Zachary M. Labe

CONTACT INFORMATION

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https://sites.uci.edu/zlabe/

y aZLabe

RESEARCH INTERESTS

large-scale climate dynamics • climate variability • atmospheric teleconnections • stratospheric dynamics • sea ice • science communication

EDUCATION

The University of California, Irvine, CA

Ph.D. Candidate in Earth System Science (*expected June 2020*) Advisor: Dr. Gudrun Magnusdottir

The University of California, Irvine, CA

M.Sc. in Earth System Science, Sep 2017

Cornell University, Ithaca, NY

B.Sc. in Atmospheric Science, May 2015, *Distinction in Research*Thesis: Anomalously Early Onset of Spring in the CESM Large Ensemble
Project

Minor: Dyson Business Minor for Life Sciences

SCIENTIFIC RESEARCH EXPERIENCE

2015-Present Graduate Research Assistant

Assessing influences of Arctic amplification and sea ice variability on the stratosphere and extreme weather in the midlatitudes through global climate model experiments and historical observations

Advisor: Dr. Gudrun Magnusdottir, Earth System Science, University of California Irvine

Su. 2015 Research Assistant

Evaluated the magnitude, frequency, and dynamics of spring onset in the CESM Large Ensemble Project (LENS) through the implementation of the Extended Spring Indices Model

Advisor: Dr. Toby Ault, Earth and Atmospheric Science, Cornell University

2014-2015 Undergraduate Research Assistant

Analyzed Extended Spring Indices model forced by Berkley Earth System Temperature (BEST) reanalysis to understand early spring onset

Advisor: Dr. Toby Ault, Earth and Atmospheric Science, Cornell University

PUBLICATIONS

Refereed/Peer-Reviewed

- [5] Thoman, R.L., U. Bhatt, P. Bieniek, B. Brettschneider, M. Brubaker, S. Danielson, Z.M. Labe, R. Lader, W. Meier, G. Sheffield, and J. Walsh (2020), The record low Bering Sea ice extent in 2018: Context, impacts and an assessment of the role of anthropogenic climate change [in "Explaining Extreme Events of 2018 from a Climate Perspective"]. Bull. Amer. Meteor. Soc., DOI:10.1175/BAMS-D-19-0175.1 [Article]
- [4] Labe, Z.M., Y. Peings, and G. Magnusdottir (2019), The effect of QBO phase on the atmospheric response to projected Arctic sea ice loss in early winter, Geophysical Research Letters, DOI:10.1029/2019GL083095. [Article]
- [3] **Labe, Z.M.**, Y. Peings, and G. Magnusdottir (2018), Contributions of ice thickness to the atmospheric response from projected Arctic sea ice loss, Geophysical Research Letters, DOI:10.1029/2018GL078158. [Article]
- [2] **Labe, Z.M.**, G. Magnusdottir, and H.S. Stern (2018), Variability of Arctic sea ice thickness using PIOMAS and the CESM Large Ensemble, Journal of Climate, DOI:10.1175/JCLI-D-17-0436.1. [Article]
- [1] Labe, Z.M., T.R. Ault, and R. Zurita-Milla (2016), Identifying Anomalously Early Spring Onsets in the CESM Large Ensemble Project, Climate Dynamics, DOI:10.10 07/s00382-016-3313-2. [Article]

Publications Submitted/in Preparation

[1] Timmermans, M.-L., **Z. Labe**, and C. Ladd, 2020. [The Arctic] Sea surface temperature [in "State of the Climate in 2019"]. Bull. Amer. Meteor. Soc. (*submitted*)

Non-refereed/Other

- [2] **Labe, Z.M.**, November 2019: Understanding Our Changing Arctic. Polar Bears International. Annual Magazine. [Article]
- [1] **Labe, Z.M.**, April 2015: Anomalously Early Onset of Spring in the CESM Large Ensemble. Cornell University. Undergraduate Honors Thesis. [PDF]

ORAL PRESENTATIONS

- [9] Labe, Z.M., Y. Peings, and G. Magnusdottir. Detection of Signal in the Large-Scale Circulation Response to Arctic Sea-Ice Decline. *33rd Conference on Climate Variability and Change*, Boston, MA (Jan 2020). [Abstract]
- [8] **Labe, Z.M.** Melting Ice: Context, Causes, and Consequences of Polar Amplification. *Kavli Frontiers of Science, National Academy of Sciences*, Jerusalem, Israel (Sep 2019). (Invited) [Recording]
- [7] **Labe, Z.M.** Projections of a future Arctic climate. Geography Department, Irvine Valley College, CA (May 2019). (**Invited**)
- [6] **Labe, Z.M.**, G. Magnusdottir, and Y. Peings. Linking the Quasi-Biennial Oscillation and projected Arctic sea-ice loss to stratospheric variability in early winter. *20th Conference on Middle Atmosphere*, Phoenix, AZ (Jan 2019). [Abstract]
- [5] Labe, Z.M., Y. Peings, H.S. Stern, and G. Magnusdottir. Arctic sea ice thickness variability and its influence on the atmospheric response to projected sea ice loss. *Machine Learning and Physical Sciences (MAPS) Symposium*, University of California, Irvine (May 2018).
- [4] **Labe, Z.M.** Disentangling Arctic climate change and variability. Geography Department, Irvine Valley College, CA (Apr 2018). (**Invited**)
- [3] **Labe, Z.M.,** G. Magnusdottir, and H.S. Stern. Variability and future projections of Arctic sea ice thickness. *Understanding the Causes and Consequences of Polar*

- Amplification Workshop, Aspen Global Change Institute, Aspen, CO (Jun 2017).
- [2] Labe, Z.M. Communicating the future of Arctic climate change. Natural Sciences Division, Fullerton College, CA (Nov 2016). (Invited)
- [1] Labe, Z.M. Anomalously early onset of spring in the CESM Large Ensemble Project. Earth and Atmospheric Science Undergraduate Research Symposium, Cornell University, NY (May 2015).

POSTER **PRESENTATIONS**

- [4] Labe, Z.M. Loss of Arctic sea ice thickness affects the large-scale atmosphere, Arctic System Change Workshop at NCAR, Boulder, CO (Apr 2018). [Poster]
- [3] Labe, Z.M., G. Magnusdottir, and H.S. Stern. Arctic Sea Ice Thickness Variability and the Large-scale Atmospheric Circulation Using Satellite Observations, PIOMAS, and the CESM Large Ensemble, 14th Conference on Polar Meteorology and Oceanography, Seattle, WA (Jan 2017). [Abstract] [Poster]
- [2] Labe, Z.M., G. Magnusdottir, and H.S. Stern. Making the most of Arctic sea ice thickness observations, Symposium on Recent Advances in Data Science, University of California, Irvine (Oct 2016). [Poster]
- [1] Labe, Z.M. and T.R. Ault. Anomalously Early Onset of Spring in the CESM Large Ensemble Project, 14th Annual AMS Student Conference, Phoenix, AZ (Jan 2015). [Poster]

OTHER PRESENTATIONS

- [4] Magnusdottir, G., Y. Peings, and Z.M. Labe. Response to sea-ice loss under the Polar Amplification MIP protocol in extended ensembles of simulations. 2019 American Geophysical Union Annual Meeting, San Francisco, CA (Dec 2019). [Abstract]
- [3] Holman, A., R. Thoman, Z.M. Labe, and J.E. Walsh. Not Just Chance: Ocean and Atmospheric Factors in the Record Low Bering Sea Ice Winter of 2017-2018 and effects on health and safety, 2018 American Geophysical Union Annual Meeting, Washington, DC (Dec 2018). [Abstract]
- [2] Magnusdottir, G., Z.M. Labe, and Y. Peings. The role of the stratosphere, including the QBO, in Arctic to mid-latitude teleconnections associated with sea-ice forcing. 2018 American Geophysical Union Annual Meeting, Washington, DC (Dec 2018). [Abstract]
- [1] Thoman, R. and Z.M. Labe. 2017-18 Sea Ice in Western Alaska during the 2017-18 Season: Historical Context and Possible Drivers. Western Alaska Interdisciplinary Science Conference and Forum, Nome, AK (Mar 2018).

FELLOWSHIPS AND AWARDS	Sep. 2019	Kavli Fellow, National Academy of Sciences
	Jan. 2019	Outstanding Student Presentation Award - Al Middle Atmosphere
	Nov. 2018	Travel Award - AMS Conference on Middle At

Su. 2016

dent Presentation Award - AMS Conference on

Travel Award - AMS Conference on Middle Atmosphere

2016-2018 NSF NRT-DESE in Data Science and Physical Science Fellow-

Data Science Initiative Fellowship, Department of Statistics,

University of California, Irvine

Wi. 2016	Jenkins Family Graduate Fellowship in Earth System Science,
	Department of Earth System Science, University of California, Irvine
2014-2015	Fuerst Outstanding Library Student Employee Award Finalist,
	Cornell University

TEACHING AND OUTREACH

University of California, Irvine

Fa. 2019	Teaching Assistant, Terrestrial Hydrology
Sp. 2019	Teaching Assistant, Earth System Physics
Wi. 2019	Teaching Assistant, Weather Analysis
Fa. 2016	Teaching Assistant, Fundamental Processes in Earth and Environmental Studies

Cornell University

Su. 2015	Guest Lecturer, Severe Weather Phenomena
Sp. 2015	Teaching Assistant, Programming and Meteorology Software (Python)
Fa. 2014	Teaching Assistant, Basic Principles of Meteorology Lab

Related Educational Activities

Related Educational Activities		
Feb. 2020	Irvine Unified School District's 39 th Annual Science Fair, Physical science project judge, Irvine, CA (Volunteer)	
Jan. 2020	100th American Meteorological Society Annual Meeting: Side Panel - Using Social Media to Communicate Climate Science, Boston, MA. (Chair) [Abstract]	
Nov. 2019	Department of Earth System Science, Improving scientific graphics of climate (change) data, University of California, Irvine, CA. (Presenter)	
Oct. 2019	Irvine Unified School District, "Ask-A-Scientist/Engineer Night" at Creekside High School, Orange County, CA (Volunteer)	
Sep. 2019	Geological Society of America Annual Meeting, Geoscience Communication in the Modern Age – "A Changing Arctic", Phoenix, AZ (Contributed Art)	
Sep. 2019	UC Irvine Graduate Orientation, Session Title – Healthy Student Life – The Current Student Perspective, Irvine, CA (Panelist)	
May 2019	College and Career Day Experience, MacArthur Fundamental Intermediate School, Santa Ana, CA (Presenter)	
Apr. 2019	<i>Vista Verde School</i> , Weather and climate booth at an Earth Science Day fair, Irvine, CA (Presenter)	
Mar. 2019	Climate, Literacy, Empowerment And iNquiry (CLEAN), Weather and Climate Outreach event, MacArthur Fundamental Intermediate School, Santa Ana, CA (Presenter)	
Feb. 2019	Orange County Regional Science Olympiad, Climate Science- Meteorology exam writer and proctor, Irvine, CA (Event Super-visor)	
Feb. 2019	Climate, Literacy, Empowerment And iNquiry (CLEAN), The Cryosphere Outreach event, MacArthur Fundamental Interme- diate School, Santa Ana, CA (Presenter)	

Dec. 2018	NOAA, Arctic Report Card - Update for 2018. [Contributed Graphics]
Oct. 2018	Brews and Brains: TED-Style Talk, Our Changing Arctic, Fireside Tavern, Costa Mesa, CA. (Invited Presenter). [Recording]
Oct. 2018	Irvine Unified School District, "Ask-A-Scientist/Engineer Night" at Rancho San Joaquin Middle School, Orange County, CA (Volunteer)
Sep 2018	UC Irvine Graduate Orientation, Session Title – Student Panel – Embracing Your New Graduate Life, Irvine, CA (Panelist)
May 2018	<i>Vista Verde School</i> , Weather and climate booth at an Earth Day fair, Irvine, CA (Presenter)
Feb. 2018	Irvine Unified School District's 37 th Annual Science Fair, Physical science project judge, Irvine, CA (Volunteer)
Feb. 2018	Climate, Literacy, Empowerment And iNquiry (CLEAN), Weather and Climate Outreach event, MacArthur Fundamental Intermediate School, Santa Ana, CA (Presenter)
Feb. 2018	Orange County Regional Science Olympiad, Climate Science- Meteorology exam writer and proctor, Irvine, CA (Event Super-visor)
Feb. 2018	Climate, Literacy, Empowerment And iNquiry (CLEAN), The Cryosphere Outreach event, MacArthur Fundamental Intermediate School, Santa Ana, CA (Presenter)
Sep. 2017	Irvine Unified School District, "Ask-A-Scientist/Engineer Night" at Rancho San Joaquin Middle School, Orange County, CA (Volunteer)
Aug. 2017	Irvine Unified School District, "Ask-A-Scientist/Engineer Night" at Rancho San Joaquin Middle School, Orange County, CA (Volunteer)
Aug. 2017	NASA DIRECT-STEM Program, Assessing a changing Arctic (Invited Presenter).
Apr. 2017	Climate Data Hackathon, Looking for clues to changes in Arctic sea ice, University of California, Irvine. (Invited Presenter). [Syllabus/GitHub]
Feb. 2017	Irvine Unified School District's 36 th Annual Science Fair, Physical science project judge, Irvine, CA (Volunteer)
Feb. 2017	Orange County Regional Science Olympiad, Severe Storms- Meteorology exam writer and proctor, Irvine, CA (Event Super-visor)
Wi. 2017	Seminar Course - Teaching Topics in Earth System Science (Training)
Oct. 2016	Irvine Unified School District, "Ask-A-Scientist/Engineer Night" at Rancho San Joaquin Middle School, Orange County, CA (Volunteer)
Aug. 2016	NASA DIRECT-STEM Workshop, Data and Analysis of Arctic Climate Change in CMIP5 using Python (Instructor). [Syllabus/GitHub]

PROFESSIONAL 2019-Present Student Board Member, American Meteorological Society's **ACTIVITIES** Board on Societal Impacts 2018-Present Journal Manuscript Referee [Publons] - Geophysical Research Letters, Journal of Climate, Journal of Geophysical Research: Atmospheres, Journal of Glaciology, Nature Climate Change, Polar Geography, 2017-Present Vice President & Communications Chair, Student Chapter of the American Meteorological Society at the University of California, Irvine [Website] 2017-2020 Student Board Member, American Meteorological Society's Committee on Climate Variability and Change 2017-2018 Member, Student Communications Working Group, University of California, Irvine Aug. 2017 Expert Contributor to the UCAR Climate Data Guide: "Sea Ice Thickness Data Sets: Overview & Comparison Table" [Website] 2014-2015 President, American Meteorological Society Student Chapter, Cornell University Affiliations/Memberships American Association for the Advancement of Science (AAAS). 2020-Present Member 2016-Present Association of Polar Early Career Scientists (APECS), Member 2015-Present American Geophysical Union (AGU), Member 2014-Present National Weather Association (NWA), Member 2009-Present American Meteorological Society (AMS), Member **PROFESSIONAL** Field Work TRAVEL May 2017 INTPART Arctic Field Summer Schools: Norway-Canada-USA collaboration, University of Tromsø, Norway (Workshops); Longyearbyen, Svalbard (R/V Lance - sea ice) Workshops Oct. 2019 Transdisciplinary Research on the Changing Arctic and Its Global Impacts: Enhancing Capacity for Convergence Science,

Beckman Center of the NAS, Irvine, CA

Atmospheric Research (NCAR), Boulder, CO

fication, Aspen Global Change Institute, Aspen, CO

Arctic System Change Workshop, Mesa Lab, National Center for

Understanding the Causes and Consequences of Polar Ampli-

Apr. 2018

Jun. 2017

Conferences 100th American Meteorological Society Annual Meeting, Jan. 2020 Boston, MA 99th American Meteorological Society Annual Meeting, Jan. 2019 Phoenix, AZ Jan. 2017 97th American Meteorological Society Annual Meeting, Seattle, Jan. 2015 95th American Meteorological Society Annual Meeting, Phoenix, ΑZ 94th American Meteorological Society Annual Meeting, Atlanta, Feb. 2014 GΑ 93rd American Meteorological Society Annual Meeting, Austin, Jan. 2013 TX **TECHNICAL** Python, MATLAB, R, Fortran, Unix, HTML, TFX, LATEX, BIBTFX Programming: SKILLS Software/Tools: NCL, PyNGL/PyNIO, NCO, CDO, GrADS, Git Visit my GitHub ?! ■ Atmospheric Chemistry ☐ Geoscience Modeling and Data Analysis **Physics** ☐ Global Physical Climatology **GRADUATE** ☐ Geophysical Fluid Dynamics ☐ Climate Dynamics Coursework ☐ Global Biogeochemical Cycles ☐ Climate Change ☐ Land Surface Processes ☐ Quantitative Methods in Ecology □ Ocean Processes UNDERGRADUATE ■ Remote Sensing and GIS ■ Atmospheric Dynamics Coursework ☐ Statistics in Meteorology and Climatology ■ Synoptic Meteorology II ☐ Programming and Meteorology Software ■ Physical Meteorology ☐ Ordinary and Partial Differential Equations ☐ Climate Dynamics ☐ Thermodynamics and Hydrostatics **NEWS AND MEDIA**

Feb. 2020	You've Been Warmed Podcast, "The Power Of Visualizing Data In Climate Communication w/ Zack Labe" (Interview). [Podcast]
Dec. 2019	AGU Annual Meeting, "Department of Earth System Science, University of California, Irvine - promo" (Interview). [Video]
Nov. 2019	Euronews, "Arctic ice reached record low in October" (Quoted). [Article]
Sep. 2019	Carbon Brief, "Arctic sea ice summer minimum in 2019 is 'joint-second lowest' on record" (Quoted). [Article]
Sep. 2019	Mashable, "Arctic sea ice plunges to dismal levels" (Quoted). [Article]
Sep. 2019	Euronews, "How summer 2019 was hellish for the Arctic, the frontline of climate change and global warming" (Quoted). [Article]
Aug. 2019	The Guardian, "Alaska records warmest month ever in July with coastline barren of sea ice" (Quoted). [Article]

Aug. 2019	TIME, "Alaska's Sea Ice Has Its Lowest August Levels Ever" (Quoted). [Article]
Aug. 2019	Mashable, "Greenland's melting hits overdrive" (Quoted). [Article]
Jul. 2019	Motherboard, "Arctic Ice Is Crashing, and That's Bad News For Everyone" (Quoted). [Article]
Jul. 2019	Wunderground, "Heat Wave Heads North: Massive Week of Melting Likely in Arctic" (Quoted). [Article]
Jul. 2019	The Washington Post, Capital Weather Gang, "Europe's heat wave is about to bake the Arctic" (Quoted). [Article]
Jun. 2019	The Washington Post, Capital Weather Gang, "The Arctic Ocean and Greenland ice sheet have seen record June ice loss" (Quoted). [Article]
Jun. 2019	Axios, "Arctic melt goes into overdrive" (Quoted). [Article]
Jun. 2019	Mashable, "There's some really intense melting in the Arctic right now" (Quoted). [Article]
May 2019	Earther, "The Last of the Arctic's Old Sea Ice Is on the Verge of Vanishing" (Quoted). [Article]
Mar. 2019	Carbon Brief, "Arctic sea ice winter peak in 2019 is seventh lowest on record" (Quoted). [Article]
Mar. 2019	Axios, "Vanishing ice in the Bering Sea drops to lowest level since 1850" (Quoted). [Article]
Mar. 2019	Mashable, "The Bering Strait should be covered in ice, but it's nearly all gone" (Quoted). [Article]
Feb. 2019	CBS News, "Week of remarkable weather extremes: Is this the new normal?" (Quoted). [Article]
Feb. 2019	Mashable, "It's damn cold, but heat records in the U.S. still dominate" (Quoted). [Article]
Jan. 2019	Popular Science, "Record cold temperatures don't mean the planet isn't warming" (Quoted). [Article]
Oct. 2018	<i>Mashable</i> , "Things in the middle of the Arctic are getting really strange" (Quoted). [Article]
Oct. 2018	KUCI Radio, "Arctic Sea Ice and Meteorology with Zack Labe" (Interview). [Article]
Sep. 2018	Euronews, "Arctic heatwave could result in summer-like warmth for Alaska" (Quoted). [Article]
Sep. 2018	Carbon Brief, "Arctic sea ice summer minimum in 2018 is sixth lowest on record" (Quoted). [Article]
Aug. 2018	Val 202 - Slovene radio station "The Arctic is rapidly melting" (Interview). [Article]
Jun. 2018	Earther, "There's Way Too Little Ice Around Svalbard Right Now" (Quoted). [Article]
May 2018	The Washington Post, Capital Weather Gang, "'Fallen off a cliff': Scientists have never observed so little ice in the Bering Sea in spring" (Quoted). [Article]
Mar. 2018	Earther, "Both Poles Are Having a Weird, Bad Year For Sea Ice So Far" (Quoted). [Article]
Mar. 2018	United States Senate – Senator Sheldon Whitehouse (D–RI), "Time to wake up: Climate Progress" (Supplied Graphic). [Speech]

Feb. 2018	PennLive, "Harrisburg-area grad, scientist fuels buzz behind news that North Pole temps surged past freezing" (Interview). [Article]
Feb. 2018	Mashable, "Drastic Arctic warm event stuns scientists, as record-breaking temperatures reach the North Pole" (Quoted). [Article]
Feb. 2018	The Washington Post, Capital Weather Gang, "North Pole surges above freezing in the dead of winter, stunning scientists" (Quoted). [Article]
Feb. 2018	Earther, "Bering Sea Ice Is Disappearing When it Should Still Be Growing" (Quoted). [Article]
Feb. 2018	USA Today, "Arctic sea ice at record low January levels" (Quoted). [Article]
Feb. 2018	UT Austin Geosciences, "Social media: changing the science communication landscape" (Interview). [Article]
Dec. 2017	USA Today, "It's cold outside, but that doesn't mean climate change isn't real" (Quoted). [Article]
Sep. 2017	The Sydney Morning Herald, "Attacked from two sides: Antarctic sea ice hits another record low" (Quoted). [Article]
Aug. 2017	The Verge, "This Artist's New Landscape Studies are of Melting Glaciers" (Quoted). [Article]
Jul. 2017	Climate Central, "Here's How Much Arctic Sea Ice Has Melted Since the '80s" (Quoted). [Article]
Jun. 2017	Climate Central, "We Couldn't Monitor Larsen C Without These Satellites" (Quoted). [Article]
Apr. 2017	<i>Mashable</i> , "Arctic ice in retreat: NASA's airborne survey shows how global warming is transforming the Arctic" (Quoted). [Article]
Apr. 2017	UCI News, "UCI Doctoral student is helping people visualize climate change and its impact on the entire planet" (Interview). [Article]
Mar. 2017	Carbon Brief, "Sea ice falls to record lows in both the Arctic and Antarctic" (Quoted). [Article]
Mar. 2017	Climate Central, "Arctic Sea Ice Continues Its Astonishing Streak of Lows" (Quoted). [Article]
Feb. 2017	The Washington Post, Capital Weather Gang, "Beyond the extreme': Scientists marvel at 'increasingly non-natural' Arctic warmth" (Quoted). [Article]
Jan. 2017	UCI News, "Climate change champions" (Interview). [Article]
Dec. 2016	NPR, "North Pole Temperatures Expected To Rise 50 Degrees Above Normal" (Interview). [Recording]
Dec. 2016	Yahoo News, "Bizarre North Pole temperatures cap off year of record-setting warmth" (Quoted). [Article]
Dec. 2016	The Washington Post, Capital Weather Gang, "Forecast: North Pole to warm 50 degrees above normal Thursday, near melting point" (Quoted). [Article]
Nov. 2016	American Geophysical Union Blogs, "A conversation with Zack Labe" (Interview). [Article]
Nov. 2016	The Washington Post, "The North Pole is an insane 36 degrees warmer than normal as winter descends" (Quoted). [Article]
Oct. 2016	The Sydney Morning Herald, "Polar heatwaves have ice in retreat at both ends of the planet" (Quoted). [Article]

Oct. 2016	The Washington Post, Capital Weather Gang, "Arctic sea ice is at a record low and could, in spurts, disappear within our lifetimes" (Quoted). [Article]
Oct. 2016	Climate Central, "This is What It's Like To Be a Young Climate Scientist" (Interview). [Article]
Sep. 2016	New York Times, Dot Earth, "Arctic Summer Sea Ice - Going Down, Down," (Contributed). [Article]
Sep. 2016	<i>Mashable</i> , "Sailboat nears goal of circumnavigating the Arctic as sea ice plummets" (Quoted). [Article]
Aug. 2016	Cornell University, "Early-onset spring models may indicate 'nightmare' for ag" (Press Release). [Article]
Jul. 2016	The Weather Junkies Podcast, "The Science of Modeling Climate & Weather" (Interview). [Recording]

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PERSONAL INTERESTS

Vegetable gardening, travel, cooking, hiking, fishing, lighthouses, trains, winter synoptic storms, long-range and seasonal weather forecasting