Ju-Mee Ryoo, Ph.D

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Education

Johns Hopkins University, USA
Ph.D. in Earth and Planetary Sciences (advisor: Prof. Darryn W. Waugh), 2009
M.A. in Earth and Planetary Sciences, 2007
Yonsei University, South Korea
M.S. in Atmospheric Sciences, 2003
B.S. in Mathematics, Atmospheric Sciences (double major), 2001

Work experience

NASA Ames Research Center
-Met Support team for ORACLES
PIs: Dr. Lennard Pfister, Dr. Rei Ueyama (Jan 2017 - present)
-Alpha Jet Atmospheric eXperiment (AJAX),
PI: Dr. Laura Iraci (Sept 2014-present)
San José State University
- Teaching faculty (Dynamic meteorology, Fall semester 2018, part-time)
- Research Scientist (part-time)
PI: Prof. Sen Chiao (Jan 2017 - present)
University of California, Berkeley, PI: Prof. Inez Fung (2012-Aug 2014)
California Institute of Technology, Jet Propulsion Laboratory,
PIs: Dr. Duane Waliser and Dr. Eric Fetzer (Aug 2009 -2011)

Research Interest

• **Atmospheric dynamics and modeling in various scales**
- Understanding of the extreme weather (e.g. Atmospheric Rivers) events using models and data analysis, Synoptic Meteorology
- Climate variability, large-scale climate dynamics and hydrological cycle (e.g. ENSO)
- Source of atmospheric moisture and water vapor/trace gas transport mechanism
- The role of regional scale wind (e.g. Petaluma gap wind, CA) on the regional precipitation and air quality

• **Atmospheric composition**
- Investigation of Transpacific ozone/aerosol transport using models and measurements
- Urban outflow of CO_2 and CH_4, and its impact on the human health and air quality
- Influence of wild Fire on local regions of CA

Research & Teaching experience

Part-time Teaching faculty *San José State University (Fall 2018)*
Teaching Meteorology major course (dynamic Meteorology)
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

- Serve as a mentor for Center for Applied Atmospheric Research and Education (CAARE) summer internship program at NASA Ames led by Prof. Sen Chiao at SJSU (2016-2017: informally served as a secondary mentor (for Dr. Laura Iraci's interns), 2017-2018: serve as a primary mentor).
- Volunteering as a graduate student for West Baltimore Elementary School Science subject (Kids Grow) tutoring, 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

NASA Ames Contractor Council, Certificate of Excellence award as a ORACLES participant (2017)
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., S. Chiao, J. R. Spackman, L. T. Iraci, R. B. Pierce, F. M. Ralph, J. E. Marrero, E. L. Yates, W. Gore, A. Martin, R. M. Dole, **2018**: The Impact of a Coastal Barrier Jet on Precipitation in Northern California during Atmospheric Rivers: A Case Study using Measurements and Models, *prepared for review in J. Hydrometeorology*.

Langford, A.O., R. J. Alvarez II. G/ Kirgis, C.J. Senff, D. Caputi, S.A. Conley, I. C. Faloona, L. T. Iraci, J.E. Marrero, M. E. McNamara, **J.-M. Ryoo**, and E.L. Yates, **2018**: Lidar and aircraft profiling of ozone above the central San Joaquin Valley during the California Baseline Ozone Transport Study (CABOTS), *in review at Atmos. Meas. Tech.*

Ryoo, J.-M., L. T. Iraci, T. Tanaka, J. E. Marrero, E. L. Yates, I. Fung, Anna M. Michalak, Jovan Tadić, and W. Gore, T. Paul Bui, J. M. Dean-Day, C. S. Chang **2018**: Quantification of CO2 and CH4 emissions

over Sacramento, California based on divergence theorem using aircraft measurement. *In review at Atmos. Meas. Tech. (published in* Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2018-254)

Ira Leifer, C. Melton, M. L. Fischer, M. Fladeland, J. Frash, W. Gore, L. T. Iraci, J. E. Marrero, **J.-M. Ryoo**, T. Tanaka, and E. L. Yates: Atmosperic characterization through fused mobile airborne and surface in situ surveys: methane emissions quantification from a producing oil field. Atmos. Meas. Tech., 11, 1-17, **2018**, https:doi.org/10.5194/amt-11-1-2018.

Ryoo, J.-M., I. Fung, J. R. Ehleringer, B. B Stephens, **2018:** Holliday CO2: Inference from the Salt Lake City data, in preparation.

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, J. of Geophys. Res.: Atmos., 122. https://doi.org/10.1002/2016JD026266

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, Environ. Sci. Tech., 51 (17), 10012-10021, DOI: 10.1021/acs.est.7b03100

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

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, J. E. Marrero, E. L. Yates, W. J. Gore, C. L. Parworth, Variability of Ozone over California during CABOTS 2016: Assessing the Role of Long-Range Transport and Local Emission using Airborne Measurements and Models, accepted to AMS January 2019.

Ryoo, J.-M., S. Chiao, J. R. Spackman, L. T. Iraci, R. B. Pierce, F. M. Ralph, E. L. Yates, J. E. Marrero, W. Gore, A. Martin, R. M. Dole, 2017: The impact of Coastal Barrier Jet on Precipitation in Northern California during Atmospheric Rivers: A Case Study using measurements and models. Meteorology and Climate – Modelling for Air Quality (MAC-MAQ), Sept. 13-15th, 2017, U.C. Davis, CA.

Ryoo, J.-M., L. T. Iraci, T. Tanaka, J. E. Marrero, E. L. Yates, W. Gore, I. Fung, 2016: New Approach to characterize CO2 and CH4 emission over Sacramento in California using an airborne aircraft measurement, the American Geological Union fall meeting, A14A-06, oral presentation, December 12-16, 2016, 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

- **Programing Language**: IDL (expert), Python, MATLAB, R, Gnuplot, Fortran 77/90, web (HTML), NCAR Graphics,
- **Technologies:** Unix/Linux, LaTeX, MS Office Suite, Web development (IT support for Meteorological data forecasting)
- **Data analysis:** Large datasets (reanalysis: NCEP/NCAR, MERRA2, ECMWF, NARR) analysis, satellite data processing, in-situ observational data (airborne data, tower, radiosonde)
- **Models:** Trajectory model (NASA GSFC trajectory model, WRF-STILT, NOAA HYSPLIT), Regional model (WRF, WRF-chem)

Professional Affiliations

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