Curriculum Vitae – Robert H. Byrne

Distinguished Research Professor
College of Marine Science, University of South Florida
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Areas of Specialization

Chemical oceanography, physical chemistry, chemical interactions of dissolved seawater constituents, oxidation–reduction kinetics, dissolution kinetics, trace metal chemistry, carbonate system chemistry, in situ instrumental analysis

Employment

1995-Present	Distinguished Research Professor College/Department of Marine Science, Univ. South Florida
1986-1995	Professor (Tenured) Dept. of Marine Science, Univ. South Florida
1982-1986	Associate Professor (Tenured) Dept. of Marine Science, Univ. South Florida
1979-1982	Assistant Professor Dept. of Marine Science, Univ. South Florida
1977-1979	Research Associate Dept. of Marine Science, Univ. South Florida
1974-1977	Research Associate Graduate School of Oceanography, Univ. Rhode Island

Education

Institution	Field of Study	Degree	Date
Univ. Rhode Island	Oceanography	PhD	1974
Boston Univ.	Chemistry	MA	1971
DePaul Univ.	Physics	MS	1967
Univ. Chicago	Physics	BS	1964

Advisory Committee Service

International Advisory Committee Member for the Dongshan Marine Research Station of The State Key Lab of Marine Environmental Science (Xiamen University, 2014-2018)

Ocean Acidification Task Force of the U.S. Ocean Research & Resources Advisory Panel

(Mar. 15, 2010 – Mar. 31, 2011)
National Science Foundation, Advisory Panel Member for Ocean Science Research – Chemical Oceanography (1987-1990, 1993, 2008)
Geosecs-II Planning Workshop, Toulouse, France (April 13-16, 2003)
National Science Foundation, Advisory Panel Member for Small Business Innovation Research – Ocean Sciences (1996, 1997)
National Oceanic and Atmospheric Administration, Carbon Flux Working Group (1991–1997)
Office of Naval Research, Ocean Sciences Research Option Review Panel (1992)
National Research Council, Graduate Fellowship Evaluation Panels (1986, 1987)

Professional Society Activities

Chair, Joint Publications Committee of the Geochemical Society and the Meteoritical Society (2008–2009)
Chair, Geochemistry Division Medal Committee, American Chemical Society (2000–2004)
Chair, IUPAC Commission on Equilibrium Data, V.6 (2000–2002)
Chair, Geochemistry Division, American Chemical Society (1995)
Program Chair, Geochemistry Division, American Chemical Society (1994)

Associate Editor, *Geochimica et Cosmochimica Acta* (1993–present)
Associate Editor, *Limnology and Oceanography: Methods* (2003–2006)
Associate Editor, *Chemical Speciation and Bioavailability* (1993–1999)

Secretary, International Union of Pure and Applied Chemistry (IUPAC) Commission on Equilibrium Data, V.6, (1998–2000)

Member, IUPAC Working Committee on Heavy Metal Speciation (2000–present)
Member, Joint Publications Committee of the Geochemical Society and the Meteroritical Society (2003–2007)
Member, Geochemistry Division Medal Committee, American Chemical Society (2004–2008)
Member, IUPAC Analytical Division Nomination Committee (Jan.-Mar., 2003)
Member, Division Committee, IUPAC Analytical Chemistry Division (2000–2001)
Member, Editorial Board, *Journal of Environmental Science and Health - Part A - Environmental Science and Engineering* (1997–1998)

Titular Member, IUPAC (1991-1997)

Member, American Association for the Advancement of Science
Member, American Chemical Society
Member, American Geophysical Union
Member, Sigma Xi

Research Cruises

Eighteen cruises in the Pacific, Atlantic, Indian and Arctic Oceans, totaling 516 days at sea
Eight cruises in the Gulf of Mexico, totaling 48 days at sea

Awards and Recognitions

Elected Fellow of the National Academy of Inventors (2014)
Elected Fellow of the AAAS (2013)
ARCS STEM Innovation & Research Award (2013)
Elected Fellow of the American Geophysical Union (2012)
USF Excellence in Innovation Award (2012)
National Academy of Inventors, charter member of founding chapter (2009)
USF Distinguished Research Professor designation (1995)
USF Sigma Xi Outstanding Faculty Research Award (1994)

University, College, Departmental, and State University System Councils and Committees

Member, Search Committee for two physical oceanography faculty positions, College of Marine Science (2014-2015)
Chair, Search Committee for two chemical oceanography faculty positions, College of Marine Science (2012-2013)
Chair, Search Committee for two faculty positions: global-scale ocean–atmosphere modeler and mesoscale ocean–atmosphere modeler, College of Marine Science (2008–2009)
Chair, Graduate Admissions and Awards Committee, Dept. of Marine Science (1980–1982)

Member, University Recommending Committee for Distinguished University Professors (2013-2015)
Member, Dean's Advisory Council, College of Marine Science (2013- present)
Member, University Search Committee for Dean of the College of Marine Science (2009–2010)
Member, University Search Committee for St. Petersburg Downtown Progress – Peter R. Betzer Endowed Chair (2010)
Member, Curriculum Committee, College of Marine Science (2003–present)
Member, Safety Committee, Dept./College of Marine Science (1980–1983, 1998–present)
Member, Honors and Awards Committee, Dept./College of Marine Science (1988–present)
Member, Tenure and Promotion Committee, Dept./College of Marine Science (1983–present)
Member, Dean's Advisory Council, College of Marine Science (2003–2005)
Member, C.W. "Bill" Young Fellowship Committee (2000–2003)
Member, Student Recruiting Committee, Dept./College of Marine Science (1987–1989, 1998–2003)

Member, Executive Board of the Ethics Center (1996–1998)
Member, Articulation Committee of the USF College of Arts and Sciences and College of Education (1996)
Member, Seminar Committee, USF Dept. of Marine Science (1990–1994)
Member, USF Press Editorial Board (1987–1989)
Member, University Radiation Safety Committee (1978–1988)
Member, University Graduate Council (1983–1986)
Member, Admissions and Awards Committee, Dept. of Marine Science (1979–1983)
Member, Graduate Council, College of Natural Sciences (1981–1982)

Articles in Refereed Publications

(key: *graduate students*, UNDERGRADUATE STUDENTS, and postdoctoral/research associates in Byrne labs)

200. *Yang, B.*, **Byrne, R.H.** and M. Lindemuth. 2015. Contributions of organic alkalinity to total alkalinity in coastal waters: A spectrophotometric approach. *Marine Chemistry* (in press)

199. *Patsavas, M.C.*, **Byrne, R.H.**, Wanninkhof, R., Feely, R.A. and W-J. Cai. 2015. Internal Consistency of Marine Carbonate System Measurements and Assessments of Aragonite Saturation States: Insights from Two U.S. Coastal Cruises. *Marine Chemistry* 176: 9-20; http://dx.doi.org/10.1016/j.marchem.2015.06.022

198. Liu, X., **Byrne, R.H**., Lindemuth, M., *Easley, R.* and J.T. Mathis. 2015. An automated procedure for laboratory and shipboard spectrophotometric measurements of seawater alkalinity: continuously monitored single-step acid additions. *Marine Chemistry* 174: 141-146; http://dx.doi.org/10.1016/j.marchem.2015.06.008

197. Schijf, J., Christenson, E.A., and **R.H. Byrne**. 2015. YREE scavenging in seawater: A new look at an old model. *Marine Chemistry* (in press)

196. Martz, T.R., Daly, K.L., **Byrne, R.H.**, Stillman, J.H., and Turk, D. 2015. Technology for Ocean Acidification Research: Needs and Availability. *Oceanography* 28(2):40-47; http://dx.doi.org/10.5670/oceanog.2015.30.

195. *Yang, B.*, **R.H. Byrne**, and R. Wanninkhof. 2015. Subannual variability of total alkalinity distributions in the northeastern Gulf of Mexico. *Journal of Geophysical Research. Oceans*, 129, 3805-3816, doi: 10.1002/2015JC010780.

194. Wanninkhof, R., Barbero, L., **Byrne, R.H.**, Cai, W.-J., Huang, W.-J., Zhang, J.-Z., Baringer, M., Langdon, C., 2015. Ocean acidification along the Gulf Coast and East Coast of the USA. *Cont. Shelf Res.* 98, 54-71. http://dx.doi.org/10.1016/j.csr.2015.02.008

193. *M.C. Patsavas*, **R.H. Byrne**, *B. Yang, R. Easley*, R. Wanninkhof, X. Liu (2015) Procedures for direct spectrophotometric determination of carbonate ion concentrations: Measurements in US Gulf of Mexico and East Coast waters. *Marine Chemistry*. 168: 80-85. http://dx.doi.org/10.1016/j.marchem.2014.10.015

192. Ma, J., L. Adornato, **R.H. Byrne** and D. Yuan (2014). Determination of Nanomolar Levels of Nutrients in Seawater. *Trends in Analytical Chemistry*. 60: 1-5. DOI: 10.1016/j.trac.2014.04.013

191. **Byrne**, **R.H.** 2014. Measuring Ocean Acidification: New Technology for a New Era of Ocean Chemistry. *Environmental Science and Technology* 48: 5352 -5360. dx.doi.org/10.1021/es405819p

190. *Yang, B., M.C. Patsavas,* **R.H. Byrne** and J. Ma. 2014. Seawater pH measurements in the field: A DIY photometer with 0.01 pH unit accuracy. *Marine Chemistry*. 160: 75-81. doi.org/10.1016/j.marchem.2014.01.005

189. Ma, J., D. Yuan and **R.H. Byrne**. 2014. Flow injection analysis of trace chromium with a liquid waveguide capillary cell and spectrophotometric detection. *Environmental Monitoring Assessment*. 186: 367-373. DOI 10.1007/s10661-013-3381-2

188. Powell, K.J., P.L. Brown, **R.H. Byrne**, T. Gajda, G. Hefter, A-K. Leuz, S. Sjoberg, and H. Wanner. 2013. Chemical speciation of environmentally significant metals with inorganic ligands. Part 5: The Zn^{2+} + OH^-, Cl^-, CO_3^{2-}, SO_4^{2-}, and PO_4^{3-} systems (IUPAC Technical Report) *Pure Appl. Chem.* 85 (12): 2249 – 2341. http://dx.doi.org/10.1351/PAC-REP-13-06-03

187. Soli, A.L., B.J. PAV and **R.H. Byrne**. 2013. The effect of pressure on meta-Cresol Purple protonation and absorbance characteristics for spectrophotometric pH measurements in seawater. *Marine Chemistry* 157: 162 – 169. http://dx.doi.org/1016/j.marchem.2013.09.003

186. Robbins, L.L., J.G. Wynn, J.T. Lisle, K.K. Yates, P.O. Knorr, **R.H. Byrne**, X. Liu, *M.C. Patsavas*, K. Azetsu-Scott and T. Takahashi. 2013. Baseline monitoring of the western Arctic Ocean estimates 20% of Canadian Basin surface waters are undersaturated with respect to Aragonite. PLoS ONE 8(9):e73796. Doi:10.1371/journal.pone.0073796

185. Liu, X., **R.H. Byrne,** L. Adornato, K.K. Yates, E. Kaltenbacher, X. Ding and *B. Yang*. 2013. In situ spectrophotometric measurement of dissolved inorganic carbon in seawater. *Environmental Science and Technology* 47:11106-11114. dx.doi.org/10.1021/es4014807

184. *Patsavas, M.C.*, **R.H. Byrne** and X. Liu. 2013. Physical-chemical characterization of purified cresol red for spectrophotometric pH measurements in seawater. *Marine Chemistry.* 55: 158-164. http://dx.doi.org/10.1016/j.marchem.2013.06.007

183. Cross, J.N., J.T. Mathis, N.R. Bates and **R.H. Byrne**. 2013. Conservative and non-conservative variations of total alkalinity on the southeastern Bering Sea shelf. *Marine Chemistry* 154: 100-112. http://dx.doi.org/10.1016/j.marchem.2013.05.012

182. *L.D. Miranda*, **R.H. Byrne**, R.T. Short and R.J. Bell. 2013. Calibration of membrane inlet mass spectrometric measurements of dissolved gasses: Differences in the responses of polymer and nano-composite membranes to variations in ionic strength. *Talanta* 116: 217-222. http://dx.doi.org/10.1016/j.talanta.2013.05.014

181. *Patsavas, M.C.*, **R.H. Byrne**, and X. Liu. 2013. Purification of meta cresol purple and cresol red by flash chromatography: procedures for ensuring accurate spectrophotometric seawater pH

measurements. *Marine Chemistry* 150: 19-24. http://dx.doi.org/10.1016/j.marchem.2013.01.004

180. Cardenas-Valencia, A.M., L. Adornato, R. Bell, **R.H. Byrne**, and R.T. Short. 2013. Evaluation of reagentless pH modification for in situ ocean analysis: determination of dissolved inorganic carbon using mass spectrometry. *Rapid Communications in Mass Spectrometry* 27: 1–8, DOI: 10.1002/rcm.6487

179. *Easley, R.A. M.C. Patsavas*, **R.H. Byrne**, X. Liu, R.A. Feely, and J.T. Mathis. 2013. Spectrophotometric Measurements of Calcium Carbonate Saturation States in Seawater. *Environmental Science and Technology* 47: 1468–1477, doi:10.1021/es303631g

178. Wang, Z.A., R. Wanninkhof, W-J. Cai, **R.H. Byrne**, X. Hu, T-H. Peng, and W-J. Huang. 2013. The marine inorganic carbon system along the Gulf of Mexico and Atlantic coasts of the United States: insights from a transregional coastal carbon study. *Limnology and Oceanography* 58(1): 325-342, doi:10.4319/lo.2013.58.1.0325

177. Feely, R.A., C.L. Sabine, **R.H. Byrne**, F.J. Millero, A.G. Dickson, R. Wanninkhof, A. Murata, L.A. Miller, and D. Greeley. 2012. Decadal changes in the aragonite and calcite saturation state of the Pacific Ocean. *Global Biogeochemical Cycles* 26 GB3001, doi: 10.1029/2011GB004157

176. Mathis, J.T., R.S. Pickart, **R.H. Byrne**, C.L. McNeil, G.W.K. Moore, L.W. Juranek, X. Liu, J. Ma, *R.A. Easley. M.M. Elliott*, J.N. Cross, S.C. Reinsdorph, F. Bahr, J. Morison, T. Lichendorf, and R. Feely. 2012. Storm-induced upwelling of high *p*CO2 waters onto the continental shelf of the western Arctic Ocean and implications for carbonate mineral saturation states. *Geophysical Research Letters* 39, L07606, doi: 10.1029/2012GL051574

175. *Easley, R.A.* and **R.H. Byrne**. 2012. Spectrophotometric calibration of pH electrodes in seawater using purified m-cresol purple. *Environmental Science and Technology* 46: 5018–024, dx.doi.org/10.1021/es300491s

174. Ma, J., *B. Yang*, and **R.H. Byrne**. 2012. Determination of nanomolar chromate in drinking water with solid phase extraction and a portable spectrophotometer. *Journal of Hazardous Materials* 219-220: 247–252.

173. Bell, R.J., W.B. Savidge, S.K. Toler, **R.H. Byrne**, and R.T. Short. 2012. In situ determination of porewater gases by underwater flow-through membrane inlet spectrometry. *Limnology and Oceanography: Methods* 10: 117–128.

172. Ma, J. and **R.H. Byrne**. 2012. Flow injection analysis of nanomolar silicate using long pathlength absorbance spectroscopy. *Talanta* 88: 484-489.

171. *Easley, R.A.* and **R.H. Byrne**. 2011. The ionic strength dependence of lead (II) carbonate complexation in perchlorate media. *Geochemica et Cosmochimica Acta* 75: 5638–5647.

170. *Miranda, L.D.*, R.J. Bell, R.T. Short, F.H.W. van Amerom, and **R.H. Byrne**. 2011. The influence of hydrostatic pressure on gas diffusion in polymer and nano-composite membranes: application to membrane inlet mass spectrometry. *Journal of Membrane Science* 385-386: 49–56.

169. Liu, X., *M. Patsavas*, and **R.H. Byrne**. 2011. Purification and characterization of meta-cresol purple for spectrophotometric seawater pH measurements. *Environmental Science and Technology* 45: 4862 – 4868.

168. *Bell, R.J.,* T. Short, and **R.H. Byrne**. 2011. In situ determination of total dissolved inorganic carbon by underwater membrane introduction mass spectrometry. *Limnol. Oceanogr. Methods* 9:164–175.

167. Powell, H.J., P.L. Brown, **R.H. Byrne**, T. Gajda, G. Hefter, A-K. Leuz, S. Sjöberg and H. Wanner. 2011. Chemical speciation of environmentally significant metals with inorganic ligands. Part 4: the Cd^{2+} + OH^-, Cl^-, CO_3^{2-}, SO_4^{2-}, and PO_4^{3-} systems. *Pure and Applied Chemistry* 83: 163– 1214.

166. *Souder, H.C.*, B. McClosky, P. Hallock, and **R.H. Byrne** 2010. Shell anomalies observed in a population of *Archaias angulatus* (Foraminifera) from the Florida Keys (USA) sampled in 1982 – 83 and 2006–07. *Marine Micropaleontology* 77: 71-81.

165. **Byrne, R.H.** 2010. Comparative carbonate and hydroxide complexation in seawater. *Geochimica et Cosmochimica Acta* 74: 4312-4321.

164. **Byrne**, **R.H.,** W. Yao, Y. Luo, and F. J. Millero. 2010. Complexation of Pb(II) by chloride ions in aqueous solutions. *Aquatic Geochemistry* 16(3): 325-335.

163. Lee, K. T.-W. Kim, **R.H. Byrne**, F.J. Millero, R.A. Feely, and Y.-M. Liu. 2010. The universal ratio of boron to chlorinity for the North Pacific and North Atlantic oceans. *Geochimica et Cosmochimica Acta* 74:1801–1811.

162. **Byrne**, **R.H**., S. Mecking, R.A. Feely and X. Liu. 2010. Direct observations of basin-wide acidification of the North Pacific Ocean. *Geophysical Research Letters* 37, L02601, doi:10.1029/2009GL040999.

161. **Byrne**, **R.H.,** M.D. DeGrandpre, R.T. Short, T.R. Martz, L. Merlivat, C. McNeil, F.L. Sayles, R. Bell, and P. Fietzek. 2010. Sensors and systems for in situ observations of marine carbon dioxide system variables. In: J. Hall, D.E. Harrison, and D. Stammer (eds.) *Proceedings of "OceanObs'09: Sustained Ocean Observations and Information for Society" Conference (Vol. 2),* Venice, Italy, Sept. 21–25, 2009, ESA Publication WPP-306.

160. Adornato, L., A. Cardenas-Valencia, E. Kaltenbacher, **R.H. Byrne**, K. Daly, K. Larkin, S. Hartman, M. Mowlem, R.D. Prien, and V. Garcon. 2010. In situ nutrient sensors for ocean observing systems. In: J. Hall, D.E. Harrison, and D. Stammer (eds.) *Proceedings of "OceanObs'09: Sustained Ocean Observations and Information for Society" Conference (Vol. 2),* Venice, Italy, Sept. 21–25, 2009, ESA Publication WPP-306.

159. Powell, K.J., P.L. Brown, **R.H. Byrne**, T. Gajda, G. Hefter, A.-K. Leuz, S. Sjoberg, and H. Wanner. 2009. Chemical speciation of environmentally significant metals with inorganic ligands. Part 3: The Pb^{2+} + OH^-, CI^-, CO_3^{2-}, SO_4^{2-}, and PO_4^{3-} systems. *Pure and Applied Chemistry* 81: 2425–2476.

158. Lenes, J.M., J.J. Walsh, J.M. Prospero, and **R.H. Byrne**. 2009. Response to "Aerosol iron deposition to the surface ocean – Modes of iron supply and biological responses" by P.W. Boyd, D.S. Mackey, and K.A. Hunter. *Marine Chemistry* 116: 56–57.

157. *Miranda, L.D.*, R.T. Short, F.H.W. van Amerom, *R.J. Bell*, and **R.H. Byrne**. 2009. Direct coupling of a carbon nanotube membrane to a mass spectrometer: Contrasting nanotube and capillary tube introduction systems. *Journal of Membrane Science* 344(1-2):26–31.

156. Dickey, T., N. Bates, **R.H. Byrne**, G. Chang, F.P. Chavez, R.A. Feely, A.K. Hanson, D.M. Karl, D. Manov, C. Moore, C.L. Sabine, and R. Wanninkhof. 2009. The NOPP O-SCOPE and MOSEAN Projects: Advanced Sensing for Ocean Observing Systems. *Oceanography* 22(2):168–181.

155. Schijf, J. and **R.H. Byrne.** 2008. Comment on "An experimental study of the solubility and speciation of neodymium(III) fluoride in F-bearing aqueous solutions" by A.A. Migdisov and A.E. Williams-Jones. *Geochimica et Cosmochimica Acta* 72:5574–5577.

154. **Byrne, R.H.** and W. Yao. 2008. Procedures for measurement of carbonate ion concentrations in seawater by direct spectrophotometric observations of Pb(II) complexation. *Marine Chemistry* 112:128–135.

153. Soli, A.L., Z.I. STEWART, and **R.H. Byrne**. 2008. The Influence of temperature on $PbCO_3^0$ formation in seawater. *Marine Chemistry* 110:1–6.

152. *Bell, R.J.* R.T. Short, F.H.W. van Amerom, and **R.H. Byrne**. 2007. Calibration of an in situ membrane inlet mass spectrometer for measurements of dissolved gases and volatile organics in seawater. *Environmental Science and Technology* 41:8123–8128.

151. Yao, W., X. Liu, and **R.H. Byrne**. 2007. Impurities in indicators used for spectrophotometric seawater pH measurements: Assessment and remedies. *Marine Chemistry* 107:167–172.

150. John, D.E., Z.A. Wang, X. Liu, **R.H. Byrne**, J.E. Corredor, J.M. Lopez, A. Cabrera, D.A. Bronk, F.R. Tabita, and J.H. Paul. 2007. Phytoplankton carbon fixation gene (RuBisCO) transcripts and air-sea CO_2 flux in the Mississippi River plume. *The ISME Journal: Multidisciplinary Journal of Microbial Ecology* 1: 517–531.

149. Wang, Z.A., X. Liu, **R.H. Byrne**, R. Wanninkhof, R. Bernstein, E.A. Kaltenbacher, and *J. Patten*. 2007. Simultaneous spectrophotometric flow-through measurements of pH, carbon dioxide fugacity and total inorganic carbon in seawater. *Analytica Chimica Acta* 596: 23–36.

148. *Adornato, L.R.*, E.A. Kaltenbacher, D.R. GREENHOW and **R.H. Byrne**. 2007. High-resolution *in situ* analysis of nitrate and phosphate in the oligotrophic ocean. *Environmental Science and Technology* 41: 4045–4052.

147. Powell, K. J., P.L. Brown, **R.H. Byrne**, T. Gajda, G. Hefter, S. Sjoberg, and H. Wanner. 2007. Chemical speciation of environmentally significant heavy metals with inorganic ligands. Part 2: The Cu^{2+} - Cl^-, OH^-, CO_3^{2-}, SO_4^{2-}, PO_4^{3-} systems. *Pure and Applied Chemistry* 79: 895–950.

146. Luo, Y-R. and **R.H. Byrne**. 2007. The influence of ionic strength on yttrium and rare earth element complexation by fluoride ions in $NaClO_4$, $NaNO_3$ and NaCl solutions at 25°C. *Journal of Solution Chemistry* 36: 673–689.

145. Schijf, J. and **R.H. Byrne**. 2007. Progressive dolomitization of Florida limestone recorded by alkaline earth element concentrations in saline, geothermal, submarine springs. *Journal of Geophysical Research – Oceans* 112: 1–17.

144. *Pillsbury, L.A.* and **R.H. Byrne**. 2007. Spatial and temporal chemical variability in the Hillsborough River system. *Marine Chemistry* 104: 4–16.

143. *Quinn, K.A.,* **R.H. Byrne** and J. Schijf. 2007. Sorption of yttrium and rare earth elements by amorphous ferric hydroxide: Influence of temperature. *Environmental Science and Technology* 41: 541–546.

142. Cardenas-Valencia, A.M., **R.H. Byrne**, M. Calves, L. Langebrake, D. P. Fries, and E.T. Steimle. 2007. Development of stripped-cladding optical fiber sensors for continuous monitoring II: Referencing method for spectral sensing of environmental corrosion. *Sensors and Actuators B* 122: 410–418.

141. Short, R.T., S.K. Toler, G.P.G. Kibelka, D.T. Rueda Roa, *R.J. Bell*, and **R.H. Byrne**. 2006. Detection and quantification of chemical plumes using a portable underwater membrane introduction mass spectrometer. *Trends in Analytical Chemistry* 25: 637–646.

140. Klochko, K., A.J. Kaufman, W. Yao, **R.H. Byrne**, and J.A. Tossell. 2006. Experimental measurement of boron isotope fractionation in seawater. *Earth and Planetary Science Letters* 248: 276–285.

139. Liu, X., Z. Wang, **R.H. Byrne**, E.A. Kaltenbacher, and R.E. Bernstein. 2006. Spectrophotometric measurements of pH in situ: Laboratory and field evaluations of instrumental performance. *Environmental Science and Technology* 40: 5036–5044.

138. *Quinn, K.A.,* **R.H. Byrne**, and J. Schijf. 2006. Sorption of yttrium and rare earth elements by amorphous ferric hydroxide: Influence of solution complexation with carbonate. *Geochimica et Cosmochimica Acta* 70: 4151–4165.

137. **Byrne, R.H.,** W. Yao, K. Klochko, J.A. Tossell, and A.J. Kaufmam. 2006. Experimental evaluation of the isotopic exchange equilibrium $^{10}B(OH)_3 + {}^{11}B(OH)_4 = {}^{11}B(OH)_3 + {}^{10}B(OH)_4$ in aqueous solution. *Deep-Sea Research I* 53: 684–688.

136. *Quinn, K.A.,* **R.H. Byrne**, and J. Schijf. 2006. Sorption of yttrium and rare earth elements by amorphous ferric hydroxide: Influence of pH and ionic strength. *Marine Chemistry* 99: 128–150.

135. Cardenas-Valencia, A.M., **R.H. Byrne**, and E.T. Steimle. 2006. Development of stripped-cladding optical fiber sensors for continuous monitoring I: Theoretical study of a referencing method for measuring refractive indices of fluids. *Sensors and Actuators B* 115: 178–188.

134. **Byrne, R.H.,** W. Yao, Y.-R. Luo, and *B. Wang*. 2005. The dependence of Fe^{III} hydrolysis on ionic strength in NaCl solutions. *Marine Chemistry* 97: 34–48.

133. *Adornato, L.R.,* E.A. Kaltenbacher, T.A. Villareal, and **R.H. Byrne**. 2005. Continuous in situ determinations of nitrite at nanomolar concentrations. *Deep-Sea Research I* 52: 43–551.

132. Powell, K.J., P.L. Brown, **R.H. Byrne**, T. Gajda, G. Hefter, S. Sjoberg, and H. Wanner. 2005. Chemical speciation of environmentally significant heavy metals with inorganic ligands. Part I: The Hg^{2+}- Cl^-, OH^-, CO_3^{2-}, SO_4^{2-} and PO_4^{3-} aqueous systems. *Pure and Applied Chemistry* 77: 739–800.

131. Powell, K.J., P.L. Brown, **R.H. Byrne**, T. Gajda, G. Hefter, S. Sjoberg, and H. Wanner. 2004. Chemical speciation of Hg(II) with environmental inorganic ligands. *Australian Journal of Chemistry* 57: 993–1000.

130. *Quinn, K.A.,* **R.H. Byrne,** and J. Schijf. 2004. Comparative scavenging of yttrium and the rare earth elements in seawater: Competitive influences of solution and surface chemistry. *Aquatic Geochemistry* 10: 59–80.

129. Daly, K.L., **R.H. Byrne**, A.D. Dickson, S.M. Gallager, M.J. Perry, and M.K. Tivey. 2004. Chemical and biological sensors for time-series research: Current status and new directions. *Marine Technology Society Journal* 38: 121–143.

128. Kibelka, G.P.G., R.T. Short, S.K. Toler, J.E. Edkins, and **R.H. Byrne**. 2004. Field-deployed underwater mass spectrometers for investigations of transient chemical systems. *Talanta* 64: 961–969.

127. *Wenner, P.G., R.J. Bell*, F.H.W. van Amerom, S.K. Toler, J.E. Edkins, M.J. Hall, K. Koehn, R.T. Short, and **R.H. Byrne**. 2004. Environmental chemical mapping using an underwater mass spectrometer. *Trends in Analytical Chemistry* 24: 288–295.

126. Schijf, J. and **R.H. Byrne**. 2004. Determination of $_{SO4}\beta_1$ for yttrium and the rare earth elements at I = 0.66 *m* and *t* = 25 ^oC – Implications for YREE solution speciation in sulfate-rich waters. *Geochimica et Cosmochimica Acta* 68: 2825–2837.

125. Callahan, M.J., E.A. Kaltenbacher, and **R.H. Byrne**. 2004. In situ measurements of Cu in an estuarine environment using a portable spectrophotometric analysis system. *Environmental Science and Technology* 38: 587–593.

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Articles in Non-Refereed Publications

11. Powell, K.J. / Brown, P.L. Brown / Byrne, R.H. Byrne / Gajda, T. / Hefter, G. / Leuz, A-K. / Sjöberg, S. / Wanner, H. (2015). Chemical Speciation of Environmentally Significant Metals: An IUPAC contribution to reliable and rigorous computer modelling. *Chemistry International*. Volume 37, Issue 1, Pages 15–19, ISSN (Online) 1365-2192, ISSN (Print) 0193-6484, DOI: 10.1515/ci-2015-0105, February 2015

10. Short, R.T., **R.H. Byrne**, D. Hollander, J. Schijf, S.K. Toler, and E.S. Van Vleet. 2008. Oceanography. In: R. Ekman, J. Silberring, A.M. Westman-Brinkmalm, and A. Kraj (eds.) *Mass Spectrometry: Instrumentation, Interpretation and Applications*. New York: John Wiley & Sons. Ch. 9.

9. **Byrne, R.H.** 2002. Speciation in seawater. In: A.M. Ure and C.M. Davidson (eds.) *Chemical Speciation in the Environment*, 2nd edition. Blackie Academic, Ch. 12, pp. 322-357.

8. Dickey, T., N. Bates, **R. Byrne**, F. Chavez, R. Feely, C. Moore, and R. Wanninkhof. A review of the NOPP Ocean-Systems for Chemical, Optical, and Physical Experiments (O-SCOPE) Project. Fifth Symposium on Integrated Observing Systems, Jan. 2001, Albuquerque, NM.

7. Johnson, K. and **R.H. Byrne**. 2000. Modern Autonomous Observing Systems Working Group summary. *Ocean Carbon Transport Exchange and Transformations*, Proc. of a Workshop, Mar. 7-10, 2000, Warrenton, VA, Airlie House. http://msrc.sunysb.edu/octet/

6. Kaltenbacher, E., E.T. Steimle, and **R.H. Byrne**. 2000. A compact, in situ spectrophotometric sensor for aqueous environments: Design and applications. *Proceedings of Underwater Technology*, May 23-26, Tokyo, Japan, pp. 41-45.

5. **Byrne, R.H.**, E. Kaltenbacher, and R. Waterbury. 1999. Autonomous in situ analysis of the upper ocean. *Sea Technology*, Feb. 1, 4 pp.

4. **Byrne, R.H.** and E.R. Sholkovitz. 1996. Marine chemistry and geochemistry of the lanthanides. In: *Handbook of the Physics and Chemistry of the Rare Earths*. V. 23, Ch. 158. Elsevier.

3. Waterbury, R.D., **R.H. Byrne**, J. Kelly, B. Leader, *S. McElligott*, and R. Russell. 1996. Development of an underwater in situ spectrophotometric sensor for seawater pH. In: R.A.

Lieberman (ed.) *Chemical, Biochemical, and Environmental Fiber Sensors VIII*, SPIE Proc. Vol. 2836. SPIE – The International Society for Optical Engineering. pp.170–177.

2. **Byrne, R.H.** 1991. Chemical and physical properties of seawater. *Encyclopedia Britannica.*

1. Fanning, K.A., J.A. Breland, and **R.H. Byrne**. 1980. Marine geothermal springs along Florida's West Coast. *Coastal Oceanogr. & Climatol. News 2:* 33–34.

Technical Reports

3. K.A. Fanning, **R.H. Byrne**, and P.R. Betzer. 1980. *The West Florida Continental Shelf: A Study of Geothermal Flows and Other Processes Affecting Radionuclides and Trace Metals*. Dept. of Energy, 28 pp.

2. K.A. Fanning, **R.H. Byrne**, and P.R. Betzer. 1978. *The Properties and Impact of Submarine Geothermal Springs on the West Florida Continental Shelf*. Dept. of Energy, 35 pp.

1. K.A. Fanning, **R.H. Byrne**, and P.R. Betzer. 1977. *Environmental Studies of Hydrothermal Discharges on the West Florida Continental Shelf*. Dept. of Energy, 22 pp.

Research and Creative Activities (Patents)

14. U.S. Patent 8,785,207 B2. Method and apparatus for measuring multiple parameters in-situ of a sample collected from environmental systems. Inventors Ryan J. Bell, R. Timothy Short, Strawn K. Toler, **Robert H. Byrne**. July 22, 2014.

13. U.S. Patent 8,077,311. Spectrophotometric system for simultaneous flow-through measurements of dissolved inorganic carbon, pH and CO_2 fugacity. Inventors **R.H. Byrne**, E. Kaltenbacher and X. Liu. December 13, 2011.

12. U.S. Patent 8,071,031. Device for in situ calibrated potentiometric pH measurements. Inventor **R.H. Byrne**. December 6, 2011.

11. U.S. Patent 7,943,391. Method of Performing in situ Calibrated Potentiometric pH Measurements. Inventor **R.H. Byrne**. May 17, 2011.

10. U.S. Patent 8,012,760. Sensor for Direct Measurements of Carbonate Ions in Seawater. Inventor **R.H. Byrne**, September 6, 2011.

9. U.S. Patent 7,842,507. Sensor for Direct Measurements of Carbonate Ions in Seawater. Inventor **R.H. Byrne**, November 30, 2010.

8. U.S. Patent 7,727,770. System and method for spectophotometric measurement of total alkalinity using a liquid core waveguide. Inventors **R.H. Byrne**, E. Kaltenbacher and X. Liu. June 1, 2010.

7. U.S. Patent 7,538,877. Variable exposure rotary spectrometer and method of use. Inventors E. Kaltenbacher, **R.H. Byrne**, and D.P. Fries. May 26, 2009.

6. U.S. Patent 7,453,572. Method and apparatus for continuous measurement of the refractive index of fluid." Inventors A.M. Cardenas-Valencia, E.T. Steimle, **R.H. Byrne**, and M. Calves. Nov. 18, 2008.

5. U.S. Patent 7,024,060. "Method and apparatus for continuous measurement of the refractive index of fluid." Inventors A.M. Cardenas-Valencia, E.T. Steimle, **R.H. Byrne**, and M. Calves. April 4, 2006.

4a. U.S. Patent 6,813,427. Fluorescence-based liquid core waveguide. Inventors E. Kaltenbacher, L.C. Langebrake, **R.H. Byrne**, and R. Waterbury. Nov. 2, 2004.

4b. Canadian Patent 2,357,651. Fluorescence-based liquid core waveguide." Inventors E. Kaltenbacher, L.C. Langbrake, **R.H. Byrne** and R. Waterbury. Nov. 7, 2006.

3. U.S. Patent 6,744,045. Portable underwater mass spectrometer. Inventors D.P. Fries, R.T. Short, and **R.H. Byrne**. June 1, 2004. (Canadian patent CA2358254 issued December 21, 2010)

2. U.S. Patent 6,727,498. Portable underwater mass spectrometer." Inventors D.P. Fries, R.T. Short, and **R.H. Byrne**. April 27, 2004. (Canadian patent CA2358243 issued July 27, 2010)

1. U.S. Patent 5,925,572. Apparatus and method for in situ pH measurement of aqueous medium. Inventors **R.H. Byrne**, R.D. Waterbury, J.J. Kelly, B. Leader, R. Russell, C.W. Jones, J. Kolesar, and *S. McElligott*. July 20, 1999.

Current Grants and Contracts

National Oceanic and Atmospheric Administration, NOAA-NOS-NCCOS-2015-2004160 (subcontract to Texas A&M University) Acidification of Coastal Estuaries Due to Climate Change, The Hydrological Switch: A Novel Mechanism Explains Eutrophication and Acidification of Estuaries. R.H. Byrne (USF PI). September 1, 2015 – August 31, 2018. USF $155,054.

U.S. Geological Survey, G14AC00384. pH Photometer: Next Generation pH Measurements. R.H. Byrne (PI) September 1, 2014 – August 31, 2016. USF $83,483.

National Science Foundation, OCE-1414586. Ocean Acidification: Collaborative Research: Development of a Compact Instrument for Field Measurements of pH, Total Dissolved Inorganic Carbon and Total Alkalinity. R.H. Byrne (USF PI), E. Kaltenbacher (SRI PI). August 1, 2014 – July 31, 2017. USF $312,764 total. SRI $617,951 total.

National Science Foundation, OCE-1220110. Ocean Acidification: Collaborative Research: Investigation of seawater CO2 system thermodynamics under high pCO2 conditions. R.H. Byrne

(USF PI), X. Liu (USF co-PI), L. Adornato (SRI co-PI). Sept. 15, 2012 – Aug. 31, 2016. USF $650,603 total, SRI $313,416 total.

Previous Grants and Contracts

National Oceanic and Atmospheric Administration, NA09OAR4310067. Development of a novel sensor for in situ measurements of carbonate ion concentrations in seawater. R.H. Byrne (PI), E. Kaltenbacher and L. Adornato (co-PIs). Sept. 1, 2009–Aug. 31, 2014. USF $186,644 total, SRI $413,356 total.

National Oceanic & Atmospheric Administration, USM-GR04148-003. Time series and underway assessments of ocean acidification and carbon system properties in coastal waters: year 2. R.H. Byrne (PI) October 1, 2011–September 30, 2012. $93,400; Year 3. R.H. Byrne (PI) October 1, 2012 – September 30, 2014. $ 97,910.

National Science Foundation, OCE-0927108. Development of methods for direct determinations of carbonate ion concentrations in seawater. R.H. Byrne (PI). Aug. 15, 2009–July 31, 2013. $457,059.

National Science Foundation, OCE-1029778. Collaborative Research: Development of an in situ sensor for high-resolution measurements of total dissolved inorganic carbon. R.H. Byrne (USF PI). L. Adornato and E. Kaltenbacher (SRI PIs). September 1, 2010–August 31, 2013. $144,347.

National Science Foundation, OCE-0727082. Purification and calibration of indicators for measurement of seawater pH. R.H. Byrne (PI), X. Liu and W. Yao (co-PIs). Sept. 15, 2007–Aug. 31, 2012. $598,244.

St. Petersburg Downtown Partnership, GRT11175. Metal stability and sea water research funding. R.H. Byrne (PI) Jan. 16, 2012–Jan. 15, 2013. $3,000.

National Oceanic & Atmospheric Administration, UAF 11-0027 (Sponsored through University of Alaska Fairbanks). Mooring observations of ocean acidification in high latitude seas. R.H. Byrne (P.I.) Nov. 1, 2010 – May 31, 2012. $138,725.

Office of Naval Research, N00014-10-1-0787. Construction and intensive field testing of miniature SEAS sensors for trace element, nutrient and CO_2 system analyses. R.H. Byrne (PI) and J. Patten (co-PI). May 1, 2010 –Apr. 30, 2012. $309,519.

National Oceanic & Atmospheric Administration, USM-GR04148-003. Time Series and Underway Assessments of Ocean Acidification and Carbon System Properties in Coastal Waters. R.H. Byrne (PI) July 1, 2010 –December 31, 2011. $100,000.

Office of Naval Research, N0014-10-0784. Profiling Platforms for use in Coastal Waters. C. Lembke, J. Patten, R. Russell, R.H. Byrne and R.H. Weisberg. May 2010 – October 2011. $366,758.

Office of Naval Research, N00014-03-1-0612. Construction and intensive field testing of SEAS-II

sensors for trace element, nutrient, and CO_2 system analyses. R.H. Byrne (PI), E. Kaltenbacher (co-PI, May 1, 2003–Jan. 31, 2007), and J. Patten (co-PI, Feb. 1, 2007–Apr. 30, 2010). May 2003–Apr. 30, 2011. $2,139,741.

Office of Naval Research, N0014-04-1-0573. Bottom Stationed Ocean Profiler Design Improvements. C. Lembke, J. Patten, R. Russell, R.H. Byrne and R.H. Weisberg. June 2004 – April 2011. $1,851,034.

National Science Foundation, OCE-0551676. Collaborative research: RUI – Dissolution kinetics of biogenic calcium carbonate in the upper water column of the North Pacific. V. Fabry (PI), R.H. Byrne (co-PI), and J. Schijf. Mar. 1, 2006–Feb. 28, 2010. $133,870 (Byrne portion).

U.S. Geological Survey. Mapping Florida shelf pCO_2 and carbonate parameters to derive saturation state. R.H. Byrne (PI). Aug. 2008–Aug. 2009. $15,000.

SRI International. Development and deployment of in situ mass spectrometers. R.H. Byrne (PI). Oct. 2007–Dec. 2008. $20,035.

U.S. Dept. of Commerce. Collaborative study/testing and deployment of CO_2 measurement systems. R.H. Byrne (PI) and E.A. Kaltenbacher (co-PI). May 2004–Apr. 2008. $561,911.

U.S. Dept. of Energy. Molecular regulation of photosynthetic carbon fixation in coastal microorganisms. J. Paul (PI) and R.H. Byrne (co-PI). Apr. 2005–Mar. 2008. $45,291 (Byrne portion).

National Oceanic and Atmospheric Administration. Collaborative study, testing, and deployment of CO_2 measurement systems. R.H. Byrne (PI) and E.A. Kaltenbacher (co-PI). July 2005–Dec. 2007. $400,000.

National Oceanic and Atmospheric Administration (through Univ. Miami). Cooperative sensor-development laboratory for oceans and climate. R.H. Byrne (PI) and L. Langebrake (co-PI). June 2004–Dec. 2007. $399,927.

Office of Naval Research. Development and deployment of in situ mass spectrometers. Mar. 2003–Apr. 2007. R.T. Short (PI), D.P. Fries, S.K. Toler, and R.H. Byrne (co-PIs). Cumulative total $1,774,760.

Office of Naval Research. Development of an in situ mass spectrometer for stable isotopes. Jan. 2002–July 2006. . R.T. Short (PI), R.H. Byrne, D. Hollander, and G. Kilbelka (co-PIs). Cumulative total $384,989.

National Science Foundation. Investigations of the influence of solution chemistry on YREE interactions with particle surfaces. R.H. Byrne (PI) and J. Schijf (co-PI). Mar. 2002–Feb. 2006. $450,000.

Office of Naval Research. The role of nutrients in the formation, maintenance, and transformation

of phytoplankton thin layers. R.H. Byrne (PI) and E.A. Kaltenbacher (co-PI). July 2002–Dec. 2005. $249,985.

National Oceanic and Atmospheric Administration. Collaborative study/testing of CO_2 measurement systems. R.H. Byrne (PI) and E.A. Kaltenbacher (co-P.I.). Aug. 2003–June 2005. $123,401.

Office of Naval Research. Bottom Stationed Ocean Profiler. Jan. 2000–Apr. 2005. R. Weisberg (PI) $733,277, with RHB portion $118,109.

Office of Naval Research. Enhanced in situ spectroscopic analysis of trace seawater solutes. Jan. 1996–Dec. 1998. $953,296. Sept. 1998, title changed to: Autonomous in situ analysis of the upper ocean: Construction of a compact, long-pathlength absorbance spectrometer. Extended to Apr. 2005. Total funding: $3,258,865.

University of New Hampshire / National Oceanic and Atmospheric Administration. In situ monitoring of a reactive metal in riverine and estuarine mixing zones. R.H. Byrne (PI). Sept. 2001–Aug. 2004. $125,855.

Concurrent Technologies Corporation. Corrosion feasibility study. R.H. Byrne (PI) and E. Steimle (co-PI). Apr. 2001–Mar. 2002. $120,904.

NSF (through Woods Hole Oceanographic Institution). Development of a spectrophotometric sensor for autonomous measurement of dissolved iron in rainwater. E. Sholkovitz (PI) and R.H. Byrne (co-PI). Sept. 1999–Feb. 2002. $113,007.

Benthos / Office of Naval Research. Collaborative observations of subsurface biogeochemical phenomena at marine hydrothermal springs. R.H. Byrne (PI) and E. Kaltenbacher (co-PI). Feb. 2003–Aug. 2003. $19,270.

Office of Naval Research. Construction of an in situ mass spectrometer. Nov. 1997–Dec. 1998. $199,735. Aug. 6, 1998, title changed to: Phase II construction of an in situ mass spectrometer, extended to June 2003. R.T. Short (PI) and R.H. Byrne (co-P.I.). Total funding $2,004,671.

Office of Naval Research, National Oceanographic Partnership Program. Oceanographic systems for chemical, optical, and physical experiments. July 1998–Jan. 2001. $241,174.

National Science Foundation. The influence of pressure and ionic strength on rare earth element solution chemistry, surface chemistry, and coprecipitation behavior in seawater. Sept. 1996–Aug. 2000. $432,754.

Ocean Farming, Inc. (Sea Grant). Phase I experiments for Iron KE-MIN: Solubility, availability in sea water, and utilization by selected phytoplankton species. Sept. 1996–Dec. 1996. Extended to Nov. 1999. R.H. Byrne: $24,993. K.A. Fanning and G.A. Vargo had sister accounts with separate funding.

National Oceanic and Atmospheric Administration. Shipboard and in situ spectrophotometric measurements of seawater pH in the South Pacific Ocean. Apr. 1995–Apr. 1997. No-cost extension through Apr. 1998. $153,538.

U.S. Geological Survey. Retrospective analysis of Florida Bay salinity using the geochemistry of calcium carbonate organisms. Oct. 1996–Sept. 1997. $10,000.

National Oceanic and Atmospheric Administration. Spectrophotometric measurements of seawater pH and alkalinity in the Central and South Pacific Ocean. Feb. 1994–Mar. 1997. $226,374.

Office of Naval Research. Development of sensing systems and unmanned underwater vehicles for land margin, continental shelf, and oceanographic environmental measurements. Aug. 1994–July 1996. $124,391.

Office of Naval Research. Support of the research activities of a marine engineering institute at the University of South Florida. June 1994–May 1996. $29,202 of $2,000,000.

National Oceanic and Atmospheric Administration. Ocean measurements: Development of new instrument platforms and sensors. Aug. 1993–July 1995. $23,500 of $500,000.

National Science Foundation. Rare earth element solution and surface chemistry. Feb. 1991–Feb. 1995. $308,105.

National Science Foundation. The calibration of indicator dyes for measurement of oceanic pH. Jan. 1991–Feb. 1995. $210,765 (USF portion).

National Oceanic and Atmospheric Administration, administered by the National Science Foundation. Spectrophotometric measurement of pH and alkalinity in the Pacific Ocean. Dec. 1991–May 1994. $180,304.

National Science Foundation. The hydromechanics of sediment traps in the oceanic environment: Key to accurate particle flux measurements. With G. Gust and P. Betzer. Nov. 1988–Oct. 1990. $378,307.

National Science Foundation. Rare earth element surface and solution chemistry. Nov.1987–Oct. 1990. $214,502.

National Oceanic and Atmospheric Administration. Oxidation and dissolution of metal sulfides and sulfates in seawater. June 1988–Apr. 1989. $20,000.

National Oceanic and Atmospheric Administration. Oxidation and dissolution of metal sulfides and sulfates in seawater. Apr. 1987–Feb. 1988. $20,000.

National Oceanic and Atmospheric Administration. Oxidation and dissolution of metal sulfides and sulfates in Seawater. June 1985–June 1986. $20,000.

University of South Florida, Faculty Research and Creative Scholarship Award. Design, fabrication, and calibration of a small swimming tunnel for crustaceans. With G. Gust and J. Torres. May 1985–May 1986. $4,580.

U.S. Department of Energy. The role of aragonite in the marine carbon cycle. With P.R. Betzer. Dec. 1984–Dec.1985. $82,262.

National Science Foundation. Rare earth chemistry in the oceanic water column. May 1984–May 1987. $141,802.

National Science Foundation. Study of chemical complexation models: Trace metals in multicomponent solutions. Aug. 1983–Aug. 1984. $15,000.

National Oceanic and Atmospheric Administration. Fluxes and dissolution rates of biogenic carbonates in the North Pacific Ocean. With P.R. Betzer. Sept. 1981–Sept. 1983. $57,000.

National Science Foundation. Study of chemical complexation models: Trace metals in multicomponent solutions. July 1981–July 1983. $86,702.

University of South Florida, Faculty Research and Creative Scholarship Award. Development of a rapid response, in situ, dissolved CO_2 sensor. June 1982–June 1983. $3,300.

National Oceanic and Atmospheric Administration. Fluxes and dissolution rates of biogenic carbonates in the North Pacific Ocean. With P.R. Betzer. Oct. 1980–Dec.1981. $85,000.

National Science Foundation. Study of chemical complexation models: Trace metals in multicomponent solutions. Nov.1979–Oct. 1981. $48,468.

U.S. Department of Energy. Processes affecting radionuclides and trace metals on the West Florida continental shelf. With K.A. Fanning and P.R. Betzer. Oct. 1980–Sept. 1981. $30,000.

U.S. Department of Energy. The properties and impact of submarine geothermal springs on the West Florida Shelf. With K.A. Fanning and P.R. Betzer. Oct. 1970–Sept. 1980. $54,000.

National Science Foundation. Ion pairing equilibria of borate and phosphate in seawater. Nov. 1976–Apr. 1977. $34,000.

Invited Presentations

Byrne, R.H. 2014. (Keynote Address) Chemical sensors for observing our changing seas: Current capabilities and the need for rapid innovation. 2nd Seafloor Observation Symposium in Xiamen. Xiamen, CN. November 9, 2014.

Byrne R.H. 2014. Measuring Ocean Acidification in Blue and Green Waters: Capabilities and Challenges. First Advisory Committee Meeting – Dongshan Marine Research Station. State Key Laboratory of Marine Environmental Science, Xiamen University CN. July 6, 2014.

Byrne, R.H. 2014. Measuring Ocean Acidification in Blue and Green Waters: Capabilities and Challenges. SAML Acidification Workshop, May 22, 2014. Hawks Cay Resort, Summerland Key, FL.

Byrne, R.H. 2013. Ocean Acidification: Measuring Long Term Acidification Rates. November 12, 2013. University of Gothenburg. Gothenburg, Sweden.

Byrne, R.H. 2013. Advances in Measurement Technology for the CO_2 System. University of Gothenburg. November 14, 2013. Gothenburg, Sweden.

Byrne, R.H. 2012. Spectrophotometric methods for in situ measurements of carbon system parameters: pH, C_T, f_{CO2}, $[CO_3^{2-}]_T$, Ω_{CaCO3}. 2012 Environmental Sensors Conference. Sept. 23–28. Anglet, France.

Byrne, R.H. 2011. Monitoring ocean acidification: evolving measurement strategies and capabilities. International Union of Geodesy and Geophysics General Assembly. July 2, 2011. Melbourne, Australia.

Byrne, R.H. 2011. Monitoring ocean acidification: evolving measurement strategies and capabilities. Florida ACS Award Symposium (FLACS). May 14, 2011. Innisbrook Resort, Florida.

Byrne, R.H. 2010. Development and application of spectrophotometric techniques for characterization of the marine CO_2 system. Chemical Speciation in Solution and at Solid/Solution Interfaces. Symposium in honour of Staffan Sjöberg. Umeå University, Umeå, Sweden. Sept. 24, 2010.

Byrne, R.H. and S. Mecking. 2010. Direct observations of basin-wide acidification of the North Pacific Ocean. Congressional Science Fair -- Coalition for National Science Funding's 16th Annual Exhibition and Reception: Building the Foundations of Innovation; STEM Research and Education. Washington, DC.

Byrne, R.H. 2009. Spectrophotometric CO_2-system measurements – principles and practice. 10^{th} Lingfeng Forum on Marine Analytical Techniques and Instrumentation. Xiamen University, Xiamen, China. Apr. 18, 2009.

Byrne, R.H. 2009. Equilibrium behavior of Pb(II) in natural waters. 10^{th} Lingfeng Forum on Marine Analytical Techniques and Instrumentation. Xiamen University, Xiamen, China. Apr. 18, 2009.

Byrne, R.H. 2007. Spectrophotometric and mass spectrometric sensors in the ocean. Gordon Research Conference in Chemical Oceanography. Tilton School, Tilton NH. Aug. 5–10, 2007.

Byrne, R.H. 2004. Yttrium and rare earth element patterns in the environment: The imprints of solution, surface, and solid state chemistries. Mediterranean Conference on Chemistry of Aquatic Systems. Reggio Calabria, Italy. Sept. 4–8, 2004.

Byrne, R.H. and E.A. Kaltenbacher. 2004. Development and application of SEAS sensors. Office of Naval Research, Progress Review – Southeast Region. College of Marine Science, Univ. South Florida, May 10–13, 2004.

Byrne, R.H., E.A. Kaltenbacher, and R.T. Short. 2003. In situ spectrophotometry and mass spectrometry for measurement of trace metals, nutrients, and dissolved gases. The Next Generation of In Situ Biological and Chemical Sensors in the Ocean. Woods Hole, MA, July 23–16, 2003.

Byrne, R.H. 2002. Spectrophotometric Elemental Analysis System. ONR Joint Review of Technology Applicable to Mine Countermeasures and Associated Missions. Coastal Systems Station, Panama City Beach, FL, Apr. 2–4, 2002.

Byrne, R.H. 2001. Design of autonomous in situ spectrophotometric systems for measurement of nutrients and CO_2 system parameters. International Workshop on Autonomous Measurements of Biogeochemical Parameters in the Ocean. Pacific Beach Hotel, Honolulu, HI, Feb. 20–21, 2001.

Byrne, R.H. 2001. Inorganic speciation in natural waters. 221st ACS National Meeting, Geochemistry Division Medal Symposium in Honor of Dr. Frank J. Millero: The Importance of Metal-Ligand Interactions in Natural Waters. San Diego, CA, Apr. 1–5, 2001.

Byrne, R.H. 1999. Rare earth complexation by inorganic environmental ligands. 22nd Rare Earth Research Conference (NERC), Argonne National Laboratory, Jul. 1999.

Byrne, R.H. 1999. Novel instrumental strategies for environmental analysis. International Symposium on Environmental Earth Science, Hokkaido University, Sapporo, Japan, Mar. 1999.

Byrne, R.H. 1999. Iron hydrolysis revisited. 217th American Chemical Society National Meeting & Exposition Program, Honoring Frank Millero: Thermodynamics and Kinetics of Natural Waters. Anaheim, CA, Mar. 1999.

Byrne, R.H. 1996. In situ measurements of seawater pH. CO_2 in the Oceans: An International Symposium hosted by the University of Puerto Rico, Mayaguez, PR, Jan. 22–26, 1996.

Byrne, R.H. 1995. Constructing a master variable: pH observations in seawater. Chemical Oceanography Gordon Research Conference. June 11–16, 1995.

Byrne, R.H. 1994. Application of pH measurements to in situ CO_2 system characterizations. PACON-94 Conference, Townsville, Australia, Jul. 3–9, 1994.

Byrne, R.H. 1993. Molecular perspectives in marine science: Studies of rare earth elements and the oceanic CO_2 system. Duke University, Durham, NC, Nov. 29, 1993.

Byrne, R.H. 1993. Chemistry of the lanthanides in natural waters. 205th ACS National Meeting, Denver, CO, Mar. 28–Apr. 2, 1993.

Byrne, R.H. 1992. Speculative aqueous speciation schemes in seawater. 204th ACS National Meeting, Washington, DC, Aug. 23–28, 1992.

Byrne, R.H. 1992. Reactivity of organic surfaces in seawater: Insights using rare earth elements (REE). ASLO Aquatic Sciences Meeting, Feb. 9–14, 1992.

Byrne, R.H. 1991. Comparative rare earth geochemistries in the marine environment. 19th Rare Earth Research Conference, Lexington, KY, Jul. 14–19, 1991.

Byrne, R.H. 1991. Oceanic behavior of the rare earth elements. 11th International Symposium, Chemistry of the Mediterranean, Primosten, Yugoslavia, May 9–16, 1990.

Byrne, R.H. 1988. Rare earth element adsorption in seawater. Spring meeting of the American Geophysical Union, Baltimore, MD. *Eos, Transactions, American Geophysical Union* 69(16):373.

Byrne, R.H. 1988. Rare earth element solution and surface chemistry in seawater. X International Symposium, Chemistry of the Mediterranean, Primosten, Yugoslavia, May 1988.

Byrne, R.H. 1988. Rare earth element surface and solution chemistry. Florida Institute of Technology, Chemical Lecture Series, Mar. 1988.

Byrne, R.H. 1987. Rare earth element chemistry in seawater. University of Rhode Island, Marine Chemistry Seminar Series, Dec. 1987.

Byrne, R.H. 1986. Shallow water dissolution of aragonite in the North Pacific Ocean. Gordon Research Conference in Chemical Oceanography, Ventura, CA, Jan. 1986.

Byrne, R.H. 1986. Flux measurements of labile oceanic particulates. Upper Ocean Processes Workshop – Global Ocean Flux Study, Cambridge, MD, Mar. 1986.

Byrne, R.H. 1985. Chemical speciation in high complexation intensity systems. Symposium on Estuarine and Marine Chemistry, American Chemical Society 189th National Meeting, Miami, FL, May 1985.

Byrne, R.H. 1983. A worldwide chemical experiment: Man's addition of carbon dioxide to the atmosphere and oceans. USF Marine Science Public Lecture Series, May 1983.

Byrne, R.H. 1983. Problems in trace metal speciation models and suggested remedies. *Eos, Transactions, American Geophysical Union* 64(18):248.

Byrne, R.H. 1982. Mixed ligand complexation in high ligand variety natural media. Univ. Miami. Jan. 1982.

Byrne, R.H. 1980. Lead speciation in seawater. Graduate School of Oceanography, University of Rhode Island. Oct. 1980.

Byrne, R.H. 1980. Lead: A poison in your life? USF Marine Science Public Lecture Series, Oct. 1980.

Byrne, R.H. 1980. Inorganic speciation of lead in seawater. College of Marine Studies, Univ. Delaware. Aug. 1980.

Byrne, R.H. 1977. Measurement of ferric ion complexation by spectrophotometry. Dalhousie University, Dept. of Oceanography, June 1977.

Byrne, R.H. 1976. Studies of ferric ion equilibria in seawater and seawater analogs. School of Oceanography, Oregon State Univ., Jul. 1976.

Byrne, R.H. 1976. The speciation of iron in seawater. Univ. Maine, Ira C. Darling Center, May 1976.

Abstracts and Oral Presentations

Breithaupt, J. L., Smoak, J.M., Smith III, T.J., Sanders, C.J., & Peterson, L.C. & **Byrne, R.H.** (2014, May). Assessing 100 Years of Carbon Burial and Sediment Accretion in the Context of Sea Level Rise, Reduced Freshwater Input, and Storms in the Coastal Everglades. Oral presentation at the Joint Aquatic Sciences Meeting in Portland, OR.

N.K. Douglas, R.H. Byrne, *M.C. Patsavas* (2014) Development of an instrument for in situ spectrophotometric measurements of the aragonite saturation horizon. Poster presentation at the 2014 Ocean Sciences Meeting -- Honolulu, HI

X. Liu, **R.H. Byrne** R, L. Adornato, E. Kaltenbacher, K.K. Yates. Integrated in situ DIC and pH sensors for comprehensive CO_2 system characterizations, Poster - 2013 Ocean Acidification Principal Investigators Meeting. Silver Spring MD

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Course Development and Instruction (Graduate)

CO_2-System Measurement Methods	(OCE 6934-603)
Seawater Analytical Techniques	(OCE 6934-608)
Mathematical Methods for Marine Science	(OCE 6934-605)
Physical Chemistry of Seawater	(OCE (934-609)
Chemical Oceanography	(OCE 6050)
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