mech.*, **207**, 133-152.
29. Carnevale, G.F., Y. Pomeau, and W.R. Young, 1990. Statistics of Ballistic Agglomeration. *Phys. Rev. Lett.*, **64**, 2913-2916.
30. Cessi, P., R.V. Condie, and W.R. Young, 1990. Dissipative dynamics of western boundary currents. *J. Mar. Res.*, **48**, 677-700.
31. Cessi, P., E.A. Spiegel, and W.R. Young, 1990. Small scale excitation in large systems. In: *Nonlinear Evolution of Spatio-Temporal Structures in Dissipative Continuous Systems*, ed. by F.H. Busse and L. Kramer. Plenum Press, New York, pp.231-236.
32. Young, W.R., and S. Jones, 1991. Shear dispersion. *Phys. Fluid*, **A- 3**, 1087-1101.

33. Carnevale, G.F., J.C. McWilliams, Y. Pomeau, J.B. Weiss, and W.R. Young, 1991. Evolution of vortex statistics in two-dimensional turbulence. *Phys. Rev. Lett.*, **66**, 2735-2737.
34. Niiler, P.O., D.K. Lee, W.R. Young and J.H. Hu, 1991. Expendable current profiler (XCP) section across the North Pacific at 25N. *Deep-Sea Research*, **38, Suppl. 1**, 545-561.
35. Ierley, G.R., and W.R. Young, 1991. Viscous instabilities in the western boundary layer. *J. Phys. Oceanogr.*, **21**, 1323-1332.
36. Young, W.R., and S. Jones, 1991. Dispersion in an unconsolidated porous medium. *Phys. Fluids*, **A-3**, 2468-2470.
37. McNamara, S. and W.R. Young, 1992. Inelastic collapse and clumping in a one-dimensional granular medium. *Phys. Fluids A.*, **4**, 496-504.
38. Cessi, P. and W.R. Young, 1992. Fixed-flux convection in a tilted slot. *J. Fluid Mech.*, **237**, 57-71.
39. Cessi, P. and W.R. Young, 1992. Multiple equilibria in two-dimensional thermohaline circulation. *J. Fluid Mech.*, **241**, 291-30.
40. Carnevale, G.F., J.C., McWilliams, Y., Pomeau, J.B. Weiss, and W.R. Young, 1992. Rates, pathways, and end-states of nonlinear evolution in decaying two-dimensional turbulence: scaling theory vs. selective decay. *Phys. Fluids A*, **4**, 1314-1316.
41. Balmforth, N.J., S.P. Meacham, E.A. Spiegel and W.R. Young, 1992. Global equilibria of turbulent accretion disks. *Annals New York Acad. Sci.*, **675**, 53-64.
42. Stommel, H. M. and W.R. Young, 1993. The average T-S relation of astochastically forced box model. *J. Phys. Oceanogr.*, **23**, 151-158.
43. McNamara, S. and W.R. Young, 1993. Kinetics of a one-dimensional granular medium in the quasielastic limit. *Phys. Fluids A.*, **5**, 34-45.
44. Young, W.R., 1994. The subinertial mixed layer approximation. *J. Phys. Oceanogr.*, **24**, 1812-1826.
45. Roemmich, D., M.Y. Morris, W. R. Young and J.R. Donguy, 1994. Fresh equatorial jets. *J. Phys Oceanogr.*, **24**, 540-558.
46. Jones, S.W. and W.R. Young, 1994. Shear dispersion and anomalous diffusion by chaotic advection. *J. Fluid Mech.*, **280**, 149-172.
47. McNamara, S. and W.R. Young, 1994. Inelastic collapse in two dimensions. *Phys. Rev. E.*, **50**, R28.
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50. Young, W.R., 1995. Decaying two-dimensional turbulence. *Turbulence, A Tentative Dictionary*, 1-4, Eds. P. Tabeling and O. Cardoso, Plenum Press.
51. McNamara S., and W.R. Young, 1996. Dynamics of a freely evolving, two-dimensional granular medium. *Phys. Rev. E.*, **53**, 5089-5100.
52. Cessi, P., and W.R. Young, 1996. Some unexpected consequences of the interaction between convective adjustment and horizontal diffusion. *Physica D.*, **98**, 287-300.
53. Balmforth, N.J., and D. del-Castillo-Negrete and W.R. Young, 1997. Dynamics of vorticity defects in shear. *J. Fluid Mech.*, **333**, 197-230.
54. Young, W.R., and M. Ben Jelloul, 1997. Propagation of near-inertial oscillations through a geostrophic flow. *J. Mar. Res.*, **55**, 735-766.
55. Ferrari, R., and W.R. Young, 1997. On the development of thermohaline correlations as a result of nonlinear diffusive parameterizations. *J. Mar. Res.*, **55**, 1069-1101.
56. Balmforth, N.J., and W.R. Young. 1997. Long-wave instability in marginally stable shear flows. *Phys. Rev. Lett.*, **79**, 4155-4158.
57. Balmforth, N.J., S.G. Llewellyn Smith, and W.R. Young. 1998. Dynamics of interfaces and layers in a stratified turbulent fluid. *J. Fluid Mech.*, **355**, 329-358.
58. Balmforth, N.J., S.G. Llewellyn Smith, and W.R. Young. 1998. Enhanced dispersion of near-inertial waves in an idealized geostrophic flow. *J. Mar. Res.*, **56**, 1-40.
59. Manfroi, A.J., and W.R. Young, 1999. Slow evolution of zonal jets on the beta-plane. *J. Atmos. Sci.*, **56**, 784-800.
60. Balmforth, N.J., and W.R. Young, 1999. Radiative damping of near-inertial oscillations. *J. Mar. Res.*, **57**, 561-584.
61. Dauxois, T., and W.R. Young, 1999. Near-critical reflection of internal waves. *J. Fluid Mech.*, **390**, 271-295.
62. Balmforth, N.J., S.G. Llewellyn-Smith and W.R. Young, 2001. Disturbing vortices. *J. Fluid Mech.*, **426**, 95-133.
63. Ferrari, R., Manfroi, A., and W.R. Young, 2001. Strongly and weakly self-similar diffusion. *Physica D*, **154**, 111-137.
64. Young, W.R., A.J. Roberts and G. Stuhne, 2001. Reproductive pair correlations and the clustering of organisms. *Nature*, **412**, 328-331.
65. Manfroi, A.J. and W.R. Young, 2002. Stability of beta-plane Kolmogorov flow. *Physica D*, **162**, 208-232.

66. Llewellyn Smith, S.G. and W.R. Young, 2002. Conversion of the barotropic tide. *J. Phys. Oceanogr.*, **32**, 1554-1566.
67. Balmforth, N.B., G.R.Ierley and W.R. Young, 2002. Tidal conversion by subcritical topography. *J. Phys. Oceanogr.*, **32**, 2900-2914.
68. Paparella, F. and W.R. Young, 2002. Horizontal convection is nonturbulent. *J. Fluid Mech.*, **466**, 205-214.
69. Balmforth, N.B. and W.R. Young, 2003. Diffusion limited scalar cascades. *J. Fluid Mech.*, **482**, 91-100.
70. Llewellyn Smith, S.G. and W.R. Young, 2003. Tidal conversion at a very steep ridge. *J. Fluid Mech.*, **495**, 175-191.
71. Tang, W., Caulfield, C.P. and W.R. Young, 2004. Bounds on dissipation in stress-driven flow *J. Fluid Mech.*, **510**, 333-352.
72. Tang, W., Caulfield, C.P. and W.R. Young, 2005. Bounds on dissipation in stress-driven in a rotating frame. *J. Fluid Mech.*, **540**, 373-391.
73. Plasting, S.C. and W.R. Young, 2006. A bound on scalar variance for the advection diffusion equation. *J. Fluid Mech.*, **552**, 289-298.
74. Birch, D.A. and W.R. Young, 2006. A master equation for a spatial population model with pair interactions. *Theoretical Population Biology*, **70**, 26-42.
75. Thompson, A.F. and W.R. Young 2006. Scaling baroclinic eddy flux: vortices and energy balance. *J. Phys. Oceanogr.*, **36**, 720-738.
76. Pétrélis, F., S.G. Llewellyn Smith and W.R. Young, 2006. Tidal conversion at a submarine ridge. *J. Phys. Oceanogr.*, **36**, 1053-1071.
77. di Lorenzo, E., W.R. Young and S.G. Llewellyn Smith 2006. Numerical and analytical estimates of M2 tidal conversion at steep oceanic ridges. *J. Phys. Oceanogr.*, **36**, 1072-1084.
78. Cessi P., W.R. Young and J.A. Polton, 2007. Control of large-scale ocean heat transport by small-scale mixing. *J. Phys. Oceanogr.*, **37**, 1877-1894.
79. Thompson, A.F. and W.R. Young 2007. Two-layer Baroclinic Eddy Heat Fluxes: Zonal Flows and Energy Balance. *J. Atmos. Sci.*, **64**, 3214-3231.
80. Balmforth N.J., J.W.M. Bush, D. Vener and W.R. Young 2007. Dissipative descent: rocking and rolling down an incline. *J. Fluid Mech.*, **590**, 295-318.
81. Birch, D.A., Y.-K. Tsang and W.R. Young 2007. Bounding biomass in the Fisher Equation. *Phys. Rev. E*, **76**, 041910. (Also selected to appear in the *Virtual Journal of Biological Physics Research*, **13**, issue 12.)

82. Birch, D.A., W.R. Young and P.J.S. Franks 2008. Thin layers of plankton: Formation by shear and death by diffusion. *Deep Sea Res. Part I: Oceanographic Research Papers*, **55**, 2277-295.
83. Young, W.R., Y.-K. Tsang and N.J. Balmforth 2008. Near-inertial parametric subharmonic instability. *J. Fluid Mech.*, **607**, 25-49
84. Tsang, Y.-K. and W.R. Young 2008. Energy-entropy stability of  $\beta$ -plane Kolmogorov flow with drag. *Phys. Fluids*, **20**, 084102.
85. Birch, D.A., W.R. Young and P.J.S. Franks 2009. Plankton layer profiles as determined by shearing, sinking and swimming. *Limnology and Oceanography*, **54**(1).
86. Winters, K.B. and W.R. Young 2009. Available potential energy and buoyancy variance in horizontal convection. *J. Fluid Mech.*, **629** 221-230.
87. Tsang, Y.-K. and W.R. Young 2009. Forced-dissipative two-dimensional turbulence: A scaling regime controlled by drag. *Phys. Rev. E*, **79**, 045308(R).
88. W.R. Young 2010. Dynamic enthalpy, conservative temperature, and the seawater Boussinesq approximation. *J. Phys. Oceanogr.*, **40**, 394-400.
89. Vanneste, J. and W.R. Young 2010. On the energy of elliptical vortices. *Phys. Fluids A*, **22**, 081701.
90. Balmforth, N.J. and W.R. Young 2011. An interacting particle system with compact hierarchical structure. *Physica D*, **240**, 101-113.
91. Sukhatme, J.. and W.R. Young 2011. The advection-condensation model and water-vapour probability density functions. *Q. J. Roy. Meteorol. Soc.*, DOI:10.1002/qj.869.
92. Hazewinkel, J., Paparella, F. and W.R. Young 2012. Stressed Horizontal Convection. *J. Fluid Mech.*, **692**, 317-331.
93. K. Srinivasan and W.R. Young 2012. Zonostrophic Instability. *J. Atmos. Sci.*, **69**, 1633-1656.
94. W.R. Young 2012. An exact thickness-weighted average formulation of the Boussinesq equations. *J. Phys. Oceanogr.* **42**, 692-707.
95. B. Gallet and W.R. Young 2013. A two-dimensional vortex condensate at high Reynolds number. In press in *J. Fluid Mech.*