



近海海洋环境科学国家重点实验室(厦门大学)

State Key Laboratory of Marine Environmental Science
(Xiamen University)

2007年度报告

2007 Annual Report



MEL INTRODUCTION

Founded in 1995, the Laboratory of Marine Environmental Science (MEL) was promoted to be a state key laboratory in March, 2005. MEL is currently a primary research institution carrying out marine environmental science at the national level.

MEL has 72 staffs comprising 36 scientists, 31 technicians and 5 administrative staffs. During the past 10 years, MEL scientists have published more than 1000 peer reviewed papers in national or international journals and 20 books, and have won more than 30 awards at the national or departmental level.

MEL is dedicated to research at the frontiers of marine environmental science with special attention paid to biogeochemical processes, mechanisms and their ecological effects. Focal areas within MEL include marginal seas such as the Taiwan Strait and the South China Sea. It is the goal of MEL to be an internationally recognized institution in advancing marine environmental science and a platform for international academic exchange and cooperation.

厦门大学近海海洋环境科学国家重点实验室于2005年3月获科技部正式批准建设。其前身是成立于1995年10月的厦门大学海洋环境科学教育部重点实验室。实验室现有固定人员72人，流动研究人员26人。固定研究人员中，教授27人（包括特聘教授5人），博士生导师20人，具有博士学位的研究人员31人，国家杰出青年科学基金获得者4人。

实验室瞄准与全球变化有关的重大科学问题，直面国家对海洋环境保护和生态安全的重大需求，以多学科交叉为基础、以技术创新为动力、以台湾海峡及其毗邻海域为典型研究区域，主攻海洋生物地球化学过程及其与海洋生态系统相互作用，深入研究在自然变化和人类活动影响下的海洋生态系统对环境变化的响应和反馈，为我国海洋环境和生态保护提供科学基础和科技支撑，成为对外开放、具有国际影响力的海洋环境科学的基础性研究和人才培养与聚集的重要基地。

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DIRECTOR'S FOREWORD

At the beginning of this foreword to the 2007 Annual Report of the State Key Laboratory of Marine Environmental Science (MEL) I would like to acknowledge the extraordinary work of MEL faculties and staffs to establish MEL towards the competence and excellence in marine environmental science. The year 2007 has been a remarkable year for MEL. She continued to deliver high impact science outcomes. She also made significant progress in the infrastructure building and intellectual environmental culturing.



During the year 2007, MEL faculties were granted with 40 new competitive research projects with the total budget of 32 million RMB, 64% of which came from the Ministry of Science and Technology through national programs such as “973”, “863” and 22 % came from the National Natural Science Foundation of China (NSFC). In the year 2007, our 35 faculties published more than 150 peer reviewed articles, 98 of which were in international and top national journals, manifesting the steadily increasing contribution of MEL to marine environmental science. Some of these outstanding researches have been highlighted in the report.

Early 2007, Dr. Kunshan Gao, a well known marine phytoplankton physiologist in China joined our group. We are also extremely fortunate to have four distinguished scientists and long-term collaborators as our eminent scholars. They are Drs. Xiao-Han Yan, Wei-Jun Cai, Feng Chen, Shuh-Ji Kao.

Through the years of expectation, MEL finally has a new “home” at the extended part of Ocean Building, named as “Ocean Building B”. The built area is about 6000 m² and is well equipped with advanced facilities which provide a pleasant environment for researches and other academic activities.

On June 15, we hosted a major review panel organized by the Ministry of Science and Technology to examine the progress of MEL since our state key laboratory was launched in March 2005. We are extremely pleased that the panel gave us a highest rank for the achievement during the past two years.

Finally, I would like to take this opportunity to wish MEL members and all of our colleagues a successful and prosperous 2008.

Prof. Minhan Dai

A handwritten signature in black ink, appearing to be the name 'Minhan Dai' in a stylized cursive script.

Director, State Key Laboratory of Marine Environmental Science

December 25, 2007

序 言

2007年是厦门大学海洋环境科学国家重点实验室启动建设以来的第三个年头，也是经过10余年的耕耘“厚积薄发”的一年。这一年，实验室稳步推进平台建设、团队构架、运行管理等“基本体系”的建设及完善，进展令人欣喜。

实验室科学研究水平稳步提高、影响力持续上升。2007年，实验室新增课题40项，科研经费总计3200万元，其中，国家级纵向经费2853万元，占总经费的90%。获得省部级以上奖励2项，授权发明专利6项。2007年，实验室同仁共发表SCI或EI期刊收录论文110篇（待刊12篇）；其中，发表在影响因子大于2的国际主流专业刊物上的论文48篇（待刊8篇）；发表在JCA一区的论文3篇（待刊1篇），发表在JCA二区的论文14篇（待刊1篇）。

实验室队伍建设进展喜人。2007年，引进国家杰出青年科学基金获得者、中科院“百人计划”入选者1名，引进4名境外中青年科学家作为厦门大学讲座教授。由此，实验室已拥有由5名特聘教授和一个创新研究群体领衔、并有一批中青年骨干的优秀人才队伍；结合新近启用的按高标准实验室配置的实验大楼，国重室已基本具备了良好的软件和硬件平台，吸引和凝聚人才的牵引力日益加强，也为学科和科研腾飞积聚了强大的力量。

2007年，实验室继续坚持按“国际标准”推进学术交流与合作，并藉此拓宽实验室能力建设的有效渠道。实验室成功组织举办了“2007年SOLAS国际开放科学大会”，来自全球32个国家和地区的220名科学家及学生参加了会议，该会议得到了包括SOLAS国际科学指导委员会主席Peter Liss教授等与会科学家的高度评价。实验室邀请大批国际知名海洋学者到访并进行学术交流和短期合作，并积极开展与国外同行院际间的合作。本年度，实验室与美国特拉华大学海洋与地球学院、美国佐治亚大学海洋科学系、台湾“中央研究院”环境变迁研究中心及香港城市大学生物及化学系等5所院校或研究所签订了合作协议或合作备忘录。另外，通过“海洋生物地球化学”创新引智计划，搭建了短期国际合作平台及开放式研究平台，与海外成员开展了全方位的科研合作，拓展了合作领域与空间。

本年度特别值得一书的显然是实验室顺利通过了科技部的验收。6月15日，我们迎来了以汪品先院士为组长的9位国内知名学者组成的专家组。专家组充分肯定了实验室获准建设2年来的成绩，指出实验室在建设期间紧紧围绕主攻方向—海洋生物地球化学过程及其与海洋生态系统相互作用，在近海碳的源汇格局、生物泵效率、微型生物功能类群在生源要素生物地球化学循环中的作用与机制等方面，取得了一批有显示度的成果，整体研究实力显著加强，学术影响力快速提升；认为实验室已形成规模适当、结构合理、优势互补、整体实力雄厚的优秀创新团队，并成为凝聚优秀人才的基地。专家组一致同意通过验收，也希望在我国海洋事业快速发展的背景下，在海洋环境科学领域加强国内引领作用，提高国际影响力，保证持续发展。

我们即将走过2007，成绩与喜悦渐成历史，我们迎来2008，带着执着与希冀，共同创造未来。值此新年来临之际，我谨代表实验室全体同仁衷心感谢各级领导及国内外各界专家学者的关心与支持，我们时刻谨记“心存感激、脚踏实地、眼望未来”，并对各位致以最美好的新年祝福。

戴民汉



于二〇〇七年十二月二十五日

HIGHLIGHTS OF RESEARCHES

科学研究

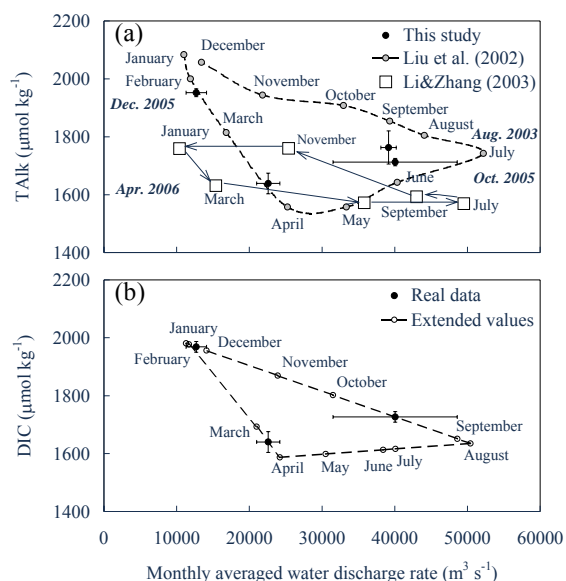
Marine Biogeochemistry

Carbonate system and CO₂ degassing fluxes in the inner estuary of Changjiang (Yangtze) River, China.

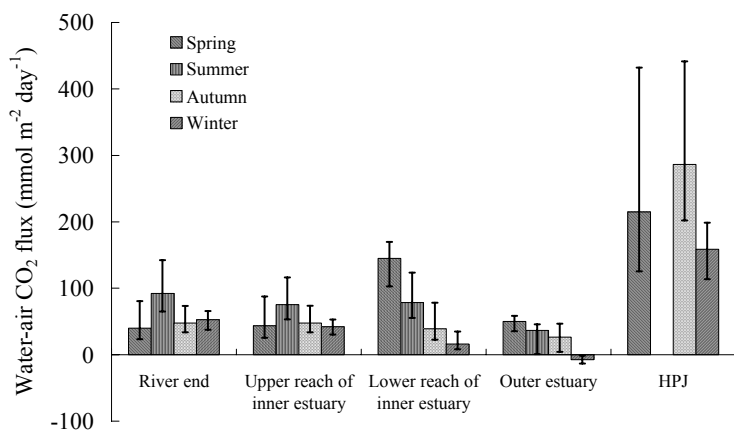
Zhai, W.D., Dai, M.H. and Guo, X.H., 2007. *Marine Chemistry*, 107(3): 342-356.

We examined the carbonate system, mainly the partial pressure of CO₂ (*p*CO₂), dissolved inorganic carbon (DIC) and total alkalinity (TAlk) in the Changjiang (Yangtze) River Estuary based on four field surveys conducted in Sep.-Oct. 2005, Dec. 2005, Jan. 2006 and Apr. 2006. Together with our reported *p*CO₂ data collected in Aug.-Sep. 2003, this study provides, for the first time, a full seasonal coverage with regards to CO₂ outgassing fluxes in this world major river-estuarine system. Surface *p*CO₂ ranged 650–1440 μatm in the upper reach of the Changjiang River Estuary, 1000–4600 μatm in the Huangpujiang River, an urbanized and major tributary of the Changjiang downstream which was characterized by a very high respiration rate, and 200–1000 μatm in the estuarine mixing zone. Both DIC and TAlk overall behaved conservatively during the estuarine mixing, and the seasonal coverage of these carbonate parameters allowed us to estimate the annual DIC export flux from the Changjiang River as $\sim 1.54 \times 10^{12}$ mol. The highly polluted Huangpujiang River appeared to have a significant impact on DIC, TAlk and *p*CO₂ in the lower reaches of the inner estuary. CO₂ emission flux from the main stream of the Changjiang Estuary was at a low level of 15.5–34.2 mol m⁻² yr⁻¹. Including the Huangpujiang River and the adjacent Shanghai inland waters, CO₂ degassing flux from the Changjiang Estuary may have represented only 2.0%–4.6% of the DIC exported from the Changjiang River into the East China Sea.

This study shows that, although the Changjiang DIC export was significant and accounted for ~5% of the global terrestrial DIC export, its estuarine CO₂ degassing level was much lower than some well-documented urbanized riverine-estuarine systems. This study demonstrates again that riverine / estuarine CO₂ degassing may vary in different systems and/or under different environmental conditions and that much remains to be investigated in order to quantitatively evaluate the significance of riverine and estuarine CO₂ outgassing on a global scale.



Monthly TAlk vs. water discharge rate (a) and DIC concentration vs. water discharge rate (b) in a year. Black circles with error bars are upstream TAlk (a) and DIC (b) data in this study (refer to [Table 2](#)). Error bars for water discharge rate are extreme differences between the neighboring monthly averaged water discharge rates. Error bars for TAlk/DIC are standard errors. In panel (a), the grey circles connected with a broken line are long-term averaged TAlk data from the Datong Station (~ 640 km upstream of the estuary mouth) during the period 1963–1999 ([Liu et al., 2002](#)), which is as a whole consistent with [Chen et al. \(2002\)](#), while the squares are averaged TAlk data from another sampling site around Nantong (~ 180 km upstream of the estuary mouth) during the period 1996–2001 ([Li and Zhang, 2003](#)). Grey circles connected with broken lines in panel (b) show the inferred monthly data for the hydrological year Jul. 2005–Jun. 2006.

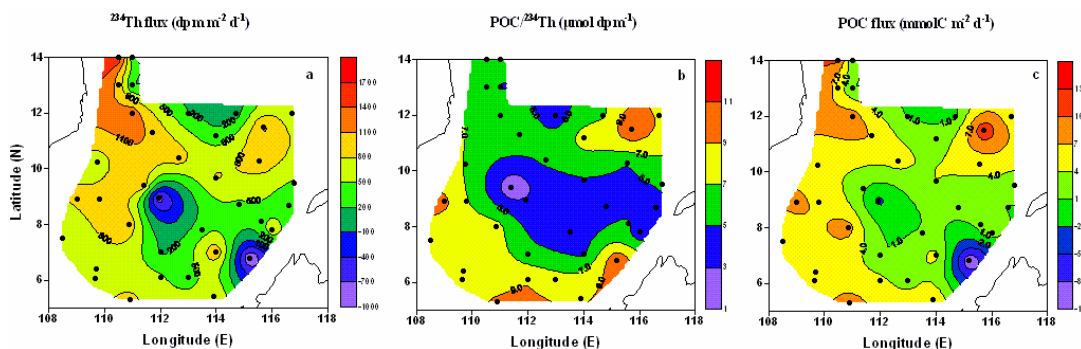


Seasonal water–air CO₂ flux estimates for different zones in the Changjiang Estuary and the adjacent Huangpujiang River under survey. Note that the flux estimate for the outer estuary may be subject to larger errors given the fact that the river plume is a very heterogeneous environment that was not fully covered by the present surveys.

A high-resolution study of particle export in the southern South China Sea based on ²³⁴Th: ²³⁸U disequilibrium.

Cai, P.H., Chen, W.F., Dai, M.H., Wan, Z.W., Wang, D.X., Li, Q., Tang, T.T. and Lv, D.W., 2007. *Journal of Geophysical Research-Ocean*, in press.

During a spring intermonsoon cruise in 2004, depth profiles of total and particulate ²³⁴Th in the upper 100 m were collected at 36 stations in the southern South China Sea (SCS), covering a surface area of ~ 1.0×10⁶ km². Thorium-234 was sampled by using a modified small-volume MnO₂ co-precipitation technique, which allows mapping the ²³⁴Th distribution with a high spatial resolution. A stratified structure of ²³⁴Th/²³⁸U disequilibria was generally observed in the upper 100 m water column, suggesting that the euphotic zone of the southern SCS in this season can be separated into two layers: an upper layer with low export production rates and a lower layer with high export production rates. At the same time, we observed extensive zones of ²³⁴Th excess within the euphotic layer, which is possibly due to intense remineralization of particulate matter. Particulate organic carbon (POC) export was estimated from a three-dimensional steady state model of ²³⁴Th fluxes combined with measurements of the POC/²³⁴Th ratio on suspended particles. The POC export for this region varied from a low of -10.7±1.5 mmolC m⁻² d⁻¹ to a high of 12.6±1.1 mmolC m⁻² d⁻¹, with an average of 3.8±4.0 mmolC m⁻² d⁻¹. A negative flux of POC export is interpreted as the result of lateral input of particulate matter from nearby waters. Regional patterns in POC export show enhanced fluxes along the western and southern boundaries of the study region, and a “tongue” of low export extending northwestward from ~ 9°N 116°E to ~ 10°N 111°E. This geographic distribution is consistent with the overall surface circulation pattern of the southern SCS in this season.

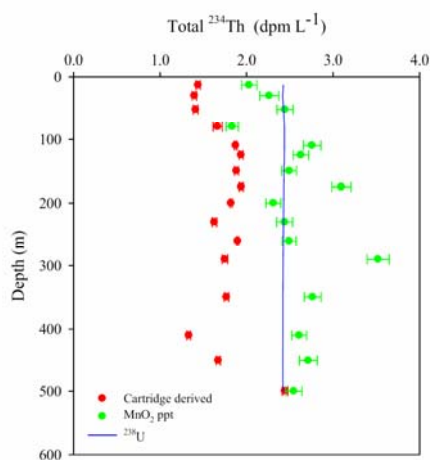


Contour plots of (a) particulate ²³⁴Th flux (dpm m⁻² d⁻¹), (b) POC/²³⁴Th ratio (µmol dpm⁻¹), and (c) POC export flux (mmolC m⁻² d⁻¹) at the export horizon. Station locations are shown as filled dots.

Response to “Comment on “How accurate are ^{234}Th measurements in seawater based on the MnO_2 -impregnated cartridge technique?”

Cai, P.H., Dai, M.H., Lv, D.W. and Chen, W.F., 2007. *Geochemistry, Geophysics, Geosystems*, in press.

We disagree that the comparison of the small-volume MnO_2 co-precipitation method and the MnO_2 cartridge method in Hung et al. [2007] is adequate. This is because at least some of the small-volume ^{234}Th data used for their comparison relied on an early protocol of the small-volume method that did not include a recovery correction. Thus, results are potentially biased. New data from the South China Sea confirm our earlier conclusion that the extraction efficiency for ^{234}Th is substantially overestimated by the cartridge method. We therefore restate that small-volume ^{234}Th measurements that include a recovery correction is advantageous over the cartridge technique and is recommended to more accurately quantify ^{234}Th activities used to constrain the export of particulate organic carbon in the upper ocean.

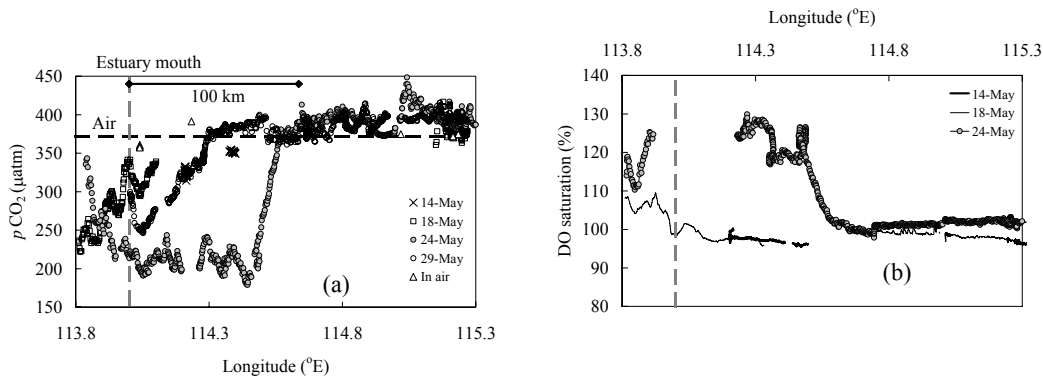


Depth profiles of total ^{234}Th activities based on the MnO_2 cartridge technique and on the MnO_2 co-precipitation technique. The solid line represents depth distribution of ^{238}U . Note that the total ^{234}Th data derived from the small-volume MnO_2 precipitation method are from Cai et al. [2006c]. The depth profile based on the small-volume method shows either ^{234}Th : ^{238}U secular equilibrium or ^{234}Th excess relative to ^{238}U below 100 m. In contrast, the depth profile based on the cartridge method shows a consistent deficiency of ^{234}Th from the surface down to 450 m. The only exception to this pattern occurs at 500 m, where ^{234}Th activity was apparently in equilibrium with ^{238}U . This single point of equilibrium could however be caused by the uncertainty inherent to the theoretical collection efficiency and should not be taken as a proof that the ^{234}Th measurements based on the cartridge method are unbiased.

Effects of an estuarine plume-associated bloom on the carbonate system in the lower reaches of the Pearl River Estuary and the coastal zone of the Northern South China Sea.

Dai, M.H., Zhai, W.D., Cai, W.J., Callahan, J., Huang, B.Q., Shang, S.L., Huang, T., Li, X.L., Lu, Z.M., Chen, W.F. and Chen, Z.Z., 2007. *Continental Shelf Research*, in press.

We observed a phytoplankton bloom downstream of a large estuarine plume induced by heavy precipitation during a cruise conducted in the Pearl River estuary and Northern South China Sea in May-June 2001. The plume delivered a significant amount of nutrients into the estuary and the adjacent coastal region, and enhanced stratification stimulating a phytoplankton bloom in the region near and offshore of Hong Kong. A several fold increase (0.2 to $1.8 \mu\text{g Chl L}^{-1}$) in biomass ($\text{Chl } a$) was observed during the bloom. During the bloom event, the surface water phytoplankton community structure significantly shifted from a pico-phytoplankton dominated community to one dominated by micro-phytoplankton ($>20 \mu\text{m}$). In addition to increased $\text{Chl } a$, we observed a significant drawdown of $p\text{CO}_2$, biological uptake of dissolved inorganic carbon (DIC) and an associated enhancement of dissolved oxygen and pH, demonstrating enhanced photosynthesis during the bloom. During the bloom, we estimated a net DIC drawdown of $100 - 150 \mu\text{mol kg}^{-1}$ and a TAlk increase of $0-50 \mu\text{mol kg}^{-1}$. The mean sea-air CO_2 flux at the peak of the bloom was estimated to be as high as $\sim -18 \text{mmol m}^{-2} \text{d}^{-1}$. For an average surface water depth of 5m , a very high apparent biological CO_2 consumption rate of $70-110 \text{mmol m}^{-2} \text{d}^{-1}$ was estimated. This value is $2 - 6$ times higher than the estimated air-sea exchange rate.



Surface $p\text{CO}_2$ (a) and dissolved oxygen (b) variations off Hong Kong before (May 14-18) and after (May 24) the bloom.

Current status of coastal zone issues and management in China: A review.

Cao, W.Z. and Wong, M.H., 2007. *Environment International*, 33(7): 985-992.

This paper identifies and examines social-economic and environmental issues recently emerged in China's coastal zone. Evaluation of management scheme and progress in perspectives of coordinated legislation, institutional arrangement, public participation, capacity building, and scientific research (mainly coastal planning and functional zoning) in China's coastal zone are made. The Chinese government has made a significant effort in developing legislation for the, coastal zone. Jurisdictional and zoning boundaries, and allocating use rights for coastal and marine resources have been established. State Oceanic Administration is the leading agency responsible for China's ocean policymaking and overall management of ocean and coastal affairs. A demonstrated project for integrated coastal management in Xiamen has been implemented, and is characterized as "decentralization" approach in decision-making process. In view of the above, comprehensive coastal management in China is a big challenge, facing with many difficulties. Finally, recommendations are raised for tackling these issues for China's coastal zone management.

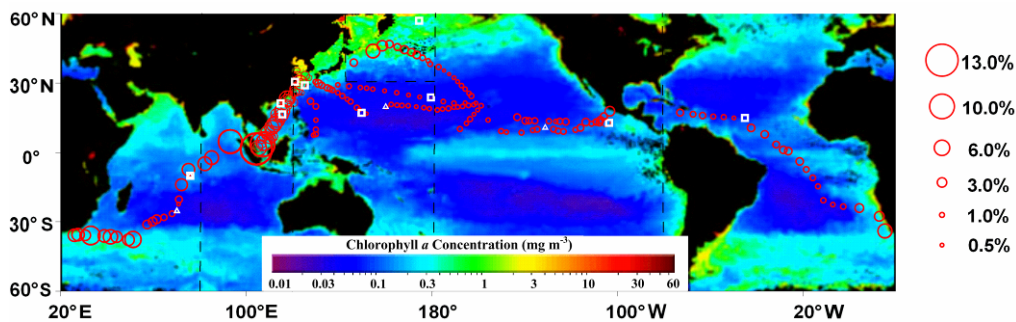
- From sectoral to integrated management
- Enhance a mechanism for public participation
- Capacity building
- Implementing integrated catchment/coastal zonemanagement

Marine Microbial Ecology

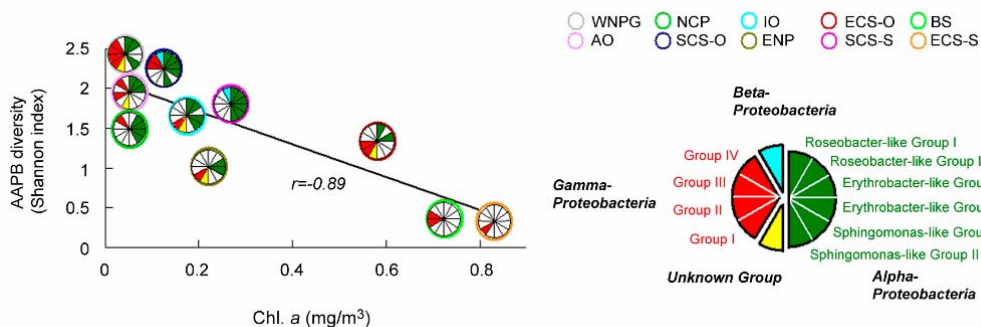
Distinct distribution pattern of abundance and diversity of aerobic anoxygenic phototrophic bacteria in the global ocean.

Jiao, N.Z., Zhang Y., Zeng, Y.H., Hong, N., Chen, F., Liu, R.L. and Wang, P.X., 2007. *Environmental Microbiology*, 9(12): 3091-3099.

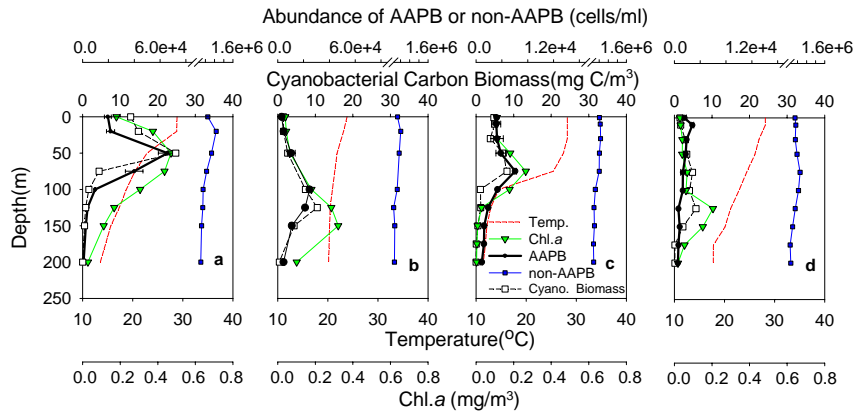
Aerobic anoxygenic phototrophic bacteria (AAPB) are an important bacterial group with capability of harvesting light energy, and appear to have a particular role in the ocean's carbon cycling. Yet the significance of AAPB relative to total bacteria (AAPB%) in different marine regimes are still controversial, and variation trend of genetic diversity of AAPB along environmental gradients remains unclear. Here we present the first comprehensive observation of the global distribution of AAPB in the Pacific, Atlantic and Indian oceans, revealing a general pattern of high abundance of AAPB and AAPB% in coastal waters than oceanic waters. The Indian Ocean contained relatively high AAPB% compared with the other two oceans, corresponding to the high primary production in this region. Both abundance of AAPB and AAPB% were positively correlated with the concentration of chlorophyll a, while the diversity of AAPB decreased with increasing chlorophyll a values. Our results suggest that AAPB abundance and diversity follow opposite trends from oligotrophic to eutrophic regimes in the ocean.



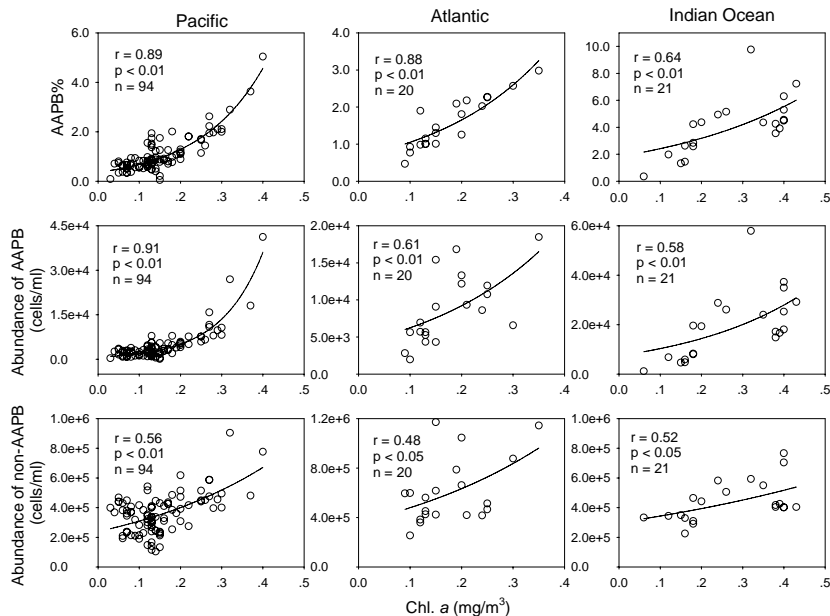
A global distribution pattern of the percentage of AAPB in total bacteria (AAPB%). Red symbol at each sampling station is proportional in diameter to the value of AAPB%. Stations marked with white square are the sites where the diversity of AAPB was analyzed (ten stations). Stations labeled with white triangle are the sites where the depth profile was taken. Samples were collected from various cruises. Most of the samples were taken from a global expedition (April 2005-January 2006) aboard R/V Ocean No.1. Samples were also collected from the Northern Pacific Ocean aboard R/V Revelle, USA (the Vertigo cruise, July-August 2005), R/V Ocean No.1 (October-December 2003 and May and November 2005). Cruises to the West Pacific marginal seas were conducted seasonally between 2003-2005 (R/V DONG-FANG-HONG No.2; and R/V YAN-PING No.2). A mosaic base map of Chlorophyll *a* remote sensed images (Aqua-MODIS) of spring 2005 (120°E-180°E, 60°S-60°N), summer 2005 (180°W-80°W, 60°S-60°N), autumn 2005 (80°W-80°E, 60°S-60°N) and winter 2006 (80°E-120°E, 60°S-60°N) were employed as the backgrounds corresponding to each leg of the global cruise. In addition, chlorophyll *a* image of the area of 140°E-180°E, 30°N-60°N in summer 2005 was added as background for the Vertigo cruise. The black dashed lines showed the boundaries of different images that comprise the whole.



Inverse correlation between AAPB genetic diversity (by *Shannon* index, see Methods) and chlorophyll *a* concentration in global surface oceans. The ten investigated sites are: Western North Pacific Gyre (WNPG, 149.69° E 17.16° N); Atlantic Ocean (AO, 45.06° W 14.83° N); North Central Pacific (NCP, 179.7° E 23.7° N); Open Water of South China Sea (SCS-O, 113.5° E 18.4° N); Indian Ocean (IO, 75.83° E, 10.01° S); Eastern North Pacific (ENP, 103.6° W 12.8° N); Shelf water of South China Sea (SCS-S, 114.8° E 21.2° N); Open water of East China Sea (ECS-O, 126.3° E 29° N); Bering Sea (BS, 174.5° E 56.9° N); Shelf water of East China Sea (ECS-S, 123.5° E 30.5° E) (refer to the white squares in the map of Fig. 1). All AAPB clones are sorted into 12 major groups according to the phylogenetic analysis of *pufM* gene sequences (Fig.4). Groups accounting for less than 5% of total clones in the clone library were treated as minor group and were not shown in this figure. The aside plate illustration with 12 rooms shows the locations of the 12 subgroups of AAPB. Closed/open rooms indicate the presence/absence of the corresponding group.



Depth profiles of AAPB abundance (black line with closed circle), Chl. *a* concentration (green line with open triangle), biomass of cyanobacteria (dotted line with open square), and temperature (red dotted line) at representative locations: a, Central Indian Ocean (75.85°E, 10.01°S); b, Southern Indian Ocean (70.04°E, 25.32°S) (oligotrophic); c, Tropical Eastern North Pacific (131.06°W, 10.71°N); and d, Western North Pacific Gyre (160.21°E, 19.66°N) (extremely oligotrophic). Error bars indicate standard deviation of triplicate measurements,

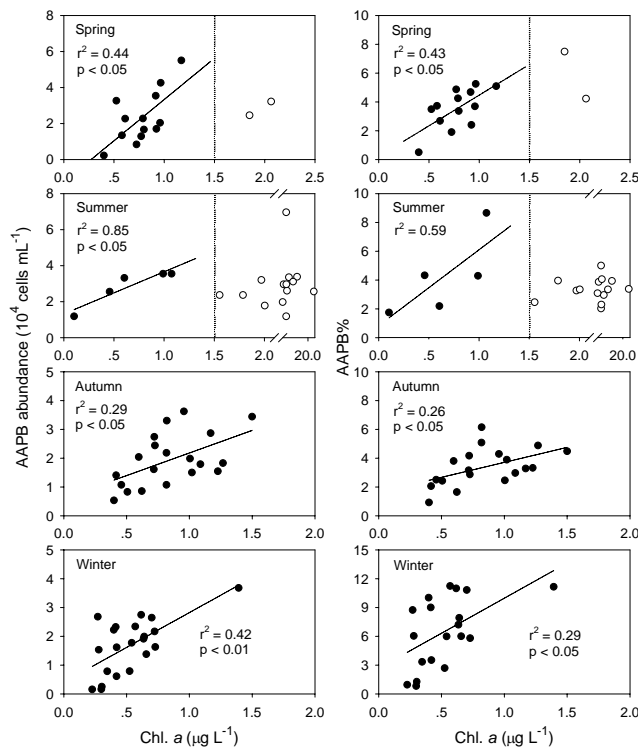


Correlations between AAPB%, AAPB abundance or non-AAPB abundance and chlorophyll *a* (Chl. *a*) in the Pacific, Atlantic and Indian oceans.

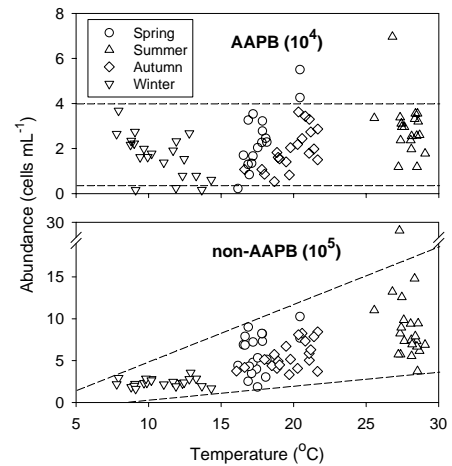
Dynamics of aerobic anoxygenic phototrophic bacteria in the East China Sea.

Zhang, Y. and Jiao, N.Z., 2007. *Fems Microbiology Ecology*, 61(3): 459-469.

Aerobic anoxygenic phototrophic bacteria (AAPB) are a group of heterotrophic bacteria capable of photosynthesis. The dynamics of AAPB in the East China Sea, a typical marginal sea characterized by diverse physical-chemical and ecological conditions, were investigated from April 2002 to September 2003. The results showed that the abundance of AAPB varied from 0.16 to 7.9×10^4 cells mL^{-1} and the percentage of AAPB (AAPB%) in the total heterotrophic bacterial abundance varied from 0.5% to 11.6% over a gradient of environmental conditions. The abundance of AAPB and AAPB% was higher in coastal and continental shelf waters than in oceanic waters. An interesting seasonal pattern was observed in the Yangtze River estuary: the abundance of AAPB was highest in summer and lowest in winter; however, AAPB% was higher in winter than in the other seasons. Throughout the investigation period, variation of AAPB abundance with temperature was much less than that of nonAAPB abundance, suggesting that low temperature was not a limiting factor for AAPB in this case. Close correlation between AAPB and chlorophyll *a* was observed in each season, suggesting that dependence of AAPB on dissolved organic carbon produced by phytoplankton (PDOC) may be one key factor controlling AAPB distribution.



Relationships between AAPB abundance and total chlorophyll *a* (left) and between AAPB% and chlorophyll *a* (right) during the four seasons.

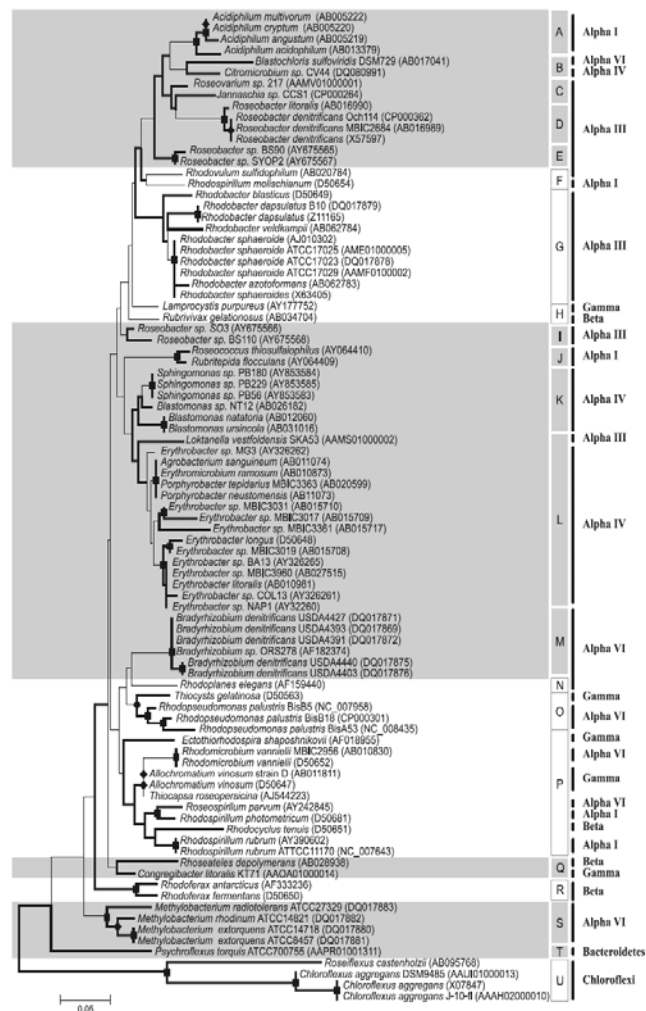


Effects of temperature on AAPB (upper) and non-AAPB (lower). Abundance of non-AAPB was calculated by subtracting AAPB from total heterotrophic bacterial abundance.

Source environment feature related phylogenetic distribution pattern of anoxygenic photosynthetic bacteria as revealed by *pufM* analysis.

Zeng, Y.H. and Jiao, N.Z., 2007. *Journal of Microbiology*, 45(3): 205-212.

Anoxygenic photosynthesis, performed primarily by anoxygenic photosynthetic bacteria (APB), has been supposed to arise on Earth more than 3 billion years ago. The long established APB are distributed in almost every corner where light can reach. However, the relationship between APB phylogeny and source environments has been largely unexplored. Here we retrieved the *pufM* sequences and related source information of 89 *pufM* containing species from the public database. Phylogenetic analysis revealed that horizontal gene transfer (HGT) most likely occurred within 11 out of a total 21 *pufM* subgroups, not only among species within the same class but also among species of different phyla or subphyla. A clear source environment feature related phylogenetic distribution pattern was observed, with all species from oxic habitats and those from anoxic habitats clustering into independent subgroups, respectively. HGT among ancient APB and subsequent long term evolution and adaptation to separated niches may have contributed to the coupling of environment and *pufM* phylogeny.

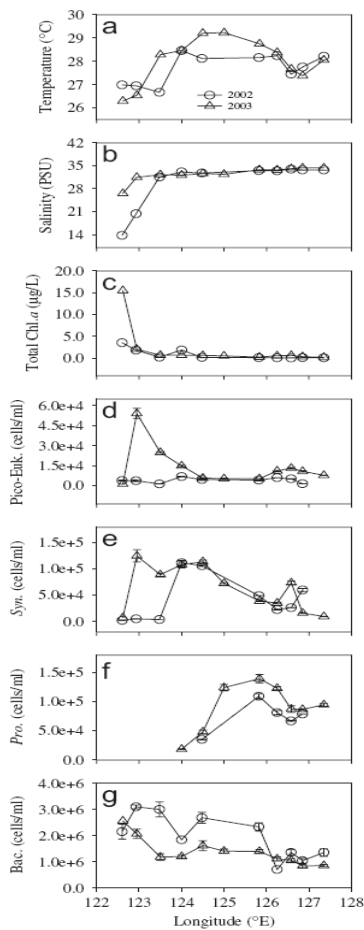


Phylogenetic analysis of *pufM* gene partial sequences from 89 *pufM* containing species. Four algorithms, neighbor joining, minimum evolution, maximum parsimony and Bayesian, were used to infer trees and the consensus tree was manually created. The bold black branches represent the most stable topological structure that appeared in all four trees. The nodes with the symbol “■” have the bootstrap value higher than 50% in all four trees, and those with the symbol “◆” have the bootstrap value higher than 50% in three of the total four trees. The scale bar represents 5% nucleotide substitution. Species in the grey region were isolated from oxic environments. The right column lists the subgroup and taxonomic affiliation of each species. Alpha, Beta and Gamma represent alpha-, beta- and gamma-proteobacteria respectively.

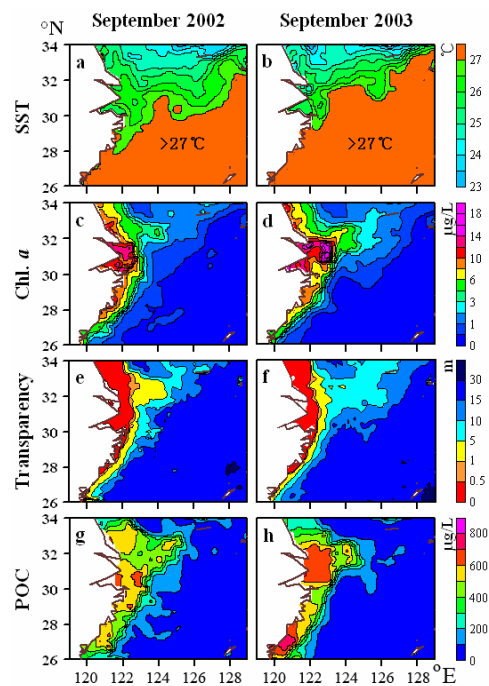
Ecological anomalies in the East China Sea: Impacts of the three gorges dam?

Jiao, N.Z., Zhang, Y., Zeng, Y.H., Gardner, W.D., Mishonov, A.V., Richardson, M.J., Hong, N., Pan, D.L., Yan, X.H., Jo, Y.H., Chen, C.T.A., Wang, P.X., Chen, Y.T., Hong, H.S., Bai, Y., Chen, X.H., Huang, B.Q., Deng, H., Shi, Y. and Yang, D.C., 2007. *Water Research*, 41(6): 1287-1293.

In this study, we examined possible impacts of the Yangtze River Three Gorges Dam (TGD), the world largest hydroelectric construction, on the adjacent marine ecosystem of the East China Sea (ECS) during its initial water storage period. The TGD filled the first one-third of its storage capacity of 39 billion m³ in 10 days in June 2003, causing an abrupt reduction in the river flow into the ECS. Noticeable changes in the microbial community structure including pico-sized autotrophs, heterotrophic bacteria and microbial diversity in the estuary and the ECS were observed 2 months later. Although causes for these changes could be multiple, the sudden decrease of river runoff and an ensuing intrusion of ECS ocean currents were postulated to be among the major ones.



Distribution of water temperature (a), salinity (b), total Chl. *a* (c), pico-Eukaryotes (d), *Synechococcus* (e), *Prochlorococcus* (f), and total bacteria (g) along a transect from the Yangtze River Estuary to the Kuroshio Current (from left to right: St.1 to 11, refer to Fig.1). Circles: September 2002, triangles: September 2003.

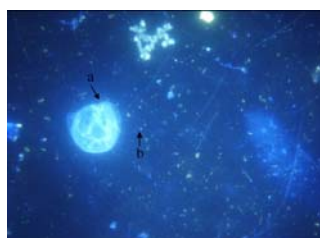


Remote sensing data-derived distribution patterns of SST (a, b), Chl. *a* (c, d), transparency (e, f), POC (g, h) in the East China Sea (left column: September 2002, right column: September 2003).

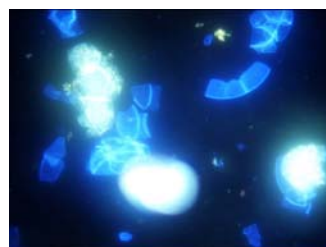
An efficient method to obtain axenic cultures of *Alexandrium tamarense* - a PSP-producing dinoflagellate.

Su, J.Q., Yang, X.L., Zheng, T.L. and Hong, H., 2007. *Journal of Microbiological Methods*, 69(3): 425-430.

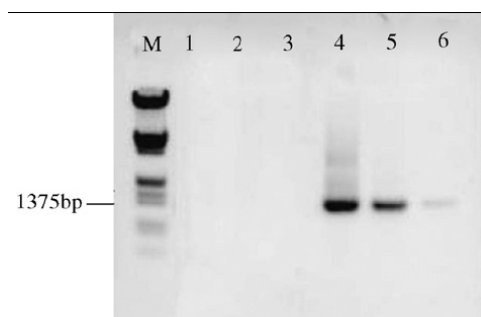
The fact that species of harmful algae maintained in the laboratory harbor a complex bacterial flora increases the difficulties involved in the study of the relationship between bacteria and algae. An efficient method to remove bacteria from a laboratory culture of the marine dinoflagellate *Alexandrium tamarense* is presented in this paper. The alga was subjected to repeated washing, lysozyme/SDS and antibiotic treatment with; a mixture of gentamycin, streptomycin, cephalothin and rifampicin. Axenic status was confirmed after subculturing three times in sterile f/2 medium without antibiotics. Bacteria could not be detected in various media, both solid and liquid, nor by epifluorescence microscopy and PCR amplification of 16S rDNA of both eubacteria and archaea. Bacterial presence was monitored throughout a full growth cycle and, following subculture, no bacteria were detected using the above methods. This method is more efficient and less time-consuming than other methods and the resultant axenic *A. tamarense* cultures would provide a simpler system for further study of bacteria-alga interactions.



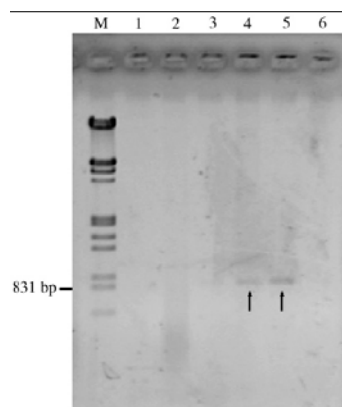
Epifluorescence microscopy image using DAPI stain (1000×magnification), of *A. tamarense* before treatment; a: algal cell, b: bacterial cell.



Epifluorescence microscopy image using DAPI stain (1000× magnification), of *A. tamarense* after treatment.



Results of PCR amplification of 16S rDNA (eubacteria) obtained from the treated culture (Lanes 1–3, about 100 ng, 10 ng and 1 ng total DNA was used as template, respectively) and the control culture (Lanes 4–6, about 100 ng, 10 ng and 1 ng total DNA was used as template respectively). M: Lamda DNA/ *EcoRI*+*HindIII* marker, Fermentas, SM0191.

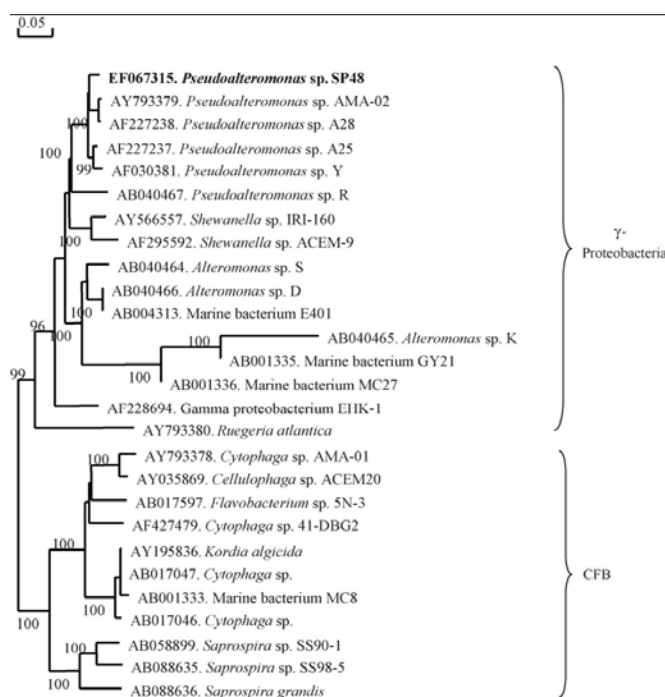


Results of PCR amplification of 16S rDNA (archaea) obtained from treated culture (Lanes 1–3, about 100 ng, 10 ng and 1 ng total DNA was used as template, respectively) and the control culture (Lanes 4–6, about 100 ng, 10 ng and 1 ng total DNA was used as template, respectively). M: Lamda DNA/ *EcoRI*+*HindIII* marker, Fermentas, SM0191.

Isolation and characterization of a marine algicidal bacterium, against the toxic dinoflagellate *Alexandrium tamarense*.

Su, J.Q., Yang, X.R., Zheng, T.L., Tian Y., Cai LZ, Jiao N.Z. and Hong, H.S., 2007. *Harmful Algae*, 6: 799-810.

Interactions between bacteria and harmful algal bloom (HAB) species have been acknowledged as an important factor regulating both the population dynamics and toxin production of these algae. A marine bacterium SP48 with algicidal activity to the toxic dinoflagellate, *Alexandrium tamarense*, was isolated from the Donghai Sea area, China. Genetic identification was achieved by polymerase chain reaction amplification and sequence analysis of 16S rDNA. Sequence analysis showed that the most probable affiliation of SP48 was to the γ -proteobacteria subclass and the genus *Pseudoalteromonas*. Bacterial isolate SP48 showed algicidal activity through an indirect attack. Additional organic nutrients but not algal-derived DOM was necessary for the synthesis of unidentified algicidal compounds but β -glucosidase was not responsible for the algicidal activity. The algicidal compounds produced by bacterium SP48 were heat tolerant, unstable in acidic condition and could be easily synthesized regardless of variation in temperature, salinity or initial pH for bacterial growth. This is the first report of a bacterium algicidal to the toxic dinoflagellate *A. tamarense* and the findings increase our knowledge of bacterial–algal interactions and the role of bacteria during the population dynamics of HABs.



Phylogenetic tree of known algicidal bacteria including the bacterial isolate SP48. The codes before the names are the GenBank Accession numbers.

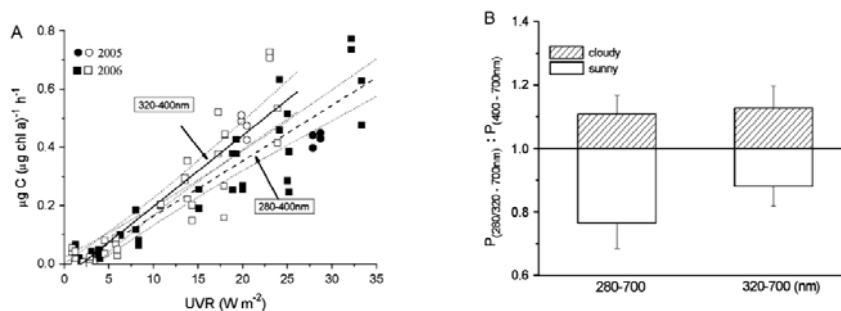
Marine Phytoplankton Ecology and Physiology

Solar UV radiation drives CO₂ fixation in marine phytoplankton: A double-edged sword.

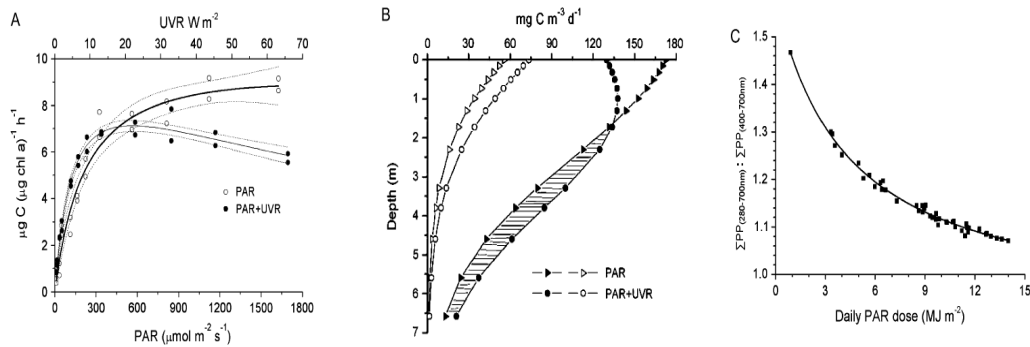
Gao, K.S., Wu, Y.P., Li, G., Wu, H.Y., Villafane, V.E. and Helbling, E.W., 2007. *Plant Physiology*, 144(1): 54-59.

Photosynthesis by phytoplankton cells in aquatic environments contributes to more than 40% of the global primary production (Behrenfeld et al., 2006). Within the euphotic zone (down to 1% of surface photosynthetically active radiation [PAR]), cells are exposed not only to PAR (400-700 nm) but also to UV radiation (UVR; 280-400 nm) that can penetrate to considerable depths (Hargreaves, 2003). In contrast to PAR, which is energizing to photosynthesis, UVR is usually regarded as a stressor (Hader, 2003) and suggested to affect CO₂-concentrating mechanisms in phytoplankton (Beardall et al., 2002). Solar UVR is known to reduce photosynthetic rates (Stemann Nielsen, 1964; Helbling et al., 2003), and damage cellular components such as D1 proteins (Sass et al., 1997) and DNA molecules (Buma et al., 2003). It can also decrease the growth (Villafane et al., 2003) and alter the rate of nutrient uptake (Fauchot et al., 2000) and the fatty acid composition (Goes et al., 1994) of phytoplankton. Recently, it has been found that natural levels of UVR can alter the morphology of the cyanobacterium *Arthrospira (Spirulina) platensis* (Wu et al., 2005b).

On the other hand, positive effects of UVR, especially of UV-A (315-400 nm), have also been reported. UV-A enhances carbon fixation of phytoplankton under reduced (Nilawati et al., 1997; Barbieri et al., 2002) or fast-fluctuating (Helbling et al., 2003) solar irradiance and allows photorepair of UV-B-induced DNA damage (Buma et al., 2003). Furthermore, the presence of UV-A resulted in higher biomass production of *A. platensis* as compared to that under PAR alone (Wu et al., 2005a). Energy of UVR absorbed by the diatom *Pseudo-nitzschia multiseriis* was found to cause fluorescence (Orellana et al., 2004). In addition, fluorescent pigments in corals and their algal symbiont are known to absorb UVR and play positive roles for the symbiotic photosynthesis and photoprotection (Schlichter et al., 1986; Salih et al., 2000). However, despite the positive effects that solar UVR may have on aquatic photosynthetic organisms, there is no direct evidence to what extent and how UVR per se is utilized by phytoplankton. In addition, estimations of aquatic biological production have been carried out in incubations considering only PAR (i. e. using UV-opaque vials made of glass or polycarbonate; Donk et al., 2001) without UVR being considered (Hein and Sand-Jensen, 1997; Schippers and Lurling, 2004). Here, we have found that UVR can act as an additional source of energy for photosynthesis in tropical marine phytoplankton, though it occasionally causes photoinhibition at high PAR levels. While UVR is usually thought of as damaging, our results indicate that UVR can enhance primary production of phytoplankton. Therefore, oceanic carbon fixation estimates may be underestimated by a large percentage if UVR is not taken into account.



A, CO₂-fixation rates measured in phytoplankton assemblages as a function of solar UVR (280–400 nm, black symbols) or UV-A (320–400 nm, white symbols) on August 4, 2005, September 27, 2005, and July 8 to 10, 2006. The solid and dashed lines represent a linear fit of the data ($P < 0.0001$), while the dotted lines are the 95% confidence limit. Mean solar irradiances ranged from 312.0 to 486.5, 44.6 to 59.2, and 1.97 to 2.56 W m⁻² for PAR, UV-A, and UV-B, respectively, throughout the incubations. B, CO₂-fixation rates of phytoplankton assemblages exposed to PAR + UV-A + UV-B (280–700 nm) and PAR+ UV-A (320–700 nm) as compared to those exposed only to PAR. The mean irradiances of PAR, UV-A, and UV-B during the incubations were 224.3, 37.2, and 1.76 W m⁻² on the cloudy days (July 29, September 10, and September 22, 2005), and 318.3, 50.1, and 2.33 W m⁻² on the sunny days (August 4 and September 27, 2005). The mean photosynthetic carbon fixation rates under PAR alone were 7.16 and 4.98 µg C (µg Chl a)⁻¹ h⁻¹ on cloudy and sunny days, respectively. The vertical bars represent SD ($n = 4$ to approximately 6).

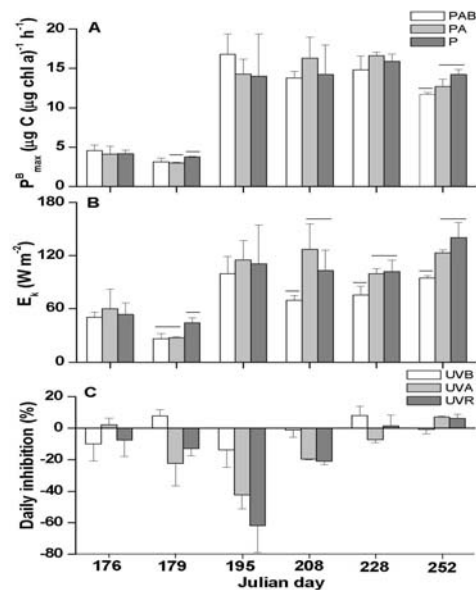


A, Photosynthesis versus irradiance curve under PAR (white circles) and PAR + UVR (black circles) conditions; dotted lines represent 95% confident limit. The mean irradiances (PAR, UV-A, and UV-B) during the incubations (August 6 and 8, 2005) were 321, 50.5, and 2.1 $W m^{-2}$, respectively. B, Vertical distribution of estimated daily photosynthetic production on a sunny day (black symbols; July 5, 2006) and a cloudy (white symbols; August 13, 2006) day. The doses (and mean irradiances) of PAR for these days were 14 ($280 W m^{-2}$) and 0.9 $MJ m^{-2}$ ($19.6 W m^{-2}$), respectively. Note that even on the sunny day without cloud coverage, UVR-enhanced production (shaded areas) is larger than the UVR-related reduction (open area enclosed by the lines). C, Daily primary production (ΣPP) ratios of samples exposed to the full solar spectrum compared to those exposed to PAR only. The estimation of ΣPP was based on the P versus E curves. The relationship of solar daily dose with ΣPP ratio is significant ($P < 0.001$; $y = 0.913 \times \exp[3.19/(x + 15.82)]$); $R^2 = 0.99$.

Variability of UVR effects on photosynthesis of summer phytoplankton assemblages from a tropical coastal area of the South China Sea.

Gao, K.S., Li, G., Helbling, E.W. and Villafane, V.E., 2007. *Photochemistry and Photobiology*, 83(4): 802-809.

From June to September 2005, we carried out experiments to determine the ultraviolet radiation (UVR)-induced photoinhibition of summer phytoplankton assemblages from a coastal site of the South China Sea. Variability in taxonomic composition was determined throughout the summer, with a peak chlorophyll a (chl *a* ~20 $\mu g chl a L^{-1}$) dominated by the diatom *Skeletonema costatum* that was detected early in the study period; the rest of the time samples were characterized by monads and flagellates, with low chl *a* values (1-5 $chl a \mu g L^{-1}$). Surface water samples were placed in quartz tubes, inoculated with radiocarbon and exposed to solar radiation for 2-3 h to determine photosynthetic rates under three quality radiation treatments (*i.e.* PAB, 280-700 nm; PA, 320-700 nm and P, 400-700 nm) using different filters and under seven levels of ambient irradiance using neutral density screens (P vs E curves). UVR inhibition of samples exposed to maximum irradiance (*i.e.* at the surface) varied from -12.2% to 50%, while the daytime-integrated UVR-related photoinhibition in surface seawater varied from -62% to 7%. The effects of UVR on the photosynthetic parameters P_{max}^B and E_k were also variable, but UV-B accounted for most of the observed variability. During sunny days, photosynthesis of microplankton (>20 μm) and piconanoplankton (<20 μm) were significantly inhibited by UVR (mostly by UV-B). However, during



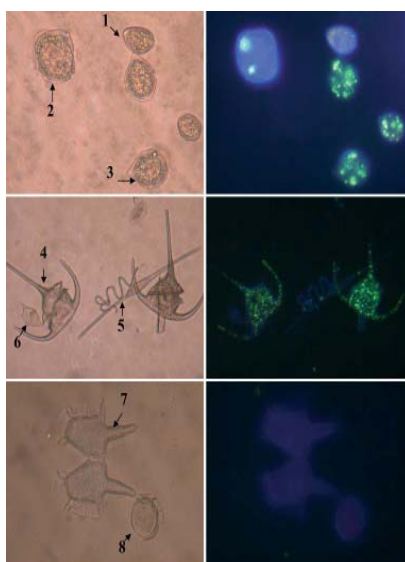
Mean photosynthetic parameters for the six experiments carried out with samples collected at Nan' Ao. (a) Mean P_{max}^B (in $\mu g C [\mu g chl a]^{-1} h^{-1}$) and (b) mean E_k (in $W m^{-2}$). White bars: Samples exposed to PAR + UVR (PAB, 280-700 nm); Gray bars: Samples exposed to PAR + UV-A (PA, 320-700 nm); Black bars: Samples exposed to PAR only (P, 400-700 nm). (c). Daily photosynthetic inhibition (in %) in the surface seawater due to UV-B (white bars), UV-A (gray bars) and UVR (black bars). The vertical lines on top of the bars represent one standard error (calculated by propagation of errors, see Materials and Methods), whereas the horizontal lines represent significant differences between treatments for each fraction ($P < 0.05$).

cloudy days, while piconanoplankton cells were still inhibited by UVR, microplankton cells used UVR (mostly UV-A) as the source of energy for photosynthesis, resulting in higher carbon fixation in samples exposed to UVR than the ones exposed only to photosynthetically active radiation (PAR). Our results indicate that size structure and cloudiness clearly condition the overall impact of UVR on phytoplankton photosynthesis in this tropical site of South China. In addition, model predictions for this area considering only PAR for primary production might have underestimated carbon fixation due to UVR contribution.

Alkaline phosphatase activity of phytoplankton in East China Sea coastal waters with frequent harmful algal bloom occurrences.

Huang, B.Q., Ou, L.J., Wang, X.L., Huo, W., Li, R.X., Hong, H.S., Zhu, M.Y. and Qi, Q.Z., 2007. *Aquatic Microbial Ecology*, 49(2): 195-206.

Alkaline phosphatase activity (APA) was measured during 3 cruises in spring 2002, 2003 and 2005 using bulk and single-cell assays in coastal waters in the East China Sea which experience frequent harmful algal bloom occurrences. The bulk APA ranged from below the detection limit to $73.53 \text{ nmol l}^{-1} \text{ h}^{-1}$, with mean values of 15.73 ± 14.12 , 23.77 ± 15.20 and $11.48 \pm 12.44 \text{ nmol l}^{-1} \text{ h}^{-1}$ for 2002, 2003 and 2005, respectively. The cell-bound fraction (mainly phytoplankton) was the major contributor to APA, with averages of 74 and 80% during 2003 and 2005, respectively. During the spring of 2005, most of the dominant dinoflagellates had high percentages of enzyme-labeled fluorescence (ELF)-labeled cells, while only a few diatoms and chrysophytes were labeled with ELF. Among the dinoflagellates, *Protoperdinium* spp. and *Karenia mikimotoi* had the highest percentages of ELF-labeled cells (84 and 82%, respectively), whereas *Gonyaulax* spp. and *Dinophysis* spp. had the lowest percentages of labeled species (17 and 21%, respectively). An alkaline phosphatase (AP) kinetic experiment was performed during 2005, with a turnover time of 10 h and a maximum potential velocity of $206.1 \text{ nmol l}^{-1} \text{ h}^{-1}$. The present results showed that severe phosphorus (P) stress occurred during springs in the study area, in particular when *Prorocentrum donghaiense* bloomed during 2003. AP played an important role in hydrolyzing soluble nonreactive phosphorus. The dominant dinoflagellates, which suffered more severe P stress compared to the diatoms, were the major AP producers during the spring of 2005, and differences in physiological P status existed among different dinoflagellate species.



Microscopic observations of enzyme-labeled fluorescence in phytoplankton during the spring of 2005. Dinoflagellates—1: *Prorocentrum micans*; 2: *Alexandrium* sp.; 3: *Scrippsiella trochoidea*; 4: *Ceratium tripos*; 5: *Ceratium fusus*; 6: *Ceratium furca*; 7: *Dinophysis caudate*; 8: *Dinophysis acuminata*. Left panels show samples observed under bright field; right panels show samples observed under a long-pass DAPI filter set. Bright green fluorescence in right panels was indicative of alkaline phosphatase activity

Influence of N, P additions on the transfer of nickel from phytoplankton to copepods.

Wang, M.H., Wang, D.Z., Wang, G.Z., Huang, X.G. and Hong, H.S., 2007. *Environmental Pollution*, 148(2): 679-687.

We examined the influence of macronutrient (nitrate and phosphate) additions on Ni uptake by phytoplankton (*Prorocentrum donghaiense* and *Skeletonema costatum*) and its subsequent transfer to marine copepods (*Calanus sinicus* and *Labidocera euchaeta*). Ni uptake by phytoplankton after 24 h of exposure was markedly dependent on nutrient conditions, with a higher nutrient quota facilitating Ni accumulation in the algae. Trophic transfer was quantified by measurements of the Ni assimilation efficiency in *C. sinicus* and *L. euchaeta*, feeding on the algae under different nutrient treatments. Ni assimilation efficiency generally increased with an increase of nutrient concentration in the algae. A significant positive-correlation was found between the Ni assimilation efficiencies of the copepods and the %intracellular Ni in the algal cells. However, ambient nutritional conditions had little effect on the physiological turnover rate constant of Ni by copepods. Thus, nutrient enrichment may lead to an increase in Ni uptake and transfer in marine plankton.

Environmental Behavior and Toxicity of PTS in Coastal Areas

Risk assessment of nitrogen discharge from a coastal watershed.

Chen, N.W., Hong, H.S., Zhang, L.P. and Cao, W.Z., 2007. *Pedosphere*, 17(4): 467-474.

Probabilistic risk assessment (PRA) uses probability theory to quantify the probability of occurrence of an event. In this study, PRA was conducted for the discharge of excess nitrogen (N) from an agricultural (Jiulong River) watershed in Southeast China. Using fault tree analysis, a type of PRA, the probability of occurrence of excess N discharge into the river during a runoff event was evaluated both qualitatively and quantitatively. Land use maps, soil maps, fertilizer use records, and expert opinions were used to determine probabilities of individual events within the fault tree and to calculate the overall probability of excess N discharge during a runoff event. Qualitative analysis showed that the risk of excess N discharge was mainly related to crop and livestock practices in the watershed. Proper management of tillage, fertilizer, and manure was necessary to control N releases. Quantitative assessment results indicated that alternative practices including reduction of fertilization, installation of vegetative strip buffer around the pig farms, and installation of more riparian buffers along the Jiulong River could reduce the likelihood of N discharge through runoff.

Heavy metal contamination in western Xiamen Bay sediments and its vicinity, China.

Zhang, L.P., Ye, X., Feng, H., Jing, Y.H., Ouyang, T., Yu, X.T., Liang, R.Y., Gao, C.T. and Chen, W.Q., 2007. *Marine Pollution Bulletin*, 54(7): 974-982.

Concentrations of selected heavy metals (Cu, Pb, Zn, Cd, Cr, Ni and Fe) in surface sediments from nine sites in western Xiamen Bay and its vicinity were studied in order to understand current metal contamination due to urbanization and economic development in Xiamen, China. The sediment samples were collected in December 2004 and July 2005 respectively in order to examine temporal variations. In this study, we found that heavy metal concentrations in surface sediments sampled in the western Xiamen Bay and adjacent Maluan Bay and Yuandang Lagoon varied from 19 to 97 mg kg⁻¹ for Cu, 45 to 60 mg kg⁻¹ for Pb, 65 to 223 mg kg⁻¹ for Zn, 0.11 to 1.01 mg kg⁻¹ for Cd, 37 to 134 mg kg⁻¹ for Cr, 25 to 65 mg kg⁻¹ for Ni and 3.08 to 4.81% for Fe. Although all metal concentrations in sediments meets Chinese National Standard Criteria for Marine Sediment Quality, both metal enrichment factors (EF) and geoaccumulation index (I_{geo}) show that Pb contamination exists in the entire study area and contamination of other metals are also present in some locations depending on the sources, of which sewage outlets and commercial ports are the main sources of contaminants to the area. This study shows that using the sediment quality standard criteria only to assess sediments cannot properly reflect sediment contamination. A multiple approaches should be applied for the sediment quality assessment.



Map showing the study area and sampling locations.

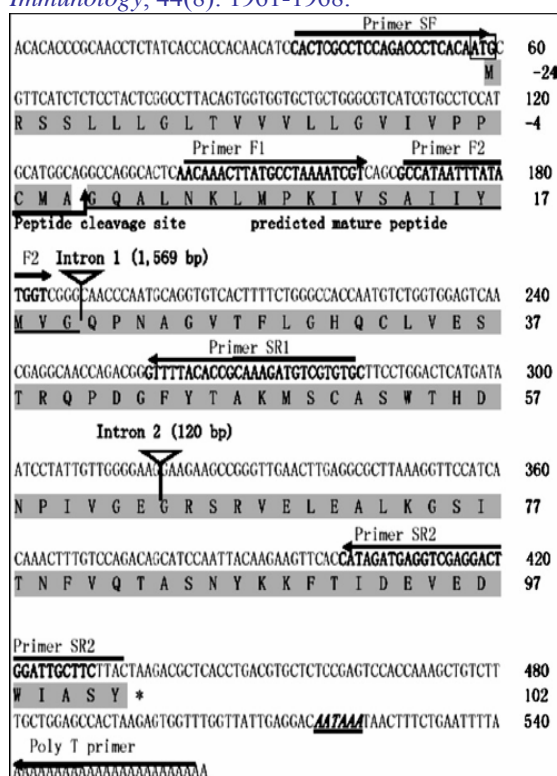
Seasonal variation of PM₁₀-bound PAHs in the atmosphere of Xiamen, China.

Hong, H.S., Yin, H.L., Wang, X.H. and Ye, C.X., 2007. *Atmospheric Research*, 85(3-4): 429-441.

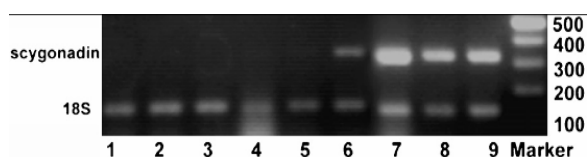
PM₁₀ samples from a garden site (site A), an industrial-traffic intersection (site B), a residential site (site C) and an island site (site D) were collected at December 21-29, 2004; March 18-22, 2005; July 4-13, 2005 and October 24-28, 2005 in Xiamen. 15 priority PAHs compounds were analyzed by using a gas chromatograph/mass spectrometer (GUMS). The abundance and origin of PAHs are discussed to reveal seasonal variations in Xiamen air quality. Average concentrations of Σ 15PAHs were 17.5 ng/m³, 3.7 ng/m³, 32.6 ng/m³ and 10.5 ng/m³ from spring to winter with the highest value in autumn. The dominant PAHs components in every season were low and middle molecular weight PAHs including phenanthrene, pyrene, fluoranthene and chrysene. Diagnostic ratios and PCA analysis identified the main sources of particle bound PAHs: mainly from both gasoline and diesel vehicles exhaust, with some contribution from coal combustion, industry emission and cooking sources.

A male-specific expression gene, encodes a novel anionic antimicrobial peptide, scygonadin, in *Scylla serrata*.

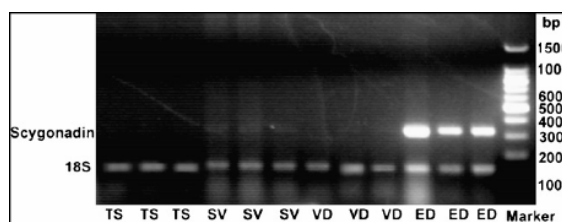
Wang, K.J., Huang, W.S., Yang, M., Chen, H.Y., Bo, J., Li, S.J. and Wang, G.Z., 2007. *Molecular Immunology*, 44(8): 1961-1968.



Nucleotide sequence of mud crab scygonadin cDNA and predicted amino acid sequence. The numbers on the right of the sequence give the positions of the last nucleotide and amino acid on each line, respectively. Binding sites for primers are shown with arrows (5'→3'). Polyadenylation signal is underlined in the 3'UTR. The predicted organization of the peptide domains (signal peptide and mature peptide) is shown by gray boxes. The stop codon is indicated with an asterisk (*). Splicing sites for introns 1 and 2 are indicated with triangles. The partial N-terminal amino acids obtained using Edman degradation are underlined in the mature peptide. The GenBank Accession number is AY 864802.



RT-PCR analysis of scygonadin gene expression in the reproductive tracts among three groups of male *S. serrata*. Lanes 1-3 are samples from smaller crabs (46.33±1.53 g); lanes 4-6 are samples from medium weight crabs (112.67±10.02 g); lanes 7-9 are samples from mature crabs (216.33±34.39 g).



RT-PCR analysis of scygonadin gene expression in different parts of the reproductive tract from mature male *S. serrata*. The different parts of the reproductive tract involved were ejaculatory duct (ED); testis (TS); seminal vesicle (SV); vas deferens (VD). Products from ED were only amplified using gene-specific primers for the mature peptide sequences of scygonadin (305 bp). Products for 18S rRNA (147 bp) were amplified from all tested parts. Marker (M) is the 100 bp ladder (TaKaRa).

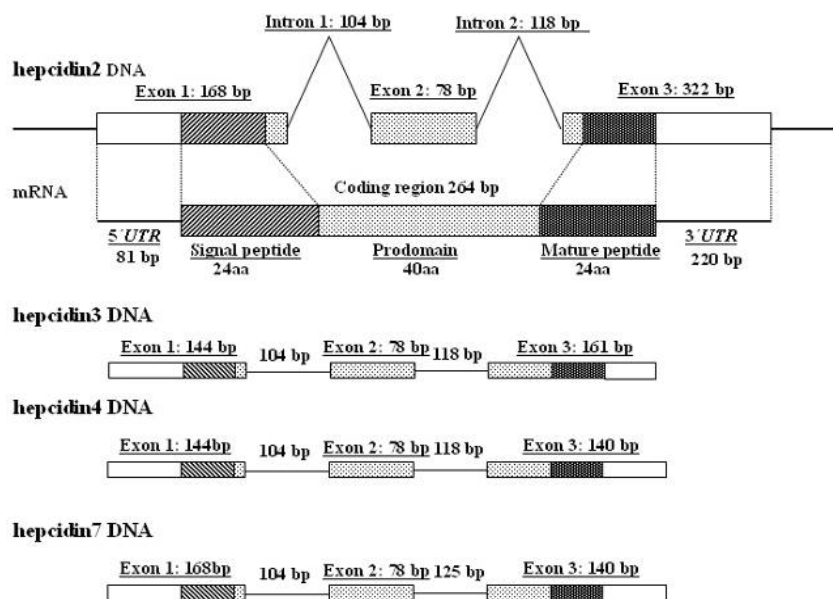
Scygonadin is a novel antimicrobial peptide, which was originally isolated from the seminal plasma of the mud crab, *Scylla serrata*. Based on the partial 20-residue NH₂-terminal sequence of the peptide, H-Gly-Gln-Ala-Leu-Asn-Lys-Leu-Met-Pro-Lys-Ile-Val-Ser-Ala-Ile-Ile-Tyr-Me t-Val-Gly-OH, scygonadin was cloned from the gonads of *S. serrata* using a degenerated reverse transcriptase (RT)-PCR and rapid amplification of cDNA ends (RACE). The full-length cDNA sequence contains an open reading frame of 539 bases (excluding polyA) with a coding capacity of 126 amino acids, which constitutes a putative NH₂-terminal signal sequence (1-24) and a mature peptide (25-126). Analysis of the genomic DNA sequence revealed that scygonadin consists of 2300 bp containing two introns (1569 and 120 bp) and three exons (187, 131 and 218 bp) and this sequence is different from any other reported antimicrobial peptide. The theoretical pI of the mature peptide is 6.09, which suggests that it is an anionic molecule. The sex and tissue-specific expression of the scygonadin gene was revealed using RT-PCR and Northern-blot analysis of multiple tissues of *S. serrata* males and females and this demonstrated that the scygonadin gene was predominantly expressed in the male reproductive tract of *S. serrata* and was restricted to the ejaculatory duct. This suggests that scygonadin might be one of the antibacterial peptides responsible for protection of the male crab reproductive tract from invading pathogenic microorganisms, so as to maintain a sterile environment leading to successful fertilization.

In summary, it can be concluded from our study that scygonadin is a male-specific antimicrobial peptide gene demonstrated to be related to the reproductive apparatus of *S. serrata*. Analysis of this antimicrobial peptide will allow us better understanding of how the innate immune system is involved with maintaining sterility in the reproductive tract of *S. serrata* and thus allows successful fertilization of gametes in microorganism laden seawater. However, much is still left to be explored, such as, whether the possible mechanism of induction of scygonadin is related to bacterial challenge or induced by mating and whether scygonadin could be transferred from male to female *S. serrata* in the seminal fluid for the purpose of protecting the female and the sperm from mating-introduced bacteria as observed with the antibacterial peptide andropin (Lung et al., 2001).

Genomic organization and tissue-specific expression analysis of hepcidin-like genes from black porgy (*Acanthopagrus schlegelii* B.).

Yang, M., Wang, K.J., Chen, J.H., Qu, H.D. and Li, S.J., 2007. *Fish & Shellfish Immunology*, 23(5): 1060-1071.

Hepcidin is an antimicrobial peptide and putative iron regulatory hormone previously described in mice and humans. Dozens of fish hepcidins have been isolated and characterized so far. Here we present seven hepcidin-like cDNA sequences named AS-hepc1-7, amplified from the normal commercially cultured fish (black porgy) by RACE-PCR. Sequence analysis reveals that these seven potential hepcidin peptides have highly conserved sequences with other known hepcidins, but they are different from each other in constitution and characteristics of predicted mature amino acids.



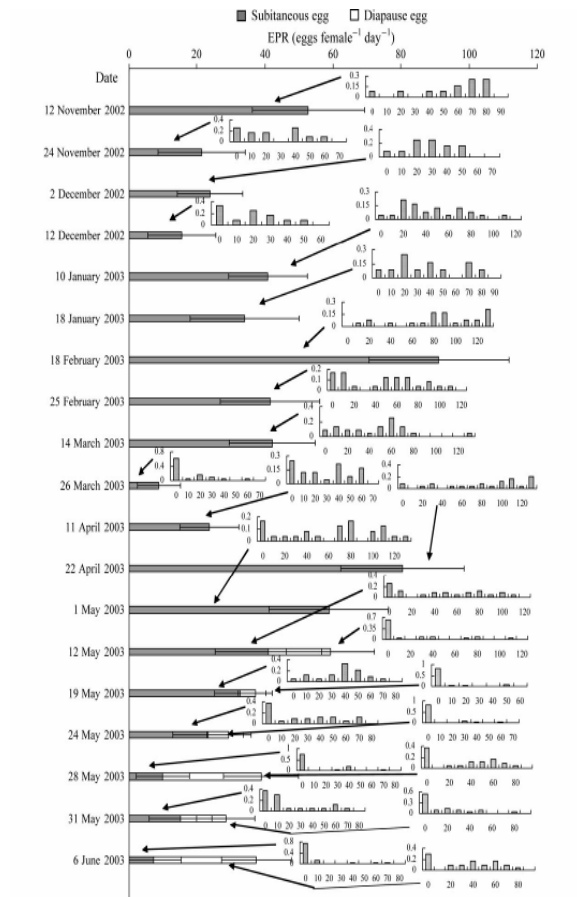
The genomic organizations of AS-hepc2, -3, -4 and -7 DNA and mRNA in black porgy.

Based on the study, it is deduced that AS-hepc-1-7 represent different variants of a family of hepcidin genes in black porgy. To understand the organization of these hepcidin-like genes. We sequenced AS-hepc2 DNA, AS-hepc3 DNA, AS-hepc4 DNA, AS-hepc7 DNA and AS-hepc2 upstream region; and all of the four genomic DNAs consisted of two introns and three exons, the same organization as other reported hepcidins. The tissue-specific gene expression of hepcidins in normal black porgy was evaluated using RT-PCR and dot blot approaches. RTPCR showed that transcripts of hepcidin-like mRNAs were present in each tested tissue of normal juvenile black porgy, including liver. spleen, kidney. heart, brain. stomach. intestine, gill, skin and blood, but abundant hepcidin-like mRNA transcripts were only detected in the liver, kidney, spleen, intestine and stomach by dot blot assay. In addition, using dot blot and Northern blot approach, a significant increase of hepcidin mRNA transcription was observed in the liver within 48 h after immersion in a suspension of live bacteria. which suggested that the expression pattern of hepcidin-like genes in black porgy might be different in the liver from the other tissues as previously reported in several hepcidin studies.

Seasonal reproductive biology of *Centropages tenuiremis* (copepoda) in Xiamen waters, People's Republic of China.

Wu, L.S., Wang, G.Z., Jiang, X.D. and Li, S.J., 2007. *Journal of Plankton Research*, 29(5): 437-446.

The egg production rate (EPR) and the effects of environmental variations on diapause induction in a the copepod *Centropages tenuiremis* in Xiamen waters were studied in 2002 and 2003. The EYR ranged from 7.33 ± 8.14 (on 18 February 2003) to 91.08 ± 20.61 (on 6 June 2003) eggs female⁻¹day⁻¹ (mean \pm 95% confidence intervals), and displayed a significant seasonal pattern. Before the period of maximum egg production, EPR increased with seawater temperature and chlorophyll a concentration; but after the maximum, no significant relationship was found between EPR and chlorophyll a concentration, and there was a negative linear relationship between EPR and temperature. Seawater temperature and photoperiod, respectively, played a primary role in the switch to diapause egg production by the females as shown by single-factor probit analysis. However, the difference in effect between the two factors was demonstrated by binary logistic multivariate analysis. These results suggest that this copepod rapidly increases subitaneous EPR by taking full advantage of conditions in favorable seasons (winter and spring). Subitaneous EPR decreases and there is a switch to the production of diapause eggs that survive in the bottom sediments during unfavorable seasons (summer and autumn) in Xiamen waters.



Seasonal variability of the EPR, showing the average values (mean: horizontal bar, with 95%CL: error bar) and the frequency distributions (vertical bar) by subitaneous and diapause eggs per female for each sampling date.

Variation of specific proteins, mitochondria and fatty acid composition in gill of *Scylla serrata* (Crustacea, Decapoda) under low temperature adaptation.

Wang, G.Z., Kong, X.H., Wang, K.J. and Li, S.J., 2007. *Journal of Experimental Marine Biology and Ecology*, 352(1): 129-138.

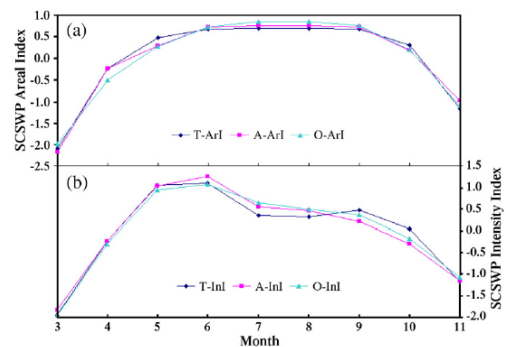
The mud crab *Scylla serrata* is an important commercial crustacean inhabiting estuarine water along the coast of southeast China. Metabolism in the gill is affected continuously by fluctuating water temperature and, therefore, the ability to cope with temperature change is essential to maintain physiological function. This experiment was conducted to help understand the mechanism of low temperature adaptation in *S. serrata* gill. In this study, 40 healthy juvenile male *S. serrata* from the same broodstock were grouped randomly into four groups, which were kept at 5 °C, 10 °C, 15 °C and 27 °C, with the same feeding regime during a 3-week adaptation period. Two-dimensional electrophoresis of the proteome was conducted to separate the specific proteins responsible for low temperature adaptation. Variations in the mitochondria were observed using transmission electron microscopy, and fatty acid composition was determined using gas chromatography. The results showed that different numbers of specific proteins were expressed under different low temperature adaptation, with more expressed at 5 °C and 10 °C than at 15 °C. Mitochondrial morphology also varied under different low temperature adaptation, but there was no linear relationship between microbial density and adaptation temperature. The composition of different fatty acids in the gill varied considerably with adaptation temperature, but elongation of the carbon chain and transition from fatty acids occurred at lower temperatures. Thus, changes in the specific proteins, mitochondria and fatty acid composition of the gill were the positive effects of low temperature on metabolism, leading to improved adaptation ability in *S. serrata*.

Remote Sensing and Modeling

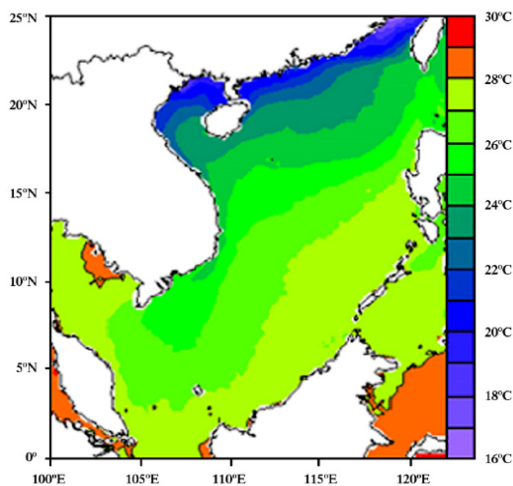
On the consistency in variations of the South China Sea Warm Pool as revealed by three sea surface temperature datasets.

Li, N., Shang, S.P., Shang, S.L. and Zhang, C.Y., 2007. *Remote Sensing of Environment*, 109(1): 118-125.

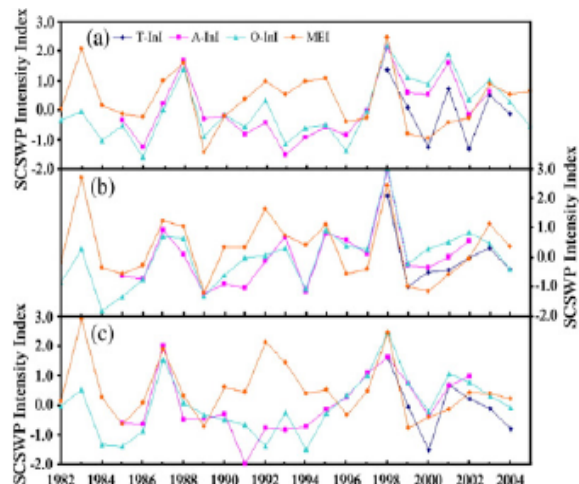
The areal and intensity indices of the South China Sea Warm Pool (SCSWP) derived from three datasets, the Advanced Very High Resolution Radiometer (AVHRR), Tropical Rainfall Measuring Mission's Microwave Imager (TMI) and Optimum Interpolation Version 2 (O1.v2) sea surface temperature (SST), are generally consistent with each other at monthly, seasonal and interannual scales. However, the three records are different in some cases. First, minor differences among the monthly records of intensity index are observed in the period July to September. Secondly, the interannual records of SCSWP intensity derived from AVHRR and O1.v2 are different in autumn during the period 1990-1996. The reason is not yet clear and nor is it clear which record best represents fluctuations in SCSWP intensity. These suggest that various drawbacks of the three datasets, such as low resolution of O1.v2, and cloud and rain contamination on AVHRR and TMI data, would be serious enough to allow deviation from each other to appear. Merging AVHRR and TMI SST data might be the way leading to a more convincing time series of SCSWP. In addition, changes of areal and intensity indices are not always consistent with each other, for example, they have different monthly patterns. Although the three interannual records of intensity index in three seasons all capture the main Multivariate ENSO Index (MEI) signals at a half-year lag, only those which are in the summer significantly correlated with MEI.



Monthly SCSWP areal index (a) and intensity index (b) derived from AVHRR, O1.v2 and TMI from March to November.



Distribution of AVHRR SST in winter for the period 1985-2002, where the orange region refers to the warm water with SST ≥ 28 °C.



Interannual variability of SCSWP InI for AVHRR, O1.v2 and TMI in spring (a), summer (b) and autumn (c), and comparison with MEI half a year before.

A test of empirical and semi-analytical algorithms for euphotic zone depth with SeaWiFS data off southeastern China.

Chen, J.J., Shang, S.L., Tang J.W., Lee, Z.P., Hong, H.S., Dai, M.H. and Zhai, W.D., 2007. *Proceedings of SPIE Coastal Ocean Remote Sensing*, 6680: 668017-1~668017-10.

This study employs SeaWiFS data over the waters off the southeastern China to evaluate a semi-analytical algorithm for euphotic zone depth (Z_e). This algorithm is based on water's inherent optical properties (IOPs), which can be near-analytically calculated from spectral remote-sensing reflectance, where remote-sensing reflectance can be derived from the normalized water-leaving radiance provided by SeaWiFS. In the Taiwan Strait, compared with in situ Z_e (± 3 hour within SeaWiFS collection), average error is 15.0 % and root mean square error (RMSE) is 0.074, with Z_e in a range of 14-34 m from field measurements. In the South China Sea, compared with in situ Z_e (± 48 hour within SeaWiFS collection), is 5.1 % in summer and 22.6 in winter, while RMSE is 0.032 in summer and 0.129 in winter, with Z_e in a range of 10-82 m from field measurements. For comparison, we also evaluate the performance of the empirical Z_e algorithm that is based on chlorophyll concentration. It is found that the IOP-centered approach has higher accuracy compared to the chlorophyll-a centered approach (e.g. in the South China Sea in winter, is 55.3 % and RMSE is 0.219). The new algorithm is thus found not only worked well with waters of the Gulf of Mexico, Monterey Bay and the Arabian Sea, but also worked well with waters of the China Sea.

A two-way nested coupled tide-surge model for the Taiwan Strait.

Zhang, W.Z., Hong, H.S., Shang, S.P., Chen, D.W. and Chai, F., 2007. *Continental Shelf Research*, 27(10-11): 1548-1567.

A two-way nested coupled tide-surge prediction model was established and applied in the Taiwan Strait and adjacent sea area in this study. This two-dimensional (2D) model had a fine horizontal resolution and took into account the interaction between storm surges and astronomical tides, which made it suitable for depicting the complicated physical properties of storm surges in the Taiwan Strait. A two-way nesting technique and an open boundary condition developed from Flather's radiation condition and Roed and Smedstad's local mode idea, were successfully implemented in the model. A simulation experiment showed that the open boundary condition could be used in the coupled tide-surge model and that the performance of the two-way nested model was slightly superior in accuracy to that of the one-way nested one. The fluctuations of storm surge residuals with tidal period at Sansha and Pingtan tide stations during the period of typhoon Dan in 1999 were well reproduced by the model, with the coupling effect between storm surges and tides indicating that the effect of astronomical tides upon typhoon surges should be considered in a storm-surge prediction model for the Taiwan Strait. The forecast experiment during typhoon Talim in 2005 showed that the storm surge prediction outputs by the model were better in the early 20 h of the forecast period of each model run than those in the later period due to the prediction accuracy of the typhoon track, maximum winds, and central air pressures.

Coastal Wetland Ecosystems

Changes of macro-benthic faunal community with stand age of rehabilitated *Kandelia candel* mangrove in Jiulongjiang Estuary, China.

Chen, G.C., Ye, Y., and Lu, C.Y., 2007. *Ecological Engineering*, 31(3): 215-224.

Distribution properties of macro-benthic faunal communities were compared among rehabilitated *Kandelia candel* forests of different ages in Jiulongjiang Estuary, China. From July 2005 to April 2006, seasonal surveys were conducted within four representative forests—K4, K7, K19 and K43, with ages of 4, 7, 19 and 43 years, respectively. Two non-vegetated flats (NF1 and NF2) were set as the references. Numbers of faunal species in rehabilitated forests were higher than NF1 and NF2, while younger forests (K4 and K7) generally had more macro-benthic fauna species than older ones (K19 and K43). Among the total 24 species recorded, *Uca arcuata*, *Metaplex elegans*, *Phascolosoma esculenta* and *Littoraria melanostoma* were dominant. Macro-benthic faunal community structures were different among the four rehabilitated *K. candel* forests. The dominant species in younger forests was *M. elegans*, while *U. arcuata* had a higher abundance than *M. elegans* in non-vegetation flats and older forests. Gastropods were abundant in younger forests. Distribution properties of dominant species differed among rehabilitated *K. candel* forests. *U. arcuata* had the largest density in nonvegetated flats, and was infrequent in younger forests. *M. elegans* had high abundances in younger forests. High abundance of *P. esculenta* was found in older forests, while *L. melanostoma* was more abundant in younger forests. Since both macro-benthic faunal community and vegetation were similar in K19 and K43, rehabilitated *K. candel* mangrove was considered steady 19 years after being planted. That is, in the case of macro-benthic fauna and vegetation, a *K. candel* mangrove may evolve to a mature state at a stand age of about 20 years.

Leaf anatomical responses to periodical waterlogging in simulated semidiurnal tides in mangrove *Bruguiera gymnorrhiza* seedlings.

Wang, W.Q., Xiao, Y., Chen, L.Z. and Lin, P., 2007. *Aquatic Botany*, 86(3): 223-228.

Leaf anatomical changes of *Bruguiera gymnorrhiza* (L.) Lamk seedlings grown in experimental equipment that simulated semidiurnal tides with salinities of 15 parts per thousand under greenhouse conditions were studied. Compared with the 0 h treatments, leaf thickness, palisade parenchyma thickness, spongy parenchyma thickness, palisade-spongy thickness ratio, xylem length of the vascular system and number of vessels and vessel lines under the 12 h treatments declined 31.9%, 59.1%, 21.7%, 47.1%, 48.9%, 67.1% and 51.6%, respectively. However, the upper and lower epidermis to leaf thickness ratio, upper and lower hypodermis to leaf thickness ratio and stomatal density of 12 h treatments showed increases of 47.9%, 50.9%, 14.3%, 21.4% and 104.3% over those of 0 h treatments, respectively. The cuticle to leaf thickness ratio (inundated for 0-6 h) decreased significantly with waterlogging duration at first and then increased. Moreover, the percentage of intercellular spaces in spongy tissue decreased from 4 to 10 h treatment and then tended to increase by nearly 20% in the 12 h treatment. Tannin cells that were distributed in the vascular tissue, crystalliferous cells and phloem fibers were more abundant in the short-duration waterlogging treatments than in the long-duration waterlogging treatment. It was concluded that significant changes in the leaf anatomical features as a result of periods of immersion would have come at the cost of reduction of photosynthesis and water transport when waterlogging duration was longer than 2 h. These anatomical characteristics further proved that *B. gymnorrhiza* had a relatively low tolerance to waterlogging at the seedling stage.

Effect of different time of salt stress on growth and some physiological processes of *Avicennia marina* seedlings.

Yan, Z.Z., Wang, W.Q. and Tang, D.L., 2007. *Marine Biology*, 152(3): 581-587.

Growth and physiological characters of *Avicennia marina* seedlings cultured under different levels of salinity were compared at 45 and 100 days after sowing. Based on the growth and physiological responses, the levels of salinity were grouped into two kinds, moderate (5-30 parts per thousand) and extreme (40 and 50 parts per thousand as well as 0 parts per thousand). Root and shoot length, leaf area, biomass of different organs, and net photosynthesis rate all showed a similar trend: the seedlings grew better at moderate levels of salinity but were adversely affected by extreme levels. Longer exposure (100 days) to salinity markedly enhanced the difference between the effects of the two levels on growth. By 45th day, the cotyledons had withered and fallen off. The concentration of ions (K^+ , Na^+ , Ca^+ , Mg^{2+} , Cl^-) and ash content of the cotyledons were determined before sowing and 45 days later. Ion concentrations and ash content of cotyledons were markedly lower at 45 days-lower than the initial levels-in seedlings irrigated with water at 0 parts per thousand salinity level. This suggested that the poor growth of these seedlings at 100 days may be due to lack of ions provided by the cotyledons. The high ion concentrations in the cotyledons grown at moderate salinity levels suggest that these organs may function as ion sinks at this stage, reducing the concentration of ions and consequent toxicity caused by excessive concentrations. Root biomass was higher than shoot biomass 45 days after sowing, whereas after 100 days, shoot biomass was higher. At the early stage of growth (45 days), the rate of photosynthesis at lower levels of salinity (0-30 parts per thousand) was limited mainly by stomatal closure but at higher levels of salinity (40-50 parts per thousand), other factors came into play. Later, at 100 days, the causes of reduced photosynthetic rate were other than stomatal closure at both low and high levels of salinity. This indicates that photosynthesis is affected by prolonged exposure to salt stress-including that caused by 0 parts per thousand salinity, as shown by poor growth of the seedlings.

New Technologies and Analytical Methods

Recent comparability of oceanographic nutrients data: Results of a 2003 intercomparison exercise using reference materials.

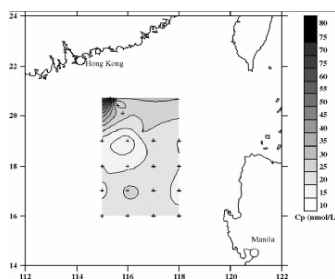
Aoyama, M., Becker, S., Dai, M.H., Daimon, H., Gordon, L.I., Kasai, H., Kerouel, R., Kress, N., Masten, D., Murata, A., Nagai, N., Ogawa, H., Ota, H., Saito, H., Saito, K., Shimizu, T., Takano, H., Tsuda, A., Yokouchi, K. and Youenou, A., 2007. *Analytical Sciences*, 23(9): 1151-1154.

An intercomparison exercise was conducted using the recently developed Reference Material for Nutrients in Seawater (RMNS). Discrepancies of reported values among laboratories were greater than the homogeneity of RMNS samples and the reported analytical precision of nutrients. The variability of in-house standards of the participating laboratories might be the most likely source of interlaboratory discrepancies. Therefore, the use of common reference materials, *i.e.* certified RM, is essential to establish and improve the comparability of nutrient data of the world's oceans.

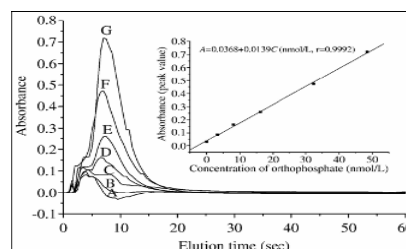
Flow injection analysis of nanomolar level orthophosphate in seawater with solid phase enrichment and colorimetric detection.

Liang, Y., Yuan, D.X., Li, Q.L. and Lin, Q.M., 2007. *Marine Chemistry*, 103(1-2): 122-130.

Phosphomolybdenum blue (PMB) paired with cetyltrimethylammonium bromide (CTAB) can be extracted using a solid phase extraction technique on C₁₈ sorbent. Based on this, a novel on-line solid phase extraction method coupled with flow injection (FI) analysis and colorimetric detection has been established to determine nanomolar level orthophosphate in seawater. A stopped flow technique was employed to assure the complete formation of the PMB-CTAB compound, which was sequentially extracted on an in-line Sep-Pak C₁₈ cartridge. The adsorbed PMB-CTAB can be rapidly eluted by 0.56 mol/L H₂SO₄ in ethanol, and determined with a spectrophotometer at 700 nm. Experimental parameters, including reaction temperature, sample loading flow rate, stopped time and eluting flow rate, were optimized throughout the experiments based on univariate experimental design. The results show that reaction temperature and stopped time were the major factors affecting the formation of PMB-CTAB. Silicate concentration up to 5000 times higher than that of orthophosphate would not interfere with the determination of orthophosphate. Using artificial seawater with salinity of 35 as a matrix under the optimized conditions, the standard curve shows a linear range between 3.2



Spatial distribution of orthophosphate in northern South China Sea.



The elution curves of artificial seawater sample at different orthophosphate concentrations and the calibration curve Schlieren peak; (B) Reagent blank; (C) 3.2 nmol/L; (D) 8.1 nmol/L; (E) 16.2 nmol/L; (F) 32.4 nmol/L; (G) 48.5 nmol/L.

and 48.5 nmol/L, and the recovery and the detection limit of the proposed method are 96.4% and 1.57 nmol/L, respectively. The relative standard deviation (RSD) ($n=8$), which was determined daily for 8 days, was 4.52% for the artificial seawater at a concentration of 32.4 nmol/L orthophosphate. Two typical

seawater samples were analyzed using both the proposed method and the MAGnesium hydroxide-Induced Coprecipitation (MAGIC) method. The results of the two methods show no significant difference using the *t* test. Compared to the MAGIC method, the proposed method has the advantage of being more sensitive, faster, sample saving and easy for on-line analysis.

Table

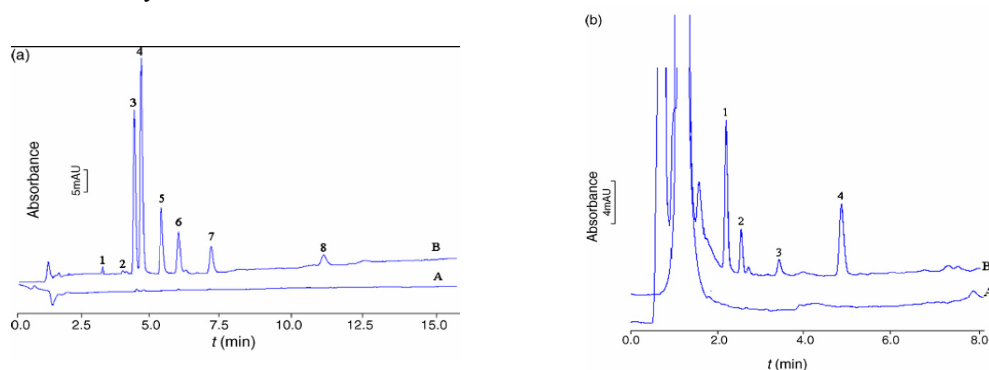
Comparison of the analytical characteristics of the proposed method and MAGIC method

Analytical characteristics	MAGIC method (Karl and Tien, 1992)	The proposed method
Preconcentrated sample volume (mL)	200	105
Optical pathlength (cm)	10	2
Reagent blank	0.039	0.037
Signal to noise of 10 nmol/L orthophosphate	1.98	4.78
Limit of quantity (nmol/L)	5	3.2
On-line or not	No	Yes
Analysis time	Several hours	30 min

Preparation of stir bars for sorptive extraction based on monolithic material.

Huang, X.J. and Yuan, D.X., 2007. *Journal of Chromatography A*, 1154(1-2): 152-157.

A stir bar for sorption extraction based on monolithic material (SBSEM) was prepared in this study. The monolithic material was obtained by in situ copolymerization of octyl methacrylate and ethylene dimethacrylate in the presence of a porogen solvent containing 1-propanol, 1,4-butanediol, and water with azobisisobutyronitrile as the initiator. The influences of polymerization parameters and the thickness of monolithic materials on the adsorption and desorption efficiencies were investigated, using naphthalene, phenanthrene and fluoranthene as detected solutes. The results show that monolithic material possessed good permeability resulting in fast adsorption and desorption for detected solutes. Spiked seawater samples containing eight polycyclic aromatic hydrocarbons (PAHs) and urine samples containing four anabolic steroids were preliminarily analyzed by using the sorptive bars and liquid desorption followed by high performance liquid chromatography with diode array detection. The results demonstrate that prepared stir bar was suitable for preconcentration of both apolar and polar analytes. The enrichment factors for phenanthrene, anthracene and pyrene were 150, 134 and 189, respectively. The SBSEM shows good batch-to-batch reproducibility and good stability, and can be reused a least 10 times for the extraction of polycyclic aromatic hydrocarbons in seawater.



Chromatograms of PAHs (a) and anabolic steroids (b) before and after the extraction of sorptive bar. (A) Spiked sample; (B) extraction of SBSEM. Chromatographic conditions: coating thickness 1.0 mm; (a) mobile phase ACN/H₂O= 80/20 (v/v); detector 254 nm; flow rate 1.5 mL/min; injection volume 20 μ L; (b) mobile phase ACN/H₂O= 75/25 (v/v); detector 240 nm; the others the same as (a). Peak identities: (a) 1, naphthalene; 2, acenaphthene; 3, phenanthrene; 4, anthracene; 5, fluoranthene; 6, pyrene; 7, chrysene; 8, benzo(a)pyrene. (b) 1, Estriol; 2, diethylstilbestrol; 3, methyltestosterone; 4, progesterone.

Determination of nitrous oxide in seawater by room temperature purge and trap-gas chromatography.

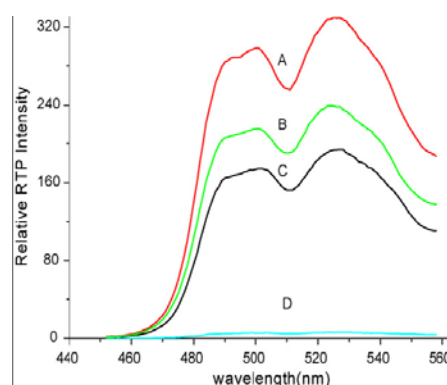
Chen, Y., Yuan, D.X. and Li, Q.L., 2007. *Chinese Journal of Analytical Chemistry*, 35(6): 897-900.

An analytical method with purge and trap system at room temperature coupled with GC was developed for the determination of N₂O in seawater samples. Optimized experimental parameters including trap temperature of 30 degrees °C, desorb temperature of 250 degrees °C, purge time of 10 min and purge flow rate of 20 mL/min, were chosen. The proposed method is simple, sensitive and repeatable. The detection limit, RSD of calibration curve slopes and average recovery of the method were 2.8×10^{-10} mol/L, 2.84% and $93.93\% \pm 3.1\%$ (n = 5), respectively. The method had been successfully applied to determine N₂O in some near shore seawater samples collected from Xiamen Seas.

Room temperature phosphorescence of alpha-bromonaphthalene induced by cyclodextrin in the presence of hexahydropyridine or 1-ethylpiperidine and its application.

Zhu, Y.X., Peng, J.H. and Zhang, Y., 2007. *Analytica Chimica Acta*, 583(2): 364-369.

Two novel heterocyclic third components, hexahydropyridine (HHP) and 1-ethylpiperidine (EP) were firstly found to enhance room temperature phosphorescence (RTP) of α -bromonaphthalene (α -BrN) induced by cyclodextrin. The effects of equilibrium time for formation of inclusion complex, temperature, pH values and the variation of concentrations of each component on RTP of α -BrN and the RTP lifetime of each ternary complex had been investigated and compared to discuss inclusion mechanism of ternary complexes. The RTP lifetimes of α -BrN/ β -CD[HHP], α -BrN/ β -CD/cyclohexane (CH) and α -BrN/ β -CD/EP were 6.18, 7.71 and 9.36 ms, respectively. Based on the strongest RTP of α -BrN induced by CD in the presence of EP, a method for determination of EP was established. Under the optimal conditions, the analytical curve of EP gave a liner dynamic range of 1.50×10^{-4} to 1.50×10^{-3} mol L⁻¹ with a detection limit of 4.8×10^{-5} mol L⁻¹. When the established CD-RTP method was applied to determine the concentration of EP synthetic samples in distilled water, the experimental results demonstrated that the recovery was 91.4% with a relative standard deviation less than 2.85% (n = 7).

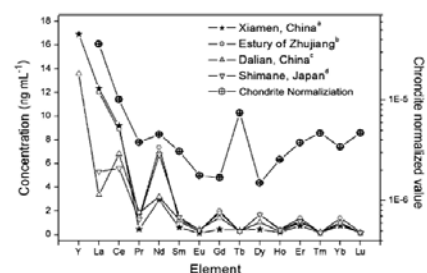


RTP spectra of α -BrN/ β -CD in the absence/presence of EP, CH, HHP, respectively. [α -BrN]= 1.0×10^{-5} mol/L; [β -CD]= 2.0×10^{-3} mol/L; A: [EP]= 5.83×10^{-3} mol/L (8 μ l); B: [CH]= 1.85×10^{-3} mol/L (2 μ l), C: [HHP]= 8.10×10^{-3} mol/L (8 μ l); D: without third component.

On-line preconcentration with a novel alkyl phosphinic acid extraction resin coupled with inductively coupled plasma mass spectrometry for determination of trace rare earth elements in seawater.

Fu, Q., Yang, L.M. and Wang, Q.Q., 2007. *Talanta*, 72(4): 1248-1254.

A newly synthesized alkyl phosphinic acid resin (APAR) was used for on-line preconcentration of trace rare earth elements (REEs, lanthanides including yttrium) and then determined by inductively coupled plasma mass spectrometry. REEs in seawater could be on-line concentrated on the APAR packed column (4.6 mm i.d. x 50 mm in length), and eluted from the column with 0.5 mL 0.1 mol L⁻¹ nitric acid within 30 s. An enrichment factor of nearly 400 was achieved for all REEs when the seawater sample volume was 200 mL, while the matrix and coexisting spectrally interfering ions such as barium, tin and antimony could be simultaneously separated. The detection limits of this proposed method for REEs were in the range from 1.43 pg L⁻¹ of holmium to 12.7 pg L⁻¹ of lanthanum. The recoveries of REEs were higher than 97.9%, and the precision of the relative standard deviation (R.S.D., n = 6) was less than 5%. The method has been applied to the determination of soluble REEs in seawater.



Comparison of REEs concentration in seawater obtained by the present method with those reported in the literature and the chondrite normalization pattern for REEs in Xiamen seawater: (a) present method; (b) Ref. [22]; (c) Ref. [24]; (d) Ref. [14].

Sequential analysis of dimethyl sulfur compounds in seawater.

Li, M., Yuan, D.X., Li, Q.L. and Jin, X.Y., 2007. *Chinese Chemical Letters*, 18(1): 99-102.

A sequential method for the determination of dimethyl sulfur compounds, including dimethylsulfide (DMS), dimethylsulfonio-propionate (DMSP) and dimethylsulfoxide (DMSO), in seawater samples has been developed. Detection limit of 2.5 pmol of DMS in 25 mL sample, corresponding to 0.10 nmol/L, was achieved. Recoveries for dimethyl sulfur compounds were in the range of 68.6-78.3%. The relative standard deviations (R.S.D.s) for DMS, DMSP and DMSO determination were 3.0, 5.4 and 7.4%, respectively.

An optical biosensing film for biochemical oxygen demand determination in seawater with an automatic flow sampling system.

Xin, L.L., Wang, X.D., Guo, G.M., Wang, X.R. and Chen, X., 2007. *Measurement Science & Technology*, 18(9): 2878-2884.

An on-line roboticized apparatus, including an optical biosensing film with an automatic flow sampling system, has been developed for biochemical oxygen demand (BOD) determination of seawater. The sensing film employed in the apparatus consisted of an organically modified silicate (ORMOSIL) film embedded with tri (4, 7- diphenyl- 1, 10- phenanthroline) ruthenium (II) perchlorate. Three species of microorganism cultivated from seawater were immobilized in an ORMOSIL- polyvinyl alcohol matrix. Possible factors affecting BOD determination were studied, including sampling frequency, temperature, pH and sodium chloride concentration. Based on measurements of the linear fluctuant coefficients and the reproducibility of its response to seawater, the BOD apparatus showed the advantages of high veracity and short response time. Generally, the linear fluctuant coefficient (R²) in the BOD range 0.2-40 mg l⁻¹ was 0.9945 when using a glucose/ glutamate (GGA) BOD standard solution. A reproducible response for the BOD sensing film of within ± 2.8% could be obtained in the 2 mg l⁻¹ GGA solution. The BOD apparatus was applied to the BOD determination of seawater, and the values estimated by this biosensing apparatus correlated well with those determined by the conventional 5 day BOD (BOD₅) test.

A new vapor generation system for mercury species based on the UV irradiation of mercaptoethanol used in the determination of total and methyl mercury in environmental and biological samples by atomic fluorescence spectrometry.

Yin, Y.M., Qiu, J.H., Yang, L.M. and Wang, Q.Q., 2007. *Analytical and Bioanalytical Chemistry*, 388(4): 831-836.

A new vapor generation system for mercury (Hg) species based on the irradiation of mercaptoethanol (ME) with UV was developed to provide an effective sample introduction unit for atomic fluorescence spectrometry (AFS). Preliminary investigations of the mechanism of this novel vapor generation system were based on GC-MS and FT-IR studies. Under optimum conditions, the limits of determination for inorganic divalence mercury and methyl mercury were 60 and 50 $\mu\text{g mL}^{-1}$, respectively. Certified reference materials (BCR 463 tuna fish and BCR 580 estuarine sediment) were used to validate this new method, and the results agreed well with certified values. This new system provides an attractive alternative method of chemical vapor generation (CVG) of mercury species compared to other developed CVG systems (for example, the traditional KBH_4/NaOH -acid system). To our knowledge, this is the first systematic report on UV/ME-based Hg species vapor generation and the determination of total and methyl Hg in environmental and biological samples using UV/ME-AFS.

Determination of cadmium in seawater by vapor generation atomic fluorescence spectrometry after online preconcentration with a novel alkyl phosphinic acid resin.

Fu, Q., Yang, L.M. and Wang, Q.Q., 2007. *Spectroscopy Letters*, 40(3): 547-557.

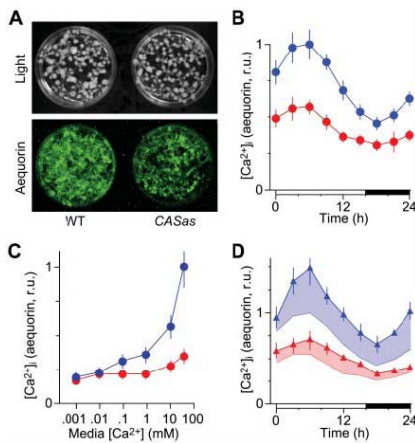
Vapor generation atomic fluorescence spectrometry (VG-AFS) coupled with online preconcentration on a short column (4.6 μm x 50-mm length) packed with a newly synthesized alkyl phosphinic acid resin (APAR) was developed for the determination of trace Cd in seawater. During the online preconcentration process, Cd in seawater was concentrated on the column while the matrix of seawater was separated flowing out of the column. Cd concentrated on the column was then eluted effectively from the column with 0.1 mol L^{-1} tartaric acid within 40 s. When the sample volume was 200 mL, an enrichment factor 189 was achieved. The detection limit of this proposed method for Cd is 2.67 ng L^{-1} . The recovery of Cd is 96.6% obtained by spiking the correspondence standard, and the precision (RSD) is 4.34% (n = 6). The established APAR/VG-AFS was applied to the determination of soluble Cd in the seawater around Xiamen Island, China.

Other Research

Coupling diurnal cytosolic Ca^{2+} oscillations to the CAS-IP₃ pathway in *Arabidopsis*.

Tang, R.H., Han, S.C., Zheng, H.L., Cook, C.W., Choi, C.S., Woerner, T.E., Jackson, R.B. and Pei, Z.M., 2007. *Science*, 315(5817): 1423-1426.

Various signaling pathways rely on changes in cytosolic calcium ion concentration ($[\text{Ca}^{2+}]_i$). In plants, resting $[\text{Ca}^{2+}]_i$ oscillates diurnally. We show that in *Arabidopsis thaliana*, $[\text{Ca}^{2+}]_i$ oscillations are synchronized to extracellular Ca^{2+} concentration ($[\text{Ca}^{2+}]_o$) oscillations largely through the Ca^{2+} -sensing receptor CAS. CAS regulates concentrations of inositol 1,4,5- trisphosphate (IP₃), which in turn directs release of Ca^{2+} from internal stores. The oscillating amplitudes of $[\text{Ca}^{2+}]_o$ and $[\text{Ca}^{2+}]_i$ are controlled by soil Ca^{2+} concentrations and transpiration rates. The phase and period of oscillations are likely determined by stomatal conductance. Thus, the internal concentration of Ca^{2+} in plant cells is constantly being actively revised.



Media Ca^{2+} and CAS control diurnal $[\text{Ca}^{2+}]_i$ oscillations. Blue, WT; red, CASas. (A) Imaging the resting $[\text{Ca}^{2+}]_i$ in *Arabidopsis* wild-type (WT) and CAS antisense (CASas). The bright light-field and aequorin luminescence images were taken at 8 hours after dawn from plants grown on 1/2 MS media under long-day conditions. (B) $[\text{Ca}^{2+}]_i$ oscillations in leaves. The aequorin luminescence images were taken from plants as in (A) every 3 hours starting from dawn. The luminescence was normalized to that discharged with excessive Ca^{2+} , and the maximum value was arbitrarily set to 1. The white and black bars represent objective light on and off, respectively. r.u., relative unit. Data from five separate experiments are shown [mean \pm SD; $n = 150$ plants; two-way analysis of variance (ANOVA), $P < 0.001$]. (C) The effect of media Ca^{2+} on $[\text{Ca}^{2+}]_i$. Plants were grown on agar media containing varied $[\text{Ca}^{2+}]$ under long-day conditions for 2 to 3 weeks. Aequorin luminescence images were taken as in (B). Data from three experiments are shown (mean \pm SD; $n = 120$ plants; two-way ANOVA, $P < 0.001$). (D) $[\text{Ca}^{2+}]_i$ oscillations in plants grown in 1 mM (solid lines) or 30 mM Ca^{2+} (triangles) (mean \pm SD; $n = 120$ plants; two-way ANOVA, $P < 0.001$).

LIST OF PEER REVIEWED PUBLICATIONS

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In press

- Cai, P.H., Chen, W.F., Dai, M.H., Wan, Z.W., Wang, D.X., Li, Q., Tang, T.T. and Lv, D.W., 2007. A high-resolution study of particle export in the southern South China Sea based on ^{234}Th : ^{238}U disequilibrium. *Journal of Geophysical Research-Ocean*, in press.
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INVITED OR KEY-NOTE PRESENTATIONS AT INTERNATIONAL CONFERENCES

Minhan Dai, “Carbon Dynamics in marginal sea-fluxes and processes” -- SOLAS 2007 Open Science Conference, Xiamen, China, Mar. 6-9, 2007.

Nianzhi Jiao, “Geomicrobiological Perspectives in the Role of Picoplankton” -- IPACES 6th Annual Meeting, Wuhan, China, Jun. 25-28, 2007.

Minhan Dai, “Dynamics of carbon fluxes in the South China Sea” -- Gordon Research Conference on Chemical Oceanography, Tilton, USA, Aug. 6-10, 2007.

Huasheng Hong, “Challenges of sustainable coastal development in East Asia” -- Asia Science Forum, Tohoku, Japan, Sept. 6-12, 2007.

Xi Chen, “Primary studies and application of solid-phase microextraction in gas chromatography” -- the 9th Asian Conference on Analytical Sciences, Korea, Nov. 4-8, 2007.



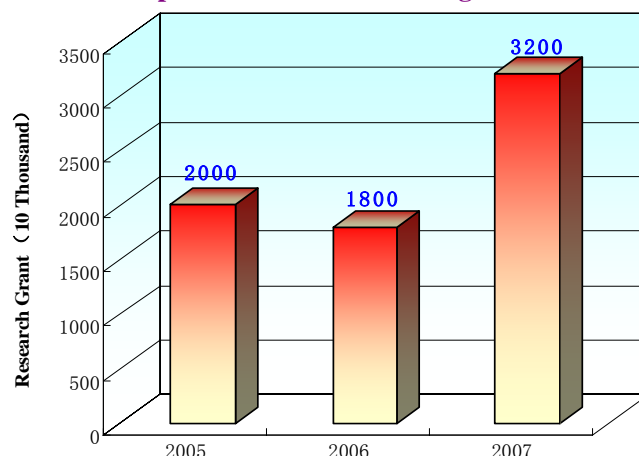
Prof. Minhan Dai in the Gordon Research Conference on Chemical Oceanography, Tilton, USA.

RESEARCH GRANTS AND SELECTED PROJECTS

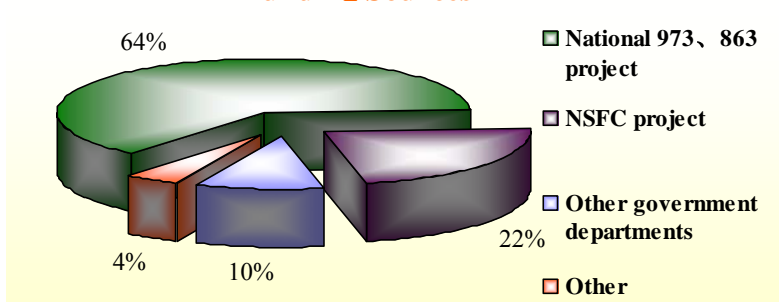
科研经费及科研课题

During the year of 2007, the MEL faculties were granted an amount of 31.963 million competitive research grants from various funding agencies. 64% of the funding came from the Ministry of Science and Technology through national programs such as “973”, “863” and 22% of the funding came from the National Natural Science Foundation of China (NSFC).

Competitive Research Funding in 2005-2007



Funding Sources



Selected Projects Funded in 2007

Project Title	Funding Source	Principal Investigator	Budget (10K)
Role of microbes in the marine carbon pool and climate changes 微型生物在碳储库及气候变化中的作用	“973” National Basic Research Program 国家 973 项目课题	Nianzhi Jiao 焦念志	300
Interaction between Kuroshio and dynamical environment in the northern South China Sea 黑潮与南海北部动力环境的相互作用	“973” National Basic Research Program 国家 973 项目课题	Jianyu Hu 胡建宇	13
Rapid monitoring of microbes in ballast waters 远洋船舶压载水微型生物快速检测技术	Key Project of National Technology R&D Program 国家科技支撑计划重点项目课题	Nianzhi Jiao 焦念志	288

Project Title	Funding Source	Principal Investigator	Budget (10K)
In situ analyzer for seawater carbonate system 多通道海水碳酸盐体系原位监测系统	“863” National Key Project of Hi-Tech Research and Development Program 国家 863 计划重点项目课题	Quanlong Li Minhan Dai 李权龙 戴民汉	193
Discovery and application of active compounds of marine microorganism for HABs controll 海洋微生物抑藻（有毒赤潮藻）活性化合物的发现与利用	“863” National Key Project of Hi-Tech Research and Development Program 国家 863 计划重点项目课题	Tianling Zheng 郑天凌	98
Development of a new feed additive with the recombinant antibacterial proteins and utilization in marine cultured animals 海洋动物抗菌类基因工程产品作为饲料添加剂的研发及其应用研究	“863” National Key Project of Hi-Tech Research and Development Program 国家 863 计划重点项目课题	Kejian Wang 王克坚	213
Key techniques for determination of Marine environmental effects of typical organic pollutants effluent from the land pollutants discharge outlets 陆源入海重点排污口典型有机污染物海洋环境效应确定的关键技术研究子课题	“863” National Key Project of Hi-Tech Research and Development Program 国家 863 计划重点项目课题	Feng Guo Xinhong Wang 郭 丰 王新红	46
“Technology of Regional Ocean Observing System” Fujian Demonstration Area Project -Auxiliary Decision System for Emergency and Rescue Work of Sudden Accident at the Sea “区域性海洋监测系统技术”福建示范区项目--海上突发事件应急辅助决策系统	Joint Program supported by “863” National Hi-Tech Research and Development Program & Fujian Provincial Government 国家 863 计划/福建省政府专项课题	Huasheng Hong Yuwu Jiang 洪华生 江毓武	150
“Technology of Regional Ocean Observing System” Fujian Demonstration Area Project-Numerical Forecast System for Sea-Surface Wind, Wave, Temperature and Salinity-Current Sub-project “区域性海洋监测系统技术”福建示范区项目--海面风场-浪场-温盐流场数值预报系统-海流子课题	Joint Program supported by “863” National Hi-Tech Research and Development Program & Fujian Provincial Government 国家 863 计划/福建省政府专项课题	Yuwu Jiang 江毓武	30
“Technology of Regional Ocean Observing System” Fujian Demonstration Area Project- Inversion Software of Satellite Remote Sensing	Joint Program supported by “863” National Hi-Tech Research and Development Program & Fujian Provincial Government	Shaoling Shang	300

Project Title	Funding Source	Principal Investigator	Budget (10K)
“区域性海洋监测系统技术”福建示范区项目--卫星遥感信息反演软件	国家863计划/福建省政府专项课题	商少凌	
Breeding of Abalone cultivar for high-yield and stress resistance	“863” National Key Project of Hi-Tech Research and Development Program	Caihuang Ke	287
鲍高产、抗逆品种的培育（杂色鲍部分）	国家863计划重点项目课题	柯才焕	
Selective breeding of fast growth strain of <i>Scylla serrata</i>	“863” National Key Project of Hi-Tech Research and development Program	Guizhong Wang	90
锯缘青蟹高产新品系的培育	国家863计划重点项目课题	王桂忠	
Carbon fluxes and their biogeochemical modulation in the Northern South China Sea - a synthesis study	NSFC Key Project	Minhan Dai	
中国邻近南海海域碳的源汇格局及其关键生物地球化学控制过程研究--深化与集成	国家自然科学基金重大研究计划	戴民汉	220
Variations of key phytoplankton functional types and its coupling with biogeochemical processes in the South China Sea	NSFC Key Project	Bangqin Huang	
南海典型海区重要浮游植物功能群的演变及其与生物地球化学过程的耦合	国家自然科学基金重点项目	黄邦钦	165
Coupled circulation-biogeochemistry study over the continental shelf in the Northern South China Sea during upwelling	NSFC/RGC International Cooperative Project	Minhan Dai	33
南海北部陆架上升流区物理海洋-生态系统耦合研究	国家自然科学基金国际（地区）合作与交流项目	戴民汉	
Transportation of aerosol PAHs in lower atmosphere across the west of Taiwan Straits	NSFC Project	Xinhong Wang	27
台湾海峡西部海域底部大气气溶胶中多环芳烃的迁移特征研究	国家自然科学基金面上项目	王新红	
Study on the Environmental behavior of typical PAHs in mangrove wetland by novel on site visualizing method and its application	NSFC Project	Yong Zhang	27
红树林湿地典型 PAHs 环境行为原位研究新方法及应用	国家自然科学基金面上项目	张勇	
Study on the transformation and bioavailability of mercury in coastal ecosystem	NSFC Project	Dongxing Yuan	28
近岸海洋生态系统中汞的迁移转化和生物可利用性研究	国家自然科学基金面上项目	袁东星	

Project Title	Funding Source	Principal Investigator	Budget (10K)
Molecular mechanisms of plasma-membrane translocating proteins responding to heavy metals in <i>Eichhornia crassipes</i> 凤眼莲质膜转运蛋白对重金属污染物的分子响应机制研究	NSFC Project 国家自然科学基金面上项目	Yuhong Li 李裕红	29
Ecologically harmful mechanisms of exotic species, <i>Mytilopsis sallei</i> , to marine zoobenthos 外来物种沙筛贝对海洋底栖动物生态危害机制的研究	NSFC Project 国家自然科学基金面上项目	Lizhe Cai 蔡立哲	38
Identification and characterization of toxin related biomarkers in toxin producing dinoflagellates 有毒甲藻中与麻痹性贝毒合成相关的蛋白质分子标志物研究	NSFC Project 国家自然科学基金面上项目	Dazhi Wang 王大志	46
Phosphorus stress and limitation of phytoplankton in coastal waters of China Seas using single-cell enzyme-labeled fluorescence (ELF) approach 基于分子探针技术研究中国近海浮游植物的磷胁迫与限制	NSFC Project 国家自然科学基金面上项目	Bangqin Huang 黄邦钦	46
Species distribution pattern along estuary and the adaptative mechanism of mangrove species to the habitat alternated by seawater and freshwater 红树植物的沿河分布格局及其对咸淡水交替环境的适应机制	NSFC Project 国家自然科学基金面上项目	Wenqing Wang 王文卿	37
Wind forcing on the annual cycle and inter-annual variation of the phytoplankton blooms off the southeast China Sea 中国东南海域风应力对浮游植物水华事件年循环和年际变化的调控研究	NSFC Project for Young Scientist 国家自然科学基金青年项目	Caiyun Zhang 张彩云	20
Studies on relationship between land-runoff and photosynthetic carbon fixation in coastal waters 近岸水循环陆源输入与藻类固碳关系的研究	MOE Key Project of Science and Research 教育部科学研究重大项目	Kunshan Gao 高坤山	50
Role of microbes in the marine carbon cycling and the mechanism 典型微型生物在海洋碳循环中的作用机制	Research Program of China Ocean Mineral Resources R & D Association 中国大洋协会开发项目	Nianzhi Jiao 焦念志	35
Ecological Restoration in Xiamen East Coastal Area 厦门市环东海域生态修复	Xiamen Municipal Government 厦门市政府项目	Changyi Lu 卢昌义	110

Selected On-going Projects

Project Title	Funding Source	Principal Investigator	Budget (10K)
Coupling between Microbial Loop and Food Production in Coastal Ecosystem of China 微食物环在近海食物产出过程中的耦合作用	“973” National Basic Research Program 国家 973 项目课题	Bangqin Huang 黄邦钦	210
Response of biogenic constitute cycling and phytoplankton diversity to physical forcing in typical marine regions 典型水域生源要素循环及浮游植物多样性对海洋物理环境演变的响应	“973” National Basic Research Program 国家 973 项目课题	Min Chen 陈敏	290
Methodologies for Determination and Evaluation of Ultratrace POPs in Complex Media – “Time Tunnel” for Historical Monitoring of Atmospheric Pollution 复杂介质中超痕量持久性有机污染物 (POPs) 的检测和表征方法学——大气污染监测的时间隧道新技术	“973” National Basic Research Program 国家 973 项目课题	Qiuquan Wang 王秋泉	20
Physiological and ecological response of important HAB species to the changes of nutrients in HAB area of China seas 我国典型赤潮高发区重要赤潮生物对营养物质的生理生态反应	“973” National Basic Research Program 国家 973 项目课题	Huasheng Hong 洪华生	178
863 Project- Stereo Dynamic Monitoring System for Taiwan Strait and Adjacent Sea Area -Fujian Demonstration Area Project 863 重大专项台湾海峡及其毗邻海域立体动态监测系统福建示范区项目	Joint Program supported by “863” National Hi-Tech Research and Development Program & Fujian Provincial Government 国家 863 计划/福建省政府专项	Huasheng Hong 洪华生	280
Multi-channel analyzer for the shipboard determination of nanomolar concentration nutrients in seawater 多通道超痕量营养盐船载分析系统	“863” National Hi-Tech Research and Development Program 国家 863 计划专题课题	Dongxin Yuan 袁东星	94
Marine biogeochemistry and ecotoxicology 海洋生物地球化学创新引智计划	Joint Program supported by Ministry of Education and the State Administration of Foreign Experts 教育部、国家外专局创新引智计划	Minhan Dai 戴民汉	450
Marine biogeochemical processes and mechanisms 海洋生物地球化学过程和机制	NSFC Group of Excellence Grant 国家自然科学基金创新研究群体科学基金	Minhan Dai, Nianzhi Jiao 戴民汉 焦念志	420

Project Title	Funding Source	Principal Investigator	Budget (10K)
Nitrogen fixation and its regulating factors in the South China Sea 南海固氮作用及其调控因子的研究	NSFC Key Project 国家自然科学基金重大研究计划重点项目	Min Chen 陈敏	120
Air-sea CO ₂ fluxes and their control by biogeochemical processes in the euphotic zone of marginal seas – case studies in the Northern South China and the Yellow Sea 边缘海真光层生物地球化学过程及其对大气 CO ₂ 的调控	NSFC Key Project 国家自然科学基金重大项目课题	Dongxing Yuan 袁东星	100
Microbial ecological processes and biodiversity in relation to marine environments 原核光合生物多样性及生命过程与海洋环境关系的研究	NSFC Key Project 国家自然科学基金重点项目	Nianzhi Jiao 焦念志	155
Studies on mechanisms of marine algal responses to solar ultraviolet radiation 海洋植物对太阳紫外辐射响应机制的研究	NSFC Key Project 国家自然科学基金重点项目	Kunshan Gao 高坤山	110
The response of phytoplankton to inter-annual environmental variability in the upwelling region of the Taiwan Strait 台湾海峡上升流区浮游植物对海洋环境年际变动的响应	NSFC Key Project 国家自然科学基金重点项目	Huasheng Hong 洪华生	140
Marine Chemistry 海洋化学	NSFC International Cooperative Project for Young Scientist 国家自然科学基金海外青年合作基金	Jingfeng Wu Min Chen 吴景锋 陈敏	40
Particle dynamics in the disphotic zone of the South China Sea 南海弱光层的颗粒动力学	NSFC Project 国家自然科学基金面上项目	Pinghe Cai 蔡平河	40
The purification mechanism of riparian vegetation and its soil system in decreasing surface source pollution and its systematic optimization 河岸植被土壤系统对面源污染削减和净化机制研究和系统优化	NSFC Project 国家自然科学基金面上项目	Wenzhi Cao 曹文志	38
The relationship between the characteristics of films on antifouling marine coatings and fouling organisms 海洋防污涂料表面生物粘膜的性质及其与污损动物附着的关系	NSFC Project 国家自然科学基金面上项目	Caihuan Ke 柯才焕	37
Gene expression and functional studies of a novel antibacterial peptide Scygonadin isolated from <i>Scylla serrata</i> 锯缘青蟹抗菌肽 scygonadin 基因的表达特性及其功能研究	NSFC Project 国家自然科学基金面上项目	Kejian Wang 王克坚	32

Project Title	Funding Source	Principal Investigator	Budget (10K)
The influence of pelagic tunicates on the micro-food web in a marine upwelling ecosystem 浮游被囊类对海洋上升流生态系统微型食物网的影响	NSFC Project for Young Scientist 国家自然科学基金青年项目	Donghui Guo 郭东晖	28
The preparation of a solid-phase microextraction (SPME) fiber (tube) coated with carbon nanotubes, and its application in the analysis of polar endocrine disruptors in the aquatic environment 以碳纳米管为涂层的固相微萃取纤维(管)的制备及其在水环境极性内分泌干扰物分析中的应用研究	NSFC Project for Young Scientist 国家自然科学基金青年项目	Quanlong Li 李权龙	
The effect of the sea surface microlayer on the airsea transfer of polychlorinated biphenyl congeners and organochlorine pesticide 海水微表层对多氯联苯及有机氯农药海-气交换的影响	NSFC Project for Young Scientist 国家自然科学基金青年项目	Shuiping Wu 吴水平	25
Biogeochemical coupling of carbon, nitrogen and oxygen in the Pearl River estuary 珠江口缺氧区形成机理-碳、氮生物地球化学过程的耦合分析	NSFC Project 国家自然科学基金面上项目	Minhan Dai 戴民汉	52
Study of the export fluxes of POC based on the unbalanced ^{210}Po and ^{210}Pb 基于 ^{210}Po 、 ^{210}Pb 不平衡的 POC 输出通量的研究	NSFC Project 国家自然科学基金面上项目	Yipu Huang 黄奕普	45
Ecological process of Aerobic Anoxygenic Phototrophic Bacteria (AAPB) in Chinese coastal sea and adjacent ocean 中国近海及其邻近洋区 AAPB 的生态学研究	NSFC Project 国家自然科学基金面上项目	Nianzhi Jiao 焦念志	47
Study on the biodegradation of soluble PAHs with Polarization Synchronous Spectrofluorimetry technique 分子发光法研究多组分溶解态 PAHs 的生物降解光降解	NSFC Project 国家自然科学基金面上项目	Yong Zhang 张 勇	27
The ecodynamics of pelagic copepod eggs in subtropical estuaries and its effect on microevolution 亚热带河口海区浮游桡足类卵库生态动力学及其对微进化的影响	NSFC Project 国家自然科学基金面上项目	Guizhong Wang 王桂忠	35
Study of temporal and spatial variability of the summertime multi-front structure in the western Taiwan Strait 台湾海峡西部海区夏季多锋结构时空变异性的研究	NSFC Project 国家自然科学基金面上项目	Jianyu Hu 胡建宇	37

Project Title	Funding Source	Principal Investigator	Budget (10K)
Study and use of the macromolecule PAHs-remediation gene in marine environment 海洋环境中高分子量PAHs降解功能基因的研究与利用	NSFC Project 国家自然科学基金面上项目	Tianling Zheng 郑天凌	40
The role of internal tides on the Taiwan south continental slope in upwelling on the Taiwan Bank 台湾浅滩南侧内潮对浅滩上升流区形成贡献研究	NSFC Project 国家自然科学基金面上项目	Yuwu Jiang 江毓武	27
The short time scale effect in the dynamical process of bank Sandwaves physiognomy of Taiwan 台湾浅滩沙波群地貌动力过程的短尺度效应	NSFC Project 国家自然科学基金面上项目	Yan Li 李炎	40
Speciation and biotransformation of organotin in the marine coastal environment 近岸海洋环境中有机锡的存在形态及其生物转化研究	NSFC Project 国家自然科学基金面上项目	Xinhong Wang 王新红	34
The process and mechanism of Mangroves restoration repair the zoobenthos sub-system 河口红树林恢复对底栖动物亚系统修复的进程和机制	NSFC Project 国家自然科学基金面上项目	Yong Ye 叶勇	31
CO ₂ partial pressure and outgassing fluxes and their biogeochemical controls in Yangtze River estuary and the adjacent downstream areas of Huang-pu River 长江口与黄浦江下游水域的CO ₂ 分压、通量及其控制	NSFC Project 国家自然科学基金面上项目	Weidong Zhai 翟惟东	27
Basic research on the population genetics and genetic improvement of <i>Penaeus monodon</i> 斑节对虾种群遗传学及遗传改良的基础研究	NSFC Project 国家自然科学基金面上项目	Guizhong Wang 王桂忠	21
Ecological restoration of mangrove wetland 红树林湿地生态恢复	Xiamen Municipal Government 厦门市政府委托项目	Changyi Lu 卢昌义	205
Molecular basis of nutrient metabolism in harmful algal species along the China Sea coast 中国近海典型赤潮生物营养代谢的分子机制	MOST Key Project for International Collaboration 国际科技合作项目	Huasheng Hong 洪华生	86
On ecosystem modeling of the upwelling region of the Taiwan Strait 台湾海峡上升流区海洋生态动力学模型研究	NSFC International Cooperative Project 国家自然科学基金国际合作交流项目	Huasheng Hong 洪华生	25

RESEARCH CRUISES

航次调查

Cruises Organized by MEL

R/V	Duration	Chief Scientist	Survey Area
Shiyan II	Dec. 14, 2006-Feb. 3, 2007	Jianyu Hu	Beibu Gulf
Shiyan II	Apr. 8-May 7, 2007	Yan Li	Beibu Gulf
Yanping II	Jul. 8-Jul. 16, 2007	Jianyu Hu	Southwest Taiwan Strait
Dongfanghong II	Aug. 14-Sept. 15, 2007	Minhan Dai	South China Sea
Shiyan II	Oct. 8-Nov. 20, 2007	Jianyu Hu	Beibu Gulf

Cruises Participated

R/V	Duration	Participant	Objective
Dongfanghong II	Jan. 20-Feb. 14, 2007	Ning Hong, etc.	National “973” Project cruise to the East China Sea, sampling for marine microbiology
Haijian 72	Apr. 15-May 20, 2007	Xueding Li, etc.	Optic spectrum measurement of In-Orbit-Test of the Sattllite Ocean 1B
Yongqiang	Apr. 22-Apr. 30, 2007	Lifang Wang, etc.	Cruise to the Pearl River Estuary
Dayang I	Apr. 24-Aug. 20, 2007	Fan Zhang,, etc.	Deep Sea Cruise, sampling for Marine microbiology
ARK XXII (Germany)	Jul. 28-Oct. 10, 2007	Pinghe Cai	Cruise to the North Pole
Dongfanghong II	Jul. 1-Aug. 12, 2007	Weidong Zhai etc.	Cruise to the South China Sea- Hydrogeologic structure in the northern South China Sea, and important Marine Biogeochemical parameter in the southeast of the South China Sea
Dongfanghong II	Nov. 1-Nov. 23, 2007	Gui Chen etc.	Real-time test of in-situ CO ₂ system in Coastal areas; sampling for marine microbiology

PATENTS AND AWARDS

获奖与专利

Awards

获奖

成果名称	获奖年份	奖励名称与等级	授奖部门	主持人	排名
海洋初级生产力结构及 微生物生态学研究	2007	国家自然科学基金二等奖	国家奖励办	焦念志	1
杂色鲍的遗传改良及中 试示范	2007	厦门市科技进步三等奖	厦门市人民政府	柯才焕	1

Patents Granted

已获批专利

专利名称	专利授权号	获准国别	完成人	类型
一种鱼粉蛋白水解物与制备方法及其应用	ZL200510096917.7	中国	杨 剑、卢昌义、 于兴娜、叶 勇	发明专利
原绿球藻的显微定量方法	ZL200510078720.0	中国	焦念志、张 瑶、 陈 瑶	发明专利
锯源青蟹抗菌肽及其基因和基因的克隆方法	ZL2005100532396	中国	王克坚、黄文树、 李少菁、王桂忠	发明专利
杂色鲍雌核发育诱导方法	ZL200510096773.5	中国	柯才焕、蔡明夷	发明专利
不同地理种群杂色鲍间的杂交方法	ZL200510096770.1	中国	柯才焕、游伟伟	发明专利
鱼藤酮防污剂	ZL200610005248.2	中国	柯才焕、冯丹青	发明专利
有机氯农药在纳米二氧化钛上光降解方法	ZL200610070862.7	中国	陈 曦、余彬彬 黄 沙、袁 宁 肖来龙	发明专利

Patents Applied

已申请专利

专利名称	专利申请号	获准国别	完成人	类型
好氧不产氧光合异养细菌的流式细菌检测方法	200610152031.4	中国	焦念志、骆庭伟、张瑶	发明专利
一种构建红树林土壤大片段宏基因组文库的方法	200710009528.5	中国	蒋云霞、郑天凌	发明专利
塔玛亚历山大藻培养液除菌方法	200610036634.8	中国	郑天凌、苏建强、杨小茹	发明专利
黑鲷抗菌肽 Hecpudin 的表达载体和表达产物及其构建制备方法	200710008862.9	中国	王克坚、杨明、蔡晶晶	发明专利
一种用于贝类标记的粘结剂及其制备方法	200710009112.3	中国	骆轩、柯才焕	发明专利
一种贝类的标记方法	200710009113.8	中国	柯才焕、骆轩	发明专利
多波长分光态二氧化碳自动监测装置	200510129959.6	中国	戴民汉、陈进顺、鲁中明、许昆明、廖英豪	发明专利
吸收类分析仪器光检测量程自动扩展电路	200510124434.3	中国	陈进顺、廖英豪、鲁中明	发明专利
便携式生化需氧量光化学微生物传感器	200710008658.7	中国	陈曦、王旭东、辛玲玲、胡浩	发明专利
一种固相微萃取萃取头及其制备方法	200710008864.8	中国	陈曦、曾景斌、余彬彬、张丽梅	发明专利
便携式生化需氧量光化学微生物传感器	200710008658.7	中国	陈曦、王旭东、辛玲玲、胡浩	发明专利
一种适用于薄片电极的静态电致化学发光电解池	200720006459.8	中国	陈曦、陈晓梅、林志杰、陶颖	实用新型
一种适用于 ITO 玻璃电极的流动体系电致化学发光电解池	200720006421.0	中国	陈曦、林志杰、陈晓梅、陶颖	实用新型

INTERNATIONAL EXCHANGE

国际交流

Conferences/Workshops/Symposia/Sessions Co-organized by MEL Scientists

Conferences	Chairs/Conveners	Organizers/Sponsors	Time
Joint Workshop on Marine Environmental Research, Xiamen	Prof. Huasheng Hong Prof. Rudolf Wu	State Key Lab of Marine Environmental Science The Centre for Marine Environmental Research Innovative Technology	Jan. 10-11, 2007
SOLAS Open Science Conference, Xiamen	Prof. Peter Liss Prof. Guangyu Shi Prof. Minhan Dai	Surface Ocean-Lower Atmosphere Study State Key Lab of Marine Environmental Science	Mar.6-9, 2007
Cross-strait Forum on Marine Environmental Science, Xiamen	Prof. Minhan Dai Prof. George Wong Prof. David Sheu	State Key Lab of Marine Environmental Science	Mar. 12-14, 2007
Lingfeng Forum on Ecotoxicology	Prof. Kejian Wang Prof. Wenxiong Wang	State Key Lab of Marine Environmental Science	Jul. 11, 2007
“Response of coastal/marginal seas to Asian rivers and dust”, AOGS Special Session, Bangkok, Thailand	Shuh-Ji Kao Jing Zhang Nianzhi Jiao Minhan Dai Jun Nishioka	Asia Oceania Geosciences Society	Jul. 31 -Aug. 1, 2007
Special Session, World Ocean Week, Xiamen	Prof. Huasheng Hong Prof. Luoping Zhang	United Nation Development Programme China (UNDP-China) State Oceanic Administration (SOA) China Communication & Transportation Association (CCTA) Xiamen Municipal Government Xiamen University	Nov. 2-5, 2007

Memorandum of Understanding or Memorandum of Agreement

Organization	MoU/MoA	Time signed
Centre for Coastal Pollution and Conservation, Department of Biology and Chemistry, City University of Hong Kong, Hong Kong SAR	Agreement on Co-operation	Mar., 2007
Research Center for Environmental Changes, Academia Sinica, Taipei	Agreement on Co-operation	Mar., 2007
The Faculty of Engineering LTH, Lund University, Sweden	Agreement on Student Exchange for Summer Research School	Apr., 2007
Institute of Marine Environment and Resources, Vietnam	Memorandum of Understanding	Apr., 2007
The College of Marine & Earth Studies, University of Delaware, USA	Statement of Interests	Sept., 2007
The Department of Oceanography, The University of Georgia, USA	Agreement on Co-operation	Oct., 2007

Student Exchange

Name	Host	Duration	Activity
Li Tang	Hong Kong Baptist University	Jan.-Jun., 2007	Joint research of marine pollution
Dongmei Zhao	Hong Kong Baptist University	Jan.-Mar., 2007	Joint research of marine pollution
Yonghui Zeng Qinglong Shu	Max Planck Institute for Marine Microbiology, Germany	May. 22-Aug. 15, 2007	A joint study of physiology and molecular ecology of marine microbes (Project Based Personnel Exchange Programme with China Scholarship Council and German Academic Exchange Service)
Weiguo Xiang	The Hong Kong University of Science and Technology, HKSAR	Jun. 11-19, 2007	HKUST summer course in Pelagic and Benthic Marine Ecosystems
Weifang Chen	University of South Carolina, USA	Jun. 5- Jul. 4, 2007	Short-term visit with lab study and field research on the application of RaDeCC

Name	Host	Duration	Activity
Xiuxiu Wang	The University of Hong Kong, HKSAR	Jul. 19-Aug. 10, 2007	Ph. D student short-term training in a new technology of Proteomics
Rui Zong	The University of Hong Kong, HKSAR	Jul.19-Aug.15, 2007	Ph. D student short-term training in a new technology of Proteomics
Xu Huang	The Hong Kong University of Science and Technology, HKSAR	Aug-Oct, 2007	Joint Ph. D program on Metal Toxicology
Na Wang	The University of Hong Kong, HKSAR	Aug. 1-31, 2007	Joint Ph. D program, focusing on project of “Characterization and identification of marine biotoxins: brevetoxins and ciguatoxins”
Cheng Li	The University of Hong Kong, HKSAR	Sept. 1-28, 2007	Joint Master program on Proteomics
Kuanbo Zhou Zhimian Cao Baoshan Chen	Surface Ocean–Lower Atmosphere Study, France	Oct. 21-Nov. 3, 2007	SOLAS summer school
Meiru Zhao	The University of Maryland, USA	Nov., 2006-present	Joint Ph. D program
Yongyu Zhang	The University of Maryland, USA	Dec., 2006-Jun, 2007	Joint Ph. D program on Proteomics
Yanlin Zhao	The University of Maryland, USA	Dec., 2006-present	Joint Ph. D program on Marine viruses

KEY EVENTS 实验室大事记

Dr. Kunshan Gao joined MEL as a Minjiang Chair Professor

高坤山教授作为闽江学者特聘教授加盟实验室

2007年1月，国家杰出青年科学基金获得者、中科院“百人计划”入选者高坤山教授作为“闽江学者”加盟实验室。高坤山教授1989年获日本京都大学博士学位，在藻类生理生态学研究的23年来，已主持课题10余项，包括国家自然科学基金重点项目2项，国家杰出青年科学基金（1997）、中国科学院“百人计划”（1997）、国家自然科学基金面上项目及“863”项目等。在基金委杰青、重点以及面上项目的支持下，近年来取得的主要学术成就如下：最先发现大气CO₂浓度升高对海洋植物光合作用与生长的促进作用；阐明了部分（有代表性海产与淡水）藻类光合作用对CO₂浓度升高的响应机制；在我国海域初步发现太阳紫外辐射对原位浮游植物固碳量的抑制作用。

MEL appointed 4 distinguished scholars

实验室聘请4名海外讲座教授

2007年1月，美国特拉华大学的严晓海教授、美国佐治亚大学的蔡卫君教授、台湾“中央研究院”的高树基副研究员及美国马里兰大学的陈峰副教授等4位境外学者受聘厦门大学讲座教授，每年将到厦门大学工作2个月以上，开展合作研究、合作教学及研究生联合培养。



Prof. Xiao-Hai Yan
University of Delaware



Prof. Wei-Jun Cai
The University of Georgia



Dr. Shuh-Ji Kao
Academia Sinica



Dr. Feng Chen
The University of Maryland

(Photos provided by scholars)

Prof. Nianzhi Jiao was awarded with the National Natural Science Award for the researches on the structure of marine primary productivity and microbial ecology

焦念志教授的研究成果获国家自然科学基金二等奖

2007年2月，在国家科学奖励大会上，焦念志教授主持完成的“海洋初级生产力结构及微型生物生态学研究”荣获国家自然科学基金二等奖。



Prof. Nianzhi Jiao at the Ceremony of National Science and Technology Award

A research report “Coupling Diurnal Cytosolic Ca²⁺ Oscillations to the CAS-IP₃ Pathway in Arabidopsis” was published at *Science* by Dr. Hailei Zheng

郑海雷博士与合作者的多年研究成果在国际一流期刊 *Science* 上发表

2007年3月，实验室流动人员郑海雷博士以共同第一作者，在国际著名学术刊物《科学》(Science, 2007, 315: 1423-1426)上发表了“拟南芥胞质钙离子周期性振荡与钙受体~三磷酸肌醇途径相偶联”(Coupling Diurnal Cytosolic Ca²⁺ Oscillations to the CAS-IP₃ Pathway in Arabidopsis) 的最新研究成果。该成果对困扰科学界多年的植物细胞自由钙离子周期性振荡的成因作出了最新的解释，在植物应对环境刺激研究领域取得了突破性的进展。

Prof. Minhan Dai was elected the President of Ocean Science Session, Asia Oceania Geosciences Society (AOGS)

戴民汉教授当选国际亚洲海洋地球科学学会海洋科学分会主席

2007年7月30日-8月4日，亚洲海洋地球科学学会(AOGS)第四届年会在泰国曼谷举行，戴民汉教授在本次会议中当选为2008-2010届海洋科学分会主席。AOGS成立于2003年，是一个年轻而快速成长的地球科学国际组织，目前拥有2297家团体会员，亚洲和大洋洲的会员约占77%，欧洲会员占13%，美国会员与约占14%；成立以来共举办了四届大规模的由全球科学家共同参与的开放科学大会。

Prof. Huasheng Hong was awarded as a “Person of the Year for Marine Environmental Protection”

洪华生教授当选“2007 感动海洋环保人物”

2007 年 9 月，在由中央权威媒体和国家海洋局联合发起的年度海洋环保人物评选中，鉴于多年来对中国海洋事业的突出贡献，洪华生教授获得“2007 感动海洋环保人物”荣誉称号。该评选集中反映了近年来中国海洋事业发展的脉络，汇集了海洋环保工作领域的先进典型代表，充分体现了“感恩海洋、保护海洋、善待海洋”的主题思想，对正确引导舆论，弘扬保护海洋的主旋律起到了积极的促进作用，在社会各界产生了广泛影响。



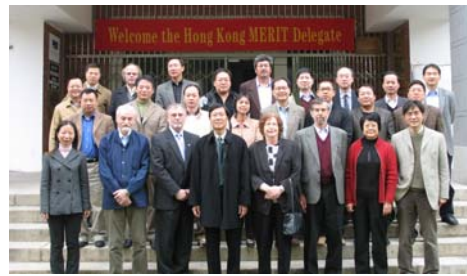
Prof. Huasheng Hong (Photo by Vera Shi)

A series of joint workshops were organized between the MEL and Hong Kong, Taiwan marine institutions 组织若干实验室研讨会，加强与港台合作

2007 年 1 月，香港海洋环境研究及创新科技中心（MERIT）代表团来访，与实验室共同举办海洋环境科学联合研讨会。双方交流探讨了在生态毒理健康、环境监测与风险评价等方面的研究。2007 年 3 月，由我实验室海外成员与实验室共同发起组织“海峡两岸海洋科学研讨会”，海峡两岸科学家畅谈科学，增进双方的了解，为将来的合作奠定了良好的基础；2007 年 7 月 11 日我实验室与与港、台海外成员共同发起“生态毒理高峰论坛”，初步凝练出生态毒理学方向近三年的发展思路，拟在四个方面开展系统研究，建立符合国际标准的模式生物研究平台，为实验室深入开展生态毒理学奠定基础。



A discussion session of the Cross-Strait Forum on Marine Environmental Science. (Photo by Vera Shi)

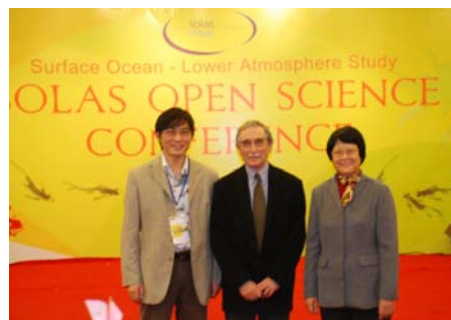


A group photo of the Joint Workshop between the Hong Kong MERIT and MEL. (Photo by Vera Shi)

March 6-9, MEL organized “the Surface Ocean-Lower Atmosphere Study” 2007 Open Science Conference.

成功举办“2007 年 SOLAS 国际开放科学大会”，得到高度评价

2007 年 3 月 6 日-9 日，实验室承办了“2007 年 SOLAS 国际开放科学大会”。会议围绕着海气生物地球化学交互作用与反馈、海气界面交换过程以及迁移转化规律、二氧化碳及其他长寿命放射性活性气体的海气通量等主题展开，来自全球 32 个国家和地区的 220 名科学家及学生（其中外籍学者 180 余位）与会，共同探讨海气相互作用给全球带来的影响。大会的成功举办得到了与会者的一致好评，更获得了包括 SOLAS 国际科学指导委员会主席 Peter Liss 教授的高度评价。



Prof. Huasheng Hong, Prof. Minhan Dai and Prof. Peter Liss, Chair of SOLAS SSC at the 2007 SOLAS OSC banquet. (Photo by Xianghui Guo)

Institutional cooperation has been promoted between the MEL and universities abroad.

与国外科研院所间开展了密切的合作

2007 年 4 月，实验室创新群体和创新引智基地成员访问越南科学院海洋环境与资源研究所；5 月，实验室部分骨干成员对美国德克萨斯农工大学、蒙特利湾水体研究所和 Scripps 海洋研究所等海洋机构进行访问，洽谈交流合作事宜；在我校讲座教授、美国特拉华大学严晓海教授的积极推动下，特拉华大学海洋与地球学院院长 Nancy Targett 教授应邀来访并签订院际合作协议。10 月，戴民汉教授代表厦门大学回访特拉华大学，更深入地探讨了校际合作。



Prof. Nancy Targett, Dean of the College of Marine & Earth Studies, University of Delaware, is signing the Statement of Interests with MEL and COE. (Photo by Vera Shi)



Prof. George T. F. Wong, Distinguished Research Fellow of Academia Sinica and Professor Emeritus of Old Dominion University, is visiting MEL as an Adjunct Professor and the chief coordinator of MEL "111" International Collaborative Project. (Photo by Shuang Yang)



The MEL delegation is visiting the Texas A&M University to explore institutional as well as individual collaborations. (Photo by Vera Shi)



Prof. John Hodgkiss from The University of Hong Kong is giving a lecture on Science Writing as a MEL Adjunct Professor and Chief English Editor. (Photo by Vera Shi)



Prof. Minhan Dai is meeting with Director Tran Duc Thanh while the MEL delegation visits the Institute of Marine Environment and Resources of Vietnam for potential collaboration. (Photo by Shuang Yang)



Prof. John Farrington from Woods Hole Oceanographic Institution is giving a Nanqiang Lecture on Ocean Environmental Quality Research. (Photo by Vera Shi)

54 well-known scientists visited MEL to conduct joint researches, deliver talks and advise students

数十位国际知名海洋科学家来访

伍兹霍尔海洋研究所前副所长、国际著名海洋化学家 John Farrington 教授来厦为研究生开设了为期两周的海洋环境有机生物地球化学的课程及讲座；德国 Max Planck 海洋微生物研究所 Rudolf Amann 教授来我实验室开展海洋微生物与环境基因组研究；法国国家科学研究中心教授、Biogeosciences 刊物主编 Jean-Pierre Gattuso 教授来厦洽谈海洋酸化研究项目；香港大学荣誉教授 John Hodgkiss 教授被聘为我实验室客座教授、英文主编，2007 年已为师生修改英文论文 74 篇，并来厦开设英文写作讲座，取得了极好的效果。



Prof. Rudolf Amann from Max Planck Institute for Marine Microbiology is giving a Nanqiang Lecture. (Photo by Vera Shi)



Prof. Jean-Pierre Gattuso from CNRS is visiting MEL. (Photo by Vera Shi)

MEL has passed the State Key Labs Review organized by the Ministry of Science and Technology with high recognition

实验室顺利通过科技部验收

2007年6月，实验室通过了科技部组织的以汪品先院士为组长的9位国内知名学者组成的专家组的验收。专家组充分肯定了实验室获准建设二年来的成绩，指出实验室在建设期间紧紧围绕主攻方向—海洋生物地球化学过程及其与海洋生态系统相互作用，在近海碳的源汇格局、生物泵效率、微型生物功能类群在生源要素生物地球化学循环中的作用与机制等方面，取得了一批有显示度的成果，整体研究实力显著加强，学术影响力快速提升；认为实验室已形成规模适当、结构合理、优势互补、整体实力雄厚的优秀创新团队，并成为凝聚优秀人才的基地；制定并完善了组织管理制度和运行机制；加强和稳定了实验室技术支撑系统，专家组一致同意通过验收，也希望在我国海洋事业快速发展的背景下，进一步考虑实验室的科学定位，明确实验室现有研究方向相结合的重大科学问题，加强在海洋环境科学领域的国内引领作用，提高国际影响力，保持持续发展。



Director Minhan Dai is presenting the MEL Progress Report at the State Key Lab Review Meeting. (Photo by Pan)

The MEL has moved

新实验大楼“海洋楼B座”启用

2007年8月，实验室迁入新建的实验大楼（建筑面积6000平方米），实验室硬件建设基本达到了设施实用先进，资源开放共享，人员交流方便的高标准。大楼全面安装中央空调、除湿系统及不间断电源，确保了实验仪器安全、稳定、精密地运行；配备了柴油发电机组，为冷冻样品的安全保存提供了保障；建立了较为完善的安全保障体系；布设了连接校园主千万兆网的六类线网络系统，设立10T的硬盘阵列，为数据共享和异地备份提供了硬件保证；配备了主要规划为安放海洋现场仪器设备的“走入式”地下仓库；统一规划、建设了一批高标准、有特色的功能实验室和科研服务平台，功能平台实行网上预约、门禁确认，为大型仪器的共享与开放提供了功能保障；营造了浓厚的学术氛围，预留了学术交流的空间。



Ocean Building B. (Photo by Ang Yu)

The summer cruise to the South China Sea was conducted with the sponsorship of “Group of Excellence” Project - “Marine biogeochemical processes and mechanisms”

创新群体夏季再征南海

2007年8月14日-9月14日，厦门大学“海洋地球化学生物创新群体”历经31天行程4000余海里对南海西部，南海北部盆地进行了科学考察。此航次是创新群体建立一年来再次针对碳循环及其机制对照去年执行的冬季航次的海上合作研究，期间共进行了102个站点，其中包括9个纬向断面，1个十字断面，和两个时间序列站的综合调查，针对南海的两个冷涡进行了完备的生物地球化学研究。本航次由戴民汉教授和王大志教授联合担任首席科学家，翟惟东、张瑶担任首席助理，并联合了中国海洋大学、中国科学院海洋研究所、香港科技大学等高校和科研机构的研究人员共同合作研究。



Dr. Weidong Zhai and a student are watching a sample.
(Photo by Ying Liu)

The national “908” Project - Coastal Survey Cruises have been organized by Xiamen University during the year

908 顺利完成科考任务

2007年，厦门大学承担了“我国近海海洋综合调查与评价专项（908专项）”908-01-ST09项目的任务，分别于2007年4~5月、10~11月组织了春季航次与秋季航次的调查，均由厦门大学908专项办公室负责组织，厦门大学海洋与环境学院和近海海洋环境科学国家重点实验室、中国海洋大学海洋环境学院、中国水产科学院南海水产研究所和中国科学院南海海洋研究所联合实施，其中大面调查任务由“实验2号”海洋综合调查船执行，调查队由来自厦门大学、中国海洋大学和中国科学院南海海洋研究所的38位调查人员组成，观测了包括琼州海峡、北部湾中国一侧周边河口冲淡水、沿岸水、由南海进入北部湾的陆架水等海洋学现象。



Students are getting the CTD off the ship. (Photo by Ying Liu)



A group photo for the summer cruise at the South China Sea. (Photo by Ying Liu)

OUTREACHES

公共服务

Lingfeng Summer Research School

Environmental Science Research Center (ESRC) of Xiamen University and the Faculty of Engineering of Lund University (LTH) organized the Lingfeng Summer Research School (LFSAR) from June 18 to July 13 at Xiamen University. The State Key Laboratory of Marine Environmental Science (MEL) serves as an important platform in this activity.



A group photo of LFSRS faculty and students. (Photo by Vera)

The LFSRS is the first cooperation between Xiamen University and Lund University which is aimed to provide an experience of laboratory research of “water resource” for undergraduate students.

The LFSRS has identified 8 projects related with “water resource” at Xiamen University, with Prof. Dongxing Yuan, Dr. Jinjing Luo, Prof. Minhan Dai, Prof. Dazhi Wang, Prof. Bangqin Huang, Prof. Xiaojing Xiong, Prof. Tong Ouyang from Environmental Science Research Center and State Key Laboratory of Marine Environmental Science who served as a mentor to each project, and one graduate student served as the research assistant, one undergraduate student from Lund University, and one undergraduate student from Xiamen University as the trainee. Each group has worked out a research plan at the first, a summary report and presentation at the end.

The LFSRS provided full information of Chinese culture and city sceneries for students from both universities who have spent great time such as Chinese Dragon Boat Festival and Swedish Mid-Summer Eve. Faculties from LTH delivered several seminars on the topics of water resource research for students.

The LFSRS is a very successful try of the ESRC and MEL’s outreach program, and is very well received among students and faculty from Lund University who regard the SRS as “incredible”, “fantastic experience”, “the days never been boring”, “communication is not a problem”, “will recommend to fellow students”.



The Orientation of students from Lund University, upon arrival at Xiamen University. (Photo by Vera Shi)



Markström, Hanna from Lund University is working on a sample with Na Wang, her group research assistant. (Photo provided by Na Wang)



Andreja Peternelj from Lund University has completed her LFSRS program and got the certificate from Prof. Dongxing Yuan, Dean of the College of Oceanography and Environmental Science. (Photo by Vera Shi)

MAJOR FACILITIES

主要仪器设备

仪器设备	Facilities
800 吨科考船及船载设备	R/V Yanping II (800T)
温盐深剖面观测与采水系统	<i>SBE 917PLUS</i> CTD profiler with water sampler system
表层多参数走航观测系统	<i>SBE 21</i> Thermosalinograph with multi-sensor system
现场光合色素分析仪	<i>BBE FluoroProbe</i>
便携式光合作用测定仪	<i>LI-6400</i> Portable Photosynthesis System
海气界面 CO ₂ /H ₂ O 通量直接观测系统	<i>Campbell CS7500</i> CO ₂ /H ₂ O open path gas analyzer
水下光谱仪	Hyperspectral Profiler II
营养盐原位自动分析仪	<i>SubChem Systems</i> Autonomous Profiling Nutrient Analyzer
流式细胞仪	<i>Beckman Counter EPICS ALTRA II</i> Flow Cytometer
现场流式细胞分析分选系统	<i>BD FACSAria</i> Flow Cytometer
微生物快速自动鉴定系统	<i>Biolog 62402</i> MicroStation System for Rapid Identification of Bacteria & Yeasts
全自动荧光显微镜	<i>Olympus BX61</i> Automatic Fluorescent Microscope
蛋白纯化液相色谱系统	<i>Amersham AKTA Purifier 100</i> Protein Purification Liquid Chromatography
激光粒度分析系统	<i>Malvem Master 2000</i> Laser Particle Size Analyzer
原子力显微镜	<i>Veeco</i> High resolution Atomic Force Microscopes and Scanning Probe Microscopes
荧光定量 PCR 仪	<i>Applied biosystems TF 7500</i> Real Time PCR System
微生物脂肪酸鉴定系统	<i>MIDI Sherlock System 6.0</i> Microbial Identification System
显微成像分析系统	<i>Fluid Imaging VH-VI</i> FlowCAM
双调制荧光光量子计	<i>PSI FL 5000</i> Double-Modulation Fluorometer
高通量筛选系统	<i>Molecular Devices FlexStation 3</i> Microplate Reader
营养盐全自动分析仪	<i>Bran-Luebbe/WPI A5-Channel</i> Auto Analyzer 3
总有机碳/总氮分析仪	<i>Shimazhu TOC-VCPH</i> TOC/TN
无机碳分析仪	<i>Apollo</i> DIC Analyzer
元素分析仪	<i>Perkin-Elmer 2400Series II</i> CHNS/O Analyzer
α能谱仪	<i>Ortec 8 Channel</i> Alpha Counter

仪器设备	Facilities
γ能谱仪	<i>Ortec GMX45P/Canberra GX3020</i> Gamma Counter
同位素比值质谱	<i>Finnigan Delta Plus^{XP}</i> Isotope Ratio Mass Spectrometer
制备型高效制备液相色谱仪	<i>Varian Prostar218</i> Preparative HPLC
高效液相色谱仪	<i>Agilent HP1100</i> High Performance Liquid Chromatograph
气相色谱 - 质谱联用仪	<i>Agilent HP6890/5973</i> GC-MSD
紫外-可见分光光度计	<i>Pekin-Elmer LAMBDA 950</i> UV-VIS
气相色谱 - 红外光谱联用系统	<i>Nicolet NEXUS 470</i> GC FT-IR

2007 年新增仪器	2007 New Facilities
激光诱导荧光监测仪	<i>Laser Laboratorium Gottingen GmbH</i> FluoVision Laser induced fluorescence spectrometer system (UV-Laserfluorimeter)
溶解气体分析仪	<i>Hiden Analytical HPR-40</i> Dissolved Species Gas Analysis System
离子色谱仪	<i>Dionex ICS-2500</i> Ion Chromatography
纳秒级时间分辨荧光光谱系统	<i>Edinburgh FLS920</i> Combined Fluorescence Lifetime and Steady State Spectrometer
并行计算与贮存集群系统	High Performance Computing & Storage Cluster
气相色谱仪	Agilent HP6890N
海气界面CO ₂ /H ₂ O通量直接观测系统	<i>Campbell CS7500</i> CO ₂ /H ₂ O open path gas analyzer
营养盐原位自动分析仪	SubChem Systems Autonomous Profiling Nutrient Analyzer

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