

Josh Willis  
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## **Education**

B.S., Physics & Mathematics, University of Houston, Honors College, Houston, Texas (1996)  
M.S., Physics, University of California, San Diego, La Jolla, California (1998)  
Ph.D. Oceanography, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California (2004)

## **Professional Experience**

### Jet Propulsion Laboratory

- Principal Investigator, OMG: Oceans Melting Greenland (Earth Ventures – Suborbital, 2015 to 2020)
- Project Scientist, Jason-CS, (2016 to present)
- Project Scientist, Jason-3, (2011 to present)
- Co-Chair, Ocean Surface Topography Science Team, (2009 to present)
- Deputy Project Scientist, Jason-1 & Jason-2, (2009 to present)
- Scientist (Oceanography), (2006 to present). Conduct research on sea level rise, ocean warming and changes in the general circulation of the world ocean.

### Jet Propulsion Laboratory

- Caltech Postdoctoral Scholar, (2004 to 2006). Conducted research on the general circulation of the upper ocean using satellite measurements of sea surface height from the Jason and TOPEX altimeters and Argo float data. Studied global- and basin-scale, climate-related ocean variability using a variety of data analysis and assimilation techniques and ocean models.

## **Research Interests**

- Understanding ocean ice interactions in Greenland and their contribution to sea level rise.
- Estimating ocean warming and sea level rise on regional to global scales.
- The role of the ocean in the Earth's climate system under global climate change.
- Understanding large scale changes in the ocean and its circulation on interannual to decadal time scales.
- Development of analysis techniques for global oceanographic data sets.

## **Membership and Service in Technical Organizations**

Co-Chair, Ocean Surface Topography Science Team (2009 to present)  
Member, US Argo Science and Implementation Panel (2010 to present)  
Member, Ocean Salinity Science Team (2009 to present)

Member, GRACE Science Team (2006 to present)

Steering Committee, Atlantic Meridional Overturning Circulation Science Team (2008 to 2013)

### **Awards and Honors**

- 2007 Contributing author to the IPCC Fourth Assessment Report (Chapter 5)
- 2008 Dr. Charles K. Witham Environmental Stewardship Award, JPL
- 2009 Ranger Award for contributions to the Jason-1 and Jason-2 Missions, JPL
- 2009 Presidential Early Career Award for Scientists and Engineers (PECASE)
- 2009 JPL Lew Allen Award for Excellence
- 2011 AGU Ocean Sciences Early Career Award
- 2012 NASA Exceptional Scientific Achievement Medal
- 2016 Bruce Murray Award for Excellence in Education and Public Engagement

## Refereed Publications

- Ala Khazendar, Ian G. Fenty, Dustin Carroll, Alex Gardner, Craig M. Lee, Ichiro Fukumori, Ou Wang, Hong Zhang, H el ene Seroussi, Delwyn Moller, Brice P. Y. No el, Michiel R. van den Broeke, Steven Dinardo, **J. K. Willis** (2019), Interruption of Two Decades of Jakobshavn Isbrae Acceleration and Thinning as Regional Ocean Cools, *Nature Geoscience*, **12**, 277–283 (2019). <https://doi.org/10.1038/s41561-019-0329-3>.
- Willis, J.K.**, D. Carroll, I. Fenty, G. Kohli, A. Khazendar, M. Rutherford, N. Trenholm, and M. Morlighem (2018), Ocean-ice interactions in Inglefield Gulf: Early results from NASA’s Oceans Melting Greenland mission. *Oceanography* 31(2). <https://doi.org/10.5670/oceanog.2018.211>.
- An L, Rignot E, Millan R, Tinto K, **Willis J.** Bathymetry of Northwest Greenland Using “Ocean Melting Greenland” (OMG) High-Resolution Airborne Gravity and Other Data. *Remote Sensing*. 2019; 11(2):131. <https://doi.org/10.3390/rs11020131>.
- V. Nieves, M. Marcos, and **J. K. Willis**. Upper-ocean contribution to short-term regional coastal sea level variability along the U.S. *J. Climate*, 30(11): 4037–4045 (2017).
- Fenty, I., **J.K. Willis**, A. Khazendar, S. Dinardo, R. Forsberg, I. Fukumori, D. Holland, M. Jakobsson, D. Moller, J. Morison, A. M unchow, E. Rignot, M. Schodlok, A.F. Thompson, K. Tinto, M. Rutherford, and N. Trenholm (2016), Oceans Melting Greenland: Early results from NASA’s ocean-ice mission in Greenland, *Oceanography* 29(4):72–83, <https://doi.org/10.5670/oceanog.2016.100>.
- Morlighem, M., E. Rignot, and **J.K. Willis** (2016), Improving bed topography mapping of Greenland glaciers using NASA’s Oceans Melting Greenland (OMG) data, *Oceanography* 29(4):62–71, <https://doi.org/10.5670/oceanog.2016.99>.
- Boyer, T. C. M. Domingues, S. A. Good, G. C. Johnson, J. M. Lyman, M. Ishii, V. Gouretski, **J. K. Willis**, J. Antonov, S. Wijffels, J. A. Church, R. Cowley, N. Bindoff (2016), Sensitivity of Global Upper Ocean Heat Content Estimates to Mapping Methods, XBT Bias Corrections, and Baseline Climatologies, *J. Clim.*, **29**(13):4817–42. doi:10.1175/JCLI-D-15-0801.1.
- Palter, J. B., C.-A. Caron, K. L. Law, **J. K. Willis**, D. S. Trossman, I. M. Yashayaev, and D. Gilbert (2016), Variability of the directly observed, middepth subpolar North Atlantic circulation, *Geophys. Res. Lett.*, **43**, doi:10.1002/2015GL067235.
- Nieves, **J. K. Willis**, W. Patzert (2015), Recent hiatus caused by decadal shift in Indo-Pacific heating, *Science*, **349**(6247), pp. 532–535, doi: 10.1126/science.aaa4521.
- Elipot, S., E. Frajka-Williams, C. Hughes, and **J. Willis** (2014), The observed North Atlantic MOC, its meridional coherence and ocean bottom pressure, *J. Phys. Oceanogr.*, **44**, 517–537, doi:10.1175/JPO-D-13-026.1, 2722.
- Nieves, V., J. Wang, and **J. K. Willis** (2014), A conceptual model of ocean freshwater flux derived from sea surface salinity, *Geophys. Res. Lett.*, **41**, 6452–6458, doi:10.1002/2014GL061365.
- Llovel, W., **J. K. Willis**, F. W. Landerer, and I. Fukumori, (2014), Deep-ocean contribution to sea level and energy budget not detectable over the past decade, *Nature Climate Change*, **4**, 1031–1035, doi:10.1038/nclimate2387.
- Johnson, G. C., J. M. Lyman, **J. K. Willis**, T. Boyer, J. Antonov, S. A. Good, C. M. Domingues, and N. Bindoff (2014), Global Oceans: Ocean Heat Content, in State of the Climate in 2013, *Bulletin of the American Meteorological Society*, **95**, 7, S54–S57, doi:10.1175/2014BAMSStateoftheClimate.1
- Abraham, J. P., M. Baringer, N. L. Bindoff, T. Boyer, L. J. Cheng, J. A. Church, J. L. Conroy, C. M. Domingues, J. T. Fasullo, J. Gilson, G. Goni, S. A. Good, J. M. Gorman, V. Gouretski, M. Ishii, G. C. Johnson, S. Kizu, J. M. Lyman, A. M. Macdonald, W.J. Minkowycz, S. E. Moffitt, M. D. Palmer, A. R. Piola, F. Reseghetti, K. Schuckmann, K. E. Trenberth, I. Velicogna, and **J. K. Willis** (2013), A review of global ocean temperature observations: Implications for ocean heat

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- Baringer, M. O., W. E. Johns, S. Garzoli, S. Dong, D. Volkov, W. R. Hobbs, **J. Willis** (2014), Global Oceans: Meridional Oceanic Heat Transport in the Atlantic Ocean, in State of the Climate in 2013, *Bulletin of the American Meteorological Society*, **95** (7), 69.
- Baringer, M. O., G. McCarthy, **J. Willis**, M. Lankhorst, D. A. Smeed, U. Send, D. Rayner, W. E. Johns, C. S. Meinen, S. A. Cunningham, T. O. Kanzow, E. Frajka-Williams, and J. Marotzke (2014), Global Oceans: Meridional overturning circulation observations in the North Atlantic Ocean, in State of the Climate in 2013, *Bulletin of the American Meteorological Society*, **95** (7), 67-69.
- Hobbs, W., and **J. K. Willis** (2013), Detection of an observed 135-year ocean temperature change from limited data, *Geophys. Res. Lett.*, **40**, doi:10.1002/grl.50370.
- Willis J.**, and J. Church (2012), Regional Sea Level Projection, *Science*, 336, pp 548-549, doi:10.1126/science.1220366.
- Johnson, G. C., J. M. Lyman, **J. K. Willis**, S. Levitus, T. Boyer, J. Antonov, S. A. Good, C. M. Domingues, S. Wijffels, and N. Bindoff (2013), Global Oceans: Ocean Heat Content, in State of the Climate in 2012, *Bulletin of the American Meteorological Society*, **94**, 8, S50-S53, doi:10.1175/2013BAMSStateoftheClimate.1.
- Baringer, M. O., W. E. Johns, G. McCarthy, **J. Willis**, S. Garzoli, M. Lankhorst, C. S. Meinen, U. Send, W. R. Hobbs, S. A. Cunningham, D. Rayner, D. A. Smeed, T. O. Kanzow, P. Heimbach, E. Frajka-Williams, A. Macdonald, S. Dong and J. Marotzke (2013), Global Oceans: Meridional Overturning Circulation and Heat Transport Observations in the Atlantic Ocean, in State of the Climate in 2012, *Bulletin of the American Meteorological Society*, **93** (7), 450-483.
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- Johnson, G. C., J. M. Lyman, **J. K. Willis**, S. Levitus, T. Boyer, J. Antonov, and S. A. Good (2012), Global Oceans: Ocean Heat Content, in State of the Climate in 2011, *Bulletin of the American Meteorological Society*, **93**, 7, S62-S65, doi:10.1175/2012BAMSStateoftheClimate.1.
- Baringer, M. O., S. A. Cunningham, C. S. Meinen, S. Garzoli, **J. Willis**, M. Lankhorst, A. Macdonald, U. Send, W. R. Hobbs, T. O. Kanzow, D. Rayner, W. E. Johns, H. L. Bryden, and J. Marotzke (2012), State of the Ocean in 2011: Meridional Overturning Circulation Observations in the Subtropical North Atlantic, *Bulletin of the American Meteorological Society*, **93**(7), S78-S81.
- Leuliette, E., and **J. K. Willis** (2011), Balancing the Sea-level Budget, *Oceanography*, **24**(2):122-129, doi:10.5670/oceanog.2011.32.
- Johnson, G. C., J. M. Lyman, **J. K. Willis**, S. Levitus, T. Boyer, J. Antonov, M. D. Palmer, and S. A. Good (2011), Global Oceans: Ocean Heat Content, in State of the Climate in 2010, *Bulletin of the American Meteorological Society*, **92**, 6, S81-S84, doi:10.1175/1520-0477-92.6.S1.
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- Roemmich, D., **J. Willis**, J. Gilson, D. Stammer, A. Koehl, T. Yemenis, D. P. Chambers, F. Landerer, J. Marotzke, J. Gregory, T. Suzuki, J. Church, N. White, C. Domingues, A. Cazenave, and P.-Y. LeTraon (2010), Global Ocean Warming and Sea Level Rise, in *Understanding Sea-Level Rise and Variability*, J. A. Church, P. L. Woodworth, T. Aarup, and W. S. Wilson (eds.), Wiley-Blackwell.
- Lyman, J. M., S. A. Good, V. V. Gouretski, M. Ishii, G. C. Johnson, M. D. Palmer, D. A. Smith, and **J. K. Willis** (2010), Robust warming of the global upper ocean, *Nature*, **465**, 334-337 doi:10.1038/nature09043.
- Willis, J. K.**, Can In-Situ Floats and Satellite Altimeters Detect Changes in Atlantic Ocean Overturning? (2010), *Geophys. Res. Lett.*, **37**, L06602, doi:10.1029/2010GL042372.

- Willis, J.K.**, D. P. chambers, C.-Y. Kuo, and C. K. Shum (2010), Global Sea Level Rise: Recent Progress and Challenges for the Decade to Come, *Oceanography*, **23**(4), 26-35.
- Johnson, G. C., J. M. Lyman, **J. K. Willis**, S. Levitus, T. Boyer, J. Antonov, M. D. Palmer, and S. A. Good (2010), Global Oceans: Ocean Heat Content, in State of the Climate in 2009, *Bulletin of the American Meteorological Society*, **91**, 7, S56-S59, doi:10.1175/BAMS-91-7-StateoftheClimate.
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- Marcus, S. L., J. O. Dickey, **J. K. Willis**, and F. K. Seitz (2009), Earth oblateness changes reveal land ice contribution to interannual sea level variability, *Geophys. Res. Lett.*, **36**, L23608, doi:10.1029/2009GL041130.
- Willis, J.K.**, J.M. Lyman, G.C. Johnson, and J. Gilson (2009), In Situ Data Biases and Recent Ocean Heat Content Variability, *J. Atmos. Oceanic Technol.*, **26**, 846–852.
- Johnson, G. C., J. M. Lyman, **J. K. Willis**, S. Levitus, T. Boyer, J. Antonov. C. Schmid, and G. J. Goni (2009), Global Oceans: Ocean Heat Content, in State of the Climate in 2008, *Bulletin of the American Meteorological Society*, **90**, 8, S49-S52, doi:10.1175/BAMS-90-8-StateoftheClimate.
- Dickey J. O., S. L. Marcus, J. K. Willis (2008), Ocean cooling: Constraints from changes in Earth's dynamic oblateness (J 2) and altimetry, *Geophys. Res. Lett.*, **35**, L18608, doi:10.1029/2008GL035115.
- Willis, J.K.**, D. P. Chambers, R. S. Nerem (2008), Assessing the Globally Averaged Sea Level Budget on Seasonal to Interannual Time Scales, *J. Geophys. Res.*, **113**, C06015, doi:10.1029/2007JC004517.
- Wijffels, S.E., **J. Willis**, C.M. Domingues, P. Barker, N.J. White, A. Gronell, K. Ridgway, and J.A. Church (2008), Changing Expendable Bathythermograph Fall Rates and Their Impact on Estimates of Thermosteric Sea Level Rise. *J. Climate*, **21**, 5657–5672.
- Tamrazian, A., S. LaDochy, **J. Willis**, and W. C. Patzert (2008), Heat Waves in Southern California: Are They Becoming More Frequent and Lasting Longer? *Yearbook of the APCG*, **70**, 59-69.
- Willis J. K.**, L.-L. Fu (2008), Combining altimeter and subsurface float data to estimate the time-averaged circulation in the upper ocean, *J. Geophys. Res.*, **113**, C12017, doi:10.1029/2007JC004690.
- Chambers D. P., **J. K. Willis** (2008), Analysis of large-scale ocean bottom pressure variability in the North Pacific, *J. Geophys. Res.*, **113**, C11003, doi:10.1029/2008JC004930.
- Johnson, G. C., J. M. Lyman, and J. K. Willis (2008), Global Oceans: Ocean Heat Content, in State of the Climate in 2007, *Bulletin of the American Meteorological Society*, **89**, 7, S39-S41, doi:10.1175/BAMS-89-7-StateoftheClimate.
- Willis, J. K.**, J. M. Lyman, G. C. Johnson, and J. Gilson (2007) Correction to "Recent cooling of the upper ocean". *Geophysical Research Letters*, **34**, L16601, doi:10.1029/2007GL030323.
- Contributing author for Chapter 5, Observations: Oceanic Climate Change and Sea Level, IPCC Fourth Assessment Report, 2007.
- Johnson, G. C., J. M. Lyman, and J. K. Willis (2007), Global Oceans: Heat Content, in State of the Climate in 2006, *Bulletin of the American Meteorological Society*, **88**, 6, S31-S33, doi:10.1175/BAMS-88-6-StateoftheClimate.
- Wong, T., B. A. Wielicki, R. B. Lee, G.L. Smith, K. A. Bush, and **J. K. Willis** (2006), Re-examination of the observed decadal variability of earth radiation budget using altitude-corrected ERBE/ERBS nonscanner WFOV data, *J. Climate*, **19**(16), pp. 4028–4040.
- Lyman, J. M., **J. K. Willis**, and G. C. Johnson (2006), Recent cooling of the upper ocean. *Geophysical Research Letters*, **33**, L18604, doi:10.1029/2006GL027033
- Johnson, G. C., J. M. Lyman, **J. K. Willis** (2006), "Heat Content", in State of the Climate in 2005, Shein, K.A., ed., *Bulletin of the American Meteorological Society*, **87**, S23-S34.
- Hansen, J., L. Nazarenko, R. Ruedy, M. Sato, **J. Willis**, A. Del Genio, D. Koch, A. Lacis, K. Lo, S. Menon, T. Novakov, J. Perlwitz, G. Russell, G.A. Schmidt, N. Tausnev (2005), Earth's Energy Imbalance: Confirmation and Implications, *Science*, 308.

- Roemmich, D., J. Gilson, **J. Willis**, P. Sutton, K. Ridgway, Closing the time-varying mass and heat budgets for large ocean areas: The Tasman Box, *J. Climate*, 18(13), 2005.
- Willis, J. K.**, D. Roemmich, and B. Cornuelle (2004), Interannual variability in upper-ocean heat content, temperature and thermosteric expansion on global scales, *J. Geophys. Res.*, 109 (C12036).
- Willis, J. K.**, D. Roemmich, and B. Cornuelle (2003), Combining altimetric height with broadscale profile data to estimate steric height, heat storage, subsurface temperature, and sea-surface temperature variability, *J. Geophys. Res.*, 108 (C9), 3292.

## Other Publications

- Willis, J.K.**, E. Rignot, R.S. Nerem, and E. Lindstrom (2016), Introduction to the special issue on ocean-ice interaction, *Oceanography* 29(4):19–21, <https://doi.org/10.5670/oceanog.2016.95>.
- Willis J.**, L. Miller, and G. Mountain (2011), Sea Level: An Introduction to the Special Issue, *Oceanography*, 24(2):22–23, doi:10.5670/oceanog.2011.24.
- Wijffels, S. E., M. Palmer, N. Raynor, G. Goni, S. Garzoli, G. C. Johnson, J. Willis, B. Dushaw, D. Roemmich, J. Church, and G. Meyers (2010), Progress and Challenges in Monitoring Ocean Temperature and Heat Content in *Proceedings of the "OceanObs'09: Sustained Ocean Observations and Information for Society" Conference (Vol. 1)*, Venice, Italy, 21-25 September 2009, Hall, J., D.E. Harrison, and D. Stammer, Eds., ESA Publication WPP-306, doi:10.5270/OceanObs09.pp.40.
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- Willis, J.K.**, Is It Me, or Did the Oceans Cool? A Lesson on Global Warming from my Favorite Denier (2008), *U.S. CLIVAR Variations*, 6 (2), U.S. CLIVAR Office.
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- Willis, J. K.** (2004), "Combining satellite and in situ data to make improved estimates of upper-ocean thermal variability on eddy to global scales," Doctoral Dissertation, Scripps Institution of Oceanography.