

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 Meteorológica 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

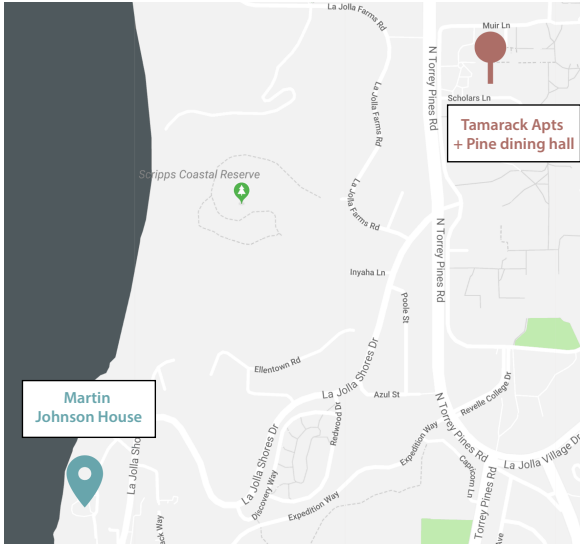
Transport from the San Diego airport (SAN) to the Scripps campus should take about 25 - 30 minutes. Taxis, LYFT and Uber are recommended. You can use the following address for drop-off: **9600 N Torrey Pines Rd. La Jolla, CA 92037**. Make sure to get a receipt in order to be reimbursed.

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):

$$IVT = g^{-1} \int_{p_0}^{p_t} (q \mathbf{V}_h) dp, \quad (0.1)$$

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 <i>Director, CW3E</i>	Welcome
15:30–15:40	Ashley Payne <i>University of Michigan</i>	Student projects
15:40–16:45	Individual 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
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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
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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

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