

Prof. Dr. Sung Yong Kim

Department of Mechanical Engineering
Korea Advanced Institute of Science and Technology (KAIST)
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Education

SCRIPPS INSTITUTION OF OCEANOGRAPHY,
UNIVERSITY OF CALIFORNIA, SAN DIEGO, USA
Ph.D. in Oceanography (Applied Ocean Science) 2003 – 2009

SEOUL NATIONAL UNIVERSITY, REPUBLIC OF KOREA
B.S. in Naval Architecture and Ocean Engineering
(Summa Cum Laude) 1995 – 1999

Professional Experiences

KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY, REPUBLIC OF KOREA
Associated Professor (tenured), Department of Mechanical Engineering 2020 – present

Assistant Professor, Department of Mechanical Engineering 2015 – 2020
Assistant Professor, Division of Ocean Systems Engineering 2012 – 2015
Adjunct Professor, Artificial Intelligence for KAIST Institute 2017 – 2020

SCRIPPS INSTITUTION OF OCEANOGRAPHY,
UNIVERSITY OF CALIFORNIA, SAN DIEGO, USA
Assistant Project Scientist (Academic) 2011 – 2012
Postdoctoral Researcher 2009 – 2011
Graduate Student Researcher 2003 – 2009

REPUBLIC OF KOREA NAVY, REPUBLIC OF KOREA
Intelligence Officer 2000 – 2003

Research Interests

Environmental fluid dynamics; Boundary layer problems
Air-sea and air-sea-land interaction processes; Mesoscale and submesoscale eddies
Oceanic turbulent flows; Ocean gravity and internal waves
Coastal oceanography and integrated coastal ocean observing system
Ocean sensing using acoustic and electromagnetic sensors
Inverse methods; Integrated statistical and dynamical data analysis

Professional Services (International)

NORTH PACIFIC MARINE SCIENCE ORGANIZATION (PICES)
MONITOR Technical Committee Chair 2019 – present
MONITOR Technical Committee 2014 – present
Science Board 2019 – present
Working Group 38: Mesoscale and Submesoscale Processes 2016 – 2021
Advisory Panel of North Pacific Coastal Ocean Observing Systems 2015 – present
Advisory Panel of North Pacific Coastal Ocean Observing Systems Co-Chairs

2015 – 2020

OCEAN OBSERVATIONS PHYSICS AND CLIMATE (OOPC) PANEL,
GLOBAL OCEAN OBSERVING SYSTEM (GOOS)
Boundary Currents and Shelf Sea Interactions (BC/SSI) Task Team 2019 – present

OCEANOBS'19
OceanObs Research Coordination Network 2019 – current
Program Committee 2019

UNITED NATIONS WORLD OCEAN ASSESSMENT
Pool of Experts and Writing Team (3rd cycle) 2021 – 2025
Pool of Experts and Writing Team (2nd cycle) 2016 – 2020
Pool of Experts (1st cycle) 2013 – 2015

EDITORIAL BOARD
Associate Editor, *Frontiers in Marine Science* (Coastal Ocean Processes) 2021– present
Review Editor, *Frontiers in Marine Science* (Coastal Ocean Processes) 2015 – 2021
Guest Associate Editor, *Ocean Dynamics* 2017 – 2019

Awards

Top 50 Best Science Books of the Year 2020, Ministry of Science and Information and
Communication Technology and Korea Foundation for the Advancement of Science and
Creativity 2020
Excellent Paper Award in Physical Oceanography, The Korean Society of Oceanography
2020
Sejong Academic Book Award, Publication Industry Promotion Agency of Korea 2020
Excellent Award in Oceans and Fisheries Science and Technology Grand Award, Ministry
of Oceans and Fisheries 2019
Young Korean Academy of Science and Technology, The Korean Academy of Science and
Technology 2017
Young Scientist Award, Pohang University of Science and Technology 2016
Young Scientist Excellent Paper Award, The Korean Society of Oceanography 2014
Young Frontier Research Scientists Award, The Korean Academy of Science and Technol-
ogy 2013
Undergraduate merit-based fellowship, Seoul National University 1996 – 1999

Refereed Publications

38. Ueno, H., A. Bracco, J. A. Barth D. Hasegawa, S. Itoh, **S. Y. Kim**, C. Ladd, Y.-G. Park, S. Prants, T. Ross, I. Rypina, Y. Sasai, O. O. Trusenkova, Y. Zhong, 2022: Review - Oceanic mesoscale processes in the North Pacific: Physical and biogeochemical impacts, *Prog. Oceanogr.* doi.org/10.1016/j.pocean.2022.102955

37. Lee, E. A. and **S. Y. Kim**, 2021: An investigation of the Helmholtz and wave-vortex decompositions on surface currents in a coastal region, *Cont. Shelf Res.* doi:10.1016/j.csr.2022.104683

36. Lee, E. A. and **S. Y. Kim**, 2021: A diagnosis of surface currents and sea surface heights in a coastal region, *Cont. Shelf Res.* doi:10.1016/j.csr.2021.104486

35. **International Altimetry Team (incl. S. Y. Kim)**, 2021: Altimetry for the Future: Building on 25 years of progress, *Adv. Space Res.*, 68, 319 - 363, doi:10.1016/j.asr.2021.01.02

34. Won, S. I.[†], **S. Y. Kim**, and K. O. Kim, 2019: Submesoscale surface tidal, vortical, and residual circulations in a semi-enclosed bay, *J. Geophys. Res. Oceans* doi:10.1002/2018JC014892, 124(7), 5105–5137, doi:10.1002/2018JC014892 [Excellent Paper Award in Physical Oceanography, The Korean Society of Oceanography (2020)]
33. Lee, E. A., **S. Y. Kim**, and H. S. Min, 2019: Climatological descriptions on regional circulation around the Korean Peninsula, *Tellus A: Dynamic Meteorology & Oceanography*, 71:1, 1–22, doi:10.1080/16000870.2019.1604058
32. Lee, E. A. and **S. Y. Kim**, 2018: Regional variability and turbulent characteristics of the satellite-sensed submesoscale surface chlorophyll concentrations, *J. Geophys. Res. Oceans* 123(6), 4250–4279, doi:10.1002/2017JC013732 [Excellent Award in Oceans and Fisheries Science and Technology Grand Award, Ministry of Oceans and Fisheries (2019)]
31. Yoo, J. G., **S. Y. Kim**, and H. S. Kim, 2018: Spectral descriptions of submesoscale surface circulation in a coastal region, *J. Geophys. Res. Oceans* 123(6), 4224–4249, doi:10.1002/2016JC012517 [Excellent Award in Oceans and Fisheries Science and Technology Grand Award, Ministry of Oceans and Fisheries (2019)]
30. Soh, H. S. and **S. Y. Kim**, 2018: Diagnostic characteristics of submesoscale coastal surface currents, *J. Geophys. Res. Oceans* 123(3), 1838–1859, doi:10.1002/2017JC013428
29. Soh, H. S., **S. Y. Kim**, P. M. Kosro, and A. L. Kurapov, 2018: Do non-orthogonally and irregularly sampled scalar velocities contain sufficient information to reconstruct an orthogonal vector current field?, *J. Atmos. Oceanic Tech.*, 35(4), 763–795, doi:10.1175/JTECH-D-17-0062.1
28. Yoo, J. G., **S. Y. Kim**, B. D. Cornuelle, P. M. Kosro, and A. L. Kurapov, 2017: A non-interpolated estimate of horizontal spatial covariance from non-orthogonally and irregularly sampled scalar velocities, *J. Atmos. Oceanic Tech.* 34(11), 2407–2430, doi:10.1175/JTECH-D-17-0100.1
27. Jeong, H. J., A. S. Lim, K. Lee, M. J. Lee, K. A. Seong, N. S. Kang, S. H. Jang, K. H. Lee, S. Y. Lee, M. O. Kim, J. H. Kim, J. E. Kwon, H. C. Kang, J. S. Kim, W. Yih, K. Shin, P. K. Jang, J. H. Ryu, **S. Y. Kim**, J. Y. Park, and K. Y. Kim, 2017: Ichthyotoxic *Cochlodinium polykrikoides* red tides offshore in the South Sea, Korea in 2014: I. Temporal variations in three-dimensional distributions of red-tide organisms and environmental factors, *Algae* 32(2), 101–130, doi:10.4490/algae.2017.32.5.30
26. **Kim, S. Y.**, A. L. Kurapov, and P. M. Kosro, 2015: Influence of varying upper ocean stratification on coastal near-inertial currents, *J. Geophys. Res. Oceans* 120(12), 8504–8527 doi:10.1002/2015JC011153
25. **Kim, S. Y.** and B. D. Cornuelle, 2015: Coastal ocean climatology of temperature and salinity off the Southern California Bight: Seasonal variability, climate index correlation, and linear trend, *Prog. Oceanogr.* 138, 136–157, doi:10.1016/j.pocean.2015.08.001
24. **Kim, S. Y.**, 2015: Quality assessment techniques applied to surface radial velocity maps obtained from high-frequency radars, *J. Atmos. Oceanic Tech.* 32(10), 1915–1927, doi:10.1175/JTECH-D-14-00207.1
23. Rogowski, P. A., E. Terrill, K. Schiff, and **S. Y. Kim**, 2015: An assessment of the transport of southern California stormwater ocean discharges, *Mar. Pollut. Bull.* 90(1-2), 135–142, doi:10.1016/j.marpolbul.2014.11.004
22. **Kim, S. Y.**, G. Gopalakrishnan, and A. Ponte, 2015: Interpretation of coastal wind transfer functions with momentum balances derived from idealized numerical model simulations, *Ocean Dyn.* 65(1), 115–141, DOI: 10.1007/s10236-014-0766-x

^{1†} The underline indicates graduate students under supervision.

21. Leising, A. W., S. J. Bograd, I. D. Schroeder, E. P. Bjorkstedt, J. Field, K. Sakuma, J. Abell, R. R. Robertson, J. Tyburczy, W. T. Peterson, R. Brodeur, C. Barcelo, T. D. Auth, G. S. Campbell, J. A. Hildebrand, R. M. Suryan, A. J. Gladics, C. A. Horton, M. Kahru, M. Manzano-Sarabia, S. McClatchie, E. D. Weber, W. Watson, J. A. Santora, W. J. Sydeman, S. R. Melin, R. L. DeLong, J. Largier, **S. Y. Kim**, F. P. Chavez, R. T. Golightly, S. R. Schneider, P. Warzybok, R. Bradley, J. Jahncke, J. Fisher, and J. Peterson, 2014: State of the California 2013 - 2014: El Nino looming, vol. 55, 51–87, *CalCOFI Rep.*
20. **Kim, S. Y.**, P. M. Kosro, and A. L. Kurapov, 2014: Evaluation of directly wind-coherent near-inertial surface currents off Oregon using a statistical parameterization and analytical and numerical models, *J. Geophys. Res. Oceans* 119(10), 6631–6654, doi:10.1002/2014JC010115
19. **Kim, S. Y.** and G. Crawford, 2014: Resonant ocean current responses driven by coastal winds near the critical latitude, *Geophys. Res. Lett.* 41, 5581–5587, doi:10.1002/2014GL060402
18. A. Verdy, M. R. Mazloff, B. D. Cornuelle, and **S. Y. Kim**, 2014: Wind-driven sea level variability on the California Coast: An adjoint sensitivity analysis, *J. Phys. Oceanogr.* 44(1), 297–318 doi:10.1175/JPO-D-13-018.1
17. **Kim, S. Y.**, 2014: A statistical description on the wind-coherent responses of sea surface heights off the U.S. West Coast, *Ocean Dyn.* 64(1), 29–46, DOI: 10.1007/s10236-013-0668-3
16. **Kim, S. Y.**, B. D. Cornuelle, E. J. Terrill, B. Jones, L. Washburn, M. A. Moline, J. D. Paduan, N. Garfield, J. L. Largier, G. Crawford, and P. M. Kosro, 2013: Poleward propagating subinertial alongshore surface currents off the U.S. West Coast, *J. Geophys. Res. Oceans* 118(12), 6791–6806, doi:10.1002/jgrc.20400 [Featured in EOS Research Spotlight (doi:10.1002/2013EO480011)]
15. B. Wells, I. Schroeder, J. A. Santora, E. L. Hazen, S. J. Bograd, E. Bjorkstedt, V. J. Loeb, S. McClatchie, E. Weber, W. Watson, A. Thompson, B. Peterson, R. Brodeur, J. Harding, J. Field, K. Sakuma, S. Hayes, W. J. Sydeman, M. Losekoot, S. A. Thompson, J. Largier, **S. Y. Kim**, F. Chavez, C. Barcelo, P. Warzybok, R. Bradley, J. Jahncke, R. Goericke, G. S. Campbell, J. A. Hildebrand, S. R. Melin, R. L. DeLong, J. Gomez-Valdes, B. Lavaniegos, G. Gaxiola-Castro, R. T. Golightly, S. R. Schneider, N. Lo, R. M. Suryan, A. J. Gladics, C. A. Horton, J. Fisher, C. Morgan, J. Peterson, E. A. Daly, T. Auth, and J. Abell, 2013: State of the California Current 2012 – 2013: No such thing as an ‘average’ year, vol. 54, 37–71, *CalCOFI Rep.*
14. **Kim, S. Y.** and P. M. Kosro, 2013: Observations of near-inertial surface currents off Oregon: Decorrelation time and length scales, *J. Geophys. Res. Oceans* 118(7), 3723–3736, doi:10.1002/jgrc.20235 [Young Scientist Excellent Paper Award, The Korean Society of Oceanography (2014); Featured in KAIST News (2014)]
13. C. Roesler, W. Emery, and **S. Y. Kim**, 2013: Evaluating the use of high-frequency radar coastal currents to correct satellite altimetry, *J. Geophys. Res. Oceans* 118(7), 3240–3259, doi:10.1002/jgrc.20220
12. E. Bjorkstedt, R. Goericke, S. McClatchie, E. Weber, W. Watson, B. Peterson, R. Brodeur, S. Bograd, T. Auth, J. Fisher, C. Morgan, J. Peterson, R. Durazo, G. Gaxiola-Castro, B. Lavaniegos, F. Chavez, C. A. Collins, B. Hannah, J. Field, K. Sakuma, P. Warzybok, R. Bradley, J. Jahncke, W. Sydeman, S. A. Thompson, J. Largier, **S. Y. Kim**, and J. Abell, 2012: State of the California Current 2011 – 2012: Ecosystems respond to local forcing as La Niña wavers and wanes, vol. 53, 41–76, *CalCOFI Rep.*

Prior to joining KAIST

11. E. Bjorkstedt, R. Goericke, S. McClatchie, E. Weber, W. Watson, N. Lo, B. Peterson, B. Emmett, R. Brodeur, J. Peterson, M. Litz, J. Gomez-Valdez, G. Gaxiola-Castro, B. Lavanigos, F. Chavez, C. A. Collins, J. Field, K. Sakuma, P. Warzybok, R. Bradley, J. Jahncke, S. Bograd, F. Schwing, G. S. Campbell, J. Hildebrand, W. Sydeman, S. A. Thompson, J. Largier, C. Halle, **S. Y. Kim**, and J. Abell, 2011: State of the California Current 2010 – 2011: Regionally variable responses to a strong (but fleeting?) La Niña, vol. 52, 36–68, *CalCOFI Rep.*
10. **Kim, S. Y.**, E. J. Terrill, B. D. Cornuelle, B. Jones, L. Washburn, M. A. Moline, J. D. Paduan, N. Garfield, J. L. Largier, G. Crawford, and P. M. Kosro, 2011: Mapping the U.S. West Coast surface circulation: A multi-year analysis of high-frequency radar observations, *J. Geophys. Res. Oceans* 116, C03011, doi:10.1029/2010JC006669 [Featured in AGU Editors' Highlight, EOS Research Spotlight (doi:10.1029/2011EO210009), and Scripps News (2011)]
9. E. Bjorkstedt, R. Goericke, S. McClatchie, E. Weber, W. Watson, N. Lo, B. Peterson, B. Emmett, J. Peterson, R. Durazo, G. Gaxiola-Castro, F. Chavez, J. T. Pennington, C. A. Collins, J. Field, S. Ralston, K. Sakuma, S. Bograd, F. Schwing, Y. Xue, W. Sydeman, S. A. Thompson, J. A. Santora, J. L. Largier, C. Halle, S. Morgan, **S. Y. Kim**, K. Merckens, J. Hildebrand, and L. Munger, 2010: State of the California Current 2009 – 2010: Regional variation persists through transition from La Niña to El Niño (and back?), vol. 51, 39–69, *CalCOFI Rep.*
8. **Kim, S. Y.**, B. D. Cornuelle, and E. J. Terrill, 2010: Decomposing observations of high-frequency radar derived surface currents by their forcing mechanisms: Locally wind-driven surface currents. *J. Geophys. Res. Oceans* 115, C12046, doi:10.1029/2010JC006223
7. **Kim, S. Y.**, B. D. Cornuelle, and E. J. Terrill, 2010: Decomposing observations of high-frequency radar derived surface currents by their forcing mechanisms: Decomposition techniques and spatial structures of decomposed surface currents. *J. Geophys. Res. Oceans* 115, C12007, doi:10.1029/2010JC006222
6. **Kim, S. Y.**, 2010: Observations of submesoscale eddies using high-frequency radar-derived kinematic and dynamic quantities. *Cont. Shelf Res.* 30, 1639–1655, doi:10.1016/j.csr.2010.06.011
5. **Kim, S. Y.**, E. J. Terrill, and B. D. Cornuelle, 2009: Assessing coastal plumes in a region of multiple discharges: The U.S.–Mexico border. *Environ. Sci. Tech.* 43(19), 7450–7457, doi:10.1021/es900775p
4. **Kim, S. Y.**, B. D. Cornuelle, and E. J. Terrill, 2009: Anisotropic response of surface currents to the wind in a coastal region. *J. Phys. Oceanogr.* 39(6), 1512–1533, doi:10.1175/2009JPO4013.1
3. Hoteit, I., B. D. Cornuelle, **S. Y. Kim**, G. Forget, A. Köhl, and E. J. Terrill, 2009: Assessing 4D-VAR for dynamical mapping of coastal high-frequency radar in San Diego. *Dynam. Atmos. Oceans* 48, 175–197, doi:10.1016/j.dynatmoce.2008.11.005
2. **Kim, S. Y.**, E. J. Terrill, and B. D. Cornuelle, 2008: Mapping surface currents from HF radar radial velocity measurements using optimal interpolation. *J. Geophys. Res. Oceans* 113, C10023, doi:10.1029/2007JC004244
1. **Kim, S. Y.**, E. J. Terrill, and B. D. Cornuelle, 2007: Objectively mapping HF radar-derived surface current data using measured and idealized data covariance matrices. *J. Geophys. Res. Oceans* 112, C06021, doi:10.1029/2006JC003756