

# Ju-Mee Ryoo, Ph.D.

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<b>Contact information</b>	Atmospheric Science Branch, NASA Ames Research Center, Moffett Field, CA 94035 Email: <a href="mailto:ju-mee.ryoo@nasa.gov">ju-mee.ryoo@nasa.gov</a> ; <a href="mailto:jmryoo@gmail.com">jmryoo@gmail.com</a> Website: <a href="https://earthscience.arc.nasa.gov/person/Ju-Mee_Ryoo">https://earthscience.arc.nasa.gov/person/Ju-Mee_Ryoo</a>
<b>Education</b>	<b>Johns Hopkins University, USA</b> Ph.D. in Earth and Planetary Sciences (advisor: Prof. Darryn W. Waugh) M.A. in Earth and Planetary Sciences <b>Yonsei University, South Korea</b> M.S. in Atmospheric Sciences B.S. in Mathematics, Atmospheric Sciences (double major)
<b>Work experience</b>	<b>NASA Ames Research Center</b> -Alpha Jet Atmospheric eXperiment (AJAX), PI: Dr. Laura Iraci (Sept 2014-present) -Met Support team for ORACLES PIs: Lennard Pfister, Rei Ueyama (Jan 2017 - present) <b>San Jose State University</b> Research Scientist (part-time) PI: Prof. Sen Chiao (Jan 2017 - present) <b>University of California, Berkeley</b> , PI: Prof. Inez Fung (2012-Aug 2014) <b>California Institute of Technology, Jet Propulsion Laboratory</b> , PIs: Dr. Duane Waliser and Dr. Eric Fetzer (Aug 2009 -2011)
<b>Research Interest</b>	<ul style="list-style-type: none"><li>• <b>Atmospheric dynamics and modeling</b> - Understanding of the extreme weather (e.g. Atmospheric Rivers) events using models and remote sensing - Climate variability, large-scale climate dynamics and hydrological cycle (e.g. ENSO) - Source of atmospheric moisture and water vapor/trace gas transport mechanism</li><li>• <b>Atmospheric composition</b> - Urban outflow of CO<sub>2</sub> and CH<sub>4</sub>, and its impact on the human health and air quality - Investigation of Transpacific ozone/aerosol transport using models and measurements</li></ul>
<b>Research &amp; Teaching experience</b>	<b>Research Assistant</b> Johns Hopkins University (2005-2009) Working on NASA-NSF project (Advisor: Prof. Darryn W. Waugh) <b>Research Assistant</b> Yonsei University (2001- 2003) National Research Laboratory of Mesoscale Dynamics (Advisor: Prof. Hye-Yeong Chun) <b>Teaching Assistant</b> Yonsei University (2001) Teaching assistant on C+ computer language programming <b>Other Activities</b> <ul style="list-style-type: none"><li>• West Baltimore Elementary School Science subject (Kids Grow) tutoring Volunteer, Baltimore, MD (2006-2007)</li><li>• Participating in the <i>Intense Rain Observation Program during Jang-ma</i> (hurricane in Asia) held in Haenam and Heuksando: Performing Direct Rawinsonde Observation (e.g. wind, temperature, etc.) with other researchers from Meteorological Research Institute, Heuksando, South Korea (July 2002)</li></ul>

## Awards & Honors

**Best poster award** at the Chapman conference (titled as 'Atmospheric water vapor and its role on the climate') in convection session (2008)  
 NASA-NSF Research Project (2005-2009)  
**Johns Hopkins University, Gillman Fellowship** (2004-2005)  
**BK 21(Brain Korea 21 Century) Scholarship** (2002)  
**Honor student Scholarship** provided by the Astronomy and Atmospheric Sciences Alumni Association (1999-2000)

## Published & on-going Journal Publications

**Ryoo, J.-M.**, M. S. Johnson, E. L. Yates, L. T. Iraci, R. B. Pierce, T. Tanaka, W. Gore, 2017: Investigating sources of ozone over California using AJAX airborne measurements and models: assessing the long-range transport, *Atmos. Environ.*, **155**, 53-67, <http://dx.doi.org/10.1016/j.atmosenv.2017.02.008>  
 Yates, E. L., M. S. Johnson, L. T. Iraci, **J.-M. Ryoo**, B. J. Johnson, M. A. Ives, T. LeBlanc, M. S. Gustin, T. Tanaka, W. Gore, 2017: Western US tropospheric ozone: An assessment of vertical, seasonal and spatial variations over California and Nevada, in review, *J. Geophys. Res.*  
 Tadić, J., A. Michalak, L. Iraci, V. Ilić, S., Biraud, D. Feldman, B. Thaopaul, M. S. Johnson, M. Loewensterin, S. Jeong, M. Fischer, E. Yates, **J.-M. Ryoo**, 2017: Elliptic cylinder airborne sampling and geostatistical mass balance approach for quantifying local greenhouse gas emissions, in review, *Environmental Science & Technology* (manuscript ID es-2017-01274n).  
**Ryoo, J.-M.**, L. T. Iraci, T. Tanaka, J. E. Marrero, E. L. Yates, W. Gore, I. Fung, B. Thaopaul, J. Day, 2017: New Approach to characterize CO<sub>2</sub> and CH<sub>4</sub> emission over Sacramento in California using an airborne aircraft measurement, in preparation.  
**Ryoo, J.-M.**, J. R. Spackman, S. Chiao, L. T. Iraci, R. B. Pierce, E. L. Yates, J. E. Marrero, W. Gore, A. Martin, D. Randall, F. M. Ralph, 2017: On the coastal barrier jet and the long-range transport of greenhouse gases over the west coast of the U.S. during Atmospheric Rivers, in preparation.  
**Ryoo, J.-M.**, I. Fung, J. R. Ehleringer, B. B. Stephens, 2017: Top-down Estimates of Urban CO<sub>2</sub> sources: A Salt Lake City Case Study, in preparation (final).  
 Leifer, I., C. Melton, M. L. Fischer, R. Chatfield, J. Frash, W. Gore, L. T. Iraci, J. Marrero, **J.-M. Ryoo**, T. Tanaka, E. L. Yates, 2016: Improved Atmospheric Characterization through Fused Mobile Airborne & Surface in situ surveys: Quantification and Fate of Methane Emissions from a Producing Oil Field, in review, *Atmos. Environ.*  
**Ryoo, J.-M.**, D. E. Waliser, D. W. Waugh, S. Wong, E. J. Fetzer, I. Fung, 2015: Classification of atmospheric river events on the U.S. west coast using a trajectory model., *J. Geophys. Res. Atmos.*, **120**, doi:10.1002/2014JD022023.  
**Ryoo, J.-M.**, Y. Kaspi, D. W. Waugh, G. N. Kiladis, D. E. Waliser, E. J. Fetzer, J. Kim, 2013: Impact of Rossby Wave Breaking on U.S. West Coast Winter Precipitation during ENSO Events. *J. Climate*, **26**, 6360–6382, doi: <http://dx.doi.org/10.1175/JCLI-D-12-00297.1>  
 Kim, J., D. E. Waliser, P. J. Neiman, B. Guan, **J.-M. Ryoo**, and G. A. Wick, 2013: Effects of atmospheric river landfalls on the cold season precipitation in California. *Clim. Dyn.*, **40**, 465–474, doi:10.1007/s00382-012-1322-3.  
**Ryoo, J.-M.**, D. E. Waliser, and E. J. Fetzer, S. Wong, 2011: Trajectory analysis on the origin of air mass and moisture associated with Atmospheric Rivers over the west coast

of the United States, *Atmos. Chem. Phys. Discuss.*, 11, 11109–11142, doi:10.5194/acpd-11-11109-2011

**Ryoo, J.-M.**, 2009: Control of tropical tropospheric humidity and transport: Measurement, theory, and Trajectory Model, *Ph.D. thesis*.

**Ryoo, J.-M.**, T. Igusa, and D. W. Waugh, 2009: PDFs of Tropical Tropospheric Humidity: Measurements and Theory, *J. Climate*, 22, 3357-3373.

**Ryoo, J.-M.**, D. W. Waugh, and A. Gettelman, 2008: Variability of subtropical upper tropospheric humidity, *Atmos. Chem. Phys.*, 8, 1041-1067.

H.-Y. Chun, and **J.-M. Ryoo**, 2005: A Case Study of Dynamical Linkage Between the Troposphere and Stratosphere Associated with Stratospheric Major Sudden Warmings in 1979 and 1984, *Journal of Korean Meteorological Society*, **41**, 3, 415-430.

**Ryoo, J.-M.** and H.-Y. Chun, 2005: Stratospheric Major Sudden Warmings Revealed in NCEP Reanalysis Data for 41 years (1958-1999), *J. Korean. Meteorol. Soc.*, 41, 2, 173-190.

**Selected  
Conference  
Proceedings**

**Ryoo, J.-M.**, L. T. Iraci, T. Tanaka, J. E. Marrero, E. L. Yates, W. Gore, I. Fung, 2017: New Approach to characterize CO<sub>2</sub> and CH<sub>4</sub> emission over Sacramento in California using an airborne aircraft measurement, the American Geological Union fall meeting, A14A-06, oral presentation, December 12-16, 2017, San Francisco, CA.

**Ryoo, J.-M.**, L. T. Iraci, W. J. Gore, E. L. Yates, J. E. Marrero, J. R. Spackman, R. M. Dole, F. M. Ralph, 2016: Capturing Atmospheric Rivers: Alpha Jet Atmospheric eXperiment (AJAX) Flights in support of CalWater/El Nino Rapid Response 2016, International Atmospheric River Conference (IARC), oral presentation, Aug. 8-11, 2016, Scripps Institution of Oceanography, La Jolla, CA.

**Ryoo, J.-M.**, D. E. Waliser, D. W. Waugh, S. Wong, E. J. Fetzer, I. Fung, 2016: Classification of atmospheric river events on the U.S. West Coast using a trajectory model, International Atmospheric River Conference (IARC), poster presentation, Aug. 8-11, 2016, Scripps Institution of Oceanography, La Jolla, CA

**Ryoo, J.-M.**, M. S. Johnson, L. T. Iraci, E. L. Yates, R. B. Pierce, T. Tanaka, W. Gore, 2015: Investigating ozone sources in California using AJAX airborne measurements and models: implications for stratospheric intrusion and long range transport, the American Geological Union fall meeting, A51B-0026, December 14-18, San Francisco, CA.

**Ryoo, J.-M.**, M. S. Johnson, L. T. Iraci, E. L. Yates, R. B. Pierce, T. Tanaka, W. Gore, 2015: Investigating ozone sources in California using AJAX airborne measurements and models: implications for stratospheric intrusion and long range transport, Transboundary Ozone Pollution Conference, March 31-April 2, Yosemite, CA

**Ryoo, J.-M.**, D. E. Waliser, D. W. Waugh, S. Wong, E. J. Fetzer, I. Fung, 2014: Classification of atmospheric river events on the U.S. west coast using a trajectory model., the American Geological Union, fall meeting, San Francisco, CA.

**Ryoo, J.-M.**, I. Fung, J. R. Ehleringer, B. B Stephens, 2013: Holliday CO<sub>2</sub>: Inference from the Salt Lake City data, the American Geological Union, fall meeting, San Francisco, CA.  
**Kim, J.**, B. Guan, **J.-M. Ryoo**, D. Waliser, E. Fetzer, P. Neiman, G. Wick, and N. Molotch, 2012: Impacts of Atmospheric River landfalls on the cold season hydrology in California. 24th Conf. on Climate Variability and Change, 22-26 January 2012, New Orleans, Louisiana.

**Ryoo, J.-M.**, D. E. Waliser, and E. J. Fetzer, D. W. Waugh, G. N. Kiladis, Y. Kaspi, and J.-W. Kim, 2011: Impact of Rossby wave breakings on the precipitation over Pacific-North

America during YOTC, *American Geophysical Union, fall meeting*, San Francisco, CA, December 5-9, 2011.

Kim, J., B. Guan, **J.-M. Ryoo**, D. Waliser, E. Fetzer, P. Neiman, G. Wick, and N. Molotch, 2011: Impacts of Atmospheric River landfalls on the cold season hydrology in California. C15-T85A, 2011 CLIVAR conference, 24-28 October 2011, Denver, CO.

**Ryoo, J.-M.**, D. E. Waliser, and E. J. Fetzer, J.-W. Kim, T. Schneider, G. N. Kiladis, 2011: Trajectory study of storm tracks and the midwinter precipitation characteristics over the west coast of the United States. *Atmospheric and Oceanic Fluid Dynamics*, Spokane, WA, June 13-17, 2011.

**Ryoo, J.-M.**, D. E. Waliser, E. J. Fetzer, T. Schneider, Y. Kaspi, D. W. Waugh, G. N. Kiladis, J.-W. Kim, 2011: Impact of Potential Vorticity intrusions on the Precipitation and Atmospheric Rivers over Pacific-North America during YOTC. *CalWater Science Workshop*, Scripps Institution of Oceanography, La Jolla, CA, June 8-10, 2011.

**Ryoo, J.-M.**, D. E. Waliser, E. J. Fetzer, T. Schneider, D. W. Waugh, Y. Kaspi, G. N. Kiladis, J.-W. Kim, 2011: A Lagrangian Trajectory Model of Atmospheric Rivers over Pacific – North America during YOTC. YOTC International Science Symposium, Beijing, China, May 16-19, 2011.

**Ryoo, J.-M.**, J.-W. Kim, E. J. Fetzer, D. E. Waliser, 2010: A study of storm tracks and the cold season precipitation characteristics in California using trajectory model. *American Geophysical Union, fall meeting*, San Francisco, CA, December, 2010.

Kim, Jinwon, D.E. Waliser, B. Guan, N.P. Molotch, **J.-M. Ryoo**, E. Fetzer, and P.J. Neiman, 2010: The impact of atmospheric rivers on the cold season hydrology in California. December 13-17, San Francisco, CA. 2010 Fall meeting, Suppl., Abstract A51F-03.

**Ryoo, J.-M.**, D. E. Waliser, E. J. Fetzer, 2010: Trajectory study on the origin of moisture associated with Atmospheric Rivers events in the west coast of United States. *Invited talk to NOAA*, Boulder, CO, November, 2010.

**Ryoo, J.-M.**, D. E. Waliser, E. J. Fetzer, 2010: Trajectory study on the cold season precipitation characteristics in west coast of United States. *Climate Diagnostic and Prediction Workshop*, North Carolina, October, 2010.

**Ryoo, J.-M.**, J.-W. Kim, E. Fetzer, D. E. Waliser, 2010: *CalWater workshop*, San Diego, CA, October, 2010.

**Ryoo, J.-M.**, D.W. Waugh, and T. Igusa, 2008: Comparison of tropospheric humidity from AIRS, MLS, and statistical and trajectory models, *a Joint NASA/NOAA Atmospheric Sounding Science Team Meeting* with focus on the AIRS/CrIMSS/IASI instruments, Greenbelt, MD, 14-17 October, 2008.

**Ryoo, J.-M.**, T. Igusa, and D.W. Waugh, 2008: PDFs of Tropical Tropospheric Humidity with Generalized Statistical Model, *AGU Chapman Conference on Atmospheric Water Vapor and Its Role in Climate*, Kailua-Kona, Hawaii, 20-24 October, 2008.

**Ryoo, J.-M.**, D.W. Waugh, and T. Igusa 2008: PDFs of Tropical Tropospheric Humidity: Measurement and Theory, *EOS Aura Science Team Meeting*, Columbia, MD, 27-30 October, 2008.

**Ryoo, J.-M.** and D.W. Waugh, 2008: Upper Tropospheric Transport and Humidity, *Burgers-Center for Environmental and Fluid Mechanics (CEAFM) Spring Symposium*, University of Maryland, MD, May, 2008.

**Ryoo, J.-M.** and D.W. Waugh, 2007: Controls on subtropical upper tropospheric humidity, *16th Conference of Atmospheric and Oceanic Fluid Dynamics*, Santa Fe, NM, 25-29 June, 2007.

**Ryoo, J.-M.** and H.-Y. Chun, 2002: Analysis of Stratospheric Major Sudden Warming using NCEP-NCAR Reanalysis data, *International Symposium on Stratospheric Variations and Climate*, Fukuoka, Japan, Nov, 2002.

<b>Computer skills</b>	IDL (expert), Python, Matlab, R, gnuplot, Fortran 77/90, Unix/Linux, LaTeX, NCAR Graphics, MS Office Suite, large datasets (reanalysis, satellite), in-situ observational data (aircraft, tower, radiosonde), and trajectory model (NASA GSFC, WRF-STILT, NOAA HYSPLIT)/ regional model (such as WRF, WRF-chem) handling	
<b>Professional Affiliations</b>	American Geophysical Union	(2005-present)
	American Meteorological Society	(2005-present)
	Korean Atmospheric Scientists in America	(2005-present)