

## ANNUAL REPORT ON GEOTRACES ACTIVITIES IN CHINA-TAIPEI

April 1st, 2019 to April 30th, 2021

### *New GEOTRACES or GEOTRACES relevant scientific results*

Dr. Tung-Yuan Ho's group in Academia Sinica has been studying the trace metal phytoplankton interaction. Reich and coauthors studied the physiological responses of cultured symbiotic dinoflagellates when exposed to increasing temperatures (26 to 30°C) and different iron concentrations. The results show more iron is needed at higher temperature suggesting the importance of trace metals to the health of coral-algal mutualisms. This work was published on Journal of phycology, and was awarded the Harold C. Bold Award for outstanding graduate student presentation at the 2019 Phycological Society of America Annual Meeting (Fort Lauderdale, Florida).

Dr. Kuo-Fang Huang's group in Academia Sinica has been working on using trace element and isotopes to trace anthropogenic sources in aerosols. Wu and Huang analyzed PM<sub>10</sub> samples in central Taiwan for water-soluble ion and trace metal concentrations as well as Pb isotope ratios. Their results suggested that Pb in PM<sub>10</sub> was predominantly contributed by oil combustion and oil refineries during the local events. This study demonstrates the robustness of using a combination of Pb isotopic compositions and chemical characteristics in PM<sub>10</sub> for source tracing in complex and heavily polluted areas. This work is published on Scientific Report.

Dr. George Burr's group at National Taiwan University has been studying iodine isotopes in marginal seas around Taiwan. They published a study of seawater <sup>129</sup>I/<sup>127</sup>I time-series data from several coastal sites in Taiwan, in order to document how <sup>129</sup>I/<sup>127</sup>I responds to known seasonal variations in the surface ocean currents that carry <sup>129</sup>I to each of these sites. They also documented <sup>129</sup>I/<sup>127</sup>I values from multiple surface ocean sites in the South China Sea (SCS), including a vertical profile from the South East Asia Time-Series Station that extends to a depth of 3,700 m. The <sup>129</sup>I from both coastal Taiwan and surface waters of the SCS is >98% anthropogenic, primarily released to the environment as a byproduct of nuclear fuel reprocessing.

### *GEOTRACES or GEOTRACES relevant cruises*

- All three new research vessels, the New Ocean Researcher I, II, and III, are now in operation.
- Abby Ren's group participated three cruises to the western Pacific east of Taiwan NORI-0001 (Dec. 2020), NORII (Nov. 2020), and NORIII-0015 (July 2020) for aerosol samples and seawater samples. The samples will be analyzed for nitrogen and oxygen isotopes on nitrate as well as nitrogen isotopes on total dissolved nitrogen.

### *New projects and/or funding*

- Dr. Tung-Yuan Ho's research project on "Marine biogeochemical cycling of anthropogenic aerosol Fe" is funded by Ministry of Science and Technology from 2019/08-2022/07.
- Dr. Tung-Yuan Ho received Investigator Award by Academia Sinica from 2021 to 2025.
- Dr. Abby Ren's research project on "Past and Present Evolution of Global Ocean Nitrogen Cycle: Implications from Studies in the Western Tropical North Pacific and South China Sea" is funded by Ministry of Science and Technology till 2023/02.

### ***Outreach activities conducted***

- Undergrad Research Program in Academia Sinica, 2020 Summer

### ***New GEOTRACES or GEOTRACES-relevant publications (published or in press)***

- PC Wu, KF Huang (2021) Tracing local sources and long-range transport of PM 10 in central Taiwan by using chemical characteristics and Pb isotope ratios, Scientific reports 11 (1), 1-15 (number of ERCs: 2)
- SC Pai, YT Su, MC Lu, Y Chou, TY Ho (2021) Determination of Nitrate in Natural Waters by Vanadium Reduction and the Griess Assay: Reassessment and Optimization, ACS ES&T Water, <https://doi.org/10.1021/acsestwater.1c00065> (number of ERCs: 3)
- HG Reich, WC Tu, IB Rodriguez, Y Chou, EF Keister, DW Kemp, OC LaJeunesse, T-Y Ho (2021) Iron availability modulates the response of endosymbiotic dinoflagellates to heat stress, Journal of phycology 57 (1), 3-13 (number of ERCs: 4)
- GS. Burr, H Matsuzaki, B-S Wang, H Kusuno, H Tokuyama, T Yamagata, T-L Yu, S-L Wang, C-C Chang, AJT Jull, C-H Lo (2020) Anthropogenic <sup>129</sup>I in the South China Sea and coastal waters around Taiwan. Elementa: Science of the Anthropocene 2. 8 (1): 064. doi: <https://doi.org/10.1525/elementa.2020.064> (number of ERCs: 4)

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