About

Atmospheric Rivers Colloquium Summer School

The overarching goal of the colloquium is to provide the next generation of atmospheric scientists with an in depth look at the cutting edge techniques in understanding, monitoring, and predicting atmospheric rivers (ARs) and their associated high-impact weather, using the AR monograph that is in preparation as a framework. To achieve this goal, the colloquium will bring a diverse group of students together, at different stages in their education and with experience in various disciplines relevant to ARs, to learn from an international group of scientists studying ARs. The colloquium agenda will allow students to interact with these leaders in AR science, gaining hands-on experience as well as participating in specially crafted lecture sessions. Outcomes will include improved understanding of

1. The fundamental dynamics and physics associated with ARs, including their role in the water cycle and impacts in different regions across the globe

2. The techniques to detect, observe, model, and forecast ARs at all relevant time scales, including in future climate scenarios

3. Applications of AR science to water management, engineering, and hazard resilience.

Steering Committee

The steering committee that is organizing the colloquium is composed of an international group of instructors and student representatives. The steering committee solicited input from students who attended the 2nd International Atmospheric Rivers Conference (IARC) and the Student Forecasting Workshop that followed.

- Christoph Böehm, University of Cologne (student member)

- Diego Campos, University of Chile; Dirección Meteorològica de Chile (student member)

- Will Chapman, Center for Western Weather and Water Extremes, UC San Diego (student member)

- Jason Cordeira, Plymouth State University
- René Garreaud, University of Chile
- Irina Gorodetskaya, University of Aveiro
- Ashley Payne, University of Michigan
- F. Martin Ralph, Center for Western Weather and Water Extremes, UC San Diego
- Alexandre Ramos, University of Lisbon
- Jonathan Rutz, NOAA National Weather Service Western Region
- Carolina Viceto, University of Aveiro (student member)
- Anna Wilson, Center for Western Weather and Water Extremes, UC San Diego

Useful Information

Location

The colloquium will be held from **24 June to 5 July 2019** in the **Martin Johnson House** at the Scripps Institution of Oceanography in La Jolla, California.

Wi-Fi will be available during the colloquium. If your home institution is eduroam-enabled, you may use the **eduroam** network. If it is not, or you are not certain, you may use **UCSD-GUEST**.

Food & Social

Outside of coffee breaks, we will not be directly providing food at the colloquium.

- Students who are using the UCSD housing option will be provided breakfast, lunch and dinner. For these students, breakfast and dinner are at the Pines dining hall and lunch will be boxed and delivered to the colloquium.

- For all others, there are several nearby restaurants – Pinpoint Cafe, Splash! Cafe, and Caroline's Seaside Cafe – and potentially group orders on other days.

We have several social events planned that are open to all:

- **June 24th** on campus at the **Surfside Lodge, 5 - 9:30 pm**. Food and drink will be provided.

- **June 28th** at the **Shore Rider brew pub, 5 - 9:30 pm**. This event isn't sponsored, but all are welcome to attend (not restricted to those over 21). The venue is close to campus.

- **July 3rd** on campus at the **Surfside Lodge, 5 - 9:30 pm**. Food and drink will be provided.

Due to the holiday on July 4th, we won't have any lectures during the day. All are welcome to join us for a beach BBQ in the afternoon, exact time is to be determined, and to **watch the fireworks** after sunset.

Important Phone Numbers

- **ANY Emergencies:** +1 (858) 534 4357 (+1 (858) 534 HELP) This is a much faster response than 911

- **Maintenance for Housing:** +1 (858) 534 2600 If anything is broken in your apartment

- **Community Service Escort:** +1 (858) 534 9255 If you are walking late at campus and would like a community service officer to walk with you. Or if you need a 'Safe Ride'

- **Counseling and Psychological Services:** +1 (858) 534 3755

Transportation

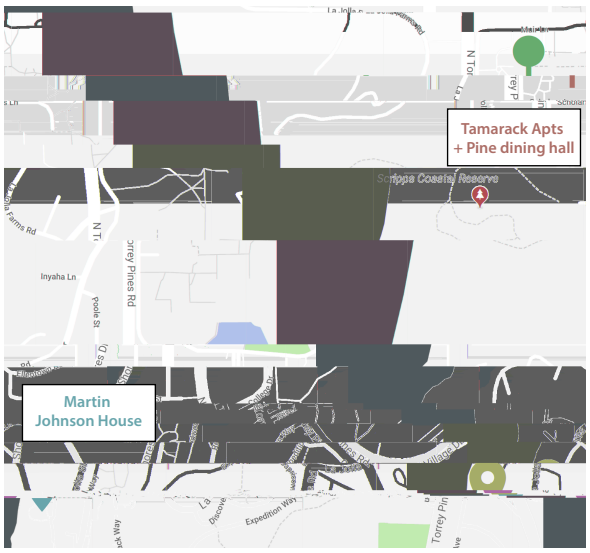
Transport from the San Diego airport (SAN) to the Scripps campus should take about 25 - 30 minutes. Taxis, LYFT and Uber are recommended. You can you the following address for drop-off: **9600 N Torrey Pines Rd. La Jolla, CA 92037**. Make sure to get a receipt in order to be reimbursed.

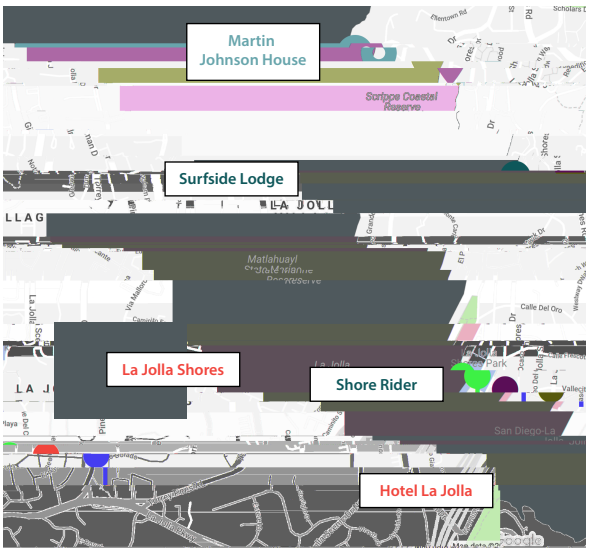
Transportation for the optional visit to the National Weather Service San Diego station will be arranged from Muir Tamarack apartments where most students are staying. Please RSVP so we have an accurate count. This event is space-limited.

A shuttle service is available for students staying in the Tamarack Apartments (**live map**)

Map

An interactive map of all of locations mentioned in this program can be found on the AR Colloquium website. Snapshots are shown below:





Equations

The vertically integrated moisture flux (IVT):

$$IVT = g^{-1} \int_{p_0}^{p_t} (q\mathbf{V_h})\, \mathrm{d}p, \tag{0.1}$$

and, where $\mathbf{V_h}$ is the horizontal wind speed on isobaric surfaces measured in units of m s^{-1}, q is specific humidity measured in units of kg kg^{-1}, g is the gravitational acceleration (9.81 m s^{-2}), p_s is 1000 hPa and p_t is some pressure level in the atmosphere (varies according to approach, usually between 500 hPa - 200 hPa).

Program

Monday, June 24th

13:30–15:00	**Registration**	
15:00–15:15	**Pre-Colloquium Coffee**	
15:15–16:45	**Orientation**	
15:15–15:30	***Marty Ralph*** *Director, CW3E*	Welcome
15:30–15:40	***Ashley Payne*** *University of Michigan*	Student projects
15:40–16:45	***I*ndividual introductions**	
16:45–17:00	**Break**	
17:00–21:30	**Social at the Surfside Lodge**	

Tuesday, June 25th

9:00–10:30	Marty Ralph	AR Definition
10:30–10:45	**Coffee**	
10:45–12:15	Ashley Payne, Jon Rutz	Tracking of ARs
12:15–13:30	**Lunch**	
13:30–15:00	Marty Ralph, Anna Wilson	AR Recon and Observations
15:00–15:15	**Coffee**	
15:15–16:45	David Lavers, Irina Gorodetskaya	AR Recon and Observations

16:45+	**Project selection**

Wednesday, June 26th

9:00–10:30	Mike Dettinger, David Lavers, René Garreaud	Hydrology
10:30–10:45	**Coffee**	
10:45–12:15	Mike Dettinger, David Lavers, René Garreaud	Hydrology
12:15–13:30	**Lunch**	
13:30–15:00	Ashley Payne, Jon Rutz, Larry Schick	Climate (past)
15:00–15:15	**Coffee**	
15:15–16:45	**Project Workspace**	

Thursday, June 27th

9:00–10:30	Jon Rutz, David Lavers	Forecast (14 days)
10:30–10:45	**Coffee**	
10:45–12:15	Hans Christian Steen-Larsen, Alexandre Ramos	Isotopes & Lagrangian
12:15–13:30	**Lunch**	
13:30–15:00	Irina Gorodetskaya, Bill Neff	Polar & Teleconnections
15:00–15:15	**Coffee**	
15:15–16:45	**Project Workspace**	

Friday, June 28th

9:00–10:30	Jon Rutz, Alexandre Ramos, René Garreaud	Impacts
10:30–10:45	**Coffee**	
10:45–12:15	Jon Rutz, Alexandre Ramos, René Garreaud	Impacts
12:15–13:30	**Lunch**	
13:30–15:00	Irina Gorodetskaya, Bill Neff	Polar & Teleconnections
15:00–15:15	**Coffee**	
15:15–16:45	**Project Workspace**	
17:00–21:30	**Shore Rider**	

Saturday, June 29th

8:00–9:30	**NWS San Diego visit: meet at Muir Tamarack apartments at 7:15 for carpool**
10:30–11:30	**Tour of Scripps Pier and Radiosonde Launch**

Monday, July 1st

9:00–10:30	Lance Bosart, Jay Cordeira	Atmospheric Dynamics
10:30–10:45	**Coffee**	
10:45–12:15	Lance Bosart, Jay Cordeira	Atmospheric Dynamics
12:15–13:30	**Lunch**	
13:30–15:00	Andy Martin	WRF Modelling
15:00–15:15	**Coffee**	
15:15–16:45	**Project Workspace**	

Tuesday, July 2nd

9:00–10:30	Jeanine Jones, Marty Ralph, Larry Schick	Operations and Engineering
10:30–10:45	**Coffee**	
10:45–12:15	Duane Waliser, Jeanine Jones	Subseasonal to Seasonal
12:15–13:30	**Lunch**	
13:30–15:00	Jeanine Jones, Marty Ralph, Larry Schick	Operations and Engineering
15:00–15:15	**Coffee**	
15:15–16:45	**Project Workspace**	

Wednesday, July 3rd

9:00–10:30	Andy Martin, Sarah Aarons	Aerosols and Chemistry
10:30–10:45	**Coffee**	
10:45–12:15	Sasha Gershunov, Alexandre Ramos	Climate (present)
12:15–13:30	**Lunch**	
13:30–15:00	Duane Waliser, Alexandre Ramos	Climate (future)
15:00–15:15	**Coffee**	
15:15–16:45	**Project Workspace**	
17:00–21:30	**Social at the Surfside Lodge**	

Thursday, July 4th

12:00–3:00	**Beach BBQ**

Friday, July 5th

9:00–9:20	**"Characterization of ARs crossing the Northern Sierra Nevada mountains"**
9:25–9:45	**"The Relationship Between AR Frequency and Longitudinal Position of the Walker Circulation Deep Convection"**
9:50–10:10	**"Forecast skill of different AR shapes"**
10:15–10:35	**"The influence of ARs on the Arctic Amplification"**
10:40–10:55	**Coffee**
10:55–11:15	**"Characteristics of the Maya Express and its hydrological impacts"**
11:20–11:40	**"Impact of ARs on the Antarctic Peninsula in summer: Rain and Snowfall"**
11:45–12:05	**"The effect that coastal range orographic lifting of inland penetrating ARs has on Rocky Mountain precipitation"**
12:10–12:30	**"AR variability in South America (Chile)"**
12:35–14:00	**Lunch in Martin Johnson House and feedback on Colloquium**

List of Participants

Aarons, Sarah saarons@ucsd.edu	Scripps, UC San Diego, USA
Albano, Christine christine.albano@dri.edu	Desert Research Institute, USA
Ayantobo, Olusola skollar24k@yahoo.com	Tsinghua University, China
Böehm, Christoph c.boehm@uni-koeln.de	University of Cologne, Germany
Bosart, Lance lbosart@albany.edu	University at Albany,ăSUNY, USA
Buch, Deveshi deveshibuch@gmail.com	Vista del Lago High School, CA, USA
Caldeirinha, Ana accaldeirinha@fc.ul.pt	University of Lisbon, Portugal
Campos, Diego diego.campos@meteochile.cl	University of Chile, Chile
Chapman, Will wchapman@ucsd.edu	Center for Western Weather and Water Extremes, UC San Diego, USA
Chyhareva, Anastasiia chyhareva@ukr.net	Ukranian Hydrometeorological Institute, Ukraine
Cordeira, Jay j_cordeira@plymouth.edu	Plymouth State University, USA
Dettinger, Mike mddettin@usgs.gov	USGS, Branch of Western Regional Research, USA
Douluri, Dhana Lakshmi dl.ayyalasomayajula@gmail.com	Indian Institute of Technology, India
Garreaud, René rgarreau@dgf.uchile.cl	University of Chile, Chile
Gershunov, Sasha sasha@ucsd.edu	Center for Western Weather and Water Extremes, UC San Diego, USA
Gomez, Tomas tomas.ignacio.gomez@gmail.com	University of Chile, Chile
Gorodetskaya, Irina irina.gorodetskaya@ua.pt	University of Aveiro, Portugal
Jones, Jeanine Jeanine.Jones@water.ca.gov	Department of Water Resources, CA, USA

Kim, Dabeen klure0824@gmail.com	Korea National University of Education, Korea
Kim, Sol solkim1@gmail.com	UC Berkeley, USA
Lauer, Melanie melle.lauer@web.de	University of Cologne, Germany
Lavers, David david.lavers@ecmwf.int	Forecast Department, ECMWF, UK
Leicht, Tyler tleicht@albany.edu	University at Albany,ăSUNY, USA
Lojko, Alexander alojko@umich.edu	University of Michigan, USA
Luis, Diogo diogo.luis9@ua.pt	University of Aveiro, Portugal
Martin, Andrew anmarti2@pdx.edu	Portland State University, USA
Michaelis, Allison a1michaelis@ucsd.edu	Center for Western Weather and Water Extremes, UC San Diego, USA
Morales, Annareli annareli@umich.edu	University of Michigan, USA
Neff, William william.neff@colorado.edu	NOAA ESRL Physical Sciences Division, USA
Osborne, Tashiana tashiana@ucsd.edu	Center for Western Weather and Water Extremes, UC San Diego, USA
Pagano, Terence terry.pagano3@gmail.com	University of Wisconsin Madison, USA
Passalacqua, Gino gpassala@ucsd.edu	Scripps, UC San Diego, USA
Payne, Ashley aepayne@umich.edu	University of Michigan, USA
Ralph, Marty mralph@ucsd.edu	Center for Western Weather and Water Extremes, UC San Diego, USA
Ramos, Alexandre amramos@fc.ul.pt	University of Lisbon, Portugal
Roj, Shawn shawnroj78@gmail.com	University of Nevada Reno, USA
Rutz, Jonathan jonathan.rutz@noaa.gov	NOAA National Weather Service Western Region, USA
Schick, Larry lawrence.j.schick@usace.army.mil	US Army Corps of Engineers, USA

Shearer, Eric eshearer@uci.edu	University of California Irvine, USA
Shulgina, Tamara tshulgina@ucsd.edu	Center for Western Weather and Water Extremes, UC San Diego, USA
Slinskey, Emily slinskey@pdx.edu	Portland State University, USA
Sousa, Pedro ppsousa@fc.ul.pt	University of Lisbon, Portugal
Steen-Larsen, Hans Christian Hans.Christian.Steen-Larsen@uib.no	University of Bergen, Norway
Stillinger, Timbo tstillinger@bren.ucsb.edu	UC Santa Barbara, USA
Uluatam, Sophie sau7@cornell.edu	Cornell University, USA
Viceto, Carolina Parreira carolinavicetto@gmail.com	University of Aveiro, Portugal
Waliser, Duane duane.waliser@jpl.nasa.gov	NASA JPL, USA
Wang, Minghua wmhua@126.com	Tongji University, China
Wille, Jonathan Jonathan.Wille@univ-grenoble-alpes.fr	University Grenoble Alps, France
Wilson, Anna anna-m-wilson@ucsd.edu	Center for Western Weather and Water Extremes, UC San Diego, USA