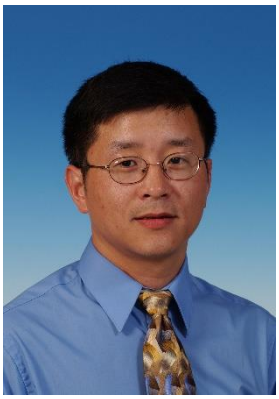

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Research Field

Physical Oceanography

RESEARCH INSTERESTS:

coastal ocean dynamics and numerical modeling of ocean circulation

EDUCATION

Ph.D in Physical Oceanography, 1995, McGill University, Canada
M.S in Physical Oceanography, 1991, McGill University, Canada
B.S in Marine Meteorology, 1983, Shandong College of Oceanology, China

Current Research

We have been conducting hard-core scientific study of ocean circulation, marine ecosystem dynamics and numerical ocean modeling in the China Seas. Besides focusing on the physical processes over the vast continental shelf/slope in the China Seas, our study widely covers the oceanic processes not only in estuaries/bays in the coastal waters, but also in the South China Sea and Western Pacific basins. Our research inter-links the processes over the estuary-shelf-basin. We have also developed interdisciplinary research in coupled physical-biogeochemical dynamics through numerical modeling, field measurement and process study in China Seas.

Research Highlights

TST-OBC:

In limited-area ocean models, existing open boundary conditions (OBCs) often create dynamic inconsistencies and perform poorly in resolving tidal or subtidal flow when both forces exist. We have developed a novel tidal-subtidal (TST) OBC to accommodate the concurrent TST forcing, and the respective tidal or subtidal forcing, at the open boundary (Liu and Gan, 2016, JGR).

China Sea Modeling System:

We developed a new three-dimensional, high-resolution ocean circulation model for the entire China Seas (CS) region. The model considered the linked physics associated with the western boundary current, monsoonal wind, tidal forcings, and topography in both the CS and the adjacent oceans. We revealed rotating layered circulation in the CS (Gan et al., 2016 JGR).

Spinning South China Sea (SCS):

We reveal the existence of a unique, three-layer, cyclonic-anticyclonic-cyclonic (CAC) circulation in the upper (<750 m), middle (750-1500 m), and deep (>1500 m) layers in the SCS with differing seasonality. The CAC is extrinsically forced by lateral planetary vorticity flux in each of the respective layers and intrinsically governed by joint effects of baroclinicity and relief (JEBAR) arising from the CAC flow–topography interaction in the SCS (Gan et al., 2016 JPO).

PUBLICATIONS

1. Yuan-Bing Zhao, X. San Liang, **J. Gan**, 2016. Nonlinear multi-scale interactions and internal dynamics underlying a typical eddy-shedding event at Luzon Strait. *J. Geophys. Res. (Oceans)* (in press).

2. Z. Liu and **J. Gan,** 2016. Open boundary conditions for tidally and subtidally forced circulation in a limited-area coastal model using the Regional Ocean Modeling System (ROMS), *J. Geophys. Res (Oceans),* 121, doi:10.1002/2016JC011975.

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5.Li, Q., Y. Wang, Y. Dong and **J. Gan**, 2015. Modeling long-term change of planktonic ecosystems in the Northern South China Sea and the upstream Kuroshio Current, *J. Geophys. Res (Oceans).*, 120, 3913-3936, doi:10.1002/2014JC010609.

6.Liu, Z., and **J. Gan,** 2015. Upwelling induced by the frictional stress curl and vertical squeezing of the vortex tube over a submerged valley in the East China Sea, *J. Geophys. Res.* (*Oceans),* 120 (4), 2571-2587, doi:10.1002/2015JC010715.

7. Gan, J., Z. Lu, Anson Cheung, M. Dai, L. Liang, P. J. Harrison, and X. Zhao, 2014. Assessing ecosystem response to phosphorus and nitrogen limitation in the Pearl River plume using the Regional Ocean Modeling System (ROMS), *J. Geophys. Res. (Oceans)*, 119, doi: 10.1002/2014JC009951.

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13.Zu, T. and **J. Gan,** 2013. A numerical study of coupled estuary-shelf circulation around the Pearl River Estuary during summer: Responses to variable winds, tides and river discharge. *Deep-Sea Res. II*. doi:10.1016/j.dsr2.2013.12.010

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17. Gan, J., H. Ho and L. Liang, 2012. Dynamics of intensified downwelling circulation over a widened shelf in the northeastern South China Sea. *J. Phys. Oceanogr*., v. 43, No. 1, 80-94, doi: 10.1175/JPO-D-12-02.1.

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