Ju-Mee Ryoo, Ph.D.

Contact information

Atmospheric Science Branch,
NASA Ames Research Center, Moffett Field, CA 94035
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Education

Johns Hopkins University, USA
Ph.D. in Earth and Planetary Sciences (advisor: Prof. Darryn W. Waugh)
M.A. in Earth and Planetary Sciences
Yonsei University, South Korea
M.S. in Atmospheric Sciences
B.S. in Mathematics, Atmospheric Sciences (double major)

Work experience

NASA Ames Research Center
-Alpha Jet Atmospheric eXperiment (AJAX),
PI: Dr. Laura Iraci (September 2014-present)
-Met Support team for ORACLES
PIs: Lennard Pfister, Rei Ueyama (Jan 2017 - present)
San Jose State University
Research Scientist (part-time)
PI: Prof. Sen Chiao
University of California, Berkeley, PI: Prof. Inez Fung (2012-August 2014)
California Institute of Technology, Jet Propulsion Laboratory,
PIs: Dr. Duane Waliser and Dr. Eric Fetzer (August 2009 -2011)

Research Interest

• **Atmospheric dynamics and modeling**
- 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
• **Atmospheric composition**
- Urban outflow of CO_2 and CH_4, and its impact on the human health and air quality
- Investigation of Transpacific ozone/aerosol transport using models and measurements

Research & Teaching experience

Research Assistant Johns Hopkins University (2005-2009)
Working on NASA-NSF project (Advisor: Prof. Darryn W. Waugh)
Research Assistant Yonsei University (2001- 2003)
National Research Laboratory of Mesoscale Dynamics (Advisor: Prof. Hye-Yeong Chun)
Teaching Assistant Yonsei University (2001)
Teaching assistant on C+ computer language programming
Other Activities

- West Baltimore Elementary School Science subject (Kids Grow) tutoring Volunteer, Baltimore, MD (2006-2007)
- Participating in the *Intense Rain Observation Program during Jang-ma* (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)

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_2 and CH_4 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_2 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_2 and CH_4 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_2: 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. *Atmostpheric 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.

Computer skills

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

Professional Affiliations

American Geophysical Union	(2005-present)
American Meteorological Society	(2005-present)
Korean Atmospheric Scientists in America	(2005-present)