Y. TONY SONG

RESEARCH SCIENTIST

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Education

Ph.D., Mathematics, Simon Fraser University (1990)
M.S., Applied Math, Chinese Academy of Sciences (1984)
B.S., Mathematics, Zhengzhou University (1981)

Research Interests

- Innovative remote sensing: Using altimetry and gravimetry data and ocean circulation models to study ocean circulation and sea level changes
- Tsunami source and early detection system: Using GPS network to study tsunami formation mechanism and to develop early detection system
- Ocean modeling: Developing non-Boussinesq ROMS with improved terrain-following *sp*-coordinate system for climate studies

Professional Experience

1998—present	Research Scientist, NASA Jet Propulsion Laboratory
1996—1997	Research Associate, Bedford Institute of Oceanography
1991—1996	Postdoc/Res. Assistant Professor, IMCS, Rutgers University

Awards and Services

2015 **2014 Editor's Citation** for Excellence in Refereeing (*JGR-Oceans)*

2014 **Associate editor** for *Journal of Atmospheric and Oceanic Technology*

2011 NASA **Exceptional Scientific Achievement Medal** *for pioneering work in tsunami research, resulting in new insight into tsunami genesis and in advance a new approach to tsunami mitigation*

2011 **Finalist** for the Katerva Award in Human Development on tsunami detection

2010 **The year in science:** #84 Yardstick for Killer Waves, selected by *Discover Magazine* as one of the top 100 amazing discoveries

2008 **Ed Stone Award** for outstanding research on *Detecting tsunami genesis and scales directly from coastal GPS stations (JPL)*

2007 NASA **Tech Brief** award # NPO44443-CN: `Parallelization of the Coupled Earthquake-Tsunami Model`

2006 **Guest editor** of the special section "Dynamics and Circulation of the Yellow, East, and South China Sea", *JGR-Oceans*

1996 **Developer** of the S-Coordinate Rutgers University Model (SCRUM, United State Copyright ©1996-2096 #TXu 715-315)

Peer-Reviewed Publications

1. **Song, Y. T**., T. Lee, J.-H. Moon, T. Qu, and S. Yueh (2015), Modeling skin-layer salinity with an extended surface-salinity layer, *J. Geophys. Res. Oceans,* 120, doi:10.1002/2014JC010346.
2. Susanto, D. W, and **Y. T. Song** (2015), Indonesian throughflow proxy from satellite altimeters and gravimeters, *J. Geophys. Res. Oceans*, 119, 10.1002/2014JC010382.
3. Moon, J.-H., and **Y. T. Song** (2014), Seasonal salinity stratifications in the near-surface layer from Aquarius, Argo, and an ocean model: Focusing on the tropical Atlantic/Indian Oceans, *J. Geophys. Res. Oceans*, 119, doi:10.1002/ 2014JC009969.
4. Yueh, S., W. Tang, A. Fore, A. Hayashi, **Y. T. Song**, and G. Lagerloef (2014), Aquarius geophysical model function and combined active passive algorithm for ocean surface salinity and wind retrieval, *J. Geophys. Res. Oceans, 119(8),* 5360–5379, doi:10.1002/2014JC009939.
5. Qu, T., **Y. T. Song**, and C. Maes (2014), Sea surface salinity and barrier layer variability in the equatorial Pacific as seen from Aquarius and Argo, *J. Geophys. Res*. Oceans, DOI: 10.1002/2013JC009375.
6. Xu, Z. and **Y. T. Song** (2013), Combining the all-source Green's functions and the GPS-derived source for fast tsunami prediction – illustrated by the March 2011 Japan tsunami, *J. Atmos. Oceanic Te*ch., http://dx.doi.org/10.1175/JTECH-D-12-00201.1.
7. Ford, M., J. M. Becker, M. A. Merrifield, **Y. T. Song** (2013), Marshall Islands fringing reef and atoll lagoon observations of the Tohoku tsunami, *Pur Appl. Geophs*., doi:10.1007/s00024-013-0757-8.
8. Moon, J.-H., **Y. T. Song**, P. D. Bromirski, and A. J. Miller (2013), Multidecadal regional sea level shifts in the Pacific over 1958–2008, *J. Geophys. Res. Oceans*, 118, doi:10.1002/2013JC009297.
9. Moon, J.-H. and **Y. T. Song** (2013), Sea level and heat content changes in the western North Pacific. *J. Geophys. Res*. Oceans, 118, 2014-2022, doi:10.1002/jgrc.200.
10. **Song, Y. T**., I. Fukumori, C. K. Shum, and Y. Yi (2012), Merging tsunamis of the 2011 Tohoku-Oki earthquake detected over the open ocean, *Geophys. Res. Lett*., doi:10.1029/2011GL050767 (***Nature* Highlights, March 8, 2012**).
11. Galvan, D. A., A. Komjathy, M. P. Hickey, P. Stephens, J. Snively, **Y. T. Song,** M. D. Butala, and A. J. Mannucci (2012), Ionospheric signatures of Tohoku-Oki tsunami of March 11, 2011: Model comparisons near the epicenter, *Radio Sci.*, **47**, RS4003, doi:10.1029/2012RS005023.
12. **Song, Y. T**. and T. Qu (2011), Multiple satellite missions confirming the theory of seasonal oceanic variability in the northern Pacific, *Marine Geodesy*, DOI: 10.1080/01490419.2011.590110.
13. **Song, Y. T**. and F. Colberg (2011), Deep ocean warming assessed from altimeters, Gravity Recovery and Climate Experiment, in situ measurements, and a non-Boussinesq ocean general circulation model, *J. Geophys. Res*., **116**, C02020, doi:10.1029/2010JC006601.
14. **Song, Y. T**. and S.C. Han (2011), Satellite observations defying the long-held tsunami genesis theory, *D.L. Tang (ed.), Remote Sensing of the Changing Oceans,* DOI 10.1007/978-3-642-16541-2, Springer-Verlag Berlin Heidelberg.

15. **Song, Y. T**., R. Gross, X. Wang, and V. Zlotnicki (2010), A non-Boussinesq terrain-following OGCM for oceanographic and geodetic applications, *Advances in Geosciences*, **18** (Ocean Science 2008, Eds. Gan et al.), 63-86.
16. Fok, H.S., H.B. Iz, C.K. Shum, Y. Yi, O. Andersen, A. Braun, Y. Chao, G. Han, C.Y. Kuo, K. Matsumoto, and **Y. T. Song** (2010), Evaluation of ocean tide models used for Jason-2 altimetry corrections, *Marine Geodesy*, 33, 285-303, doi:10.1080/01490419.2010.491027.
17. Qu, T. and **Y. T. Song** (2009), Mindoro Strait and Sibutu Passage transports estimated from satellite data, *Geophys. Res. Lett*., 36, L09601, doi:10.1029/2009GL037314.
18. Qu, T., **Y. T. Song**, and T. Yamagata (2009), An Introduction to the South China Sea Throughflow: Its dynamics, variability, and application for climate, *Dynamics of Atmospheres and Oceans*, **47**, 3-14.
19. **Song, Y. T.** and V. Zlotnicki (2008), The subpolar ocean-bottom-pressure oscillation and its links to ENSO, *Int. J. Remote Sensing*, Vol. **29** (21), 6091-6107.
20. Zheng, Q., **Y. T. Song**, L. H. Lin, X. Hu, J. Meng, and D. Wang (2008), On generation source sites of internal waves in the Luzon Strait, *Act Oceanologica Sinica*, **27** (3), 38-50.
21. Xu, Q., Q. Zheng, H. Lin, Y. Liu, **Y. T Song**, and Y. Yuan (2008), Dynamical analysis of mesiscale eddy-induced ocean internal waves using linear theories, *Act Oceanologica Sinica*, **27** (3), 60-69.
22. Zheng, Q., **Y. T. Song**, C.-R. Ho, and H. Lin (2008), Statistics of internal waves in the South China Sea, *Satellite Remote Sensing of South China Sea (ed. A. K. Liu et al)*, Chapter **4**, 67-80.
23. **Song, Y. T**., L.-L. Fu, V. Zlotnicki, C. Ji, V. Hjorleifsdottir, C.K. Shum, and Y. Yi (2008): The role of horizontal impulses of the faulting continental slope in generating the 26 December 2004 Tsunami, *Ocean Modelling*, doi:10.1016/j.ocemod.2007.10.007**.**
24. **Song, Y. T**. (2007), Detecting tsunami genesis and scales directly from coastal GPS stations, *Geophys. Res. Lett*., **34**, L19602, doi:10.1029/2007GL031681.
25. Zheng, Q., H. Lin, J. Meng, X. Hu, and **Y. T. Song** (2007), Sub-mesoscale Ocean Vortex Trains in the Luzon Strait, *J. Geophys. Res*., 112, C03021, doi:10.1029/2006JC003551.
26. Zlotnicki, V., J. Wahr, I. Fukumori, and **Y. T. Song** (2006), The Antarctic Circumpolar Current: seasonal transport variability during 2002-2005, *J. Phys. Oceanogr*., 37, doi:10.1175/JPO3009.1.
27. **Song, Y. T.** (2006), Estimation of interbasin transport using ocean bottom pressure: Theory and model for Asian marginal seas, *J. Geophys. Res*., 111, C11S19, doi:10.1029/2005JC003189.
28. Zheng, Q., R. Dwi Susanto, Chung-Ru Ho, **Y. T. Song**, and Qing Xu (2006), Statistical and dynamical analyses of generation mechanisms of solitary internal waves in the northern South China Sea, *JGR-Oceans*, 112, C03021, doi:10.1029/2006JC003551.
29. Zheng, Q., G. Fang, and **Y. T. Song** (2006), Introduction to special section: Dynamics and circulation of the Yellow, East, and South China Sea, *J. Geophys. Res*., 111, C11S01, doi:10.1029/2005JC003261.

30. **Song, Y. T**. and T. Y. Hou (2006), Parametric vertical coordinate formulation for multiscale, Boussinesq, and non-Boussinesq ocean modeling, *Ocean Modelling*. Doi:10.1016/j.ocemod.2005.01.001.
31. **Song, Y. T**., C. Ji, L.-L. Fu, V. Zlotnicki, C.K. Shum, Y. Yi, and V. Hjorleifsdottir (2005), The 26 December 2004 Tsunami Source Estimated from Satellite Radar Altimetry and Seismic Waves, *Geophys. Res. Lett.*, **23**, doi:10.1029/2005GL023683.
32. Wang, P., **Y. T. Song**, Y. Chao, and H. Zhang (2005), Parallel computation of the Regional Ocean Model System (ROMS), *International Journal of High Performance Computing Applications*, Volume 19, No. 4, 375-385, UCRL-JRNL-211096.
33. **Song, Y. T.** and V. Zlotnicki (2004), Ocean bottom pressure waves predicted in the tropical Pacific, *Geophys. Res. Lett.,* Vol. 31, No. 5, L05306, 10.1029/2003GL018980.
34. Glenn, S. M., Arnone, R., Bergmann, T., Bissett, W. P., Crowley, M., Cullen, J., Gryzmski, J., Haidvogel. D., Kohut, J., Moline, M. A., Oliver, M., Orrico, C., Sherrell, R., **Song, Y. T**., Weidemann, A., Chant, R., Schofield (2004), The Biogeochemical impact of summertime coastal upwelling in the Mid-Atlantic Bight. *J. Geophys. Res.*, **109** (C12S02), DOI:10.1029/2003JC002265.
35. **Song, Y. T.** and Y. Chao (2004), The role of topography in coastal upwelling and cross-shore exchange: A theoretical study, *Ocean Modelling*, **6**(2), 151-176.
36. **Song, Y. T**. and T. Tang (2002), Eddy-resolving simulations for the Asian marginal seas and Kuroshio using the nonlinear-terrain following coordinate system, *J. Korean Oceanogr.*, **37**(3), 167-177.
37. **Song, Y. T**., D. Haidvogel, and S. Glenn (2001), The effects of topographic variability on the formation of upwelling centers off New Jersey: A theoretical model, *J. Geophys. Res.* **106**, 9223-9240.
38. **Song, Y. T**. and Y. Chao (2000), An embedded bottom boundary layer formulation for z-coordinate ocean models, *J. Atmos. Oceanic Te*ch., **17**, 546-560.
39. **Song, Y. T** (1998) A general pressure gradient formulation for ocean models. Part I: Scheme design and diagnostic analysis, *Month. Weather Rev.*, **126**, 3213-3230.
40. **Song, Y. T**. and D. Wright (1998), A general pressure gradient formulation for ocean models. Part II: Energy, momentum, and bottom torque consistency, *Monthly Weather Review*, **126**, 3231-3247.
41. Glenn, S., M. Crowley, D. Haidvogel, and **Y. T. Song** (1996), Underwater observatory captures coastal upwelling events off New Jersey, *EOS Trans. Amer. Geophys. Union*, **77**, 233, 236.
42. Lardner, R. W. and **Y. Song**, 1995: Optimal estimation of eddy viscosity and friction coefficients for a quasi-three-dimensional numerical tidal model, *Atmosphere-Ocean*, **33**, 581-611.
43. **Song, Y**. and T. Tang, 1994: On staggered Turkel-Zwas type schemes for the two-dimensional shallow water equations. *Month. Weather Rev.*, **122**, 223-234.
44. **Song, Y**. and D. Haidvogel, 1994: A semi-implicit primitive equation ocean circulation model using a generalized topography-following coordinate system. *J. Comput. Phys.*, **115**, 228-244. (**Over 570 citations as of 2015**)

45. **Song, Y.**, S. L. Das, and R. W. Lardner, 1994: Computation of density driven flows using the spectral method: Application to the Arabian Gulf. *Cont. Shelf Res.*, **14**, 1039-1052.
46. **Song, Y**. and D. Haidvogel, 1993: Numerical simulations of California Current System under the joint effect of coastal geometry and surface forcing, in M.L.Spaulding et al. (eds). *Estuarine and Coastal Modeling,* **3**, 216-234.
47. **Song, Y**. and T. Tang, 1993: Dispersion and group velocity in numerical schemes for three-dimensional hydrodynamic equations. *J. Comput. Phys.*, **105**, 72-82.
48. Lardner, R. W. and **Y. Song**, 1992: A comparison of spatial grids for numerical modeling of lows in near-coast seas, *Int. J. Numer. Methods. Fluids*, **14**, 109-124.
49. Lardner, R. W. and **Y. Song**, 1992: A hybrid spectal method for the three-dimensional numerical modeling of nonlinear flows in shallow seas, *J. Comput. Phys.*, **100**, 322-334.
50. Lardner, R. W. and **Y. Song**, 1991: An Algorithm for three-dimensional convection and diffusion with very different horizontal and vertical length scales, *Int. J. Numer. Methods Engineering.*, **32**, 1303-1319.
51. **Song, Y**. and M. Yang, 1986: Spectral approximation theory for multigroup neutron transport operators, *Acta Mathematica Scientia*, 6 (3), 339-352.
52. Zheng, S. and **Y. Song**, 1985: Characteristics of p>1-order quasi-collectively compact operator and its applications, *Science bulletin* (in Chinese), **12**, 896-900.