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EDUCATION

1988/09 – 1993/08 Ph.D. Marine, Estuary and Environ. Science Program, U of Maryland, College Park, USA

1984/09 – 1986/08 M.S. Institute of Marine Biology, National Sun-Yat -Sen U, Taiwan

1976/09 – 1981/08 B.A. Depart. of Biology, National Taiwan Normal U, Taiwan

EMPLOYMENT

2004/08 - present Research Fellow RCEC, Academia Sinica, Taiwan

2005/08 - present Professor (joint appoint.) Inst. Mar. Environ Ecol, Natl Taiwan Ocean U.

2007/08 - present Professor (joint appoint.) Inst. Oceanography Natl Taiwan U.

2007/08 - 2012/07 Associate professor Inst. Oceanography Natl Taiwan U.

2001/08 - 2007/07 Assistant Professor Inst. Oceanography Natl Taiwan U.

HONORS & AWARDS

2001 MOST-Taiwan the distinguish research award

2001 National Taiwan Univ. Young scholar award

1992 Univ. Maryland HPL MEERC research scholarship. 1992.09-1993.08.

1987 Ministry of Education-ROC government scholarship. 1988.09 - 1991.08.

PROFESSIONAL SERVICE

RESEARCH INTEREST

My research lies in the fields of limnology and oceanography. I am interested in studying (1) the growth controlling mechanisms of planktons (heterotrophic bacterioplankton, phytoplankton, protozoan and viruses) and their eco-linkages in freshwater (the Fei-Tsuei reservoir) and marine (the East China Sea, South China Sea and the NW Pacific) ecosystems; (2) the planktonic and ecosystem responses (ratio of primary production to community respiration) to external physical and chemical (inorganic nutrients, organic substrate) forcing induced by episodic events such as typhoons, internal waves... etc., and (3) the operation and management of decadal time-series biogeochemical observatory studies including the SEATS project in the South China Sea and the T-WEBS project in Fei-Tsuei reservoir in northern Taiwan.

RESEARCH HIGHLIGHTS

- 1. Extreme Weather Events Enhance DOC Consumption in a Subtropical Freshwater Ecosystem:** Empirical evidence suggests that the frequency/intensity of extreme weather events might increase in a warming climate. It remains unclear how these events quantitatively impact

dissolved organic carbon (DOC), a pool approximately equal to CO₂ in the atmosphere. This study conducted a weekly-to-biweekly sampling in a deep subtropical reservoir in the typhoon-prevailing season (June to September) from 2004 to 2009, at which 33 typhoons with distinctive precipitation had passed the study site. Our analyses indicated that the phosphate (DIP) varied positively with the intensity of the accumulated rainfall 2-weeks prior; bacteria growth rate behaved as a positive function of DIP, and DOC concentrations (54~119 μMC) changed negatively with bacterial production (1.2~26.1 mgC m⁻³ d⁻¹). These implied that the elevated DIP-loading in the hyperpycnal flow induced by typhoons could fuel bacteria growth and cause a significant decline of DOC concentrations. As the typhoon's intensity increases, many mineral-limited lentic freshwater ecosystems might become more like a CO₂ source injecting more CO₂ back to the atmosphere, creating a positive feedback loop that might generate severer extreme weather events.

Reference: Lai et al 2021a.

- 2. Biogeochemical responses to monsoon-driven water masses mixing in the Kuroshio off the East coast of Taiwan:** Biogeochemical responses to mixing were examined in two cruise surveys along a transect across the Kuroshio Current (KC) in May and July, 2020. Two stations located at the South China Sea (SCS)-KC mixing and KC waters were chosen for the diel study. In the euphotic zone (~100 m depth), the averaged values of nitrate, chlorophyll-a, and primary production (PP) of the mixing water stations (MWS) of the two cruises of mixing water station (MWS) were several folds higher than those of the KC station (KCS) respectively. In the July cruise, the maximal bacterial production (BP) at the MWS was 82% higher in comparison with that of the KCS; and that the readings of Chl-a showed no trend with BP in the oligotrophic KCS, but a positive relationship was found among these measurements at the mesotrophic MWS. This implies that the system's trophic status might affect phytoplankton-bacteria interactions. The backward-trajectory analyses conducted by an observation-validated 3-D model identified that the prevailing southwest monsoon drove a northeastward "intrusion" of the South China Sea (SCS) waters in July, 2020, and resulted in mixing between SCS and Kuroshio (KC) waters off the east coast of southern Taiwan. This study for the first time demonstrates that the high biological biomass and activities that occur in the Kuroshio Current can be induced by the northward intrusion of the SCS waters.

Reference: Lai et al 2021b.

REPRESENTATIVE PUBLICATIONS (*: corresponding author)

1. Chen TY, JH Tai, CY Ko, CC Chen, CH Hsieh, NZ Jiao, HB Liu and **FK Shiah***. 2016. Nutrient pulses driven by internal solitary waves enhance heterotrophic bacteria growth in the South China Sea. *Environmental Microbiology*. 08:40PM EST | DOI: 10.1111/1462-2920.13273. IF: 6.201
2. Ko CY, CC Lai, HH Hsu, **FK Shiah***. 2017. Decadal phytoplankton dynamics in response to episodic climatic disturbances in a subtropical deep freshwater ecosystem. *Water Research* 109: 102-113. IF: 6.769.

3. Okuda N, Y Sakai, K Fukumori, SM Yang, CH Hsieh, **FK Shiah***. 2017. Food-web properties of the recently constructed, deep subtropical Fei-Tsui Reservoir. *Hydrobiologia* 802 (1): 199–210. IF: 2.321.
4. Chow MF, CC Lai, HY Kuo, CH Lin, TY Chen, **FK Shiah***. 2017. Long term trends and dynamics of dissolved organic carbon (DOC) in a subtropical reservoir basin. *Water*. 9, 545; doi:10.3390/w9070545. IF: 1.832.
5. Chow MF, JC Huang, **FK Shiah***. 2017. Phosphorus dynamics along river continuum during typhoon storm events. *Water*. 9, 537; doi:10.3390/w9070537. IF: 1.832.
6. Miki T, M Itoh, H Kojima, PC Ho, CW Chang, TY Chen, SY Hsiao, Y Kobayashi, M Fujibayashi, SJ Kao, CH Hsieh, M Fukui, N Okuda and **FK Shiah***. 2017. Integrating isotopic, microbial and modeling approaches to better understand methane dynamics at a frequently-disturbed deep reservoir in Taiwan. *Ecological Research* DOI 10.1007/s11284-017-1502-z. IF: 1.338.
7. Austria E, CC Lai, CY Ko, KY Lee, HY Kuo TY Chen and **FK Shiah***. 2018. Growth controlling mechanisms on heterotrophic bacteria in the South China Sea shelf: Summer and winter patterns. *Terrestrial, Atmospheric and Oceanic Sciences TAO*. 29(4): 1-13. IF: 0.705
8. Lai CC., CY Ko, E Austria and **FK Shiah***. 2021a. Extreme weather events enhance DOC consumption in a subtropical freshwater ecosystem: a multiple-typhoon analysis. *Microorganisms*. 9(6): 1199 doi.org/10.3390/microorganisms9061199. IF: 4.167
9. Lai CC, CR Wu, CY Chuang, JH Tai, KY Lee, HY Kuo and **FK Shiah***. 2021b. Phytoplankton and bacteria responses to monsoon-driven water masses mixing in the Kuroshio off the East coast of Taiwan. *Frontiers in Marine Science*. doi: 10.3389/fmars.2021.707807. IF: 4.440
10. Hou LT, BS Wang, CC Lai, TY Chen, YY Shih, **FK Shiah*** and CY Ko*. 2021. Effects of the mixed layer depth on phytoplankton biomass in a tropical marginal ocean: a multiple timescale analysis. *Earth's Future* (accept after revision). IF: 6.640.
11. Chen TY, CC Lai, JH Tai, CY Ko and **FK Shiah***. 2021. Diel to seasonal variation of picoplankton in the tropical South China Sea. *Frontiers in Marine Science*. (accept after revision). IF: 4.400.
12. Huang JC, TY Lee, TC Lin, T Hein, LC Lee, YT Shih, SJ Kao, FK Shiah, and NH Lin. 2016. Effects of different N sources on riverine DIN export and retention in subtropical high-standing island, Taiwan. *Biogeosciences* 13: 1787-1800. IF: 3.754.
13. Lu HP, YC Yeh, A Sastri, FK Shiah, GC Gong, and CH Hsieh. 2016. Evaluating community environment relationships along fine to broad taxonomic resolutions reveals evolutionary forces underlying community assembly. *International Society for Microbial Ecology Journal*. 10: 2867~ 2878. IF: 8.951.
14. Ho PC, N Okuda, T Miki, M Itoh, FK Shiah, CW Chang, SY Hsiao, SJ Kao, M Fujibayashi and CH Hsieh. 2016. Summer profundal hypoxia determines the coupling of methanotrophic production and the pelagic food web in a subtropical reservoir. *Freshwater Biology*. 61: 1694–1706. IF: 2.738.
15. Kobayashi Y, Kojima H, Itoh M, Okuda N, Fukui M and FK Shiah. 2016. Abundance of

planktonic methane-oxidizing bacteria in a subtropical reservoir. *Plankton and Benthos Research*. 11(4):144-146. DOI:[10.3800/pbr.11.144](https://doi.org/10.3800/pbr.11.144). IF: 0.740.

16. Yamamoto Y and FK Shiah. 2016. Appearance of *Cylindrospermopsis raciborskii* in winter in an artificial pond in northern Taiwan. *Ann. Limnol. - Int. J. Limnol.*, 52: 335-341. IF: 1.042.
17. Jurikova H, T Guha, O Abe, FK Shiah, CH Wang and MC Liang. 2017. Variations in triple isotope composition of dissolved oxygen and primary production in a subtropical reservoir. *Biogeosciences*. 13, 6683-6698. IF: 3.700.
18. DeCarlo TM, AL Cohen, GTF Wong, FK Shiah; SJ Lentz; KA Davis, KEF Shamberger and P Lohmann. 2017. Community production modulates coral reef pH and the sensitivity of ecosystem calcification to ocean acidification. *J GeoPhys Res - Oceans* 10.1002/2016JC012326. 1-17. IF: 3.426.
19. Chen CC, GC Gong, WC Chou, CC Chung, CH Hsieh, FK Shiah and KP Chiang. 2017. The influence of episodic flooding on pelagic ecosystem in the East China Sea. *Biogeosciences*. 14: 2597-2609. IF: 3.700.
20. Ko CY, YC Hsin, TL Yu, KL Liu, FK Shiah and MS Jeng. 2018. Monitoring multi-year macro ocean litter dynamics and backward-tracking simulation of litter origins on a remote island in the South China Sea. *Environmental Research Letter* <https://doi.org/10.1088/1748-9326/aaaf21>. IF: 4.400.
21. Pan XJ, GTF Wong, TY Ho, JH Tai, HB Liu, JJ Liu and FK Shiah. 2018. Remote sensing of surface [nitrite+nitrate] in river-influenced shelf-seas: The northern SCS Shelf-sea. *Remote Sensing of Environment*. 210: 1-11. IF: 6.265.
22. Shih YT, PH Chen, LC Lee, CS Liao, SH Jien, FK Shiah, TY Lee, T Hein, F Zehetner, CT Chang, and JC Huang. 2018. Dynamic Responses of DOC and DIC Transport to Different Flow Regimes in a Subtropical Small Mountainous River. *Hydrology and Earth System Sciences (HESS)*. 22: 6579-6590. IF: 4.256.
23. Lu HP, YC Yeh, FK Shiah, GC Gong and CH Hsieh. 2019. Evolutionary constraints on species diversity in marine bacterioplankton communities. *International Society for Microbial Ecology Journal (ISMEJ)*. 13:1032–1041. IF: 8.951
24. Lee LC, TC Hsu, TY Lee, YT Shih, CY Lin, SH Jien, T Hein, F Zehetner, FK Shiah, JC Huang. 2019. Unusual Roles of Discharge, Slope and SOC in DOC Transport in Small Mountainous Rivers, Taiwan. *Scientific Reports*. 9:1574. IF: 4.122.
25. Sia ESA, Z Zhu, J Zhang, W Cheah, J Shan, FH Jang, A Mujahid, FK Shiah and M Müller. 2019. Biogeographical distribution of Microbial Communities along the Rajang River-South China Sea Continuum. *Biogeosciences*. 16: 4243–4260 IF: 3.700.
26. Ho PC, CW Chang, FK Shiah, PL Wang, CH Hsieh and KH Andersen. 2020. Body size, light intensity and nutrient supply determine plankton stoichiometry in mixotrophic plankton food webs. *America Naturalist*. 195(4): 100~111 IF: 4.265.
27. Chen CC, GC Gong, WC Chou and FK Shiah. 2020. Hypoxia in autumn of the East China Sea. *Marine Pollution Bulletin*. 152: 110875 IF: 5.540.
28. Zheng LW, D Li, XD Ding, TY Lee, ZH Zheng, FK Shiah, XF Zheng, TC Hsu, JC Huang and

- SJ Kao. 2020. Isotope Constraints on the Sources of Particulate Organic Carbon in a Subtropical Deep Reservoir. *JGR Biogeosciences*. 10.1029/2019JG005240. 1~15. SCI. IF: 3.620.
29. Ho PC, E Wong, FS Lin, A Sastri, C García-Comas, N Okuda, FK Shiah, GC Gong, RSW Yam and CH Hsieh. 2020. Prey stoichiometry and phytoplankton and zooplankton composition influence the production of marine crustacean zooplankton. *Progress in Oceanography*. 186: 1~7. IF: 3.245.
 30. Tai JH, WC Chou, CC Hung, KC Wu, YH Chen, TY Chen, GC Gong, FK Shiah and CH Chow. 2020. Short-term variability of biological production and CO₂ system in the shallow and deep water areas of the northern South China Sea: impact of topography-flow interaction. *Frontiers in Marine Science*. 7: 1~9. DOI: [10.3389/fmars.2020.00511](https://doi.org/10.3389/fmars.2020.00511) IF: 4.400.
 31. Chen TY, CC Lai, FK Shiah and GC Gong. 2020. Dissolved and particulate primary production and subsequent bacterial C consumption in the southern East China Sea of the NW Pacific. *Frontiers in Marine Science*. 7:713. DOI: [10.3389/fmars.2020.00713](https://doi.org/10.3389/fmars.2020.00713). IF: 4.400.
 32. Chang CW, Y Hao, M Takeshi, D Ethan, S Souissi, A Orlane, A Rita, YR Chiang, I Satoshi, K Michio, M Shin-ichiro, FK Shiah, JT Wu, CH Hsieh and G Sugihara. 2020. Long-term warming destabilizes aquatic ecosystems through weakening biodiversity-mediated causal networks. *Global Change Biology*. IF: 8.880. doi.org/10.1111/gcb.15323
 33. Ritika Kaushal, CC Lai, FK Shiah and MC Liang. 2020. Investigating nitrate dynamics in a well-preserved subtropical reservoir using $\delta^{17}\text{O}$ method. *Science of the Total Environment*. IF: 5.589. 753:141836. DOI: [10.1016/j.scitotenv.2020.141836](https://doi.org/10.1016/j.scitotenv.2020.141836).
 34. Chen CC, GC Gong, KP Chiang, FK Shiah, CC Chung and CC Hung. 2021. Scaling effects of a eutrophic river plume on organic carbon consumption. *Limnology & Oceanography*. 1-15. DOI: 10.1002/lno.11729. IF: 3.778.
 35. Chen CC, FK Shiah, GC Gong, TY Chen. 2021. Impact of upwelling on phytoplankton blooms and hypoxia along the Chinese coast in the East China Sea. *Marine Pollution Bulletin*. 167: 112288. IF: 5.540.
 36. Chang FH, JW Yang, CH Ariana, HP Lu, GC Gong, FK Shiah and CH Hsieh. 2021. Community assembly processes as a mechanistic explanation of the predator-prey diversity relationship in marine microbes. *Frontiers in Marine Science* 8:651565. doi: 10.3389/. IF: 4.400.
 37. Lopez ML, YY Lin, M. Sato, FK Shiah, CH Hsieh, and M Ryuji. 2021. Using meta-transcriptomics to estimate the diversity and composition of zooplankton communities. *Molecular Ecology Resources*. (accepted). IF: 7.059.
 38. Shih YY, FK Shiah, CC Lai, WC Chou, JH Tai, YS Wu, CY Lai, CC Hung. 2021. Comparison of primary production estimates derived using the VGPM vs. *in situ* measurements at the SEATS station in the South China Sea. *Frontiers in Marine Science*. (accepted). IF: 4.400.
 39. Chang CW, T Miki, M Ushio, PJ Ke, HP Lu, FK Shiah, CH Hsieh. 2021. Reconstructing large interaction networks from empirical time series data. *Ecology Letters* (accepted). IF: 9.492.
 40. Jurikova H, Abe O, FK Shiah & MC Liang. 2021. New constraints on biological production and mixing processes in the South China Sea from triple isotope composition of dissolved oxygen. *Biogeosciences* (revision). IF: 3.480.