

**CURRICULUM VITAE**  
**July 2016**  
**Thomas M. Church, Ph.D.**

**TITLE:** E. I. DuPont Professor of Marine Studies, Emeritus  
School of Marine Science and Policy  
College of Earth, Ocean, and Environment  
Chemistry and Biochemistry Department (joint)

**PERSONAL:** Birth: 13 November 1942  
Citizenship: USA

**ADDRESSES:**

<b>WORK:</b>	<b>HOME:</b>
College of Earth, Ocean, and Environment	Bob White Farm
University of Delaware	1540 Clayton Delaney Rd.
Newark, DE 19716-3501	Clayton, DE 19938
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Married: Karen Hullings (8/73)  
Children: Dorothy Lind (3/79)  
Thomas Edward (9/84)  
Aimee Elisabeth (8/88)

**EDUCATION:** A.B. (m.c.l), 1964, Colgate University, Chemistry  
Ph.D., 1970, University of California, San Diego, Chemistry

**EXPERIENCE:**

Undergraduate (Summers):

1962 Allied Chemical Corporation, Plastics Division, technical research (B. MacMillan)  
1963 Lamont-Doherty Geological Observatory, geochemical research (W. Broecker)  
1964 Woods Hole Oceanographic Institution, physical chemical research (P. Mangelsdorf)

Graduate:

1964-67 University of California, San Diego, Chemistry Department, Teaching Assistant (K. Marti)  
1967-70 Scripps Institution of Oceanography, Geological Research Division, Research Assistant (E. Goldberg)  
1970-71 Scripps Institution of Oceanography, Geological Research Division, Research Chemist (M. Peterson; C. Patterson, Cal. Inst. Tech.)

Postgraduate:

- 1971-72 University of Paris, CNRS-NSF Postdoctoral Exchange Fellow (C. Allegre)  
1972-79 University of Delaware, College of Marine Studies, and Chemistry Department, Assistant Professor  
1979-83 University of Delaware, College of Marine Studies and Chemistry Department, Associate Professor, tenured  
1983- University of Delaware, College of Marine Studies and Chemistry Department, Full Professor  
1994- University of Delaware, Department of Chemistry and Biochemistry Joint Appointment  
2006- University of Delaware, College of Earth, Ocean and Environment School of Marine Science and Policy  
E.I. du Pont Professor, Emeritus

Interim:

- 1975-76 National Science Foundation, International Decade of Ocean Exploration, Environmental Quality, Program Manager (IGPA), (\$4.8M budget)  
1978-81 Chairman, Chemical Oceanography Curriculum group  
1982-83 Director, Oceanography Program

**HONORS/FELLOWSHIPS:**

- 1963 Undergraduate summer fellowship; Lamont-Doherty Geological Observatory  
1964 A.B. Degree - Magna cum Laude  
- High Honors in Chemistry  
- McGregory Chemistry Award  
Undergraduate Predoctoral Fellowship; Woods Hole Oceanog. Inst.  
NDEA Title IV Graduate Fellowship; Univ. California, San Diego  
1970 NSF/CNRS (U.S. - France) Postdoctoral Exchange Award  
1980 PRF-480 (U.S. - India) Visiting Professor Stipend; Physical Research Laboratory, Ahmedabad, India  
1979 College of Marine Studies, University of Delaware, Best Paper Award (with R. Pellenbarg)  
1984 College of Marine Studies, University of Delaware, Research Award (with J. Sharp)  
1986 Dean's Prize for Research, College of Marine Studies, University of Delaware  
1987 NATO Study Visit Fellowship; International Atomic Energy Agency, Monaco, and the University of Nice, Visiting Professor  
1988-92 California Institute of Technology, Geological Science Division, Research Faculty Associate in Geochemistry  
1992 Riker Fellowship for Continuing Research at Bermuda Biological Research Station  
2002-08 French Ministry of Research; Distinguished Senior Scientist Fellowship (02-03); Visiting Professor, Univ.Pau-Pays Ardour ('07-'08), France  
2003-10 German Hanse Wissenschaftskolleg; Hanse Institute for Advanced Studies Fellowship, Delmenhorst, Germany

## HONOR SOCIETIES:

Phi Beta Kappa  
Sigma Xi  
Phi Kappa Phi

## TEACHING (Courses taught at least once):

Undergraduate:      Oceanography

Graduate:            Biogeochemical Oceanography  
                          Chemical Oceanography  
                          Current Topics in Chemical Oceanography  
                          Environmental Chemistry  
                          Estuarine and Coastal Chemistry  
                          Field and Lab Techniques in Marine Chemistry  
                          Global Environmental Change Course  
                          Introduction to Oceanography  
                          Marine Aquatic Chemistry  
                          Marine Environmental Chemistry  
                          Marine Geochemistry  
                          Ocean/Atmosphere Chemical Fluxes  
                          Oceanographic Geochemistry  
                          Oceanographic Practicum  
                          Oceanography Seminar

Marine Chemistry Summer Intern Program - 1977, 1978, 1979, 1980  
Oceanography Summer Intern Program - 1982, 1990, 1992  
Research Experience for Undergraduates (NSF) – 1991 to present

### Advisement as Major Professor

Ph.D. students - 5  
M.S. students - 14  
Postdoctoral Associates – 8

## SERVICE:

### National

#### American Chemical Society:

1975            Delaware Section; Chairman, Environmental Chemistry Division  
1976            Middle Atlantic Region; Chairman, Bicentennial National Meeting (4/76)  
                          Special Symposium, "Marine Chemistry in the Coastal Environment"

American Geophysical Union:

- 1980 Nominated National Secretary
- 1982 Ocean Sciences Meeting, San Antonio; Chairman, Special Session "Ocean, river interaction - sedimentation and chemistry section"
- 1982 Spring Biannual Meeting, Philadelphia; Chairman, Special Session "Coastal and estuarine chemistry - major east coast estuaries"
- 1983 Spring Biannual Meeting, Baltimore, Chairman, Special Session "Estuarine chemistry"
- 1985 Spring Biannual Meeting, Baltimore, Chairman, Special Session "Estuarine processes"
- 1993 Spring Biannual Meeting, Baltimore, Chairman, Special Session "Atmospheric Deposition to Coastal and Inland Waters"
- 1994 Spring Biannual Meeting, Baltimore, Chairman, Special Session "Atmospheric Deposition to Marine and Fresh Water Systems"

Gordon Research Conferences, Chemical Oceanography

- 1979 Vice Chairman
- 1980 Chairman
- 1990,93,95,97 Discussion Leader

National Oceanic and Atmospheric Administration

- 1977 Marine Ecosystems Analysis Program Review Committee  
New York Bight (2/77)  
Puget Sound (5/77)
- 1978 Outer Continental Shelf Environmental Assessment Program (BLM) Review panel
- 1993 Coastal Oceanography Program - Review Committee
- 1998 Atmospheric Nitrogen Deposition to Watersheds and Coastal Waters Working Group

National Science Foundation

- 1975-76 Environmental Quality Program, IDOE, Ocean Science Program Manager (IGPA rotation)
- 1977-85 Sea Air Exchange Program (SEAREX), Advisory Committee
- 1978-82 Manganese Nodule Program (MANOP), Review Committee
- 1979 Vertical Exchange Program (VERTEX), Review Committee
- 1980 Coordinated Research in Ocean Science (CORES); Advisory Committee
- 1985-89 Marine Chemistry Program, Review Panel
- 1989-94 Coastal Oceanography Program - Steering Committee
- 1997-98 Chemical Oceanography Long Range Planning Committee (FOCUS)
- 2006 Marine Chemistry Program, Review Panel

United States Environmental Protection Agency

- 1984 Workshop, Camp Topridge, New York, "Trace elements in atmospheric deposition"
- 1992 Expert Review Program for the Offices of Research and Development, and Pesticides and Toxic Substances

National Research Council/National Academy of Science/Ocean Studies Board  
 1998-99 Committee on the Causes and Management of Coastal Eutrophication  
 2005 EPA-STAR Environmental Chemistry and Materials Graduate Fellow Review Panel

International

- 1976-77 Global Investigations of Pollution in the Marine Environment (GIPME) Annual Meeting, U. S. Delegate, Geneva and Hamburg
- 1977-78 Task Team on Marine Pollution Monitoring, Lowestoff, U.K. Group of Experts on Methods, Standards, and Intercalibration, Meeting, Paris
- 1983 International Union of Geodesy and Geophysics (IUGG), Semi-decade Meeting (Hamburg, FRG); Special Symposium Chairman "Coastal and near shore zone processes"
- 1986-88 NATO Advanced Research Workshop "Long range atmospheric transport of natural and contaminant substances from continent to ocean and continent to continent. Organizing committee member and participant.
- 1987-91 SCOR (Scientific Committee on Oceanic Research) Working Group 80; "Phase Transfer Processes in Estuarine Trace Metal Cycling"
- 1988-90 Dahlem Conference, Organizing Committee, "Ocean Margin Processes in Global Change"
- 1988-91 UN/WMO/GESAMP Working Group "Workshop on the input of trace species from the atmosphere to the oceans."
- 1990 Edward D. Goldberg Symposium - A Tribute, "Progress in Marine Chemistry," American Chemical Society (Geochemistry Division), Organizer and Co-Convener.
- 1991, 1997, 1999, 2002, 2004, 2006, 2008 2<sup>nd</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup> and 13<sup>th</sup> International Symposia on the Biogeochemistry of Model Estuaries: Jekyll Island, USA; Rimouski, Canada; Grimstad, Norway; Solomons, MD USA; Warnemunde, Germany; Xiamen, China; Bordeaux, France (respectively); co-Chair and organizing committee.

- 1991 CHEMRAWN VII - World Conference on the Chemistry of the Atmosphere: Its Impact on Global Change (Poster Organizing Committee), 2-6 December.
- 1991-93 Guest Editor - *Marine Chemistry* - Special publication to include proceedings of "The Second International Symposium on the Biogeochemistry of Model Estuaries; Estuarine Processes in Global Change," - Jekyll Island, Georgia, 14-20 April 1991.
- 1992 The Estuarine and Coastal Sciences Association (ESCA) and Estuarine Research Federation (ERF) International Meeting, "Changes in fluxes to estuaries: Implications from science to management," Co-Chairman of Session entitled, "Particle/Chemical Interactions," September 1992. Invited.
- 1992 International Symposium, "Topics in Global Geochemistry: A Symposium in Honor of Clair C. Patterson," Pasadena, California, December 1992.
- 1993 9th International Conference, "Heavy Metals in the Environment," Scientific Programme Committee, 12-17 September, 1993. Invited key-note talk.
- 1993-94 Associate Editor - *Geochimica et Cosmochimica Acta* - Special publication to include the proceedings of "Topics in Global Geochemistry: A Symposium in Honor of Clair C. Patterson," - Pasadena, California 3-4 December 1992.
- 1992-2008 International Estuarine Biogeochemistry Conferences  
International Organizing Committee
- 2000-present Bermuda Biological Station for Research. Science Trustee.  
Chair, Education Committee ('03-'07)
- 2007-08 University of Delaware, Strategic Planning Steering Committee

## RESEARCH INTERESTS:

- Atmospheric Chemistry: Transport of continental emissions to the ocean; Chemistry of marine precipitation; Deposition of trace elements to the marine environment
- Chemical Oceanography: Trace metal transport and cycling in salt marsh, estuarine and coastal waters
- Sedimentary Geochemistry: Redox processes of metals, sulfur, and nutrients
- Marine Chemistry: Sea water precipitates and oceanic mineralization

**RESEARCH FUNDING:** (since 1972 as Principal or Co-Principal Investigator):

<u>Agency</u>	<u>Amount</u>
National Science Foundation	\$6,109,352
Delaware Sea Grant (NOAA)	159,821
EPA	650,068
Maryland Department of Natural Resources, Power, Plant Program	336,060
Department of Energy	278,411
NOAA – Air Resources Lab	259,507
Chesapeake Bay Research Consortium, Inc.	215,920
University of Maryland	158,970
Office of Naval Research	123,032
Maryland Department of the Environment	87,659
University of Virginia	80,012
Delaware State Water Resources Program	76,850
NOAA – AIRMON Project	71,750
University of Delaware	67,427
Electric Power Partners	44,987
Interstate Commission on the Potomac River Basin	34,100
U.S. Army Corps	29,000
Delaware Research Partnership	28,000
NASA	13,000
Battelle Pollutants (NOAA Rainwater)/MAP3S Network	13,000
UDE Match to Delaware State Water Res. Program	12,000
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Total Grant amount to UDE since 1972	\$8,733,927

### **Graduate and Postgraduate Research Group (past and present)**

<u>Post Doctoral Associates</u>	-D. Velinsky (PhD)
	-P. Sharma (PhD)
	-M. Sarin (PhD)
	-A. Veron (PhD)
	-N. Hussain (PhD)
	-L. Alleman (PhD)
	-C. Chen (PhD)
	-P. Ollivier (PhD)
	-S. Rigaud (PhD)

### Doctoral Students (Year of Dissertation)

Pellenbarg, Robert E. (1976) Ph.D.

"The aqueous surface microlayer and trace metals in the salt marsh"

Lord, Charles J. III (1980) Ph.D.

"The chemistry and cycling of iron, manganese, and sulfur in salt marsh sediments"

- Ferdelman, Timothy G. (1994) Ph.D.  
 "Oceanographic and geochemical controls on sulfur diagenesis in coastal sediments"
- Kim, Geubeum. (1998) Ph.D.  
 "Atmospheric inputs and upper ocean biogeochemistry of trace elements and radionuclide tracers"
- Achilles, Katherine (2004) Ph.D. "The importance and bioavailability of iron to *Trichodesmium*"
- Martin, Danielle (2007) Ph.D.

#### Masters Students (Year of Thesis)

- Leone, Gerald M. (1977) M.S.  
 "Trace metals in petroleum; a tool for monitoring estuarine oil spills"
- Conway, William P. (1979) M.S.  
 "Copper, cadmium, and manganese concentrations within the soft tissues of the marsh mussel *Geukensia demissa* (Dillwyn)"
- Eastman, Kurt W. (1980) M.S.  
 "Mixing behavior of iron, manganese, and humic acid in a salt marsh creek"
- Fleisher, Martin Q. (1985) M.S.  
 "Geochemistry of uranium in salt marshes; Tidal mixing and salt marsh estuary exchange"
- O'Shea, Leo E. (1986) M.S.  
 "The accumulation of trace metals emitted from coal fired power plants as recorded in the sediments of Maryland and Delaware salt marshes" (co-advised with R.B. Biggs)
- Hartman, Mary C. (1987) M.S.  
 "The total deposition of Pb, Cd, Zn and 210-Pb-Pb, and atmospheric transport to the western Atlantic using 222-Rn and air mass trajectory analysis"
- Ferdelman, Timothy G. (1988) M.S.  
 "The distribution of sulfur, iron, manganese, copper and uranium in a salt marsh sediment core as determined by a sequential extraction technique"
- Johnston, Kirk (1989) M.S.  
 "Estuarine organic complexation of copper in the Delaware Bay"
- Burkhard, Carolyn A. (1994) M.S.  
 "Speciation and reactivity of manganese with reduced sulfur in the marine environment" (co-advised with G. W. Luther, III)
- Roadman, Megan (2001) M.S.  
 "Gaseous ammonia emissions from a poultry house in the Delaware Inland Bays watershed" (co-advised with W. Ullman)
- Tian, Zhenglong (2006) MS  
 "Coupling between the atmospheric deposition and oceanic flux of Fe and AL in the Sargasso Sea"
- Bahrou, Andrew (2008) M.S.  
 "Polonium volatilization by tellurite resistant marine microorganisms"



Ruocco, Maria (2011) M.S.  
“Biotransformation and distribution of Selenium in cultures of a salt-marsh yeast”

Vandermark, Amanda (2011) M.S.  
“Seasonal distribution of Fe, Mn, and Zn in sediment traps and suspended particles in response to atmospheric input to the Sargasso Sea”

Marsan, David (2013) M.S.  
“<sup>210</sup>Po and <sup>210</sup>Pb Radionuclides in the Delaware and Chesapeake Estuarine and Coastal Regions”

Undergraduate Assistants- 14

Funded Equipment

Atomic Spectrometers:

Perkin-Elmer Model 3200 Atomic Absorption Spectrophotometers with Model 700 HGA furnace and Model A-60 autosampler

VG Plasma Quad ICP-Mass Spectrometer, Turboplus II, Laserlab, ETV

Low Level Radionuclide Counters:

- Alpha Spectrometer - 4 Canberra surface barrier counters
  - 4 Tenelec surface barrier counters
  - Ortec/IBM-XT Maestro Multi-Channel Analyzer
- Beta counters
  - gas flow proportional counters for <sup>210</sup>Pb, <sup>234</sup>Th (3)
  - anti-coincidence guard counter
  - low level Pb shield
- Gamma Spectrometer
  - PGT N Type co-axial Ge detector
  - low level Pb shields
- Radon Counter
  - Water (Alpha) and Air Samples (Beta) for Air Samples (Beta)
- Atmospheric sampling
  - precipitation (ACM) and aerosol collectors
- Sea-going equipment
  - Go-Flo bottles (6), Kevlar line, large filtration sets

**PAPERS PRESENTED AT PROFESSIONAL MEETINGS:**

<u>Date</u>	<u>Organization and Topic</u>
4/74	American Geophysical Union. "Rare Earth Distributions in Barites."
5/75	American Chemical Society (MARM). "Use of the Metals Silver and Zinc to Trace Dispersion of Sewage Sludge."
10/75	Estuarine Research Federation. "Trace Metals and the Estuarine

- Surface Microlayer."
- 2/76 American Chemical Society (MARM). "The Corinthos Incident; Trace Metal Characteristics."
- 3/76 American Meteorological Society. "Metals in the Estuarine Surface Microlayer."
- 12/77 American Geophysical Union. "Iron Mineral Equilibrium and Flux From Salt Marsh Sediments." Lord, C.P.J. III, T.M. Church.
- 6/78 American Society of Limnology and Oceanography. "Salt Marsh Flux and Cycling of Trace Elements."
- 12/78 American Geophysical Union
- (1) "Barium sulfate solubility in sea water; an experimental and theoretical evaluation."
  - (2) "Comparative pore water geochemistries of salt marshes and open estuary of Delaware Bay."
- 5/79 American Geophysical Union
- (1) "The chemistry of iron and manganese in salt marsh sediments."
  - (2) "Chemical oceanography of shelf-slope interaction in the Wilmington Canyon, August 1978."
- 6/79 American Society of Limnology and Oceanography. "Flocculation of trace elements during mixing in the Delaware Estuary."
- 11/79 American Mineralogical Society, Marine Minerals Short Course. "Marine Barite."
- 4/80 American Chemical Society (MARM). "Geochemical cycling of iron and manganese in salt marshes and parent estuaries."
- 5/80 American Chemical Society-Delaware and Philadelphia Analytical Groups, Trace Analysis Workshop. "Trace metal analysis in sea water."
- 8/81 International Association for Meteorology and Atmospheric Physics Symposium on Role of the Ocean in Atmospheric Chemistry, Hamburg, FDR "Chemistry of Precipitation over the Western Atlantic."
- 8/81 Gordon Research Conference in Chemical Oceanography. Poster "Trace Metal Chemistry of Delaware Bay."
- 2/82 American Geophysical Union - American Society of Limnology and Oceanography Joint Meeting, San Antonio, Texas. "Trace Metal Geochemistry of Delaware Bay."
- 6/82 American Geophysical Union - Philadelphia, Pa.
- (1) "Comparative geochemistries of trace metals in the waters of the major estuaries of the Middle Atlantic Bight."
  - (2) "Nutrient Dynamics in Chesapeake and Delaware Bay."
  - (3) "Trace Metal Geochemistry of Delaware Bay."
- 8/82 Joint Oceanography Assembly, Halifax, Nova Scotia. "Estuarine Geochemistry of Trace Elements."
- 1/83 Gordon Research Conference in Chemical Oceanography. Poster, "Pore water chemistry of a Delaware salt marsh."
- 3/83 Delaware Department of Natural Resources and Environmental Control (DNREC) - Dover, DE. "Acid rain research at Lewes, Delaware."
- 5/83 Western Atlantic Ocean Experiment (WATOX) Annual Meeting - Bermuda Biological Station - Bermuda

- 6/83 American Geophysical Union Biannual Meeting - Baltimore, Maryland.
- (1) "Comparative estimates of trace element fluxes from sediments of the Delaware estuary."
  - (2) "Mixing experiments with waters of the Delaware estuary."
  - (3) "Precipitation chemistry and acidity at the mid-Atlantic coast."
- 8/83 International Union of Geodesy and Geophysics (IUGG), Coastal and Near Shore Zone Chemical Processes-Session Chairman, "The geochemistry of intertidal sediments," Hamburg, Germany.
- 8/83 Commission on Atmospheric Chemistry and Global Pollution (CACGP), Oxford, England. "Wet deposition of trace metals to the western Atlantic coast."
- 9/83 Heavy Metals in the Environment International Conference, Heidelberg, Germany. Poster - "Heavy metal biogeochemistry in the Delaware estuary."
- 10/83 Estuarine Research Federation Meeting, Virginia Beach, VA. "The estuarine interaction of nutrients, organics, and metals: A case study in the Delaware estuary," (Co-author, presented by Dr. Sharp).
- 1/84 Ocean Sciences Meeting, New Orleans, LA. "Chemical oceanography and circulation over Wilmington Canyon during summer months."
- 5/84 International Council for the Exploration of the Sea (ICES) Symposium - Contaminant fluxes through the coastal zone, Nantes, France. "Trace metal fluxes through the Delaware Estuary."
- 5/84 Chemistry of the Mediterranean - Residence time of Microconstituents in Coastal Waters, Primosten, Yugoslavia. "Factors controlling microconstituent residence times in the larger estuaries of eastern U.S.A."
- 7/84 Western Atlantic Ocean Experiment (WATOX) meeting. Charlottesville, VA. "Trace metals in WATOX precipitation."
- 8/84 Gordon Research Conference on Chemical Oceanography, Meriden, New Hampshire.
- 11/84 Western Atlantic Ocean Experiment (WATOX) Biannual meeting. Norfolk, VA. "Trace metals collected from R.V. Knorr, April May, 1984."
- 2/85 Western Atlantic Ocean Experiment (WATOX) Biannual meeting. Lewes, DE. "Trace metals and related ground-based activities during WATOX intensive."
- 5/85 American Geophysical Union - Baltimore, Maryland
- (1) "Estuarine behavior of U-The series radionuclides; initial results from the Delaware and coastal waters"
  - (2) "Sulfur speciation in a Delaware salt marsh"
  - (3) "Trace metal biogeochemistry and flux through the Delaware estuary"
  - (4) "Trace metals dissolved in middle Atlantic shelf waters"
- 7/85 Western Atlantic Ocean Experiment (WATOX) Biannual Meeting - Charlottesville, VA. "Radon and 210-Pb in WATOX rain water."
- 4/85 American Geophysical Union - Baltimore, Maryland
- (1) Sarin, M. M., S. L. Murray, M. Q. Fleischer, T. M. Church (1985). Estuarine behavior of U-The series radionuclides; initial results from the Delaware and coastal waters, *EOS*, **66**, 276.
  - (2) Tramontano, J. M., S. Murray, and T. M. Church (1985) Trace metal biogeochemistry and flux through the Delaware estuary. *EOS*, **66**, 278.
- 1/86 American Geophysical Union-Ocean Sciences Meeting, New Orleans, LA
- (1) Church, T. M. (1985). Trace metal behavior in estuaries; *Biogeochemical*

- processes for transport, cycling and retention. EOS, 66, 1260.
- (2) Bollinger, M. S., W. S. Moore, and T. M. Church (1985). Biological uptake of radium in an estuary. EOS, 66, 1285
- (3) Sarin, M. M. and T. M. Church (1985). Salt marsh intertidal systems; an important sink for dissolved uranium in the marine environment. EOS, 66, 1294.
- 1/86 Atmospheric Environment Service workshop on the measurement of metals in precipitation - Ontario, Canada. "The collection and analysis of metals in Atlantic precipitation"
- 4/86 American Chemical Society Symposium on acid rain: I. Sources and atmospheric processes presented before the Division of Petroleum, Inc., New York, New York. "The Western Atlantic Ocean Experiment (WATOX) advection, deposition and fate of atmospheric emissions from North America to the western Atlantic"
- 4/86 American Chemical Society, Geochemistry Division, New York, New York. "Diagenesis in salt marsh sediments: An ideal example of biogeochemical cycling of elements"
- 4/86 Illinois State Water Survey - MAP3S and CORE Workshop - Champaign-Urbana, Illinois. "MAP3S Station Report - Lewes, Delaware"
- 5/86 American Geophysical Union - Baltimore, Maryland
- (1) "Suspended particulate trace metals in Delaware Bay"
- (2) "10-Be and 26-Al in Marine Phillipsites"
- 10/86 NASA - BREW 1 Workshop - Wetlands Planning Meeting. NASA-Langley Research Center, Virginia. "Below-Ground Sulfur Speciation"
- 12/86 American Geophysical Union - San Francisco, California
- (1) "Atmospheric and precipitation chemistry of the North Atlantic; Shipboard results during April-May 1984"
- (2) "Estuarine organic complexation of copper in the Delaware Bay"
- (3) "The wet and dry deposition of arsenic at the Mid-Atlantic coast: concentration and speciation"
- (4) "The atmospheric transport and total deposition of Pb, Cd, Zn and <sup>210</sup>Pb to the western Atlantic Ocean"
- (5) "Oceanographic observations of the shelfbreak front off the Delmarva peninsula"
- (6) "Iodine speciation in Chesapeake Bay"
- 3/87 NSF/GOFS Coastal Workshop, Slidell, MI entitled: The Impact of Ocean Boundaries on the Interior Ocean. "Estuarine, atmospheric, and groundwater inputs to continental margins"
- 4/87 193rd ACS National Meeting, Denver, Colorado.  
Church, T., Johnston, K. and Luther III, G.W. Speciation of Cu(II) in Estuarine waters, presented at the 193rd ACS national meeting, Denver, Co. April 9, 1987, Geochemistry Abstract 94.
- 8/87 Gordon Research Conference, Meriden, NH
- (1) Poster presentation: Uranium removal in the Delaware and Chesapeake Estuaries
- (2) Poster presentation by Tim Ferdelman: The distribution of sulfur, iron, manganese, copper and uranium in a salt marsh sediment core.
- 8/87 American Chemical Society, New Orleans

- 8/87 (1) Tramontano, J. M. and T. M. Church, Trace Elements in the Environment. CACGP Conference, Trent University, Ontario, Canada
- (1) Trace elements in coastal Atlantic deposition; sources and fluxes
- (2) Atmospheric <sup>222</sup>Rn and deposition <sup>210</sup>Pb as continental tracers to the western Atlantic.
- 1/88 AGU/ASLO Ocean Sciences Ocean Sciences Meeting, New Orleans
- (1) Luther III, G. W., T. Ferdelman, T. C. Church. (1987) Evidence suggesting biological oxidation of bisulfide ion in Chesapeake Bay. EOS, 68, 1757.
- (2) Sharma, P., T. M. Church and R. B. Biggs. 1987, Natural (<sup>210</sup>Pb, <sup>7</sup>Be, <sup>228/226</sup>Ra and <sup>40</sup>K) and fall-out (<sup>137</sup>Cs) radionuclides as geochemical tracers for studying sedimentary processes in Kelly Island salt marsh, Delaware Bay.
- 2/88 Gordon Research Conference on Estuarine Processes, Oxnard, CA
- (1) Processes controlling the chemistry of trace metals in estuarine water
- 3/88 Chapman Conference on the GAIA Hypothesis, San Diego, CA
- (1) GAIA in the coastal environment: Biogeochemical responses to recent anthropic impacts
- 12/88 American Geophysical Union - San Francisco, California
- (1) Luther III, G. W. and T. M. Church. (1988) Sulfur speciation and possible sulfide oxidation in the water column of the Black Sea. EOS, Vol. 69, p. 1242.
- (2) Cifuentes, L. A., T. C. Hoering, G. W. Luther, III, T. G. Ferdelman and T. M. Church. (1988). Stable sulfur isotope measurements of inorganic sulfur in the Great Marsh, Delaware. EOS, Vol. 69, p. 1234.
- 12/88 Environmental Heavy Metal Workshop, Taiwan, Republic of China
- Heavy metals in the environment Lecture Series
- Heavy metals in seawater
- Heavy metals in the atmosphere
- Heavy metals in the coastal environments
- Heavy metals in marine sediments
- 1/89 Korea Ocean Research Development Agency
- "Processes controlling the transport of trace elements in estuaries."
- Seoul National University
- "Atmospheric chemistry of trace metals over the Atlantic Ocean"
- 3/89 Electric Power Partners Program, Clayton Hall, Newark, DE
- "Trace elements in precipitation as emissions sources indicators"
- 4/89 Red Clay Creek Conference III, Ashland Nature Center
- "Rates of erosion, deposition and cycling of zinc-contaminated sediments"
- 4/89 American Geophysical Union - Baltimore, Maryland
- (1) Ferdelman, T. G., T. M. Church and G. W. Luther, III. Distribution and formation of solid phase organic sulfur in a salt marsh sediment core (Great Marsh, DE, USA) presented at the Spring AGU meeting, Baltimore, MD., May 8, 1989. EOS, Vol. 70, 361.
- (2) Kostka, J. E., G. W. Luther, E. J. Tsamakis, T. G. Ferdelman and T. Church. Short term cycling of pyrite and thiosulfate in salt marsh sediments, presented at the Spring AGU meeting, Baltimore, MD., May 8,

1989. EOS, Vol. 70, 361.
- 5/89 First International Symposium on Small Estuaries, Primosten, Yugoslavia, 21-27, May 1989. Church, T. M. (1989). Trace metal cycling in a Delaware salt marsh estuary. (In) Biogeochemical Processes in a Stratified Estuary: Krka Estuary (east Adriatic Coast).
- 5/89 Science, Engineering, and Technology Seminar (S.E.T.), Dover, DE "Acid Rain."
- 12/89 American Geophysical Union Meeting - San Francisco, California
- (1) Scudlark, J. R., T. M. Church and S. Moore (1989). "Trace metals in Bermuda precipitation; initial results from the AEROCE Program," EOS, Vol 70(43), 1039.
  - (2) Lim, B., T. Jickells, J. Scudlark, T. Church, X. Zhu and J. Prospero (1989). "Particulate and dissolved trace metal distribution in North Atlantic precipitation." EOS, Vol 70(43), 1039.
  - (3) Church, T.M., A. Véron, R. Flegal, H. Maring and C. Patterson (1989). "Trace elements in the North Atlantic atmosphere; shipboard results from WATOX/CGE (Aug-Sept '88)." EOS, Vol 70(43), 1045.
- 2/90 American Geophysical Union/Ocean Sciences Meeting - New Orleans, Louisiana
- (1) Scudlark, J. R., and T. M. Church (1990). "Precipitation chemistry at the mid-Atlantic coast of the U.S. I. Acids and major ions." EOS, Vol 71(2), 164.
  - (2) Church, T. M. and J. R. Scudlark (1990). "Precipitation chemistry at the mid-Atlantic coast of the U.S. II. Trace Elements." EOS, Vol 71(2), 164.
  - (3) Véron, A., T. Church, J. Merrill and C. Patterson (1990). "Trace element sources and deposition characteristics to the western Atlantic; shipboard results during April 1989. EOS, Vol 71(2), 153.
  - (4) Hussain, N., T. Church, M. Heyraud, S. Fowler, S. Heussner, A. Monaco, P. Biscaye and R. Anderson (1990). "Systematics of radon daughters ( $^{210}\text{Pb}$ - $^{210}\text{Po}$ ) atmospheric fallout to coastal regions." EOS, Vol 71(2), 72.
- 6/90 American Association for Aerosol Research 1990 Annual Meeting, Philadelphia, Pennsylvania. Church, T.M., A.J. Véron, J.R. Scudlark and C.C. Patterson (1990). "Trace metal aerosols and deposition to the North Atlantic Ocean."
- 9/90 Commission on Atmospheric Chemistry and Global Pollution (CACGP) 7th International Symposium on the Chemistry of the Global Atmosphere in Chamrousse, France. Véron, A., T. Church, C. Patterson and J. Merrill, "Atmospheric sources, transport and deposition characteristics of trace metals to the western North Atlantic" in Abstracts and Resumes, July 1990.
- 4/91 Second International Symposium on the Biogeochemistry of Model Estuaries: Estuarine Processes in Global Change, Jekyll Island, Georgia, April 14-20, 1991. Church, Thomas M. (1991). "Natural Radionuclide Studies of Delaware Estuarine Processes," in Program Abstracts, April 1991.
- 5/91 American Geophysical Union, Spring Meeting, Baltimore, Maryland, May 28-June 1, 1991.
- (1) Hussain, N. and T.M. Church (1991). "Radon Daughter Disequilibria in the North Atlantic Atmosphere." EOS, Vol. 72(17), 88.
  - (2) Véron, A.J., T.M. Church and C.C. Patterson (1991). "Response of Lead

- Cycling to Seasonal Changes of the Tropospheric Input into the Sargasso Sea." *EOS*, Vol. 72(17), 88.
- (3) Church, T.M. and S.M. Moore (1991). "Trace Metals in Bermuda Precipitation; Results from AEROCE Phase I (88-90)." *EOS*, Vol. 72(17), 88.
  - (4) Ferdelman, T.G., G.W. Luther, T.M. Church, and J. Cullen (1991). "Distribution of Reduced Sulfur Compounds and Iodide in Sediment Porewaters from the Mid-Atlantic Bight Slope." *EOS*, Vol. 72(17), 151.
  - (5) Gawarkiewicz, Glen, T.M. Church, G. Luther, T. Ferdelman (1991). "An Example of Gulf Stream Water on the Continental Shelf North of Cape Hatteras." *EOS*, Vol. 72(17), 162.
  - (6) Church, T.M. (1991). "Coastal Ocean Processes (CoOP); An U.S. Interdisciplinary Research Program." *EOS*, Vol. 72(17), 164.
  - (7) Scudlark, J.R. and T.M. Church. "Atmospheric input of inorganic nitrogen to Delaware Bay." A52A-03.
- 7/91 5th International Conference on Precipitation Scavenging and Atmospheric Surface Exchange Processes, Seattle, Washington, July 14-19.  
Church, T., A. Véron, C. Patterson and D. Settle (1991). "Trace Metal Scavenging from the North Atlantic Troposphere."
- 8/91 Gordon Research Conference - Chemical Oceanography, Meridan, New Hampshire, August 12-16, 1991.
- (1) Veron, A., T.M. Church, A.R. Flegal, C.C. Patterson, and Y. Erel. "Response of lead cycling in the Surface Sargasso Sea to atmospheric inputs."
  - (2) Ferdelman, T.G., G.W.Luther, III and T. Church. "Reduced Sulfur in the Porewaters and Solid Phases of a Mid-Atlantic Bight Slope Sediment Core."
- 10/91 Annual AEROCE Workshop - "AEROCE-JGOFS Interaction;" Presentations on "Precipitation, Trace Metals" and "Potential for JGOFS/AEROCE Cooperation," Bermuda, October 23-25, 1991.
- 11/91 Korean Air Pollution Research Association, Chuncheon, Korea, November 13-17. "Sources, transport and deposition of trace metals to coastal waters of the North Atlantic."
- 11/91 Marine Pollution Symposium - National Cheng Kung University, Taiwan, Republic of China, November 5-13.  
Church, Thomas M. (1991). "Sources, Transport, and Fate of Toxic Elements in The Coastal Marine Environment."
- 12/91 The Chemistry of the Atmosphere: Its Impact on Global Change: CHEMRAWN VII, A World Conference, Baltimore, Maryland, December 2-6.
- (1) Scudlark, J.R. and T.M. Church (1991). "Precipitation Chemistry of Major Ions and Trace Elements at the Mid-Atlantic Coast: Sources, Fluxes and Trends," in Abstracts, December 1991.
  - (2) Moody, J., T. Church, G. Cutter, J. Galloway, W. Keene, J. Merrill, J. Scudlark and A. Véron (1991). "Source Attribution of Major and Trace Chemical Species in Precipitation on Bermuda," in Abstracts, December, 1991.
  - (3) Church, T. and A. Véron (1991). "Precipitation Chemistry and Deposition

- of Trace Metals Over the North Atlantic Ocean," in Abstracts, December, 1991.
- (4) Galloway, J.N., T.M. Church and W.C. Keene (1991). "Acid Deposition, Natural and Anthropogenic: A Decade of Measurements from the USA East Coast, Bermuda and the Indian Ocean," in Abstracts, December, 1991.
- 12/91 American Geophysical Union, Fall Meeting, San Francisco, California, December 9-13.
- (1) Véron, A.J. and T.M. Church (1991). "Precipitation Chemistry and Deposition of Trace Metals Over the North Atlantic Ocean," Poster Presentation, in AGU Programs and Abstracts, December, 1991.
- (2) Hussain, N. and T.M. Church (1991). "Excess <sup>210</sup>Polonium in the Coastal Marine Atmosphere; Possible Escape from Productive Waters," in AGU Programs and Abstracts, December, 1991.
- 1/92 American Geophysical Union, Winter Meeting, New Orleans, Louisiana, January 27-31, 1992.
- (1) Church, T.M., A.J. Véron, and C.C. Patterson (1992). "Response of Lead Cycling in the Surface Sargasso Sea to Changes in Tropospheric Input."
- (2) Véron, A.J., T.M. Church and A.R. Flegal (1992). "Impact of the Subtropical North Atlantic Gyre Circulation on the Distribution of Dissolved Pb in the Eastern North Atlantic Ocean."
- (3) Ferdelman, T.G., G.W. Luther, III and T.M. Church (1992). "Reduced Sulfur in the Porewaters and Solid Phases of Continental Slope Sediments of the Mid-Atlantic Bight."
- 4/92 Mineralogical Society Geochemistry Group and Challenger Society Meeting, Coastal Exchange, "Sources, Transport, and Fate of Material During Coastal Exchange, London, England, April 1-2. Keynote Speaker.
- 4/92 European Geophysical Society XVII, Edinburgh, Scotland, April 6-10, 1992. Church, T.M., A.J. Véron, C.C. Patterson (1992). "Trace Metal Chemistry of Marine Rain; Aerosol Scavenging and Exchange Processes."
- 5/92 American Geophysical Union, Spring Meeting, Montreal, Canada, May 12-16, 1992.
- (1) Church, Thomas M. (1992). "Sources, Transport, and Fate of Trace metals in the Coastal Marine Environment," Invited.
- (2) Church, T.M., J.R. Scudlark, and A.J. Véron (1992). "The Atmospheric Deposition of Trace Metals to the North Atlantic during the Past Decade."
- (3) Galloway, J.N., T.M. Church, W.C. Keene, and J.R. Scudlark (1992). "Ten Years of Atmospheric Deposition to the North Atlantic Ocean: Detecting a Gradient in Anthropogenic Influence."
- 9/92 Joint Estuarine and Coastal Sciences Association (ECSA) and Estuarine Research Federation (ERF) International Meeting, Plymouth, England, 14-20 September, "Radionuclide studies of estuarine phase transfer process." Invited.
- 12/92 American Geophysical Union, Fall Meeting, San Francisco, CA, 7-11 December, 1992. "The determination of dissolved zinc-organic complexation in stripping voltammetry with complexometric titration and pseudo voltammograms." Lewis, B.L., G.W. Luther, H. Lane, T.M. Church.



- 4/93 The Oceanographic Society, 3rd Annual Meeting, Seattle, Washington, "Use of Lead to Trace the Circulation and Distribution of North Atlantic Surface Waters." (April 13-16)
- 4/93 Global Atmospheric-Biospheric Chemistry (IGAC) Conference, Eilat, Israel, (April 18-22, presented by A. Véron).
- (1) "Trace Element Sources, Scavenging and Deposition in the Western North Atlantic Troposphere."
  - (2) "Air mass sources and temporal variations in trace metal transport and wet deposition from the North Atlantic troposphere."
- 5/93 American Geophysical Union, Spring Meeting, Baltimore, MD, May 24-28, 1993.
- (1) Church, T.M., A.J. Véron, R. Arimoto, and G. A. Cutter (1993). "Trace Element Sources, Scavenging, and Deposition to the Western North Atlantic."
  - (2) Véron, A.J. and T.M. Church (1993). "Continental Origin and Anthropogenic Sources of Trace Metals in the Subtropical North Atlantic Troposphere."
  - (3) Conko, K.M., J.R. Scudlark and T.M. Church (1993). "An Assessment of the Atmospheric Inputs of Trace Metals to the Delaware Inland Bays."
  - (4) Scudlark, J.R., T.M. Church and K.M. Conko (1993). "Atmospheric Wet Deposition of Trace Elements to Chesapeake Bay."
- 8/93 Gordon Research Conference, Chemical Oceanography, Meriden, NH, "Use of Lead to Trace the Circulation and Distribution of North Atlantic Surface Waters," (August 15-20).
- 9/93 9th International Conference on Heavy Metals in the Environment, Toronto, Canada "Transport of Heavy (Trace) Elements from the Land to the Sea," Invited Keynote Speaker.
- 12/93 American Geophysical Union Fall Meeting, San Francisco, CA, December 6-10, 1993
- (1) Church, T.M., J.R. Scudlark, and A.J. Véron. "The wet deposition of trace metals from the North Atlantic troposphere: Continental sources and spatial/temporal trends."
  - (2) Hussain, N., T.M. Church, and W.C. Burnett. "Volatile polonium in Floridian groundwater."
- 2/94 Ocean Science Meeting, San Diego, CA, February 21-25, 1994.
- (1) Scudlark, J.R., T.M. Church. "Major and tracer chemical species in precipitation at the mid-Atlantic US coast: Source apportionment and atmospheric flux."
  - (2) Ferdleman, R.G., G. Gawarkiewicz, T.M. Church, G.W. Luther, III. "The influence of stratification on the interaction of shelf, slope, and Gulf Stream water masses on the continental shelf north of Cape Hatteras."
  - (3) Hussain, N., T.M. Church, G.W. Luther, III. "Radioactive disequilibrium of  $^{210}\text{Po}$  in hydrothermal fluids from Juan de Fuca ridge."
- 5/94 American Geophysical Union Spring Meeting, Baltimore, MD, May 23-27, 1994
- (1) Arimoto, R., N.F. Lewis, U.M. Tomza, R.A. Duce, T.M. Church. "Size distributions and precipitation scavenging of mineral aerosol particles over the ocean"

- (3) Scudlark, J.R., T.M. Church, J.M. Ondov, M. Han. "Source apportionment of major ions and trace elements in precipitation at the mid-Atlantic coast."
- 5/94 EPA-453/R-9-055 "Deposition of Air Pollutants to the Great Waters", First Report to Congress. T.M. Church was part of the team who put this together.
- 6/94 Chesapeake Research Conference, Norfolk, VA, June 1-3, 1994, Scudlark, J.R., T. M. Church, K.M. Conko, G.A. Cutter. "Atmospheric Wet Deposition of Trace Elements to the Chesapeake Bay"
- 6/94 37th Conference on Great Lakes Research, University of Windsor, Canada - "The Comparative Geochemistry of Trace Metals in Estuaries and Lakes."
- 7/94 The Oceanographic Society, Pacific Basin Meeting, Honolulu, Hawaii, R-06. Hussain, N., Church, T.M., Luther, G.W., Moore, W.S. "Radioactive Disequilibrium of  $^{210}\text{Po}$  in Hydrothermal Fluids from Juan de Fuca Ridge."
- 12/94 American Geophysical Union Fall Meeting, San Francisco, CA, December 5-9,  
 (1) Véron, A.J., T.M. Church, N. Hussain, and A.R. Flegal. "Use of Lead Isotopes as Tracers of Lead Sources and Transport in North Atlantic Waters: Impact of Surface and Deep Circulation in Lead Cycling."
- 5/95 American Geophysical Union Spring Meeting, Baltimore, MD, May 30-June 2, 1995, "The fallout isotope  $^{207}\text{Bi}$  in a Delaware salt marsh and its application to sea level geochronology." Kim, G., N. Hussain, T.M. Church.
- 6/95 Gordon Research Conference, Henniker, NH, June 11-16, Invited presentation, "Atmospheric Trace Elements in Southern Lake Michigan Waters."
- 6/95 Metal Speciation and Contamination of Surface Water Workshop (U.S. EPA,IAEAC, ACS, University of Delaware), Jekyll Island, GA, June 25-28, Invited presentation, "Atmospheric Inputs of Metals to Surface Waters."
- 9/95 The Second Circum Pacific International Symposium on Earth Environment Invited Speaker - Pusan, Korea, Spetember 1-2, "The Role of Atmospheric Trace Metal Inputs to Surface Waters in Global Climate Change."
- 11/95 AEROCE Annual Meeting, Miami, FL, November 16-18, Presentation "Trace Metals in the North Atlantic."
- 2/96 AAAS Annual Meeting, Baltimore, MD, February 8-13, Invited presentation, "The middle Atlantic Environmental and Ecological Systems."
- 2/96 The Oceanographic Society, Ocean Sciences Meeting, San Diego, CA, February 12-16,  
 (1) "Salt Marshes: An Important Coastal Sink for Dissolved Uranium." T.M. Church, M.M. Sarin, M.Q. Fleisher, T.G. Ferdelman.  
 (2) "Atmospheric wet deposition and water column distribution of trace elements in Lake Michigan: impact of the Chicago urban plume." J.R. Scudlark, T.M. Church, K.M. Conko, S.M. Moore, M. Freeman, J.P. Leonard.
- 10/96 GSA Annual Meeting, Denver, CO, October 28-31, Presentation "Rapid Clay Transformations in Delaware Salt Marshes." T.M. Church, B. Velde
- 11/96 Society of Environmental Toxicology and Chemistry - Annual Meeting, Washington, D.C., November 17-21,

- (1) Invited presentation, "Trace Elements in Lake Michigan: Impact of the Chicago Urban Plume." J.R. Scudlark, T.M. Church, K.M. Conko, S.M. Moore, M. Freeman, J.P. Leonard.
- (2) "Dissolved organic nitrogen in precipitation: collection, analysis, and atmospheric flux." Scudlark, J.R., K.M. Russell, J.A. Montag, J.R. Maben, W.C. Keene, J.N. Galloway, T.M. Church.
- 5/97 5th International Symposium on Model Estuaries: New Approaches to Estuarine Chemistry, Rimouski, Québec, Canada, May 25-29, 1997, "Excess radon in Chesapeake Bay: Evidence of groundwater discharge," T. Church, N. Hussain, and G. Kim (1997)
- 5/97 American Geophysical Union, Spring Meeting, Baltimore, MD, 27-30 May, 1997.
- (1) K.M. Conko, J.R. Scudlark, T.M. Church. "An assessment of trace metal transport in the Anacostia River, Washington, DC."
- (2) G. Kim, N. Hussain, T.M. Church, J.P. Leonard. "High wind driven  $^{210}\text{Po}$  in the Chesapeake Bay atmosphere: implications to its summertime biovolatility."
- 8/97 Gordon Research Conference, Meridan, N.H., August 10-15, 1997.
- (1) T.M. Church, N. Hussain, G. Kim. " $^{222}\text{Rn}$ ,  $^{226}\text{Ra}$  in Chesapeake Bay: Evidence of groundwater discharge."
- (2) Seasonal variation of  $^{234}\text{Th}$  and  $^{210}\text{Po}$  in the surface Sargasso Sea: Estimate of oligotrophic export production. (poster)
- 11/97 International Conference on Isotopes in the Solar System, Ahmedabad, India, November 11-14, 1997,
- (1) (PRL Silver Jubilee), "Marine radionuclide studies: A silver jubilee of PRL-University of Delaware collaboration," T.M. Church, B.L.K. Somayajulu, M.M. Sarin, P. Sharma, N. Hussain and R. Rengarajan, (1997);
- (2) "Marine applications of radon daughter disequilibria," T.M. Church, N. Hussain, G. Kim and M.M. Sarin, (1997);
- 02/98 Ocean Sciences Meeting, San Diego, California, February, 1998
- (1) " $^{210}\text{Po}$  and  $^{210}\text{Pb}$  in the South Atlantic distribution and disequilibria in the upper 500m." Sarin, M.M., G. Kim, and T.M. Church
- (2) "Seasonal changes in  $^{234}\text{Th}$  disequilibria in the surface Sargasso Sea: Implication for carbon and trace element export fluxes." Kim, G. T.M. Church, N. Hussain and M. Conte
- (3) Alleman, L.Y., T.M. Church, A. Veron, A.R. Flegal. 1998. "Stable lead isotopes as tracers of water mass sources in the south Atlantic Ocean." *EOS*, vol 79(1), OS 70
- 04/98 American Geophysical Union, Spring Meeting, Boston, Mass. 1998.
- (1) "Atmospheric depositional fluxes of trace elements to the Atlantic Ocean." Kim, G., Alleman, L.Y., and T.M. Church
- (2) "Stable lead isotopes as tracers of water mass sources in the South Atlantic Ocean." Alleman, L. Y., T.M. Church, A. Veron, and A.R. Flegal.
- 12/98 American Geophysical Union, Fall Meeting, San Francisco, CA, 1998

- (1) “Origin and transport of metal pollutants and crustal elements across the north atlantic:  $^7\text{Be}$ ,  $^{210}\text{Pb}$  and stable lead isotopes as tracers.” Alleman, L.Y., G. Kim, A.J. Veron, T.M. Church, B. Hamelin
- (2) “Transmissions of Atmospherically-deposited trace elements through an undeveloped, forested Maryland Watershed.” Church, T.M., J.R. Scudlark, K.M. Conko, O.P. Bricker, K.C. Rice.
- 09/98 2nd Annual Scientific ELOISE Conference, Huelva, Spain, September 30 - October 3, 1998. Keynote lecture, “Biogeochemical Cycles and Fluxes in Salt Marshes” T.M. Church
- 06/99 5th International Conference on Mercury as a Global Pollutant. Rio de Janeiro, Brazil 23-28 May 1999 “Mercury in precipitation and salt marsh tidal waters at the US Mid-Atlantic coast”, T.M. Church, J.R. Scudlark, W.C. Chen, J.I. Popp.
- 08/99 Gordon Conference in Chemical Oceanography. Meriden, NH August 1999 “Long term atmosphere to ocean deposition of trace elements to the North Atlantic”, L.Y. Alleman, G. Kim, T. Church and A. Veron.
- 01/00 Ocean Sciences 2000 Meeting, (AGU/ASLO) San Antonio, Texas, 24-28 January 2000
- (1) “North Atlantic surface water response to variations in trace elements atmospheric deposition” L.Y. Alleman, T.M. Church, G. Kim, A.J. Veron, B. Hamelin.
- (2) “Atmospheric wet deposition of iron fuels biogeochemical fluxes in the oligotrophic Sargasso Sea” G. Kim, L.Y. Alleman, T.M. Church, M. Conte, D.K. Steinberg, and K.M. Orcutt.
- 02/00 International SOLAS, University of Bremerhaven, Germany - “How important is the sea to air transfer of trace elements?”
- 06/00 AGU Spring Meeting, Washington D.C. May 30 – June 3, 2000 – “Atmospheric contributions of trace elements to the Potomac watershed”, T.M. Church, K.M. Conko, and J.R. Scudlark
- 07/00 Sixth International Symposium on Model Estuaries, July 5-7, 2000 Ispra, Italy – “Biogeochemical cycles and exchanges in salt marshes”,
- 12/00 AGU Fall Meeting. San Francisco, CA December 15-19, 2000 – “Long-term and seasonal deposition of crustal dust trace elements to the Sargasso Sea”, T.M. Church, L. Alleman, A. Veron and G. Kim
- 01/01 Woods Hole Oceanographic Institute. July 17-20, 2001 – “Lead isotope tracers of Atlantic atmospheric transport and oceanic circulation”
- 03/01 Sargasso Sea Ocean/Atmosphere Observatory Workshop, Bermuda Biological Station for Research March 5-9, 2001 – “Atmospheric time-series on the AEROCE tower” T.M. Church
- 04/01 Bermuda Biological Station for Research Public Forum Talk – “Continental pollutants reaching Bermuda air and water”
- 05/01 US SOLAS Workshop (Surface Ocean Lower Atmosphere Studies), Bolger Center, Potomac, MD May 16-18, 2001 – “Atmospheric impacts on marine biogeochemical processes”
- 08/01 Gordon Conference in Chemical Oceanography, Meriden, New Hampshire, August 12-17, 2001 – “Long term seasonal deposition of crustal dust trace elements to the Sargasso Sea” T.M. Church, A. Veron, and L. Alleman

- 11/01 Joint IAPSO/IABO Assembly, Mar de Plata, Argentina, October 21-26, 2001  
 (1) “Atmospheric delivery and oceanic fate of trace elements” T.M. Church  
 (2) “The Sargasso Sea Ocean’ Atmosphere Observatory” T.M. Church
- 12/01 AGU Fall Meeting, December 2001, San Francisco, CA  
 (1) ”Long term atmospheric deposition of trace elements to the Sargasso Sea”,  
T. M. Church, A. J. Veron, and L. Y. Alleman  
 (2) “Lead stable isotope tracers of atmospheric and marine scavenging in the  
 Sargasso Sea” A. J. Veron, L. Y. Laurent and T. M. Church
- 02/02 ASLO Oceans 02 Meeting. Honolulu, HI. “Availability of iron for N fixation by  
 the cyanobacteria *Trichodesmim* in the Sargasso Sea” K. A. Achilles, S. W.  
 Wilhelms, T. M. Church, G. W. Luther, and D. A. Hutchins
- 04/02 U.S. Joint Global Ocean Flux Study (JGOFS) Time Series Summit. Vancouver,  
 B.C. Canada  
 (1) “Time series records of atmospheric trace element deposition in Bermuda”  
 (oral) T.M. Church  
 (2) “The lead stable isotope tiem series at Bermuda; Tracers for atmospheric  
 sources and surface ocean processing” (poster) T. M. Church, A. J. Veron,  
 and L.Y. Alleman
- 05/02 Seventh International Symposium on Estuarine Biogeochemistry, Grimstad,  
 Norway “Salt marshes as temperate records of regional sea level rise and metal  
 pollution” T. M. Church
- 01/03 IGBP OCEANS Meeting; Ocean Biogeochemistry and Ecosystem Analysis,  
 Paris, France  
 (1) “The Cycle of Volatile Metals between Waters and Atmosphere”  
D. Amouroux, T. M. Church, O.F.X. Donard  
 (2) Importance of Iron for *Trichodesmium* in the North Atlantic  
 Kate Achilles, Thomas M. Church, George W. Luther III, and Fred  
 Lipschultz
- 02/03 Amer. Soc. Limnol. Oceanog. Annual Meeting, Salt Lake City, US  
 (1) “The Cycling of Volatile Metals Other Than Hg  
 Donard, O., D. Amouroux, E.Krupp, E.Tessier, C. Pecheyran,  
 M.-P. Pavageau, M.-P., and T. M. Church  
 (2) “Importance of Iron for *Trichodesmium* in the North Atlantic”  
 K. Achilles, T. M. Church, G. W. Luther III, and F. Lipschultz
- 04/03 EGU-AGU-EGS Combined Meeting, 6-11 April, 2003, Nice, France  
 (1) “Stable lead isotope tracers of atmospheric and marine scavenging to the  
 Sargasso Sea” T. Church, L. Alleman and A. Veron.  
 (2) “The cycle of volatile trace elements between surface waters and lower  
 atmosphere” T. Church and D. Amouroux.
- 06/03 IUGG Meeting, 30 June – 11 July 2003, Sapporo, Japan  
 “The exchange of volatile trace elements between surface waters and lower  
 atmosphere” T. Church, D. Amouroux and O. Donard
- 11/03 *XV International Conference on Marine Geology, 17-21 November 2003,  
 Moscow, Russia* “. Stable lead isotopes as geochemical tracers in the remote air  
 and water of the Atlantic and Arctic oceans” T. Church, L. Alleman, A. Veron,  
 and V. Shevchenko
- 01/04 *American Geophysical Ocean Science Meeting, 26-30 January 2004, Portland,*

OR.

“Historical pollution as recorded in marsh sediments of the upper Delaware River”. T. Church, C. Sommerfield, D. Velinsky, D. Point, C. Benoit, D. Amouroux and O. Donard.

- 02/04 ASLO/TOS Ocean Research. Honolulu, HI Feb. 2004 SS5.03 Bowie, A.R., Sekwick, P.N., Ussher, S.J., Marsya, C.M., Church, T.M. “Effect of mineral dust deposition on Iron (II) distribution in the Sargasso Sea”.
- 02/04 ASLO/TOS ocean Research Honolulu, HI Feb. 2004 SS5.03 Achilles, K.M., Hutchins, D.A., Church, R.M. “Bioavailability of Iron for Cyanobacteria cultures”.
- 05/04 8<sup>th</sup> International Estuarine Biogeochemistry Symposium, 19 May 2004, Solomons, MD. “Marsh Sediments as Records of Eutrophication and Metal Pollution in the Urban Delaware Estuary”
- 02/05 ASLO 2005 Aquatic Sciences Meeting. Salt Lake City, UT, February 2005 P29 Achilles, K., Lipschultz, F., Sekwick, P.N., Luther III, G.W., Church, T.M. “Importance of Iron to Trichodesmium colonies in the western North Atlantic”.
- 02/05 ASLO 2005 Aquatic Sciences Meeting. Salt Lake City, UT, February 2005 P45 TS26 Achilles, K.M., Hutchins, D.A., Church, T.M. “Bioavailability of Iron for Cyanobacteria cultures”.
- 02/05 ASLO 2005 Aquatic Sciences Meeting. Salt Lake City, UT, February 2005 P53 Sedwick, P.N., Church, T.M., Bowie, A.R., Marsay, C.M., Achilles, K.M., Ussher, S.J., Lethaby, R.J., Johnson, R.J., McGilliguddy, D.J. “Iron in the Sargasso Sea during summer: Aeolian imprint, spatiotemporal variability, and ecological implications”.
- 05/05 15<sup>th</sup> Annual Goldschmidt Conference. A Voyage of Discovery. Moscow, Idaho May 2005 SS-28 Veron, A, Church, T. (2005). “Stable lead isotopes as geochemical tracers in remote air of the Atlantic”. 15<sup>th</sup> Annual Goldschmidt Conference. A Voyage of Discovery. Moscow, Idaho May 2005.
- 06/05 TOS/UNESCO/IOC 2005 International Ocean Research Conference, Paris, June 2005 Achilles, K., Lipschultz, F., Sekwick, P.N., Luther III, G.W., Church, T.M. “Importance of Iron to Trichodesmium colonies in the western North Atlantic”.
- 06/05 At Both UNESCO and ASLO Meetings Santiago, June 2005 Church, T. M., Hanson, T. E., Amouroux, D. “Processes for formation of volatile trace element species in the ocean: Evidence using Tellurite resistant microbes”.
- 01/06 Ocean Sciences Meeting (AGU/ASLO/TOS) Honolulu, HI Jan '06 OS13A-01 Thomas Church, M. Sarin, N. Hussain, M. Baskaran “A Prospective Review on <sup>222</sup>Rn and its Daughters as Geochemical Metrics for Atmosphere and Ocean Processes”
- 01/06 OCEAN SCIENCES MEETING (AGU/ASLO/TOS) Honolulu, HI Jan '06 OS12M-03 Z-L.  
Tian, T. M. Church M. Conte and S. Huang “Coupling Between the Atmospheric Deposition and Oceanic Flux of Lithogenic Trace Elements (Fe) in the Sargasso Sea”.
- 01/06 OCEAN SCIENCES MEETING (AGU/ASLO/TOS) Honolulu, HI Jan '06 OS15B-15 Carmen Hill, Mark Baskaran, and Thomas Church “Export of Biogenic Particulate Matter as Traced by Preferential Scavenging of <sup>210</sup>Po at the

- Bermuda Atlantic Time Series”.
- 05/06 Hanse-Wissenschaftskolleg, Delmenhorst, Germany, May 2006 Church, T.M. “Global Distillation in the atmosphere, ocean and biota; Lessons learned from the metalloids, radon and its daughters”
- 05/06 9<sup>th</sup> IEBC Meeting, May 2006, Warnemunde, DE. “Trace metals in the Potomac (U.S.) watershed: Spatial and temporal processes for particle distribution, loading and basin yield”
- 12/06 AGU Fall meeting San Francisco, CA December 11-15, 2006 A42C-07 invited Church, T.M., Veron, A.J., Tian, A., Sholkovitz, E.R., Sedwick, P.N. “Atmospheric Input of Lithogenic Elements to the Sargasso Sea: the Long and Short of Bermuda Observations”
- 02/07 ASLO Aquatic Sciences Meeting Santa Fe, NM Feb 2007 SS27 SS02 CS06 Ollivier, P., Bahrou, A., Cox T., Marcus S., Church, T., Hanson, T., “Tellurium volatilizing microbes isolated from Delaware Salt Marshes”.
- 10/07 Planetary and Geosciences Division, Physical Research Laboratory, Ahmedabad, INDIA, Oct. 16, 2007. Church, T.M. “Atmospheric sources and oceanic fate of trace metals in the Sargasso Sea (North Atlantic)”.
- 03/08 Ocean Sciences Meeting (ASLO, AGU, TOS, CERF), Orlando FL, March 2008  
 (1) W304:022-161 Marsay, C M; Sedwick, P N; Johnson, R J; Lohan, M C; McGillicuddy, D J; Church, T M; FeAST Science Team “Pronounced temporal and mesoscale variability of dissolved iron in the Sargasso Sea (BATS region)”.  
 (2) W304:022-1412 Sholkovitz, E R; Sedwick, P N; Church, T M “Impact of anthropogenic combustion emissions on the input of soluble iron to the surface ocean: Estimates for the North Atlantic Basin”.  
 (3) W304:022-2293 Tian, Z L; Ollivier, P R; Veron, A J; Church, T M “Atmospheric Fe deposition modes at Bermuda and the adjacent Sargasso Sea”.  
 (4) W304:022-3008 Bahrou, A; Ollivier, P; Church, T; Hanson, T “Volatilization of Polonium by Tellurite resistant marine microbes”.
- 05/08 10<sup>th</sup> International Estuarine Biogeochemistry Symposium in Xiamen China Church, T. M., M.M. Sarin, W. J. Moore, J. F. Todd: “Natural U – TH- Series Radio-nuclides reveal important estuarine biogeochemical processes in the Delaware and Chesapeake Bays, USA.
- 12/08 AGU Fall Meeting, San Francisco, December 2008  
 (1) OS23E\_W M Landing, T Church “Influences of Atmospheric Deposition of Nutrients, Trace Elements, and Isotopes on Ocean Biogeochemistry III”  
 (2) OS21G-03. Sedwick, P, Marsay, C, Bowie, A, Church, T, Cullen, J, Giesbrecht, T, Johnson, R, Lohan, M, McGillicuddy, D, Ussher, S “Dynamics and Speciation of Dissolved Iron in the Sargasso Sea (BATS Region)”  
 (3) OS23S-1291. Church, T, Tian, Z, Ollivier, P, Conte, M, Huang, S Linking “Atmospheric Deposition and Ocean Flux of Fe and Al in the Sargasso Sea”
- 1/09 ASLO, Aquatic Sciences Meeting, Nice, France, January 25-30, 2009  
 (1) 016, 10:45 Ollivier, P.L., Tessier, E., Bahrou, A.S., Hanson, T.E., Armouroux, D., Church, T.M. “Variable formation of volatile

- methyl species of S, SE, TE, and PO by marine microbes.”
- (2) 009, 15:00 Fowler, S.W., Teyssie, J.L., Church, T.M. “Scavenging and retention of bismuth by marine plankton.”
- 8/09 Gordon Research Conference, Tilton, NH, August 2-7, 2009 Bahrou, A., Ollivier, P., Tessier, E., Hanson, T., Amouroux, D., and Church, T. “Formation and identification of volatile methyl species of Polonium by marine microbes.”
- 10/09 International Topical Conference on Po and radioactive Pb isotopes, Seville, Spain, October 26-28, 2009
- (1) Bahrou, A., Ollivier, P., Tessier, E., Hanson, T., Amouroux, D., and Church, T. “Formation and identification of volatile methyl species of Polonium by marine microbes.”
- (2) Baskaran, M., Church, T.M., Hong, G.H., Bahrou, A., Hill, C., Conte, M. “Savenging, Cycling and Removal Fluxes of  $^{210}\text{Po}$  and  $^{210}\text{Pb}$  at the Bermuda Time Series site in the Western Sargasso Sea.”
- 2/10 2010 Ocean Sciences Meeting, Portland, OR, February 22-26, 2010
- (1) 746051, IT11B-03 Church, T., C. Fontaine, P. Sedwick, and Velde, B. “Diagnostic source minerals of eolian transport in Bermuda dust.” Invited talk.
- (2) 746051, 1430h, CO23A-07 Baskaran, M.M., Church, T.M., Hong, G.H., Ma, Q., Kumar, A., Maiti, K., Buesseler, K. “Intercalibration of dissolved and particulate  $^{210}\text{Po}$  and  $^{210}\text{Pb}$  and effects of filter composition and flow rates on the particulate  $^{210}\text{Po}$  and  $^{210}\text{Pb}$  activities”.
- 4/10 School of Environmental Sciences, University of East Anglia, Norwich, UK April 12, 2010 Church, T.M., Sedwick, P.N., Sholkovitz, E.S., Conte, M., Veldt, B. “Atmospheric input of trace elements to the North Atlantic at Bermuda: Sources, processing and fate”
- 4/10 Megacity and the Coastal Zone FTI meeting, UK, April 13-15, 2010 Church, T.M., Raine, R., Uematsu, M., Purvaja, R. “How do megacity emissions affect coastal ecosystems?”
- 9/11 U.S. GEOTRACES Pacific Workshop, La Jolla, CA, September 12-14, 2011 “Distribution of  $^{210}\text{Po}$  and  $^{210}\text{Pb}$  at GEOTRACES stations in the South East Pacific Ocean”.
- 12/11 AGU Fall Meeting 2011, San Francisco, CA, December 5-9, 2011 Invited Talk, A44C room 3004, Thursday, PM. Church, T.M., P.N. Sedwick, and E.R. Sholkovitz. The role of atmospheric deposition on the input of trace elements to the surface ocean: the Bermuda wet and dry record”.
- 2/12 2012 Ocean Sciences Meeting, Salt Lake City, UT, February 20-24, 2012, 11248P
- (1) OS31D-1771 Vandermark, A. R., Church, T. M., Conte, M. H. “Seasonal distribution of Fe, Mn and Zn in the Sargasso Sea in response to atmospheric input”.
- (2) P11248 Church, T.M., Rigaud, S.B., Choi, H.Y., Puigcorbe, V., Bermejo, M., Masque, P., Gerringa, L., Rijkenberg, M., Middag, R. “Process  $^{210}\text{Po}$  and  $^{210}\text{Pb}$  disequilibrium along the GEOTRACES meridional transect of the western North Atlantic.”
- 7/12 ASLO, 2012 Aquatic Sciences Meeting, Lake Biwa, Japan, July 8-13, 2012, SS48, Church, T.M., P.N. Sedwick, E.R. Sholkovitz, “Trace element deposition to surface waters of the ocean” Atmosphere and Ocean Research Institute. The



- University of Tokyo, Kashiwa, JAPAN, July 13, 2012.
- 7/12 2012 Ocean Science Special Seminar. Institute for Chemical Research, Kyoto University, Laboratory of Hydrospheric Environment Analytical Chemistry, Kyoto, JAPAN. “Trace Elements Including Bismuth in the Marine Atmosphere and Deposition to the Ocean”. July 10, 2012.
- 12/12 AGU, 2012 Fall Meeting, San Francisco, CA, December 3-7, 2012, OS31D-1771, Rigaud, S., Baskaran, M., Stewart, G., and Church, T.M. “ $^{210}\text{Po}$  and  $^{210}\text{Pb}$  along North Atlantic US GEOTRACES sections to assess bio-active and particle-active scavenging and export rates”. Session: OS036 Poster, abstract #1498666.
- 1/13 AMS Annual Meeting, Austin, TX, 93<sup>rd</sup> Am Meteorological Society annual meeting, January 6-10, 2013, Robert A. Duce symposium, Air-Sea Exchange: Impacts on the Atmosphere and Ocean, January 8, 2013, J3.1, Church, T. M., “Fifty years at the skin of the ocean: Understanding the air-sea exchange of trace elements at Bermuda under the Duce legacy” Invited.
- 1/13 Earth and Environmental Science Seminar Series (E2S3), Department of Geology and Environmental Science Program, Wayne State University, Jan. 16, 2013. Prof. T.M. Church. “The wonderful world of radon and its daughters in the marine environment”.
- 2/13 Second International Conference on Po and Radioactive Pb isotopes, Mangalore, INDIA, February 10-13, 2013.  
 (1) Church, T.M. Inaugural topical presentation and dedicated career session “Polonium as an atmospheric tracer”. Invited. 2/10/13  
 (2) Church, T.M., “Po-210 and Pb-210 as atmosphere tracers” Invited. 2/12/13
- 3/13 GEOTRACES workshop, ODU, Norfolk, VA, March 11-15, 2013.  
 (1) Rigaud, S., Church, T.M., Baskaran, M., Stewart, G. “ $^{210}\text{Po}$  and  $^{210}\text{Pb}$  during North Atlantic GEOTRACES cruises: Dissolved distribution, Reactions and Export Net rates”.
- 8/13 Gordon Research Conference, Biddleford, ME, August 4-9, 2013.  
 (1) Rigaud, S., Baskaran, M., Stewart, G., and Church, T.M. “ $^{210}\text{Po}$  and  $^{210}\text{Pb}$  along the North Atlantic US GEOTRACES sections to assess dissolved bioactive and particle active scavenging and export rates.”  
 (2) Marsan, D., Rigaud, S., McDougall, E., and Church, T.M. “Estuarine and Coastal Biogeochemistry of the Natural Radionuclides  $^{210}\text{Po}$  and  $^{210}\text{Pb}$  in the Delaware and Chesapeake Estuaries.”
- 8/13 Oceanography 2013, International Conference on Oceanography and Natural Disasters, Orlando, FL, August 21-23, 2013. Church, T.M. “Atmospheric input of trace elements to the ocean: Dust to ashes”.

## **PUBLICATIONS (T. M. Church):**

### **Thesis**

1. Church, T. M. 1970. Marine Barite. Ph.D. Thesis, University of California, San Diego. 100 pp.

### **Book**

Church, T. M. 1975. Ed. Marine Chemistry in the Coastal Environment. American Chemical Society, Symposium Series, Vol. 18.

## **Refereed Publications**

### **1970's**

2. Church, T. M., Bernat, M., Michard, G. 1971. Distribution des elements al-calino-terreux dans les eaux interstitielles d'une carotte de Mediterranee Occidentale. *Compt. Rend. Acad. Sci., Paris*, 273:2031.
3. Church, T. M. and Bernat, M. 1972. Thorium and uranium in marine barites. *Earth Planet. Sci. Letters*, 14:139.
4. Church, T. M. and Wolgemuth, K. 1972. Marine barite saturation. *Earth Planet. Sci. Letters*, 15:35.
5. Bernat, M., T. Church, and C.J. Allegre. 1972. Barium and strontium concentrations in Pacific and Mediterranean sea water profiles by direct isotope dilution mass spectrometry. *Earth Planet. Sci. Letters*, 16:75-80.
6. Somayajulu, B. L. K. and Church, T. M. 1973. Ra, Th, and U isotopes in the interstitial water from the Pacific Ocean sediment. *J. Geophys. Res.*, 78:4529.
7. Michard, G., T. Church, and M. Bernat. 1974. The pore water chemistry of recent sediments in the western Mediterranean basin. *J. Geophys. Res.*, 79(6):817-824.
8. Rutherford, F. and Church, T. 1975. Use of the metals zinc and silver to trace sewage sludge dispersal in coastal waters. *Marine Chemistry in the Coastal Environment*, (Church, editor). Amer. Chem. Soc. Symposium Series, 18:440-452.
9. Bernat, M. and Church, T. M. 1978. Deep-sea Phillipsites: Trace geochemistry and modes of formation. (in:) *Zeolites* (ed. L. Sand), Pergamon Press, pp. 259--267.
10. Pellenbarg, R. and T. Church. 1978. Storage and processing of estuarine water samples for trace metal analysis by atomic absorption spectrometry. *Anal. Chim. Acta*, 97:81-86.
11. Pellenbarg, R. and Church, T. 1979. The estuarine surface microlayer and trace metal cycling in a salt marsh. *Science*, 203(4384):101-0-1012, (with color photo).
12. Church, T. and Velde, B. 1979. Geochemistry and origin of a deep-sea Pacific palygorskite deposit. *Chem. Geol.*, 25:31.
13. Guichard, F., Church, T. M., Treuil, M., and Jaffrezic, H. 1979. Rare earth in barites: distribution and effects on aqueous partitioning. *Geochim. Cosmochim. Acta.*, 43(7): 983-997.

14. Church, T. 1979. Marine Barite. (In:) Marine Minerals. (ed. M. Burns), Chpt. 7. Minerol. Soc. Amer., pp. 175-210.

### 1980's

15. Church, T. M., Lord, C. J., and Somayajulu, B.L.K. 1981. Uranium, thorium, and lead nuclides in a Delaware salt marsh sediment. *Est. Coastal & Shelf Sci.*, 13:267-275.

16. Sharp, J. H. Church, T. M. 1981. Biochemical modeling in coastal waters of the Middle Atlantic States. *Limnol. Oceanog.*, 26(5):843-854.

17. Boulegue, J., and T. M. Church. 1981. Speciation of iron and copper in the pore waters of a Delaware salt marsh. *Heavy Metals in the Environment (CEC-WHO Conference)*, Amsterdam, September 1981.

18. Boulegue, J., C. J. Lord, T. M. Church. 1982. Sulfur speciation and associated trace metals (Fe, Cu) in the pore waters of Great Marsh, Delaware. *Geochim. Cosmochim. Acta*, 46(3):453-464.

19. Jickells, T., A. Knap, T. Church, J. Galloway, and J. Miller. 1982. Acid rain on Bermuda. *Nature*, 297(5861):55-57.

20. Culberson C., E. Liang, T. Church, and R. Wood. 1982. A chelating gel for trace metal analysis in seawater. *Analytica Chimica Acta*, 139:373-377.

21. Sharp, J. H., C. H. Culberson, and T. M. Church. 1982. The chemistry of the Delaware Estuary. *General Considerations*. *Limnol. Oceanogr.*, 27(6):1015-1028.

22. Church, T. M., J. N. Galloway, T. D. Jickells and A. H. Knap. 1982. The chemistry of western Atlantic precipitation at the mid-Atlantic coast and on Bermuda. *J. Geophys. Res.*, 87(C13):11013-11018.

23. Biggs, R. B., J. H. Sharp, T. M. Church, and J. M. Tramontano. 1983. Optical properties, suspended sediments, and chemistry associated with the turbidity maxima of the Delaware estuary. *Can. J. Fish. & Aquatic Sci.*, 40(Suppl. 1):172-179.

24. Lord, C. J. and T. M. Church. 1983. The geochemistry of salt marshes: sedimentary ion diffusion, sulfate reduction, and pyritization. *Geochim. Cosmochim. Acta*, 47(8):1381-1391.

25. Galloway, J. N., A. H. Knap and T. M. Church. 1983. The composition of western Atlantic precipitation using shipboard collectors. *J. Geophys. Res.*, 88(C15):10859-10864.

26. Scudlark, J. R. and T. M. Church. 1983. The chemistry of marine acid rain. *Coastal Ocean Pollution Assessment News*, 3(1):4-5.

27. Rengarajan, R., B. L. K. Somayajulu and T. M. Church. 1983. Chemical and radiochemical studies of a sediment core from the Tapti salt marsh. *Mahasagar-Bull. Nat'l. Inst. Oceanogr.*, 16(2):127-133.
28. Church, T. M. and J. M. Tramontano. 1983. Heavy metal biogeochemistry in the Delaware estuary. (In:) *Int'l. Conf. of Heavy Metals in the Environment*, 2:1276-1279, (Heidelberg, Germany).
29. Eastman, K. W. and T. M. Church. 1984. Behaviour of iron, manganese, phosphate and humic acid during mixing in a Delaware salt marsh creek. *Est., Coastal Shelf Sci.*, 18(4):447-458.
30. Church, T. M., J. M. Tramontano, J. R. Scudlark, T. D. Jickells, J. J. Tokos, Jr., A. H. Knap, and J. N. Galloway. 1984. The wet deposition of trace metals to the western Atlantic Ocean at the mid-Atlantic coast and on Bermuda. *Atmos. Environ.*, 18 (12):2657-2664.
31. Church, T. M., C. N. K. Mooers and A. D. Voorhis. 1984. Exchange processes over a middle Atlantic Bight shelfbreak canyon. *Est., Coastal Shelf Sci.*, 19:393-411.
32. Tramontano, J. M. and T. M. Church. 1984. A technique for the removal of estuarine seston from nuclepore filters. *Limnol. Oceanogr.*, 29(6):1339-1341.
33. Jickells, T. D., A. H. Knap and T. M. Church. 1984. Trace metals in Bermuda rainwater. *J. Geophys. Res.*, 89(D1):1423-1428.
34. Sharp, J. H., J. R. Pennock, T. M. Church, J. M. Tramontano and L. A. Cifuentes. 1984. The estuarine interaction of nutrients, organics, and metals: A case study in the Delaware Estuary. (in:) *The Estuary as a Filter*, (ed. V. S. Kennedy), Academic Press, pp. 241-257.
35. Maurer, D., T. Church, C. Lord, C. Wethe. 1985. Marine benthos in relation to pore water chemistry and sediment geochemistry of simulated dredged material. *Internationale Revue, Gesamte Hydrobiologie*, 70:369-377.
36. Church, T. M. 1986. Biogeochemical factors influencing the residence time of microconstituents in a large tidal estuary, Delaware Bay. *Marine Chemistry*, 18:393-406.
37. Luther III, G. W., T. M. Church, J. R. Scudlark and M. Cosman. 1986. In-organic and organic sulfur cycling in salt-marsh pore waters. *Science*, 232:746-749.
38. Luther III, G. W., T. M. Church, A. E. Giblin and R. W. Howarth. 1986. Speciation of dissolved sulfur in salt marshes by polarographic methods. (in:) *Organic Marine Geochemistry*, (ed. M. L. Sohn), *Marine Chemistry in the Coastal Environment*, American Chemical Society, Washington, D.C., Symposium Series, Vol. 305. Chpt. 20, pp. 340-355.
39. Church, T. M., M. Bernat and P. Sharma. 1986. Distribution of natural uranium, thorium, lead, and polonium radionuclides in tidal phases of a Delaware salt marsh. *Estuaries*, 9(1):2-8.

40. Church, T. M., J. M. Tramontano and S. Murray. 1986. Trace metal fluxes through the Delaware estuary. (In:) Proc. of Int'l. Council for Exploration of the Sea (ICES) Symposium. "Contaminant Fluxes through the Coastal Zone," Nantes, France, May 1984. Rapp. P.v Reun. Cons. Int. Explor. Merc., 186:271-276.
41. Maurer, D., R. Keck, J. Tinsman, W. Leathem, C. Wethe, C. Lord and T. Church. 1986. Vertical migration and mortality of marine benthos in dredged material: A synthesis. *Internationale Revue, Gesampte Hydrobiologie*, 79(1):49-63.
42. Cutter, G. A. and T. M. Church. 1986. Selenium in Western Atlantic precipitation. *Nature*, 322(6081):720-722.
43. Galloway, J. N. T. M. Church, A. H. Knap, D. M. Whelpdale. 1987. The Western Atlantic Ocean Experiment (WATOX); The export, deposition, and fate of North American emissions to the western Atlantic Ocean. (In:) *Chemistry of Acid Rain* (eds. R. W. Johnson, G. E. Gordon, A. Z. Elzerman, and W. Calkins), Amer. Chem. Soc. Special Symposium, Vol. 349, Chpt. 4, pp. 39-55.
44. Jickells, T. D., T. M. Church, and W. G. Deuser. 1987. A comparison of atmospheric inputs and deep-ocean particle fluxes for the Sargasso Sea. *Global Biogeochem. Cycles*, 1(2):117-130.
45. Barrie, L. A., S. E. Lindberg, W. H. Chan, H. B. Ross, R. Arimoto and T. M. Church. 1987. On the concentration of trace metals in precipitation. *Atm. Envir.*, 21(5):1133-1135.
46. Church, T. M. 1987. Advances in the chemistry of rivers, estuaries, micro-cosms, and salt marshes - 1983-1986. *Geophys.*, 25:1431-1438.
47. Tramontano, J. M., J. R. Scudlark and T. M. Church. 1987. A method for the collection, handling and analysis of trace metals in precipitation. *Env. Sci. and Tech.*, 21:749-753.
48. Wolff, G. T., T. M. Church, J. N. Galloway, and A. H. Knap. 1987. An examination of SO<sub>x</sub>, NO<sub>x</sub> and trace metal wash-out ratios over the western Atlantic Ocean. *Atmos. Environ.*, 21:2623-2628.
49. Church, Thomas M. 1987. Estuarine, Atmospheric and Groundwater Inputs to Continental Margins. (In:) *U.S. Global Ocean Flux Study - Ocean Margins in JGOFS, Report #6*, University of Southern Mississippi, March 10-12, 1987.
50. Sharma, P., J. Klein, R. Middleton and T. M. Church. 1987. <sup>26</sup>Al and <sup>10</sup>Be in authigenic marine minerals. *Nuclear Instruments and Methods in Physics Research*, B29:335-340.
51. Hastie, D. R., H. I. Schiff, D. M. Whelpdale, R. Peterson, W. H. Zoller, D. L. Anderson, and T. M. Church. 1988. Description and intercomparison of techniques to measure N and S compounds in the Western Atlantic Ocean Experiment. *Atmos. Environ.*, 22(11):2393-2399.

52. Luther III, G. W. and T. M. Church. 1988. Seasonal cycling of sulfur and iron in porewaters of a Delaware salt marsh. *Mar. Chem.*, 23:295-309.
53. Church, T. M., J. M. Tramontano, J. R. Scudlark and S. L. Murray. 1988. Trace metals in the waters of the Delaware estuary. (In:) *Ecology and Restoration of the Delaware River Basin*. (ed. S.K. Majumdar, E.W. Miller and L. E. Sage), The Philadelphia Academy of Sciences.
54. Scudlark, J. R. and T. M. Church. 1988. The atmospheric deposition of arsenic and association with acid precipitation. *Atmos. Envir.*, 22(5):937-943.
55. Scudlark, J. R., and T. M. Church. 1989. The sedimentary flux of nutrients at a Delaware salt marsh site: A geochemical perspective. *Biogeochem.*, 7:55-75.
56. Sharma, P., T. M. Church, and M. Bernat. 1989. Use of cosmogenic  $^{10}\text{Be}$  and  $^{26}\text{Al}$  in phillipsite for the dating of marine sediments in the South Pacific Ocean. *Chemical Geology (Isotope Geoscience Section)*, 73:279-288.
57. Bernat, M. and T. M. Church. 1989. Uranium and thorium decay series in the modern marine environment. (In:) *Handbook of Environmental Isotope Geochemistry, Vol. 3, The Modern Marine Environment, A*, (eds. J. Fontes and P. Fritz), Elsevier, Chapt. 10, pp. 357-383.
58. Church, T. M., R. Arimoto, L. A. Barrie, F. Dehairs, F. Dulac, T. D. Jickells, L. Mart, W. T. Sturges and W. H. Zoller. 1990. The long-range atmospheric transport of trace elements; a critical evaluation. Chapter 2, (In:) *Long Range Transport of Atmospheric Material between Oceans and Continents* (ed. A. Knap), Reidel Publ., NATO Workshop, Bermuda, 1987.
59. Jickells, T. D., R. Arimoto, L. A. Barrie, T. M. Church, F. Dehairs, F. Dulac, L. Mart, W. Sturges, W. Zoller. 1990. The long-range transport of trace elements: four case studies. Chapter 9 (In:) *Long Range Transport of Atmospheric Material between Oceans and Continents* (ed. A. Knap), Reidel Publ., NATO Workshop, Bermuda, 1987.
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### 1990's

61. Gawarkiewicz, G., R.K. McCarthy, K. Barton, A.K. Masse and T.M. Church. 1990. A Gulf Stream-derived pycnocline intrusion on the Middle Atlantic Bight Shelf. *J. Geophys. Res. - Oceans*, 95(C12):23305-23313. DEL-SG 04-91.

62. Church, T. M., A. Veron, C. C. Patterson, D. Settle, Y. Erel, H. R. Maring, A. R. Flegal 1990. Trace elements in the North Atlantic troposphere: Shipboard results of precipitation and aerosols. *Global Biogeochemical Cycles*, 4(4):431-443.
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64. Ferdelman, T. G., T. M. Church and G. W. Luther, III. 1991. Sulfur enrichment of substances in a Delaware salt marsh sediment core. *Geochim. Cosmochim. Acta.*, 55:979-988.
65. Duce, R. A., P. S. Liss, J. T. Merrill, E. L. Atlas, P. Buat-Menard, B. B. Hicks, J. M. Miller, J. M. Prospero, R. Arimoto, T. M. Church, W. Ellis, J. N. Galloway, L. Hansen, T. D. Jickells, A. H. Knap, K. H. Reinhardt, B. Schneider, A. Soudine, J. J. Tokos, S. Tsunogai, R. Wollast and M. Zhou. 1991. The atmospheric input of trace species to the world ocean. *Global Biogeochemical Cycles*, 5:193-259.
66. Church, T. M. 1991. Progress in chemical oceanography 1987-1990. (in:) *Reviews of Geophysics, Supplement*, pp. 632-633, April, 1991; U.S. National Report to International Union of Geodesy and Geophysics 1987-1990.
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69. Church, T.M. 1991. Biogeochemical processes in model estuaries. *EOS*, 74(53):595-598.
70. Luther, III, G. W. and T. M. Church. 1992. An overview of the environmental chemistry of sulphur in wetland systems. (In:) *Proceedings of SCOPE meeting, Sulphur Cycling on the Continents*, Chapt. 6, pp. 125-142.
71. Gawarkiewicz, G., T.M. Church, G.W. Luther, III, T.G. Ferdelman, and M. Caruso. 1992. Large scale penetration of Gulf Stream water onto the continental shelf north of Cape Hatteras. *Geophys. Res. Letters*, 19(4):373-376.
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