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## **CURRICULUM VITAE OF RICHARD C. DUGDALE**

Romberg Tiburon Center for Environmental Studies, phone: 415 338 3518  
San Francisco State University, PO BOX 855, FAX: 415 435 7120  
Tiburon, CA 94920-0855 email: rdugdale@sfsu.edu

### **CURRENT POSITION:**

Senior Research Scientist, Romberg Tiburon Center,  
Adjunct Professor, San Francisco State University.  
Emeritus Professor of Biology, University of Southern California

### **EDUCATION:**

1950 B.S., University of Wisconsin, Electrical Engineering  
1951 M.S., University of Wisconsin, Zoology and Botany  
1955 Ph.D., University of Wisconsin, Zoology  
1956 Post-Doctoral Fellow, Marine Institute, University of Georgia

### **PROFESSIONAL BACKGROUND:**

1996- Senior Research Scientist, Romberg Tiburon Center,  
Adjunct Professor, San Francisco State University.  
1996- Emeritus Professor of Biology, University of Southern California (USC)  
1996-97 Acting Director, Hancock Institute for Marine Studies, USC  
1994 Visiting Scientist, Institute of Marine Biology of Crete, Greece  
1993 Visiting Scientist, University of Luminy, Marseilles, sponsored by PACA-Provence  
Alpes Maritimes, California Cooperative Agreement.  
1988- Consultant, Ocean Sciences, Jet Propulsion Laboratory  
1987 Associate Scientist with CNRS: "Poste Rouge", Laboratoire Physique et Chimie  
Marines, Villefranche-sur-Mer, France  
1984-85 Consultant, Woodward Clyde Associates  
1981-86 Director, Allan Hancock Foundation, University of Southern California  
1979-96 Professor of Biological Sciences, University of Southern California  
1979-83 Associate Director for Marine Sciences, Institute for Marine & Coastal Studies, USC  
1975-79 Research Scientist, Bigelow Lab for Ocean Sciences, W. Boothbay Harbor, Maine  
1974-75 Consultant, World Health Organization  
1972-73 Fulbright Research Fellow, Athens, Greece  
1967-75 Research Professor, Department of Oceanography, University of Washington  
1962-67 Associate Professor of Marine Science, University of Alaska  
1960-62 Assistant Professor of Zoology, University of Pittsburgh  
1958-60 Instructor in Zoology, University of Pittsburgh  
1957 Instructor in Zoology, University of Kentucky

### **HONORS AND AWARDS:**

Honoris Causae, University of Marseilles  
Hutchinson Award, American Society of Limnology and Oceanography  
Fellow, California Academy of Sciences,  
Fellow of AAAS  
Past President ASLO  
Poste-Rouge Award, CNRS

**MEMBER:**

American Association for the Advancement of Science  
California Academy of Sciences  
American Geophysical Union  
American Society of Limnology and Oceanography  
International Association for Ecology  
Phycological Society of America  
SIGMA XI  
The Oceanography Society

**SCIENTIFIC ACTIVITIES (National and International, Past and Present):**

Editor and Author, UNEP Millenium Assessment Study  
Convenor, AGU Chapman Conference: Role of Diatom Production, Si Flux and Burial in  
Regulation of Global Cycles, Greece 2003  
Received Docteur Honoris Causae from University of the Mediteranee-Marseille-Aix en  
Provence, France Oct 1999  
Received American Society of Limnology and Oceanography Hutchinson Medal, 1991  
Elected Fellow, California Academy of Sciences, 1985  
Past-President, American Society of Limnology and Oceanography  
Former Chairman, Ocean Sciences Executive/Advisory Committee, National Science  
Foundation  
Editorial Board, Journal of Plankton Research  
Natural Sciences Coordinator of Sea Grant Institutional Program at the University of  
Southern California  
Past Member, User Advisory Group for the Scripps Institution of Oceanography Satellite  
Remote Sensing Facility (SIO-SRSF)  
Member, UNOLS Advisory Council  
Chairman, UNOLS Advisory Council, 1977-1979  
Member, Joint Committee of the Polar Research Board and the Ocean Sciences Board;  
Committee to Evaluate Marine Research in the Antarctic, National Research Council  
Panel Member, National Research Council Board on Biology, Dec 1989  
Panel Member, National Research Council Board on Long-term Archiving of Ocean  
Data, Jun 1993  
JGR Ocean Editor Selection Panel, 1994  
ASLO Hutchinson Award Committee, 1993-  
External Member, PhD Committees, Univ. Delaware, Univ of Alaska,

International Thesis Jury Member of :

Del Amo, Y., 1996 University of Brest

Raimbault, P. 1992, University of Luminy

Collos, Y. 1982 University of Luminy

International Research Programs

Director, Upwelling Biome Program, International Biological Program (IBP)

Coordinator, Greek/U.S. Working Conference on Oceanography

Member, Program Committee for the Cooperative Investigations of the Equatorial Atlantic (CINECA)

Participant, CINECA II cruise of N/S Jean Charcot

Participant, OPALÉO Workshop (Brest, 96)

Lecturer, SiWEBS Summer School, Greece (June 2003)

Member, Organizing Committee, TRACER 99; Tracer Workshop (Brest)

Member, PICES Modeling Working Group Committee, 2000

Member, SCOPE Committee: Effects of dams on Si Sources, 2000

Member, United Nations Millenium Assessment Study 2003

### **CURRENT RESEARCH INTERESTS:**

Role of silicon and iron in oceanic export production and exchange of CO<sub>2</sub> with the atmosphere.

Role of the "silicate pump" in interpretation of the sedimentary record of past ocean productivity.

Algal nutrient dynamics, Cyclic behavior of nitrogen and silicon in the sea

Upwelling, Eutrophication by marine outfalls

Measurement of productivity with <sup>15</sup>N

Theoretical aspects and modeling of nutrient limitation in aquatic systems

Remote Sensing

### **PUBLICATIONS:**

1959 Neess, J. and R.C. Dugdale. Computation of production for populations of aquatic midge larvae. Ecology 40(3): 425-430.

Dugdale, R.C., V.A. Dugdale, J. Neess, and J.J. Goering. Nitrogen fixation in lakes. Science 130 (3379): 859-860.

1960 Dugdale, R.C., and J.T. Wallace. Light and dark bottle experiments in Alaska. Limnology and Oceanography 5(2): 230-231.

1961 Dugdale, R.C., D.W. Menzel and J.H. Ryther. Nitrogen fixation in the Sargasso Sea. Deep-Sea Research 7:298-300.

Dugdale, R.C. and V.A. Dugdale. Sources of phosphorus and nitrogen for lakes on Afognak Island. Limnology and Oceanography 6(1): 13-23.

- 1962 Neess, J., R.C. Dugdale, V.A. Dugdale and J.J. Goering. Nitrogen metabolism in lakes. I. Measurement of nitrogen fixation with  $^{15}\text{N}$ . Limnology and Oceanography 7(2): 163-169.
- Dugdale, V.A. and R.C. Dugdale. Nitrogen metabolism in lakes. II. Role of nitrogen fixation in Sanctuary Lake, Pennsylvania. Limnology and Oceanography 7(2): 170-177.
- 1964 Goering, J.J., R.C. Dugdale and D.W. Menzel. Cyclic diurnal variations in the uptake of ammonia and nitrate by photosynthetic organisms in the Sargasso Sea. Limnology and Oceanography 9(3): 448-451.
- Dugdale, R.C., J.J. Goering and J.H. Ryther. High nitrogen fixation rates in the Sargasso Sea and the Arabian Sea. Limnology and Oceanography 9(4): 507- 510.
- 1965 Dugdale, V.A. and R.C. Dugdale. Nitrogen metabolism in lakes. III. Tracer studies of the assimilation of inorganic nitrogen sources. Limnology and Oceanography 10(1): 53-57.
- 1965 Barsdate, R.J. and R.C. Dugdale. Rapid conversion of organic nitrogen to  $\text{N}_2$  for mass spectrometry: An automated Dumas procedure. Analytical Biochemistry 13: 1- 5.
- 1966 Natarajan, K.V. and R.C. Dugdale. Bioassay and distribution of thiamine in the sea. Limnology and Oceanography 11(4): 621-629.
- Goering, J.J., R.C. Dugdale and D.W. Menzel. Estimates of in situ rates of nitrogen uptake by Trichodesmium sp. in the tropical Atlantic Ocean. Limnology and Oceanography 11(4): 614-620.
- 1966 Goering, J.J. and R.C. Dugdale. Denitrification rates in an island bay in the equatorial Pacific Ocean. Science 154(3748): 505-506.
- 1967 Dugdale, R.C. Nutrient limitation in the sea: Dynamics, identification, and significance. Limnology and Oceanography 12(4): 685-695. (Also reprinted in: F. Ford and W.E. Hazen (eds), Readings in Aquatic Ecology, p. 349-359. W.B. Saunders, Co. Philadelphia. 1972)
- Dugdale, R.C. and J.J. Goering. Uptake of new and regenerated forms of nitrogen in primary productivity. Limnology and Oceanography 12(2): 196- 206.
- 1969 Forbes, R.B., R.C. Dugdale, T. Katsura, H. Matsumoto and H. Haramura. Dredged basalt from Giacomini Seamount. Nature 221(5183): 849-850.
- MacIsaac, J.J. and R.C. Dugdale. The kinetics of nitrate and ammonia uptake by natural populations of marine phytoplankton. Deep-Sea Research 16: 45-47.

- 1970 Dugdale, R.C. and T. Whitley. Computer simulation of phytoplankton growth near a marine sewage outfall. Rev. Intern. Oceanogr. Med. 17: 201-210.
- Dugdale, R.C., J.C. Kelley and T. Becacos-Kontos. The effects of effluent discharge on the concentration of nutrients in the Saronikos Gulf. FAO Technical Conference on Marine Pollution and Its Effects on Living Resources and Fishing, Rome, Italy, Dec. 9-18. 12 pp.
- Dugdale, R.C. and J.J. Goering. Nutrient limitation and the path of nitrogen in Peru Current production. Scientific Results of the Southeast Pacific Expedition, Anton Brunn Report No 5: 5.3-5.8.
- 1971 Walsh, J.J. and R.C. Dugdale. A simulation model of the nitrogen flow in the Peruvian upwelling system. Investigacion Pesquera 35(1): 309-330.
- Dugdale, R.C. and J.J. MacIsaac. A computational model for the uptake of nitrate in the Peru upwelling region. Investigacion Pesquera 35(1): 299-308.
- 1971 Walsh, J.J., J.C. Kelly, R.C. Dugdale and B.W. Frost. Gross features of the Peruvian upwelling system with special reference to possible diel variation. Investigacion Pesquera 35(1): 25-42.
- Dugdale, R.C. and J.J. Goering. A model of nutrient-limited phytoplankton growth. In: D.H. Hood (ed.) Impingement of Man on the Ocean. John Wiley and Sons. N.Y. pp. 589-600.
- Becacos-Kontos, T. and R.C. Dugdale. Pollution in Greek waters. Marine Pollution Bulletin 2(10): 158-160.
- Packard, T.T., D. Blasco, J.J. MacIsaac and R.C. Dugdale. Variations on nitrate reductase activity in marine phytoplankton. Investigacion Pesquera 35(1): 209- 219.
- Barber, R.T., R.C. Dugdale, J.J. MacIsaac and R.L. Smith. Variations in phytoplankton growth associated with the source and conditioning of upwelling water. Investigacion Pesquera 35(1): 171-193.
- 1972 Dugdale, R.C. Chemical oceanography and primary productivity in upwelling regions. Geoforum 11: 47-61.
- Whitley, T.E. and R.C. Dugdale. Creatine in seawater. Limnology and Oceanography 17(2): 309-314.
- Barsdate, R.J. and R.C. Dugdale. Effects of volcanic ashfalls on chemical and sediment characteristics of two Alaskan lakes. Journal of the Fisheries Research Board of Canada 29: 229-236.

- MacIsaac, J.J. and R.C. Dugdale. Interactions of light and inorganic nitrogen in controlling nitrogen uptake in the sea. Deep-Sea Research 19: 209-232.
- Dugdale, R.C. Nitrogen cycle in the Ocean. In: R.W. Fairbridge (ed.), The Encyclopedia of Geochemistry and Environmental Sciences, Encyclopedia of Earth Sciences Series, Van Nostrand Rheinhold Co., N.Y., Vol. IVa: 807- 809.
- Dugdale, R.C., J.J. MacIsaac and D. Blasco. Nutrient kinetics of algal populations in two gulfs adjoining the Attic Peninsula, one receiving effluents. Abstract in Journées d'études sur les pollutions marines (Athens, Greece, 3-4 November, 1972), CIESM pp. 163-166.
- Walsh, J.J. and R.C. Dugdale. Nutrient submodels and simulation models of phytoplankton production in the sea. In: Allen, H.E. and J.R. Kramer (eds.) Nutrients in Natural Waters. John Wiley and Sons, N.Y. pp. 171-191.
- 1973 Davis, C.O., P.J. Harrison and R.C. Dugdale. Continuous culture of marine diatoms under silicate limitation. I. Synchronized life cycle of Skeletonema costatum. Journal of Phycology 9(2): 175-180.
- 1973 Goering, J.J., F.A. Richards, L.A. Codispoti and R.C. Dugdale. Nitrogen fixation and denitrification in the oceans. Biogeochemical budgets. Proceedings of the International Symposium of Hydrogeochemistry and Biogeochemistry II: 12-27.
- Hopkins, T.S., R.D. Pillsbury and R.C. Dugdale. Water movements in the Petalion Gulf, Greece, based on observations taken in late winter 1970. Rapports et Proces-verbaux des Reunions Commission Internationale pour l'Exploration Scientifique de la Mer Mediterranee 22(5): 19.
- 1974 Pavlou, S.P., G.E. Friederich, J.J. MacIsaac and R.C. Dugdale. A modified tracer technique for the determination of nitrogen uptake by marine phytoplankton. Tethys 6(1-2): 171-178.
- MacIsaac, J.J., R.C. Dugdale and G. Slawyk. Nitrogen uptake in the northwest Africa upwelling area: Results from the CINECA-CHARCOT II Cruise. Tethys 6(1-2): 69-76.
- 1975 Dugdale, R.C. Biological modelling, in: J.C.J. Nihoul (ed.), Modelling of Marine Systems. Elsevier Oceanography Series 10, Elsevier, N.Y. pp. 187-216.
- Kelley, J.C., T.E. Whitley and R.C. Dugdale. Results of sea surface mapping in the Peru upwelling system. Limnology and Oceanography 20: 784- 794.
- Dugdale, R.C. and J.J. MacIsaac. Conclusions and recommendations concerning the oceanography and pollution by liquid wastes of the Saronikos Gulf. In: Environmental Pollution Control Project Athens, Interim Technical Report, Vol III:103-122.

- Dugdale, R.C. and J.J. MacIsaac. Interpretation of O<sub>2</sub>, nutrients and primary and secondary production data. In: Environmental Pollution Control Project Athens, Interim Technical Report, Vol III: 280-393.
- 1976 Slawyk, G., J.J. MacIsaac and R.C. Dugdale. Inorganic nitrogen by marine phytoplankton under in situ and simulated in situ incubation conditions. Limnology and Oceanography 21(1): 149-152.
- Harrison, P.J., H.L. Conway and R.C. Dugdale. Marine diatoms grown in chemostats under silicate or ammonium limitation. I. Cellular chemical composition and steady state growth kinetics of Skeletonema costatum. Marine Biology 35: 177-186.
- Dugdale, R.C. Nutrient cycles. in: D.H. Cushing and J.J. Walsh (eds.), The Ecology of the Sea. Blackwells, London pp. 141-172.
- 1976 Coachman, L.K., T.S. Hopkins and R.C. Dugdale. Water masses of the Saronikos Gulf in Winter. Acta Adriatica 18(1-23): 129-162.
- 1977 Dugdale, R.C., J.J. Goering, R.T. Barber, R.L. Smith and T.T. Packard. Denitrification and hydrogen sulfide in Peru upwelling during 1976. Deep-Sea Research 24: 601- 608.
- Dugdale, R.C. Modelling. in: E.D. Goldberg and J.H. Steele (eds.), The Sea, Ideas and Observations on Progress in the Study of the Seas. John Wiley, N.Y. Vol 6: 789-806.
- Dugdale, R.C. Recommendations of the working group on the physical and chemical environment. In: N.R. Andersen and B.J. Zahuranec (eds.), Oceanic Sound Scattering Prediction. Plenum Press, N.Y.
- 1978 Dugdale, R.C. and T.S. Hopkins. Predicting the structure and dynamics of a pollution-driven marine ecosystem embedded in an oligotrophic sea. Thalassia Jugoslavica 14(1-2): 107-126.
- Packard, T.T., R.C. Dugdale, J.J. Goering and R.T. Barber. Nitrate reductase activity in the subsurface waters of the Peru Current. Journal of Marine Research 36(1): 59-76.
- 1979 Dugdale, R.C. Primary nutrients and red tides in upwelling regions. in: Taylor, L. and H.H. Selinger (eds.) Toxic Dinoflagellate Blooms. Elsevier. pp. 257-262.
- 1979 Dugdale, R.C., B.H. Jones, J.J. MacIsaac and J.J. Goering. Interactions of primary nutrient and carbon uptake in the Peru Current: a review and synthesis of laboratory and field results. CUEA Technical Report No. 51.
- MacIsaac, J.J., R.C. Dugdale, S.A. Huntsman and H.L. Conway. The effect of sewage on uptake of inorganic nitrogen and carbon by natural populations of marine phytoplankton. Journal of Marine Research 37(1):51-66.

Mickelson, M.J., H. Maske and R.C. Dugdale. Nutrient-determined dominance in multispecies chemostat cultures of diatoms. Limnology and Oceanography 24(2): 298-315.

1980 Dugdale, R.C. Environmental factors which control phytoplankton populations in coastal waters. in: Simonett, D.L. (ed.) Marine Sciences and Ocean Policy Symposium, University of California, Santa Barbara, June 1979, pp. 9-19.

Dugdale, R.C. The kinetic approach to identification of limiting nutrient processes in oligotrophic marine ecosystems. Abstract in: A.P. Grimanis and R.C. Dugdale (eds.) First Greek/U.S. Working Conference on Oceanography Related to Environmental Problems. July, 1980.

- 1980 Grimanis, A.P. and R.C. Dugdale (eds.) Summary activities, results and recommendations from seven joint working groups, list participants, conference program, abstract of papers. Report GUS I, vol. 1. First Greek/U.S. Working Conference on Oceanography related to Environmental Problems.
- Grunseich, G.S., R.C. Dugdale, N. Breitner and J.J. MacIsaac. Sample conversion and mass spectrometry for  $^{15}\text{N}$  analysis of phytoplankton. CUEA Technical Report No. 44 pp. 1-89.
- 1981 Brink, K.H., B.H. Jones, J.C. Vanleer, C.N. Mooers, D. Stuart, M. Stevenson, R.C. Dugdale and G. Heburn. Physical and biological structure and variability of the upwelling center off Peru at  $15^{\circ}\text{S}$ , during March 1977. In: F.A.Richards (ed.), Coastal Upwelling, American Geophysical Union, 1981. pp. 473-495.
- 1981 Dugdale, R.C., B.H., Jones, J.J. MacIsaac and J.J. Goering. Adaptation of nutrient assimilation. In: T. Platt (ed.) Canadian Bulletin of Fisheries and Agriculture Sciences 210: 234-250.
- 1982 Minas, H.J., L.A. Codispoti and R.C. Dugdale. Nutrients and primary production in the upwelling region off northwest Africa. Rapp. P. Reun. Cons. Int. Explor. Mer. 180: 148-183.
- Codispoti, L.A., R.C. Dugdale and H.J. Minas. A comparison of the nutrient regimes off northwest Africa, Peru and Baja California. Rapp. P. Reun. Cons. Int. Explor. Mer. 180: 184- 201.
- 1983 Dugdale, R.C. Effects of source nutrient concentrations and nutrient regeneration on production of organic matter in coastal upwelling centers. In: E.Suess and J. Thiede (eds.), Coastal Upwelling, Pt.A. Plenum Press. pp. 175- 182.
- Jones, B.H. K.H. Brink, R.C. Dugdale, D.W. Stuart, J.C. Van Leer, D. Blasco and J.C. Kelley. Observations of a persistent upwelling center off Point Conception, California. In: E. Suess and J. Thiede (eds.), Coastal Upwelling, Pt.A. Plenum Press. pp. 37-60.
- 1984 Blasco, D., J.J. MacIsaac, T.T. Packard and R.C. Dugdale. Relationship between nitrate reductase and nitrate uptake in phytoplankton. Limnology and Oceanography 29(2): 275- 286.
- Wilkerson, F.P. and R.C. Dugdale. Possible connections between sewage effluent, nutrient levels and jellyfish blooms. In: Proceedings of Workshop on jelly-fish blooms in the Mediterranean Sea. UNEP, Athens. pp195-201.
- 1985 MacIsaac, J.J., R.C. Dugdale, R.T. Barber, D. Blasco and T.T. Packard. Primary production cycle in an upwelling center. Deep-Sea Research 32: 503-529.

- 1985 Dugdale, R.C. The effects of varying nutrient concentration on biological production in upwelling regions. CalCOFI Report 26: 93-96.
- Packard, T.T., D. Blasco, R.C. Dugdale. Coastal Upwelling: A Short Summary of its Physical, Chemical and Biological Characteristics. Chapt. 2. In: P.V. Hag and J.D. Milliman (eds.), Marine Geology and Oceanography of Arabian Sea and Coastal Pakistan. Hutchinson Press, Strondberg, PA.
- Dugdale, R.C. and F.P. Wilkerson. Primary production in the Cap Blanc region. International Symposium on Upwelling in West Africa, Inst. Inv., Barcelona 1: 233-243.
- 1986 Dugdale, R.C. and F.P. Wilkerson. The use of  $^{15}\text{N}$  to measure nitrogen uptake in eutrophic oceans; experimental considerations. Limnology and Oceanography 31: 673-689.
- Dugdale, R.C. Citations classic "Uptake of new and regenerated forms of nitrogen in primary productivity. Limnol. Oceanogr. 12: 196-206". Current Contents 9: 14.
- 1987 Zimmerman, R.C., J.N. Kremer and R.C. Dugdale. Acceleration of nutrient uptake by phytoplankton in a coastal upwelling ecosystem: a modeling analysis. Limnology and Oceanography 32: 359-367.
- Wilkerson, F.P. and R.C. Dugdale. The use of large shipboard barrels and drifters to study the effects of coastal upwelling on phytoplankton nutrient dynamics. Limnology and Oceanography 32: 368-382.
- Wilkerson, F.P., R.C. Dugdale and R.T. Barber. Effects of El Nino on new, regenerated and total production in eastern boundary upwelling systems. Journal of Geophysical Research 92: 14347-14355.
- Dugdale, R.C., F.P. Wilkerson, R.T. Barber, D. Blasco and T.T. Packard. Changes in nutrients, pH, light penetration and heat budget by migrating photosynthetic organisms. Oceanology Acta Spec. 6: 103-109.
- 1988 Dugdale, R.C., and F.P. Wilkerson. Nutrient sources and primary production in the eastern Mediterranean. Oceanologica Acta Spec: 179-184.
- 1989 Dugdale, R.C., and F.P. Wilkerson. New production in the upwelling center at Point Conception, California: temporal and spatial patterns. Deep-Sea Research, 36: 985-1007.
- Dugdale, R.C., A. Morel, A. Bricaud and F.P. Wilkerson. Modeling new production in upwelling centers: II A case-study of modeling new production from remotely sensed temperature and color. Journal of Geophysical Research, 94: 18119-18133.

- 1989 Dugdale, R.C. and F.P. Wilkerson. Regional perspectives in global new production. In: Oceanologie actualite et prospective, M.M. Denis (ed.), Proceedings of the Centennial of Station d'Endoume, Marseille, pp. 289-309.
- 1990 Dugdale, R.C., F.P. Wilkerson and A. Morel. Modeling new production in upwelling centers: I Applications of a shift-up model to 3 upwelling areas. Limnology and Oceanography, 35: 822-829
- Dugdale, R.C. and F.P. Wilkerson. Iron addition experiments in the Antarctic- a re-analysis. Global Biogeochemical Cycles. 4:13-19.
- 1991 Dugdale, R.C. and F.P. Wilkerson. Low specific nitrate uptake rate: a common feature of high-nutrient, low-chlorophyll marine ecosystems. Limnology and Oceanography, 36: 1678-1689.
- 1992 Dugdale, R.C., F.P. Wilkerson, R.T. Barber and F.P. Chavez. Estimating new production in the equatorial Pacific Ocean at 150°W. Journal Geophysical Research. 97: 681-686.
- Wilkerson, F.P. and R.C. Dugdale. 1991 Measurements of nitrogen productivity in the equatorial Pacific at 150°W. Journal Geophysical Research. 97: 669-679.
- Dugdale, R.C. and F.P. Wilkerson. a Nutrient limitation of new production. In: Primary Productivity and Biogeochemical Cycles in the Sea, P.G. Falkowski and A.D. Woodhead (eds.), Plenum Press, New York, pp. 107-122.
- 1994 Dugdale, R.C., F.P. Wilkerson, D. Halpern, F.P. Chavez and R.T. Barber. 1994. Remote sensing of seasonal and annual variation of equatorial new production: a model for global estimates. Advances in Space Research, 14: 169-178.
- Minas, H.J., R.C. Dugdale, M. Minas and F.P. Wilkerson. New production in oligotrophic waters: a review of results and ideas induced by the "<sup>14</sup>C-method" controversy.
- 1995 Dugdale, R.C., F.P. Wilkerson and H.J. Minas. 1995 The role of a silicate pump in driving new production., Deep-Sea Research 42: 697-719
- 1996 Wilkerson, F.P. and R.C. Dugdale. 1996. Using satellite-derived sea surface temperatures to estimate silicate and nitrate concentrations in the equatorial Pacific. Advances in Space Research 18: 81-89.
- Kudela, R.M. and R.C. Dugdale. Estimation of new production from remotely sensed data in a coastal upwelling regime (Monterey Bay). Advances in Space Research 18: 91-97.
- 1997 White, K.K. and R.C. Dugdale. 1997 Silicate and nitrate uptake in the Monterey Bay upwelling system. Continental Shelf Res., 7: 455-472.

- Dugdale, R.C., C.O. Davis and F.P. Wilkerson. 1997. Assessment of new production at the upwelling center at Point Conception, California using nitrate estimated from remotely-sensed sea-surface temperature. Journal of Geophysical Research. 102, 8573-8585.
- Kudela, R.M., W.P. Cochlan and R.C. Dugdale. 1997. Carbon and nitrogen uptake to light in response to light by phytoplankton during an upwelling event. Journal of Plankton Research. 19: 609-630.
- Wilkerson, F.P. and R.C. Dugdale. The effect of El Niño on coastal new production. In "California and the World Ocean '97, pp. 1554-1562.
- 1998 Dugdale, R.C. and F.P. Wilkerson. Silicate regulation of new production in the equatorial Pacific upwelling. Nature. 391: 270:273.
- Brzezinski, M. A., D. R. Phillips, F. P. Chavez, R. C. Dugdale, G. E. Friederich.. 1998. Silica production in the Monterey California upwelling system. Limnol. Oceanogr. 42: 1694-1705.
- 1999 Chu, Shaoping, L. A. McNair, S. Elliott, C-C A. Lai, O.A. Hurricane, R.P. Turco and R.C. Dugdale. 1999. Ecodynamics and dissolved gas chemistry routines for ocean circulation models. Computers and Chemistry 23 : 447-467.
- 2000 Kudela, R.M. and R.C. Dugdale. Nutrient regulation of phytoplankton productivity in Monterey Bay, California. Deep-Sea Research Part II 47: 1023-1055.
- Kudela, R.M., D.A. Hansell and R.C. Dugdale. Seasonal variability in the phytoplankton nitrogenous nutrition and nutrient dynamics of Monterey Bay, California. Cont. Shelf Res. (in revision).
- Wilkerson, F.P., R.C. Dugdale, R.M. Kudela and F.P. Chavez. 2000. Biomass and productivity in Monterey Bay, CA: Contribution of the large phytoplankton. Deep-Sea Research Part II 47: 1003-1023.
- Ragueneau, O., P. Treguer, A. Leynaert, R.F. Anderson, M.A. Brzezinski, D.J. DeMaster, R.C. Dugdale, J. Dymond, F.G. Fischer, R. Francois, C. Heinze, E. Maier-Reimer, V. Martin-Jezequel, D.M. Nelson and B. Queguiner. A review of the Si cycle in the modern ocean: recent progress and missing gaps in the application of biogenic opal as a paleoproductivity proxy. Global and Planetary Change 26: 317-365.

- 2000 Dugdale, R.C. and F.P. Wilkerson. Sources and fates of silicon in the ocean: the role of diatoms in climate and glacial cycles. *Scientia Marina* 65: (Suppl. 2: A Marine Science Odyssey Into the 21<sup>st</sup> Century, J.M. Gili, J.L. Pretus and T.T. Packard, eds.) 141-152.
- Hogue, V., F. Wilkerson, R. Dugdale and A. Marchi. 2001 Phytoplankton and nutrient dynamics in Suisun, San Pablo and Central Bays. *Interagency Ecological Program Newsletter* 14: 35-41.
- 2002 Chai, F., R. C. Dugdale, T-H Peng, F. P. Wilkerson, and R. T. Barber. 2002. One dimensional ecosystem model of the equatorial Pacific upwelling system. Part I: Model development and silicon and nitrogen cycle. *Deep-Sea Research II*. 49: 2713—2747.
- Dugdale, R.C., R. T. Barber, F. Chai, T.H. Peng, and F.P. Wilkerson. 2002. One dimensional ecosystem model of the equatorial Pacific upwelling system, Part II: Sensitivity analysis and comparison with JGOFS EqPac Data *Deep-Sea Research II*. 49: 2747-2769.
- Dugdale, R. C. A. G. Wischmeyer, F.P. Wilkerson, R.T. Barber, F. Chai, M. Jiang and T-H. Peng. 2002. Meridional asymmetry of source nutrients to the equatorial Pacific upwelling ecosystem and it's potential impact on ocean-atmosphere CO<sub>2</sub> flux; a data and modeling approach. *Deep-Sea Research II*. 49: 2513-2533.
- Wilkerson, F.P., R. C Dugdale, A. Marchi and C.A. Collins. 2002. Hydrography, nutrients and chlorophyll measured during El Niño and La Niña compared to normal years in the Gulf of the Farallones, CA. *Progress in Oceanography* 53: 293-310.
- 2003 Jiang, M-S, F. Chai, R.C. Dugdale, F.P. Wilkerson, T-H Peng and R.T. Barber. 2003. A nitrate and silicate budget in the equatorial Pacific Ocean: a coupled physical-biological model study. *Deep-Sea Research II*. 50: 2971-2996
- Chai, F., M. Jiang, R.T. Barber, R.C. Dugdale, and Y. Chao. 2003. Interdecadal variation of the transition zone chlorophyll front, a physical-biological model simulation between 1960 and 1990. *Journal of Oceanography*, Vol. 59, 461-475.
- 2004 Leynaert A., Bucciarelli E., Claquin P. Dugdale, R.C. Martin-Jezequel, V., Pondaven P. Ragueneau O. Effect of iron deficiency on diatom cell size and silicic acid uptake kinetics. *Limnology and Oceanography* 49: 1134-1143.
- Strutton, Peter G.; Chavez, Francisco P.; Dugdale, Richard C.; Hogue, Victoria. Primary productivity in the central equatorial Pacific (3°S 130°W) during GasEx-2001. *Journal of Geophysical Research*, Vol. 109, No. C8, C08S06, .1029/2003JC001790
- Dugdale, R. C.; Lyle, M.; Wilkerson, F. P.; Chai, F.; Barber, R. T.; Peng, T.-H. Influence of equatorial diatom processes on Si deposition and atmospheric CO<sub>2</sub> cycles at

glacial/interglacial timescales, *Paleoceanography*, Vol.19, No.3, PA3011,  
10.1029/2003PA000929

- 2005 Hogue, V. F.P. Wilkerson and R,C. Dugdale. Hogue, V., F.P. Wilkerson and R,C. Dugdale. 2005 Effects of ultraviolet-B radiation on natural phytoplankton assemblages in central San Francisco Bay. *Estuaries*. 28: 190-204.

Cloern, J. E., T. S. Schraga, C. B. Lopez, N. Knowles, R. Labiosa, R. Dugdale. 2005. Climate anomalies generate an exceptional dinoflagellate bloom in San Francisco Bay. *Geophysical Research Letters*, vol. 32, 114608, doi:10.1029/2005GL023321.

- 2006 Wilkerson, F.P., R.C. Dugdale, V.E. Hogue and A. Marchi. Phytoplankton blooms and nitrogen productivity in San Francisco estuary. 2006i n press, *Estuaries*.

Takabayashi, M., K. Lew, A. Johnson, A. Marchi, R. Dugdale, F.P. Wilkerson. Changes in chain length of a diatom, *Skeletonema costatum*, measured with a Cytobuoy field cytometer. *Journal of Plankton Research*. (in review)

Wilkerson, F.P. R.C. Dugdale, A. Marchi, V. Hogue, A. Lassiter. The phytoplankton bloom response to wind events and upwelled nutrients during the CoOP-WEST Study. *Deep-Sea Res II* (in press)

Lassiter, A.M, F. Wilkerson, R.Dugdale and V. Hogue. Functiona phytoplankton groups in the CoOP\_West upwelling region: the *Chaeteoceros* complex. *Deep-Sea Res II* (in press).

Dugdale, R.C., F.P. Wilkerson, A.Marchi and V.Hogue. Nutrient controls on new production in

Wilkerson, F. and R,C. Dugdale. Nitrogen in Coastal Upwelling. Chapter in Nitrogen in the Sea (in review)

Dugdale, R.C., F.P. Wilkerson, V.E. Hogue and A. Marchi. Spring phytoplankton bloom development in San Francisco Estuary: the role of ammonium and nitrate. Submitted to *Estuarine, Coastal and Shelf Science*

#### PRESENTATIONS SINCE 1984:

- 1984 Phytoplankton responses to upwelling. AGU/ASLO, New Orleans, LA. January, Invited paper.

Nutrient and carbon uptake processes contributing to patterns of primary production in upwelling centers during OPUS II. AGU/ASLO, New Orleans, LA. January, Invited paper.

- The effect of nutrient concentration on biological productivity of Eastern Boundary regions. CalCOFI Symposium, CalCOFI Annual Conference, Idyllwild, CA. October, Invited paper.
- Biological importance of upwelling at Point Conception. First Annual Minerals Management Service Studies Information Transfer Meeting, Pacific OCS Region, Santa Barbara, CA. December, Invited paper.
- Some thoughts on process and perspectives in aquatic nitrogen cycle research. AGU/ASLO, San Francisco, CA. December, Invited paper.
- 1985 Changes in nutrients, pH, light penetration and heat budget due to vertical movements of photosynthetic organisms in Peru coastal waters. SCOR WG 56 Symposium on vertical motion in the equatorial upper ocean and its effects upon living resources and the atmosphere. Paris, France. May, Invited paper. Session chairman.
- Rapid changes in nutrients, pH and heat budgets of seawater due to vertically migrating organisms. ASLO, Minneapolis, MI. June 1985. Session chairman.
- Nutrient sources and primary production in the eastern Mediterranean. Colloque Int du CNRS. Oceanography of the Mediterranean Sea: interdisciplinary aspects of the pelagic environment. Villefranche-sur-Mer, France. September, Invited paper, Session chairman.
- 1986 Nitrogen dynamics at the Point Conception, California upwelling center during the non-El Nino and El Nino years, 1981 and 1983. AGU/ASLO, New Orleans, LA. January.
- Use of  $^{15}\text{N}$  to measure nitrogen uptake and new production in eutrophic oceans. ASLO. Rhode Island, June.
- Effects of El Nino on new, regenerated and total production in eastern boundary upwelling systems. Chapman Conference on El Nino, Guayaquil, Ecuador. October.
- A research program designed to measure new production in the equatorial Pacific. EPOC Meeting, Lake Arrowhead, CA. October.
- Factors affecting the proportion of new primary production in California coastal upwelling systems. AGU/ASLO, San Francisco, CA. December. Session chairman.
- 1987 New production from space. International Atomic Energy Agency, Monaco. Invited talk.
- Remote sensing and new production in the Northwest Africa upwelling system. Marseilles. Invited talk.
- Remote sensing of new production in the ocean. ASLO, Madison, WI.

- 1988 A shift-up model of new production in upwelling plumes using remotely sensed temperatures. AGU/ASLO, New Orleans, LA. January.
- New production concepts. ASLO, Boulder, CO. June. Invited talk
- Preliminary new production estimates from the WECOMA 1988 section across the Pacific equator at 150°W. EPOC Meeting, Lake Arrowhead, CA. November
- New production in the eastern equatorial Pacific upwelling measured with <sup>15</sup>N. AGU/ASLO, San Francisco, CA. December.
- Discussion Panel, Sigma XI Forum on global change and our common future. Los Angeles, CA. May.
- Control of new production at high and low latitudes. ASLO, Fairbanks, AK. June. Invited talk.
- Estimates of new production in the eastern equatorial Pacific during the WEC88 cruise. The Oceanography Society, Monterey, CA. August.
- Regional perspectives in global new production. Centennial of Station d'Endoume, Marseille, France. October. Invited talk
- 1989 Estimating new production from remotely sensed SST. EPOC Meeting, Asilomar, CA, November. Invited talk.
- Global new production Department of Oceanography, University of Washington, Seattle, WA, November. Invited seminar
- Nitrogenous nutrients. Symposium in honor of R.R.L. Guillard, Woods Hole, MA, December. Invited talk.
- Reducing global warming by enhancing carbon dioxide assimilation in phytoplankton. National Research Council Board on Biology, Washington DC, December. Invited talk.
- 1990 Evidence of a critical nitrate concentration in upwelling systems: implications for operation of the biological pump in the CO<sub>2</sub> cycle. AGU/ASLO, New Orleans, February.
- Control of new production in upwelling systems. 12th Colloquium of GIROQ, Quebec, Canada, March. Invited talk.
- Biogeochemical modeling of the equatorial Pacific, U.S. JGOFS Workshop, Invited, Princeton, NJ, September.

- Primary productivity and new production as estimated by  $^{15}\text{N}$  in Monterey Bay. AGU, San Francisco, CA. (Kudela, Yang and Dugdale), December.
- A comparison of the independent estimates of the f-ratio in Monterey Bay. AGU, San Francisco, CA. (DiTullio, Hansell, Dugdale and Downs), December.
- 1991 The effect of nitrate concentration on new production and ecosystem structure. MBARI, Monterey CA, February, Invited seminar
- Panelist at ASLO Special Symposium: What controls phytoplankton production in nutrient rich areas of the open ocean. San Marcos, CA., February.
- New production in the Southern Ocean: Fe limited, grazed or cold-adapted. ASLO Special Symposium: What controls phytoplankton production in nutrient rich areas of the open ocean. San Marcos, CA. (Wilkerson and Dugdale), February.
- Control of new production in the Pacific equatorial upwelling system: experiments and measurements with  $^{15}\text{N}$  and Fe. ASLO Special Symposium: What controls phytoplankton production in nutrient rich areas of the open ocean. San Marcos, CA. (Yang, Kudela and Dugdale), February.
- Pacific equatorial nitrate distribution from AVHRR temperatures: a step toward remotely sensed new production and  $\text{CO}_2$  exchange. The Oceanography Society, St Petersburg, FL., March.
- Nutrient limitation of new production in the sea. Brookhaven Symposium: Primary productivity and biogeochemical cycles in the sea, Brookhaven National Laboratory, Long Island, NY., June, Invited talk.
- Acceptance speech for the ASLO Hutchinson Award, ASLO, Halifax, Nova Scotia, Canada., June, Invited.
- Nutrient regimes and nitrogen productivity around Fieberling Guyot- a seamount located on the western margin of the California Current. EPOC 1991, Lake Arrowhead, CA. (Dugdale, Kudela, Kopczak and Wilkerson), October.
- The role of biological productivity in the ocean/atmosphere  $\text{CO}_2$  cycle. California Institute of Technology, Pasadena, CA., December, Invited seminar.
- 1992 Nutrient distributions in the nearfield of a submarine topographical feature. ASLO Aquatic Sciences Meeting, Santa Fe, New Mexico, (Dugdale, Kudela, Kopczak and Wilkerson), February.
- An evaluation of seasonal variability and  $^{15}\text{N}$  techniques in Monterey Bay, CA. ASLO Aquatic Sciences Meeting, Santa Fe, New Mexico, (Kudela and Dugdale), February.

- Nitrate uptake processes within the equatorial Pacific: limitation on uptake and air-sea exchange of CO<sub>2</sub>. University of California, Santa Cruz, May, Invited seminar.
- Remote sensing of seasonal and annual variation of equatorial new production: a model for global estimates. Committee on Space Research Symposium, World Space Congress. September.
- 1992 Importance of a silicate pump in coastal regions, Universite de Marseille, Luminy, France. November. Invited seminar.
- New production in the equatorial Pacific in El Nino and La Nina conditions. AGU, San Francisco, CA. (Yang, Dugdale, Wilkerson, Barber and Chavez). December.
- 1993 Upwelling, new production and the exchange of CO<sub>2</sub> between atmosphere and the ocean, UCLA. February. Invited seminar.
- The role of silicate in global new production: a neglected nutrient. The Oceanography Society Meeting, Seattle, WA. (Dugdale, Wilkerson and Minas). April.
- Spatial and temporal variability of new production in Monterey Bay, CA. The Oceanography Society Meeting, Seattle, WA. (Wilkerson, Dugdale, Kudela and White) April.
- Factors controlling new production in Monterey Bay, CA estimated using large shipboard enclosures. The Oceanography Society Meeting, Seattle, WA. (Kudela, White and Dugdale). April.
- Silicic acid and nitrate uptake interactions in a coastal upwelling system. The Oceanography Society Meeting, Seattle, WA. (White, Dugdale, and Wilkerson). April.
- 1994 The biological silicate pump: effects on new production. ASLO AGU Ocean Sciences Meeting, San Diego, CA, February. Organizer and Chair of Special session on Silicate Limitation in the Sea.
- Silicate control of silicate and nitrate uptake in Monterey Bay. ASLO AGU Ocean Sciences Meeting, San Diego, CA, February. (White and Dugdale).
- Can silicate versus nitrate limitation be evaluated from remotely sensed sea-surface temperature? ASLO AGU Ocean Sciences Meeting, San Diego, CA, February. (Wilkerson and Dugdale).
- Delineation of high nitrate, low silicate, low chlorophyll in offshore upwelled waters using satellite derived sea-surface temperatures, COSPAR (Committee on Space Research, Hamburg, July, Scientific Organizer and Invited Paper.

- Invited Moderator at Dahlem Workshop on upwelling in the ocean: modern processes and ancient records, Berlin, September.
- 1995 Nutrient uptake and CO<sub>2</sub> flux, Marine Boundary Layer Workshop, Irvine, CA, August
- Silicate dynamics in Monterey Bay, Eastern Pacific Ocean Conference (EPOC), Fallen Leaf Lake, CA, September
- Global warming and new production in the California Current ecosystem, CalCOFI, Lake Arrowhead, CA, November
- 1996 Organizer, Session on Eastern Boundary Systems off the California Coast, AGU-ASLO Ocean Sciences Mtg., San Diego, February
- Seasonal new production at an upwelling site in Monterey Bay, CA; the contribution of the larger-celled autotrophs, AGU-ASLO Ocean Sciences Mtg., San Diego, February (Wilkerson, Dugdale, Kudela, Cochlan and Hayden)
- A study of the role of biology in the air-sea flux of CO<sub>2</sub> during the Spring 95 MBL Experiment off Monterey Bay, CA, AGU-ASLO Ocean Sciences Mtg., San Diego, February Invited (Chavez, Friederich, Dugdale, Wilkerson)
- Spatial distribution of new production in Monterey Bay during CoOP95: implications for CO<sub>2</sub> air-sea flux, AGU-ASLO Ocean Sciences Mtg., San Diego, February (Dugdale, Friederich, Chavez, Pennington, Wilkerson and Hayden)
- Air-sea fluxes of CO<sub>2</sub> in coastal upwelling: an overview of the Monterey Bay CoOP Experiment, AGU-ASLO Ocean Sciences Mtg., San Diego, February Invited (Dugdale, Chavez, Dacey, DeGrandpre, Brzezinski)
- Inorganic carbon and nutrient utilization in the central California upwelling systems during the CoOP95 Experiment, AGU-ASLO Ocean Sciences Mtg., San Diego, February (Friederich, Chavez and Dugdale)
- The importance of the silicate pump in global ocean flux, OPALCO Workshop, University of Brest, France, June 1996 (Dugdale, Wilkerson and Minas). Invited
- New production and air-sea fluxes of CO<sub>2</sub> measured during the Monterey Bay, CoOP experiment, EPOC 96, Timberline, OR, September
- The nutrient conditions required for order of magnitude changes in paleo-new production, AGU San Francisco, December 1996, Invited

- 1997 The relative importance of nitrate, ammonium and urea in determining estimates of eutrophic and oligotrophic new production. ASLO Ocean Sciences, Santa Fe, February Invited (Wilkerson and Dugdale)
- Is nitrate uptake the best candidate for measuring new production? ASLO Ocean Sciences, Santa Fe, February Invited (Dugdale and Wilkerson)
- The effect and prediction of El Niño on the coastal biological production of California. California and the World Ocean '97, San Diego, March (Dugdale and Wilkerson).
- Effects of massive flooding in January 1997 on the biology and physics of San Francisco Bay and the Gulf of Farallones, ERF, Rhode Island (Bollens, Collins, Dugdale, Wilkerson, Cordell, Cole, Cloern, Murphee, Rago, Hayden, Avent, Franklin).
- 1998 Effects of meridional nutrient asymmetry in equatorial undercurrent source water. AGU Ocean Sciences San Diego, February (Dugdale, Wilkerson and Barber).
- Ratios of carbon to nitrogen uptake by the Monterey Bay phytoplankton assemblage. AGU Ocean Sciences San Diego, February. (Wilkerson, Dugdale, Chavez, Kudela and Pennington)
- Nutrient limitation of new production with emphasis on the role of silicate; sources, control mechanisms and interaction with iron. US JGOFS Synthesis and Modeling Project Workshop, Durham, NH, July (Dugdale and Wilkerson), Invited
- Effects of San Francisco Bay on surface region nutrients in northern California coastal waters; a comparison of 1997 and 1998 non El Niño and El Niño conditions, EPOC 98, Timberline, OR, September (Dugdale, Collins, Wilkerson and Marchi).
- The silicate pump model for new production in upwelling systems: the effect of the estuary on silicate and nitrate supply to the Farallones during El Niño, Roimberg Tiburon Center, Invited, October.
- Effects of San Francisco Bay on surface region nutrients in northern California coastal waters; a comparison of 1997 and 1998 non El Niño and El Niño conditions, AGU, San Francisco, December (Dugdale, Marchi, Wilkerson and Collins).
- Surface processes and consequences on export production (Session Chair).  
US OPALEO proposals in the Pacific. OPALEO (The use of OPAL as a PALEO-productivity proxy) Workshop, Brest, France, December
- 1999 Nutrient concentrations and nutrient utilization in Central San Francisco Bay ASLO Ocean Sciences, Santa Fe, February (Dick Dugdale, Marchi, Hogue, Tustin, and Wilkerson)

Size fractionated nitrogen uptake and assimilation in Monterey Bay, Ca, ASLO Ocean Sciences, Santa Fe, February, Invited (Wilkerson, Dugdale, Schaefer, Marchi, Hogue)

Nutrients and new production in upwelling systems: the emerging role of silicate, Bodega Marine Lab., February, Invited.

Preliminary results from a 1D Model for the equatorial Pacific upwelling system incorporating silicate as a nutrient. Workshop "Modelling the biological pump of CO<sub>2</sub> and the biogeochemical cycle of silicon. Southampton, England, March, (Dugdale, Barber, Chai, Peng and Wilkerson)

SMP Workshop, Keystone, CO (July)

High silicate:nitrate conditions in central San Francisco Bay, Estuarine Research Federation 99, New Orleans, September 1999, (Dugdale, Marchi, Hogue, Tustin, Wilkerson).

Small scale variability in water column properties at the San Francisco deep ocean disposal site (SF-DODS), American Geophysical Union (AGU), December 1999 San Francisco, CA (Dugdale, Marchi, Tustin, McGowan).

2000 Origins and dynamics of silicate supply to eastern equatorial Pacific upwelling system. AGU-Ocean Sciences, San Antonio, January 2000 (Dugdale, Chai and Barber)

Comparing the impact of the 1998 El Nino versus the 1999 La Nina on the spring bloom in Central San Francisco Bay. AGU-Ocean Sciences, San Antonio, January 2000 (Wilkerson, Marchi, Hogue, Tustin, Dugdale)

Nutrient Dynamics between central San Francisco bay and the Gulf of Farallones: a comparison of El Nino and La Nina years, AGU-Ocean Sciences, San Antonio, January 2000 (Marchi, Dugdale, Collins, Hogue, Tustin, Jarvis)

Integrative Indicators of Ecosystem Condition and Stress Across Multiple Trophic Levels in the San Francisco Estuary EPA Workshop, May 2000, Las Vegas.

Meridional asymmetric nutrient distribution in the equatorial Pacific upwelling system: It's role in the variability of CO<sub>2</sub> efflux to the atmosphere. NSF JGOFS/SMP summer workshop, July 9-14, 2000, Woods Hole (Wischmeyer, Dugdale, Chai, Wilkerson, Barber)

Wind-driven Experiment of Shelf Transport (WEST): phytoplankton size and the fate of upwelled macro-nutrients and CO<sub>2</sub> off Bodega Bay, CA, EPOC, Victoria, Oct 2000 (Wilkerson, Dugdale, Marchi, Hogue, Lassiter, Righetti and Ferm)

A comparison of phytoplankton bloom dynamics in North and Central San Francisco Bay (Suisun, San Pablo and Central Bays), CALFED-Delta Scientific Conference, Sacramento, Oct 2000 (Wilkerson, Dugdale, Hogue, Marchi, Lassiter)

Sources of  $\text{Si(OH)}_4$  and  $\text{NO}_3$  to the Pacific Equatorial Upwelling System and Effects on Ocean/Atmosphere  $\text{CO}_2$  flux. AGU San Francisco, Dec 2000 (Dugdale, Wischmeyer, Wilkerson, Barber, Chai, Jiang and Peng)

- 2001 Wind-driven Experiment of Shelf Transport (WEST): the role of wind-driven transport in shelf hydrography, nutrients and chlorophyll off Bodega Bay, CA. ASLO Aquatic Sciences Meeting, Albuquerque, February 2001 (Wilkerson, Dugdale, Marchi, Hogue, Lassiter)

Phytoplankton and nutrient dynamics in the north and central San Francisco Bay (Suisun, San Pablo and Central Bays, ASLO Aquatic Sciences Meeting, Albuquerque, February 2001 (Hogue, Lassiter, Marchi, Wilkerson, Dugdale)

Modeling Equatorial Productivity Using Silicate Limitation: Connections to the Southern Ocean. Invited Seminar at Moss Landing Marine Lab., April 2001.

Dependence Of Equatorial Pacific Export Production And  $\text{PCO}_2$  On Silica Trapping In The Southern Ocean; Implications For Paleo-Oceanography And Paleo-Climatology, TOS Miami May 2001, Plenary Talk (Dugdale, Wischmeyer, Wilkerson, Barber, Chai, Jiang and Peng)

Sources and Fates of Silicate in the Ocean: the Role of diatoms in the Marine Food Web. 36<sup>th</sup> European Marine Biology Symposium, Key-note Speaker, September 2001.

The impact of diatoms on climate variability: comparison of model output and core data for opal and  $\text{CO}_2$ , AGU Fall Meeting, San Francisco, December (Dugdale, Wischmeyer, Chai, Barber, Jiang and Peng)

- 2002 The response of phytoplankton processes to wind events and upwelled nutrients during the CoOP-WEST study. Ocean Sciences 2002 Honolulu, February (Wilkerson, Dugdale, Marchi, Hogue, A.M. Lassiter)

Climate impacts on primary production in central San Francisco Bay. Ocean Sciences 2002 Honolulu, February (Dugdale, Hogue, Marchi, Wilkerson)

Decadal variability of modeled carbon cycle and ecosystem dynamics in the Pacific Ocean, AGU Ocean Sciences, Honolulu HI, February, (Chai, Barber, Jiang, Dugdale, Peng, & Chao).

The modulation of Pacific decadal oscillation on the ENSO activities and ecosystem responses in the equatorial Pacific: a coupled biological-physical modeling study, AGU Ocean Sciences, Honolulu HI, February, (Jiang, Chai, Barber, & Dugdale).

ENSO and diatoms: implications for the eastern equatorial Pacific from a 3-D model – an analogue for the last glacial maximum? AGU Ocean Sciences, Honolulu HI, February, (Wischmeyer, Dugdale, Jiang, Chai, & Wilkerson).

Temporal and spatial distributions of nutrients and phytoplankton productivity in a northern California upwelling region measured during CoOP-West. Ocean Sciences 2002 Honolulu, February (Hogue, Marchi, Dugdale, Wilkerson)

Is the chlorophyll produced at the WEST upwelling site transported off shore or held close to the coast and propagated southward along the shelf? EPOC 2002 Oregon, Sept 2002 (Wilkerson, Dugdale, Marchi, Hogue, Lassiter Lew, Lorenzi)

Productivity performance of the west upwelling region off Bodega Bay, CA: comparison with other well-studied coastal upwelling systems. EPOC 2002, Oregon Sept 2002. (Dugdale, Wilkerson, Hogue, Marchi and Lassiter)

The response of nutrients and pCO<sub>2</sub> to wind-driven coastal upwelling measured during the CoOP-WEST Study 2000-2002. AGU, 2002, San Francisco, CA, Dec 2002. (Marchi, Dugdale, Lew, Hogue, Lassiter, Wilkerson)

Productivity performance of the west upwelling region off Bodega Bay, CA: comparison with other coastal upwelling systems, AGU, 2002, San Francisco, CA, Dec 2002 (Hogue, Dugdale, Marchi, Lassiter Wilkerson)

Productivity Performance of the WEST Upwelling Region off Bodega Bay, CA. AGU, 2002, San Francisco, CA, Dec 2002 (Dugdale, Wilkerson, Hogue, Marchi, Lassiter)

The response of phytoplankton size spectra and chlorophyll biomass to wind-driven coastal upwelling off northern California during the CoOP-WEST study. AGU, 2002, San Francisco, CA, Dec 2002 (Wilkerson, Dugdale, Marchi, Hogue, Lew, Lassiter)

2003 Diatoms in control and at risk: climate feedbacks and anthropogenic forcing. Oceans, Paris. Jan 2003 (Dugdale, Wilkerson, Chai, Barber, Peng)

Effects of anthropogenic ammonium input and low on primary production in San Francisco Bay. Invited Talk, CALFED Science Conference, Sacramento, CA, Jan 2003 (Dugdale)

The spatial patterns of diatom based new production in the coastal upwelling region off Bodega, CA. ASLO Aquatic Sciences, Salt Lake City, UT, Feb 2003. (Wilkerson, Dugdale, Hogue, Marchi, Lassiter)

Ammonium inhibition of nitrate uptake and diatom blooms in estuarine and coastal regions. ASLO Aquatic Sciences, Salt Lake City, UT, Feb 2003. Invited talk (Dugdale, Wilkerson, Hogue, Marchi and Lassiter)

Diatom nutrient uptake strategies, SiWEBS Summer School, Athens Greece, June 2003.  
(Dugdale, invited)

Special abilities of diatoms for nutrient uptake and the effects of ammonium inhibition on nitrate uptake. AGU Chapman Conference, Paros, Greece, Sept. 2003 Invited talk.  
(Dugdale, Wilkerson.)

Nitrogen limitation of estuarine primary production: the relative roles of anthropogenic ammonium versus nitrate in San Francisco Bay. ERF, Seattle, Sept. 2003 (Hogue, Dugdale, Marchi, Lassiter, Wilkerson)

A new dimension in the control of primary production in the San Francisco-Bay Delta Estuary: the impact of anthropogenic ammonium. 6<sup>th</sup> Biennial State of the Estuary Conference, Oakland CA, October 2003 (Dugdale, Hogue, Marchi, Lew, Lassiter, Wilkerson)

An assessment of nutrient dynamics on primary producers in central San Francisco Bay: the impact of ammonium on phytoplankton assemblages. 6<sup>th</sup> Biennial State of the Estuary Conference, Oakland CA, October 2003 (Marchi, Lew, Koch, Lorenzi, Hogue, Dugdale, Wilkerson)

2004 Application of the cytosense flow cytometer to estimate time series of eukaryotic phytoplankton community structure, AGU Ocean Sciences, Portland, OR, Feb 2004 (Marchi, Griffin, Lew, Koch, Dugdale)

Using Shipboard Enclosures to Understand the Controls on New Production in Upwelling Ecosystems. AGU Ocean Sciences, Portland, OR, Feb 2004 (Hogue, Dugdale, Marchi, Lassiter, Wilkerson)

Nutrient control of new production rates in coastal upwelling ecosystems. AGU Ocean Sciences, Portland, OR, Feb 2004 (Dugdale, Hogue, Wilkerson, Marchi)

Application of the cytosense flow cytometer to estimate time series of eukaryotic phytoplankton community structure, AGU Ocean Sciences, Portland, OR (Marchi, Griffin, Lew, Koch, Dugdale)

Impact of anthropogenic ammonium on phytoplankton ecology in an urbanized estuary: San Francisco Bay. ASLO-TOS Ocean Research Conference, Hawaii, Feb 2004, Invited talk (Dugdale, Hogue, Marchi, Wilkerson)

The impact of diatom-based food webs on nutrient drawdown in coastal upwelling areas and their influence on biogeochemical cycling. ASLO-TOS Ocean Research Conference, Hawaii, Feb 2004, Invited talk (Wilkerson, Dugdale, Lassiter, Marchi and Hogue)

The effect of temperature on diatom cell size, growth rates and biogenic silica content. Phycological Society Meeting, Williamsburg, August 2004. (Johnson, Dugdale, Wilkerson)

Using experimental enclosures to monitor water quality of the San Francisco Bay-Delta for management purposes. CalFed Science Meeting, Sacramento, October 2004 (Dugdale Wilkerson, Hogue, Marchi, Koch, Lew, Lorenzi, Takabayshi)

Evaluating nutrient regimes and primary productivity in wetlands in the San Francisco Estuary. CalFed Science Meeting, Sacramento, October 2004 (Cohen, Wilkerson, Carpenter, Dugdale)

Silicate uptake by diatoms in San Francisco Bay. Western Society of Naturalists, Santa Rosa, Dec 2004, (Koch and Dugdale).

Tracking phytoplankton blooms and eutrophication with daily monitoring in Central San Francisco Bay. ERF, Norfolk, VA September 2005 (Wilkerson, Lew, Marchi, Hogue, Koch, Dugdale)

Anthropogenic ammonium as a control on estuarine primary production ERF, Norfolk, VA September 2005 (Parker, Hogue, Wilkerson, Dugdale).

How does nutrient availability relate to primary productivity in natural and restored wetlands in the San Francisco Estuary? ERF, Norfolk, VA September 2005 (Cohen, Wilkerson, Carpenter, Dugdale).

Daily monitoring of estuarine water quality (eutrophication and phytoplankton blooms) in San Francisco Bay. 7<sup>th</sup> Bienial State of the San Francisco Estuary Conference, Oakland, October 2005 (Fuller, Wilkerson, Lew, Dugdale, Marchi, Hogue, Koch).

2006 Low silicate, the cause of the HNLC and high surface pCO<sub>2</sub> condition of the Eastern Equatorial Pacific. AGU Ocean Sciences, HI, February, 2006, (Dugdale, Chai, Brzezinski, Wilkerson, Feely)

The role of new production in coastal upwelling areas: comparison of different regions. AGU Ocean Sciences, HI, February, 2006 (Wilkerson, Dugdale, Hogue Marchi)

Silicate regulation on diatom growth in the eastern equatorial pacific evaluated with silicate/nitrate/TCO<sub>2</sub> distribution. AGU Ocean Sciences, HI, February, 2006. (Marchi, Marchi, Dugdale, Chai, Feeley, Brzezinski, Wilkerson)

Nutrient utilization and phytoplankton community response during enclosure experiments conducted in the eastern equatorial pacific: testing Fe vs. Si Limitation. AGU Ocean Sciences, HI, February, 2006 (Parker, Marchi, Hogue, Lew, Lorenzi, Greely, Feely Wilkerson, Dugdale)

Variability of Nutrients and Phytoplankton Dynamics in the Equatorial Pacific Ocean between 1990 and 2004: a Three-Dimensional Modeling Study. AGU Ocean Sciences, HI, February, 2006 (Shi, Chai, Dugdale, Chao, Barber)

Modeling Carbon and Silicon Cycling in the Equatorial Pacific. AGU Ocean Sciences, HI, February, 2006 (Peng, Fujii, Chai, Dugdale, Barber)

Modeling Peru Upwelling Ecosystem Dynamics: from Physics to Anchovy. AGU Ocean Sciences, HI, February, 2006. (Xu, Chai, Shi, Dugdale, Chao, Rose, Chavez, Barber)

Coastal Upwelling Research Is Poised to Improve the Management and Conservation of Fish Resources Dramatically .AGU Ocean Sciences, HI, February, 2006. (Barber, Smith, Dugdale, Chai, Chao, Chavez, O'Brien, Mooers)