

BIOGRAPHICAL SKETCH

(1) WEI-JUN CAI

The University of Delaware
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(2) History of employment

2013-present Professor, School of Marine Science and Policy, College of Earth, Ocean, and Environment, University of Delaware, Newark, DE. *Mary A. S. Lighthipe Chair of Earth, Ocean and Environment*.

1994-2012 Assistant (94-00), Associate (00-06), and Full Professor (06-12), Department of Marine Sciences, University of Georgia, Athens, GA.

1992-1994 Postdoctoral Fellow and Postdoctoral Investigator, Woods Hole Oceanographic Institution.

(3) Degrees

Xiamen University, Xiamen, China, Marine Sciences, B.S. - 1982

Shandong College of Oceanography (now: Ocean University of China), Qingdao, China.

Marine Chemistry, M.S. - 1985

University of California at San Diego, Scripps Institution of Oceanography, La Jolla, CA

Oceanography, Ph.D. - 1992

(4) Research experience

I have worked in the area of marine carbon cycle for 30 years. My research areas include, CaCO_3 dissolution and sediment diagenesis using microelectrodes (O_2 , pH and pCO_2), air-sea exchange of CO_2 , and carbon cycling in coastal oceans. My recent research focuses on the responses of coastal ocean carbon cycle and ecosystem to a changing terrestrial export of carbon and nutrients, interactions between coastal ocean acidification and other environmental stressors in particular eutrophication, coral calcification mechanisms and its responses to ocean acidification, and impacts of sea-ice loss and warming on carbon cycle and ocean acidification in the Arctic Ocean.

I approach my study from a whole system view and often involves a comparison with other systems. My research has involved extensive collaborations with ocean biologists, ecologists, ocean coupled physical-biological modelers and terrestrial nutrient and carbon cycle modelers. I have also developed extensive international collaborations in particular with scientists from mainland China, Taiwan, Hong Kong, South Korea and Japan. I have advised 12 Ph.D. students, 7 MS students, more than 10 postdocs and many visiting young scientists.

(5) Key publication (*indicates first author under Cai advisement; total 195: *Google Scholar* (<https://scholar.google.com/citations?user=7i0r93YAAAAJ&hl=en>)).

Bauer, J.E., Cai, W.-J., Raymond, P.A., Bianchi, T.S., Hopkinson, C.S., Regnier, P.A.G., 2013. The changing carbon cycle of the coastal ocean. *Nature* 504, 61-70.

Cai W-J, Xu Y-Y, Feely RA, Wanninkhof R, Jönsson B, et al. 2020. Controls on surface water carbonate chemistry along North American ocean margins. *Nature Communications* 11(1):2691

Cai, W.-J., Huang, W.-J. Luther, G. W. , [Pierrot, D.](#), [Li M.](#), [Testa, J.](#), [Xue M.](#), [Joesoef, A.](#), [Mann, R.](#), [Brodeur, J.](#), [Xu, YY.](#), [Chen, B.](#), [Hussain, N.](#), [Waldbusser, G.G.](#), [Cornwell, J.](#), [Kemp, W.M.](#) 2017. Redox reactions and weak buffering capacity lead to acidification in the Chesapeake Bay. *Nature Communications* 8: s41467-17.

Cai, W.-J., Ma, Y., Hopkinson, B.M., Grottoli, A.G., Warner, M.E., Ding, Q., Hu, X., Yuan, X., Schoepf, V., Xu, H., Han, C., Melman, T.F., Hoadley, K.D., Pettay, D.T., Matsui, Y., Baumann, J.H., Levas, S., Ying, Y. and Wang, Y., 2016. Microelectrode characterization of coral daytime interior pH and carbonate chemistry. *Nature Communications* 7.

- Cai, W.-J. 2011. Estuarine and coastal ocean carbon paradox: CO₂ sinks or sites of terrestrial carbon incineration? *Annual Review of Marine Science* 2011. 3:123-45.
- Cai, W.-J. X. Hu, W. Huang, M. C. Murrell, J. C. Lehrter, S.E. Lohrenz, W.-C. Chou, W. Zhai, J.T. Hollibaugh, Y. Wang, P. Zhao, X. Guo, K. Gundersen, M. Dai and G.-C. Gong. 2011. Acidification of subsurface coastal waters enhanced by eutrophication. *Nature Geoscience* 4, 766-770.
- Cai, W.-J., Chen, L., Chen, B., Gao, Z. Lee, S.H., Chen, J., Pierrot, D., Sullivan, K., Wang, Y., Hu, X., Huang, W.-J., Zhang, Y., Xu, X., Murata, A., Grebmeier, J.M., Jones, E.P., and Zhang, H. 2010. Decrease in the CO₂ uptake capacity in an ice-free Arctic Ocean basin. *Science* 329(5991):556-9.
- Cai, W.-J., M. Dai, and Y. Wang. 2006. Air-sea exchange of carbon dioxide in ocean margins: A province-based synthesis, *Geophys. Res. Lett.*, 33, L12603.
- Cai W.-J. and Y. Wang. 1998. The chemistry, fluxes and sources of carbon dioxide in the estuarine waters of the Satilla and Altamaha Rivers, Georgia. *Limnology and Oceanography*, 43:657-668.
- Cai, W.-J. and Sayles, F.L. 1996. Oxygen penetration depths and fluxes in marine sediments. *Marine Chemistry*, 52:123-13.
- Cai, W.-J., Reimers, C.E., and Shaw, T., 1995. Microelectrode studies of organic carbon degradation and calcite dissolution at a California continental rise site. *Geochimica et Cosmochimica Acta*, 59:497-511.
- *Hu, X. and Cai, W.-J., 2011. An assessment of ocean margin anaerobic processes on oceanic alkalinity budget. *Global Biogeochemical Cycles* 25, GB3003, doi: 10.1029/2010GB003859.
- *Huang, W.-J., Cai, W.-J., Wang, Y., Lohrenz, S.E., and Murrell, M.C. 2015. The carbon dioxide (CO₂) system on the Mississippi River-dominated continental shelf in the northern Gulf of Mexico – I: Distribution and air-sea CO₂ flux, *Journal of Geophysical Research*. 120, 1429–1445.
- *Jiang, L.-Q., Cai, W.-J., Wang, Y., Wanninkhof, R., and Lüger, H. 2008. Air-sea CO₂ fluxes on the U.S. South Atlantic Bight: Spatial and seasonal variability, *Journal of Geophysical Research*, 113, C07019.
- Laruelle, G. G., Cai, W.-J., Hu, X., Gruber, N., Mackenzie, F. T., & Regnier, P. (2018). Continental shelves as a variable but increasing global sink for atmospheric carbon dioxide. *Nature Communications*, 9(1), 454.
- *Ouyang Z, Qi D, Chen L, Takahashi T, Zhong W, ...Cai, W.-J. 2020. Sea-ice loss amplifies summertime decadal CO₂ increase in the western Arctic Ocean. *Nature Climate Change*.
- *Qi, D., Chen, L., Chen, B., Gao, Z., Zhong, W., Feely, R.A., Anderson, L.G., Sun, H., Chen, J., Chen, M., Zhan, L., Zhang, Y. and Cai, W.-J., 2017. Increase in acidifying water in the western Arctic Ocean. *Nature Climate Change*, 7(3): 195-199.
- *Su, J., Cai, W., Brodeur, J. et al. Chesapeake Bay acidification buffered by spatially decoupled carbonate mineral cycling. *Nature Geoscience* 13, 441–447 (2020).
- *Wang, Z., Cai, W.-J., Wang, Y. and Ji, H. 2005. The southeastern continental shelf of the United States as an atmospheric CO₂ source and an exporter of inorganic carbon to the ocean. *Continental Shelf Research*, 25:1917-1941.
- *Xue, L., Cai, W.-J., Takahashi, T. and others. 2018. Climatic modulation of surface acidification rates through summertime wind forcing in the Southern Ocean. *Nature Communications* 9: 3240.

(7) Honors

- 1) Fellow of the American Geophysical Union (AGU), 2017,
- 2) Fellow of the Association for the Sciences of Limnology and Oceanography (ASLO), 2017.
- 3) Creative Research Medal (2008), University of Georgia.
- 4) Outstanding L&O Reviewer (2002), Limnology and Oceanography.

(8) Professional society memberships

American Geophysical Union, AGU (1988-lifetime); Association for the Sciences of Limnology and Oceanography, ASLO (1994-, continuous since 2011); American Association for the Advancement of Science, AAAS (2010-2012, 2017-lifetime); Geochemical Society (2017-lifetime). Associate editor, AGU's *Global Biogeochemical Cycles* (2014-).