

**Sinéad Louise Farrell, Ph.D.**, is an Associate Research Scientist at the Earth System Science Interdisciplinary Center (ESSIC) at the University of Maryland, College Park. She is a visiting scientist at the Laboratory for Satellite Altimetry, National Oceanic and Atmospheric Administration (NOAA) Center for Weather and Climate Prediction (NCWCP). Dr. Farrell is also affiliated with the Cryospheric Sciences Branch (Code 615) at the NASA Goddard Space Flight Center (GSFC). Previously Dr. Farrell was a National Research Council Research Associate at NOAA between 2007 and 2009. She studied at University College London and received an M.Sci. in Earth and Space Science in 2002, and a Ph.D. in Space and Climate Physics in 2007, for her dissertation on satellite laser altimetry over sea ice.

Dr. Farrell has over a decade of experience in remote sensing of the polar oceans using satellite and airborne altimetry for marine geophysics and cryospheric investigations. Current research topics include understanding the seasonal and inter-annual variability of Arctic sea ice thickness and volume, the mean dynamic topography and circulation of the Arctic Ocean, and the marine gravity field of the Arctic Ocean. A major component of this research involves analyses and cross-comparison of altimetry data from satellite missions including ICESat-2, ICESat, CryoSat-2, Envisat, and ERS-2, as well as airborne missions such as NASA's Operation IceBridge.

Dr. Farrell currently serves as a principal investigator on both the NASA ICESat-2 Science Definition Team (SDT) and the NASA/NOAA Ocean Surface Topography Science Team (OSTST). She served as a member of the NASA Operation IceBridge Science Team from 2009-2016.

#### **Peer-reviewed Publications**

Shepherd, A., H. A. Fricker, S. L. Farrell (2018), Trends and Connections Across the Antarctic Cryosphere, *Nature*, 558, 223-232, <https://doi.org/10.1038/s41586-018-0171-6>.

Blanchard-Wrigglesworth, E., M. Webster, S. L. Farrell and C. Bitz (2018), Reconstruction of Snow on Arctic Sea Ice, *J. Geophys. Res.*, <https://doi.org/10.1002/2017JC013364>

Allard, R. A., S. L. Farrell, D. A. Hebert, W. F. Johnston, L. Li, N. T. Kurtz, M. W. Phelps, P. G. Posey, R. Tilling, A. Ridout, A. J. Wallcraft (2018), Utilizing CryoSat-2 Ice Thickness to Initialize a Coupled Ice-Ocean Modeling System, *Advances in Space Res.*, <https://doi.org/10.1016/j.asr.2017.12.030>

Duncan, K., S. L. Farrell, L. N. Connor, J. Richter-Menge and R. Dominguez (2018), High-Resolution Airborne Observations of Sea Ice Pressure-Ridge Sail Height, *Annals of Glaciology*, <https://doi.org/10.1017/aog.2018.2>

Perovich, D. K., W. Meier, M. Tschudi, S. Farrell, S. Hendricks, S. Gerland, C. Haas, T. Krumpen, C. Polashenski, R. Ricker and M. Webster (2017), Sea ice, *Arctic Report Card 2017*, peer-reviewed. <http://www.arctic.noaa.gov/Report-Card/Report-Card-2017/ArtMID/7798/ArticleID/699/Sea-Ice>

Skourup, H., S. L. Farrell, S. Hendricks, R. Ricker, T. W. K. Armitage, A. Ridout, O. B. Andersen, C. Haas and S. Baker (2017), An Assessment of State-of-the-Art Mean Sea Surface and Geoid Models of the Arctic Ocean: Implications for Sea Ice Freeboard Retrieval, *J. Geophys. Res.: Oceans*, 122, <https://doi.org/10.1002/2017JC013176>

Kwok, R., N. T. Kurtz, L. Brucker, A. Ivanoff, T. Newman, S. L. Farrell, J. King, S. Howell, M. A. Webster, J. Paden, C. Leuschen, J. A. MacGregor, J. Richter-Menge, J. Harbeck and M. Tschudi (2017), Intercomparison of snow depth retrievals over Arctic sea ice from radar data

acquired by Operation IceBridge, *The Cryosphere*, 11, 2571-2593,  
<https://doi.org/10.5194/tc-11-2571-2017>

Cole, S. T., J. M. Toole, R. Lele, M.-L. Timmermans, S. G. Gallaher, T. P. Stanton, W. J. Shaw, B. Hwang, T. Maksym, J. P. Wilkinson, M. Ortiz, H. Graber, L. Rainville, A. A. Petty, S. L. Farrell, J. A. Richter-Menge and C. Haas (2017), Ice and ocean velocity in the Arctic marginal ice zone: Ice roughness and momentum transfer, *Elementa Sci. Anth.*, 5(55),  
<http://doi.org/10.1525/elementa.241>

Perovich, D., W. Meier, M. Tschudi, S. Farrell, S. Gerland, S. Hendricks, T. Krumpen and C. Haas (2017), Sea ice cover [in "State of the Climate in 2016"], *Bull. Amer. Meteor. Soc.*, 98(8), S131–S133

Yan, J.-B., S. Gogineni, F. Rodriguez-Morales, D. Gomez-Garcia, J. Paden, J. Li, C. Leuschen, D. Braaten, J. Richter-Menge, S. Farrell, J. Brozena and R. Hale (2017), Airborne Measurements of Snow Thickness: Using ultrawide-band frequency-modulated-continuous-wave radars, *IEEE Geosci. Rem. Sens. Mag.*, 5(2), pp. 57-76, <https://doi.org/10.1109/MGRS.2017.2663325>

Markus, T., T. Neumann, A. Martino, W. Abdalati, K. Brunt, B. Csatho, S. Farrell, H. Fricker, A. Gardner, D. Harding, M. Jasinski, R. Kwok, L. Magruder, D. Lubin, S. Luthcke, J. Morison, R. Nelson, A. Neuenschwander, S. Palm, S. Popescu, CK Shum, B. E. Schutz, B. Smith, Y. Yang and J. Zwally (2017), The Ice, Cloud, and land Elevation Satellite-2 (ICESat-2): Science requirements, concept, and implementation, *Rem. Sens. Environ.*, 190, 260-273,  
<https://doi.org/10.1016/j.rse.2016.12.029>

Perovich, D. K., W. Meier, M. Tschudi, S. Farrell, S. Gerland, S. Hendricks, T. Krumpen and C. Haas (2016), Sea ice, *Arctic Report Card 2016*, peer-reviewed.  
<http://arctic.noaa.gov/Report-Card/Report-Card-2016/ArtMID/5022/ArticleID/286/Sea-Ice>

Perovich, D., W. Meier, M. Tschudi, S. Farrell, S. Gerland and S. Hendricks (2016), Sea ice cover [in "State of the Climate in 2015"], *Bull. Amer. Meteor. Soc.*, 97(8), S134–S135

Petty, A., M. Tsamados, N. Kurtz, S. Farrell, T. Newman, J. Harbeck, D. Feltham and J. Richter-Menge (2016), Characterizing Arctic sea ice topography using high-resolution IceBridge data, *The Cryosphere*, 10(3), 1161

Perovich, D. K., W. Meier, M. Tschudi, S. Farrell, S. Gerland and S. Hendricks (2015), Sea ice, *Arctic Report Card 2015*, peer-reviewed. <http://arctic.noaa.gov/Report-Card/Report-Card-2015/ArtMID/5037/ArticleID/217/Sea-Ice>

Blanchard-Wrigglesworth, E., S. L. Farrell, T. Newman and C. M. Bitz (2015), Snow cover on Arctic sea ice in observations and an Earth System Model, *Geophys. Res. Lett.*,  
<https://doi.org/10.1002/2015GL066049>

Farrell, S. L., K. M. Brunt, J. M. Ruth, J. M. Kuhn, L. N. Connor and K. M. Walsh (2015), Sea Ice Freeboard Retrieval using Digital Photon-counting Laser Altimetry, *Ann. Glaciol.*, 56(69), 167–174, <https://doi.org/10.3189/2015AoG69A686>

Newman T., S. L. Farrell, J. Richter-Menge, B. Elder, L. Connor, N. Kurtz and D. McAdoo (2014), Assessment of Radar-derived Snow Depth Measurements over Arctic sea ice, *J. Geophys. Res.*, 119, 8578–8602, <https://doi.org/10.1002/2014JC010284>

Webster, M. A., I. G. Rigor, S. V. Nghiem, N. T. Kurtz, S. L. Farrell, D. K. Perovich and M. Sturm (2014), Interdecadal Changes in Snow Depth on Arctic Sea Ice, *J. Geophys Res.*, 119,  
<https://doi.org/10.1002/2014JC009985>

Tsamados, M., D. Feltham, D. Schroeder, D. Flocco, S. Farrell, N. Kurtz, S. Laxon, and S. Bacon (2014), Impact of atmospheric and oceanic form drag on simulations of Arctic sea ice, *J. Phys. Oceanog.*, 44, 1329-1353, <https://doi.org/10.1175/JPO-D-13-0215.1>

Richter-Menge, J., and S. L. Farrell (2013), Arctic Sea Ice Conditions in Spring 2009 - 2013 Prior to Melt, *Geophys. Res. Lett.*, 40, 5888-5893, <https://doi.org/10.1002/2013GL058011>

Kurtz, N., S. L. Farrell, M. Studinger, N. Galin, J. Harbeck, R. Lindsay, V. Onana, B. Panzer, and J. Sonntag (2013), Sea ice thickness, freeboard, and snow depth products from Operation IceBridge airborne data, *The Cryosphere*, 7, 1035-1056, <https://doi.org/10.5194/tc-7-1035-2013>

Connor, L. C., S. L. Farrell, D. C. McAdoo, W. B. Krabill, and S. Manizade (2013), Validating ICESat over thick sea ice in the northern Canada Basin, *IEEE Transactions on Geoscience & Remote Sensing*, 51(4), 2188-2200, <https://doi.org/10.1109/TGRS.2012.2211603>

Laxon, S.W., Giles, K. A., Ridout, A. L., Wingham, D. J., Willatt, R., Cullen, R., Kwok, R., Schweiger, A., Zhang, J., Haas, C., Hendricks, S., Krishfield, R., Kurtz, N., Farrell, S. L., Davidson, M. (2013), CryoSat Estimates of Arctic Sea Ice Volume, *Geophys. Res. Lett.*, 40(4), 732-737, <https://doi.org/10.1002/grl.50193>

McAdoo, D. C., S. L. Farrell, S. W. Laxon, A. L. Ridout, H. J. Zwally and D. Yi (2013), Gravity of the Arctic Ocean from satellite data with validations using airborne gravimetry: oceanographic implications, *J. Geophys. Res.*, 118, 917-930, <https://doi.org/10.1002/jgrc.20080>

Kurtz, N., M. Studinger, S. Farrell, J. Paden, J. Richter-Menge, J. Sonntag, and J. Yungel (2013), IceBridge Airborne Survey Data Support Arctic Sea Ice Predictions, *EOS Trans. AGU*, 94(4), 41, <https://doi.org/10.1002/2013E0040001>

Onana, V. D. P., N. T. Kurtz, S. Farrell, L. S. Koenig, M. Studinger, and J. P. Harbeck (2013), A Sea Ice Lead Detection Algorithm for use with High Resolution Airborne Visible Imagery, *IEEE Trans. Geosci. & Rem. Sens.*, 51(1), 38-56, <https://doi.org/10.1109/TGRS.2012.2202666>

Farrell, S. L., N. Kurtz, L. N. Connor, B. C. Elder, C. Leuschen, T. Markus, D. C. McAdoo, B. Panzer, J. Richter-Menge, and J. G. Sonntag (2012b), A First Assessment of IceBridge Snow and Ice Thickness Data Over Arctic Sea Ice, *IEEE Trans. Geosci. & Rem. Sens.*, 50(6), 2098 - 2111, <https://doi.org/10.1109/TGRS.2011.2170843>

Gardner, J., J. Richter-Menge, S. Farrell, and J. M. Brozena (2012), Coincident multiscale estimates of Arctic sea ice thickness, *EOS Trans. AGU*, 93(6), 57, <https://doi.org/10.1029/2012E0060001>

Farrell, S. L., D. C. McAdoo, S. W. Laxon, H. J. Zwally, D. Yi, A. Ridout, and K. Giles (2012a), Mean Dynamic Topography of the Arctic Ocean, *Geophys. Res. Lett.*, 39, L01601, <https://doi.org/10.1029/2011GL050052>

Kurtz, N. T. and S. L. Farrell (2011), Large-scale surveys of snow depth on Arctic sea ice from Operation IceBridge, *Geophys. Res. Lett.*, 38, L20505, <https://doi.org/10.1029/2011GL049216>

Kurtz, N. T., T. Markus, S. L. Farrell, D. L. Worthen, and L. N. Boisvert (2011), Observations of recent Arctic sea ice volume loss and its impact on ocean-atmosphere energy exchange and ice production, *J. Geophys. Res.*, 116, C04015, <https://doi.org/10.1029/2010JC006235>

Farrell, S. L., T. Markus, R. Kwok, L. Connor (2011), Laser Altimetry Sampling Strategies over Sea Ice, *Annals of Glaciology*, 52(57), 69-76, <https://doi.org/10.3189/172756411795931660>

Abdalati, W., H. J. Zwally, R. Bindenschadler, B. Csatho, S. L. Farrell, H. A. Fricker, D. Harding, R. Kwok, M. Lefsky, T. Markus, A. Marshak, T. Neumann, S. Palm, B. Schutz, B. Smith, J. Spinhirne, C. Webb (2010), The ICESat-2 Laser Altimetry Mission, *Proc. IEEE*, 98(5), 735 – 751, <https://doi.org/10.1109/JPROC.2009.203476>

Kwok, R., S. Farrell, R. Forsberg, K. Giles, S. Laxon, D. McAdoo, J. Morison, L. Padman, C. Peralta-Ferriz, A. Proshutinsky, and M. Steele (2010), Combining satellite altimetry, time-variable gravity, and bottom pressure observations to understand the Arctic Ocean: A transformative opportunity, in *Proc. OceanObs09: Sustained Ocean Observations and Information for Society (Vol. 2)*, Hall, J., D. E. Harrison and D. Stammer (eds.), Venice, Italy, 21-25 September 2009, ESA Publication WPP-306 [Refereed].

Farrell, S. L., S. W. Laxon, D. C. McAdoo, D. Yi, and H. J. Zwally (2009), Five years of Arctic sea ice freeboard measurements from the Ice, Cloud and land elevation Satellite, *J. Geophys. Res.*, 114, C04008, <https://doi.org/10.1029/2008JC005074>

McAdoo, D. C., S. L. Farrell, S. W. Laxon, H. J. Zwally, D. Yi, and A. L. Ridout (2008), Arctic Ocean Gravity Field Derived from ICESat and ERS-2 Altimetry: Tectonic Implications, *J. Geophys. Res.*, 113, B05408, <https://doi.org/10.1029/2007JB005217>

#### **Technical Notes and White Papers**

Starkweather, S., S. Farrell, S. Helfrich and J. Intrieri (2018), The Case for a Framework – Optimizing Observing Data Systems for Sea Ice Forecasting and Monitoring under the Arctic Observing Network, Arctic Observing Summit 2018, [white paper](#).

Wilson, C., S. L. Farrell, D. Robinson, J. Sevardjian and V. Lance (2018), PolarWatch – A NOAA Initiative to Increase Access to Ocean Remote Sensing Data Products for the Arctic and Southern Oceans, Arctic Observing Summit 2018, [short statement](#).

Haas, C., S. Baker, J. Beckers, S. L. Farrell, J. Gaudelli, S. Hendricks, J. King, R. Ricker, G. Spreen (2016), CryoSat Sea Ice Product Validation using CryoVex and IceBridge campaign data, *European Space Agency CryoVal – Sea Ice Technical Note 3: Assessment of Different Sources of Uncertainty*, CVSI-TN-WP3-3001, Issue 1.1

Haas, C. and S. L. Farrell (2015), CryoSat Sea Ice Product Validation using CryoVex and IceBridge campaign data, *European Space Agency CryoVal – Sea Ice Technical Note 1: Review of the CryoSat sea ice retrieval error budget and comparison with ICESat*, CVSI-TN-YU-1001, Issue 1

Farrell, S. L., N. Kurtz, L. N. Connor, B. C. Elder, C. Leuschen, T. Markus, D. C. McAdoo, B. Panzer, J. Richter-Menge, and J. G. Sonntag (2012), [Front Cover](#), *IEEE Transactions on Geoscience & Remote Sensing*, 50 (6), C1, doi: 10.1109/TGRS.2012.2198310

Farrell, S. L. (ed.) (2010), Interdisciplinary investigations of sea ice at the onset of the melt season: a case study on land-fast ice off Barrow, Alaska, in *Handbook on field techniques in sea-ice research - A sea-ice system services approach*, Eicken, H., R. Gradinger, M. Salganek, K. Shirasawa, D. Perovich, M. Lepparanta (eds.), University of Alaska Press, (published electronically on [Multimedia DVD](#) accompanying book).

Farrell, S. L. (2007), *Satellite Laser Altimetry Over Sea Ice*, [Ph.D. thesis](#), 224 pp., Univ. College London, London, United Kingdom.