

# JOSH K. WILLIS

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## EDUCATION

PH.D. OCEANOGRAPHY 2004  
*Scripps Institution of Oceanography, University of California, San Diego* *La Jolla, California*  
DISSERTATION: *Combining satellite and in situ data to make improved estimates of upper-ocean thermal variability on eddy to global scales* ADVISOR: DEAN ROEMMICH

M.S. PHYSICS 1998  
*University of California, San Diego* *La Jolla, California*

B.S. PHYSICS AND MATH 1996  
*University of Houston, Honors College* *Houston, Texas*

## PROFESSIONAL EXPERIENCE

PROJECT SCIENTIST FOR JASON-3 2011 – PRESENT  
*Jet Propulsion Laboratory, Pasadena, California*

DEPUTY PROJECT SCIENTIST FOR JASON-1 AND JASON-2 2009 – PRESENT  
*Jet Propulsion Laboratory, Pasadena, California*

SCIENTIST 2006 – PRESENT  
*Jet Propulsion Laboratory, Pasadena, California*

CALTECH POSTDOCTORAL SCHOLAR 2004 – 2006  
*Jet Propulsion Laboratory, Pasadena, California*

GRADUATE STUDENT RESEARCHER 1996 – 2004  
*University of California, San Diego, La Jolla, California*

## MEMBERSHIP AND SERVICE IN TECHNICAL ORGANIZATIONS

Co-Chair, Ocean Surface Topography Science Team  
Member, US Argo Science and Implementation Panel  
Member, Ocean Salinity Science Team  
Member, GRACE Science Team  
Member, Atlantic Meridional Overturning Circulation Science Team  
Member, CLIVAR Global Synthesis and Observations Panel  
Member, American Geophysical Union

## 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

## RESEARCH INTERESTS

Observing changes in global and regional sea level and their causes using data from satellite altimeters, gravimeters and in situ observation. Understanding the role of the ocean in the global climate system and changes in the general circulation of the ocean and their impact on the transport of heat by the ocean.

## MENTORING

Postdoctoral Scholar:

William Hobbs, Sept. 2009 – 2012

Undergraduate Student Interns:

Kyung Choi, 2005  
 Yang-qing Wang, 2005  
 Teni Mardirosian, 2005-2006  
 Arbi Tamrazian, 2006-2007  
 Robert Karl, 2007-2008  
 Ann Bui, 2009 – 2011  
 Dan Killam, 2008 – 2012

## PEER-REVIEWED PUBLICATIONS

- 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.
- 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).
- Roemmich, D., J. Gilson, **J. Willis**, P. Sutton, K. Ridgway (2005), Closing the time-varying mass and heat budgets for large ocean areas: The Tasman Box, *J. Climate*, 18(13).
- 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.
- G. C. Johnson, 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.
- 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., **J. K. Willis**, G. Johnson (2006), Recent cooling of the upper ocean, *Geophys. Res. Lett.*, 33, L18604, doi:10.1029/2006GL027033.
- Willis, J. K.**, J. M. Lyman, G. C. Johnson, and J. Gilson (2007), Correction to "Recent cooling of the upper ocean". *Geophys. Res. Lett.*, 34, L16601, doi:10.1029/2007GL030323.
- Johnson, G. C., J. M. Lyman, and **J. K. Willis** (2007), "Global Oceans: Heat Content," *In State of the Climate in 2006*, A. Arguez, Ed., *Bulletin of the American Meteorological Society*, 88, 6, S31-S33.
- 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.

- 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.
- Johnson, G. C., J. M. Lyman, and **J. K. Willis** (2008), Global Oceans: Ocean Heat Content. In State of the Climate in 2007, D. H. Levinson and J. H. Lawrimore, Eds., *Bulletin of the American Meteorological Society*, *89*, 7, S39–S41, doi: 10.1175/BAMS-89-7-StateoftheClimate.
- 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.
- 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.
- Dickey J. O., S. L. Marcus, **J. K. Willis**, Ocean cooling: Constraints from changes in Earth's dynamic oblateness (J 2) and altimetry (2008), *Geophys. Res. Lett.*, *35*, L18608, doi:10.1029/2008GL035115.
- 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, T. C. Peterson and M. O. Baringer, Eds., *Bulletin of the American Meteorological Society*, *90*, 8, S49-S52, doi:10.1175/BAMS-90-8-StateoftheClimate.
- Chambers D. P., **J. K. Willis** (2009), Low-frequency exchange of mass between ocean basins, *J. Geophys. Res.*, *114*, C11008, doi:10.1029/2009JC005518.
- 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.**, Can In-Situ Floats and Satellite Altimeters Detect Changes in Atlantic Ocean Overturning? (2010), *Geophys. Res. Lett.*, *37*, L06602, doi:10.1029/2010GL042372.
- 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.
- 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, D. S. Arndt, M. O. Baringer, and M. R. Johnson, Eds., *Bulletin of the American Meteorological Society*, *91*, 7, S56-S59, doi:10.1175/BAMS-91-7-StateoftheClimate.
- 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.
- Chambers D. P., **J. K. Willis** (2010), A Global Evaluation of Ocean Bottom Pressure from GRACE, OMCT, and Steric-Corrected Altimetry, *J. Atmos. Oceanic Technol.*, *27*, 1395-1402, doi:10.1175/2010JTECHO738.1.
- 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, Blunden, J., D. S. Arndt, and M. O. Baringer, Eds., *Bulletin of the American Meteorological Society*, *92*, 6, S81-S84, doi:10.1175/1520-0477-92.6.S1.

- Syed, T., J. Famiglietti, D. Chambers, **J. Willis** and K. Hilburn (2010), Increasing Continental Freshwater Discharge from Satellite-Based Global Ocean Mass Balance (1994-2006), *Proc. Natl. Acad. Sci. USA*, published online Oct 4, 2010, doi: 10.1073/pnas.1003292107.
- Lee, T., W. R. Hobbs, **J. K. Willis**, D. Halkides, I. Fukumori, E. M. Armstrong, A. K. Hayashi, W. T. Liu, W. Patzert, and O. Wang (2010), Record warming in the South Pacific and western Antarctica associated with the strong central-Pacific El Niño in 2009-10, *Geophys. Res. Lett.*, **37**, L19704, doi:10.1029/2010GL044865.
- 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.
- 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, and S. A. Good. 2012. Global Oceans: Ocean Heat Content. In State of the Climate in 2011, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, **93**, 7, S62-S65, doi:10.1175/2012BAMSStateoftheClimate.1.
- Hobbs, W. R., and **J. K. Willis** (2012), Midlatitude North Atlantic heat transport: A time series based on satellite and drifter data, *J. Geophys. Res.*, **117**, C01008, doi:10.1029/2011JC007039.
- Boening, C., **J. K. Willis**, F. W. Landerer, R. S. Nerem, and J. Fasullo (2012), The 2011 La Niña: So strong, the oceans fell, *Geophys. Res. Lett.*, **39**, L19602, doi:10.1029/2012GL053055.
- 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.

## OTHER PUBLICATIONS

- Willis, J. K.**, “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, 2004.
- Contributing author for Chapter 5, Observations: Oceanic Climate Change and Sea Level, IPCC Fourth Assessment Report, 2007.
- 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.
- Palmer, M. D., J. Antonov, P. Barker, N. Bindoff, T. Boyer, M. Carson, C. M. Domingues, S. Gille, P. Gleckler, S. Good, V. Gouretski, S. Guinehut, K. Haines, D. E. Harrison, M. Ishii, G. C. Johnson, S. Levitus, M. S. Lozier, J. M. Lyman, A. Meijers, K. von Shuckmann, D. Smith, S. Wijffels, and **J. Willis** (2009), Future Observations for Monitoring Global Ocean Heat
- 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.
- Willis J.**, and J. Church (2012), Regional Sea Level Projection, *Science*, **336**, pp 548-549, doi:10.1126/science.1220366.

## INVITED PRESENTATIONS AT SCIENTIFIC MEETINGS AS FIRST AUTHOR

- Upper-Ocean Thermal Variability on Global Scales: a decade of satellite and in situ measurements* (**J. Willis**), NASA Sea Level Meeting, Washington, D.C., April 2005.
- Observations of the steric component of sea level rise* (**J. Willis** and D. Roemmich), IAMAS Meeting, Beijing, China, August 2005.
- Estimating circulation and upper-ocean thermal variability from a combination of satellite, Argo and other in situ data*, (**J. Willis** and L.-L. Fu,) CLIVAR, OOPC, GOOS, Argo, CPPS Meeting, Concepción, Chile, October 2005.

- Toward closing the globally averaged sea level budget on seasonal to interannual time scales* (J. Willis, D. P. Chambers, and R. S. Nerem), European Geosciences Union, General Assembly, Vienna, Austria, April 2008.
- A new estimate of interannual variability in upper ocean heat content in light of recently discovered in situ data biases* (J. Willis), European Geosciences Union, General Assembly, Vienna, Austria, April 2008.
- Pie in the sky: ocean warming and sea level rise during the era of satellite oceanography* (J. Willis), William Smith Meeting of the Geological Society, London, U.K., September 2008.
- The Day after Yesterday: Good Science, Bad Movies and the Ugly Truth about the AMOC's Role in Global Climate* (J. Willis), AMOC Science Team Meeting, Annapolis, MD, May 2009.
- Observing Steric Changes in the World Ocean: Argo and the Way Forward* (J. Willis), NASA Sea Level Workshop, Austin, TX, November 2009.
- Warming or Melting? Dissecting the Causes of Sea Level Rise over the Past 16 Years* (J. Willis), 2009 AGU Fall Meeting, San Francisco, CA, December 2009.
- 17 Years and Counting: Satellite Altimetry from Research to Operations* (J. Willis, L.-L. Fu, E. Lindstrom, M. Srinivasan), 2010 IGARRS Meeting, Honolulu, HI, July 2010.
- Explaining regional sea level variations during the satellite altimeter era* (J. Willis, and I. Fukumori), WCRP/IOC Workshop on Regional Sea Level Change, Paris, France, February 2011.
- Steric Contributions to Sea Level Rise: A Global Perspective* (J. Willis), Coastal and Estuarine Research Federation (CERF) 2011, Daytona Beach, FL, November 2011.