

CIRMOUNT

An Interview with Mike Dettinger, 2014 Fellow of the American Geophysical Union

Mike Dettinger, Research Hydrologist with the U.S. Geological Survey and University of California Scripps, Institution of Oceanography at La Jolla, California, was elected this year to the 2014 Class of Fellows of the American Geophysical Union (AGU). In that Mike is a founder and key leader of CIRMOUNT, we in the mountain-science community send Mike our congratulations and share in the pride of this honor. Mike will be recognized with other 2014 Fellows during the annual Fall Meeting of the AGU on Wednesday evening, December 17, 2014 in San Francisco, California. My admiration for Mike's incisive mind and for his many critical scientific contributions added incentive to pin Mike down with the following questions.

"The most successful scientist thinks like a poet—wide-ranging, sometimes fantastical—and works like a bookkeeper." -- e.o. wilson

Connie: Your recent critical body of research on atmospheric rivers has brought clarity and systematic rigor to what had been a poorly understood climatological process of significant implications. What got you started on this line of research?

Mike: Interestingly, it was a PACLIM [Pacific Climate] Workshop back in the days when I was running that show that led me into this atmospheric rivers stuff. It was the year when we wanted to look at paleo records of multi-decadal droughts and such (sounds like any PACLIM, but in those days this was a special theme for that particular year...I think I still have the t-shirt). I rather cantankerously was concerned that some of the isotope-based discussions would devolve into long strings of attributing various isotopic excursions in various proxies to "El Niño supplies a bunch of tropically fed precipitation here, and La Niña does more over there", and so on, without anyone having actually looked to see what ENSO and PDO and so forth actually do to the movements of water vapor around the world. I realized that I was in a position to derive a 50-yr record of daily vapor transports globally using modern meteorological data sets (re-analyses) to preempt the gap in

the discussion that I was anticipating, and also immediately realized that if I made such a data set, there would be a ton of other uses for it too. So much of what we did was based on inferring how moisture (and heat) is transported from various proxies, like pressure fields and such. I realized that with the (then) modern data, I could go directly to what I so often really wanted to know: where was this water I was studying coming from, on any given day, month, year, whatever.

One of the things I did with the dataset once I'd constructed it (besides a poster session on ENSO/PDO/annual patterns of vapor transport for that PACLIM) was to track down and document every pineapple express storm on the west coast since 1948.

That led me into conversations with the folks, like Marty Ralph, at NOAA, who had recently been flying around in such storms, and who were calling them "atmospheric rivers". I won't deny that I pretty quickly recognized the sex appeal of that term (coined earlier by Yong Zhu and Reginald Newell of MIT) and equally quickly realized that these things really are the guts of the atmospheric arm of the water cycle. Honestly the global (atmospheric) water cycle has always been a very attractive topic for me...I've often felt that meteorologists and climatologists weren't giving it the attention it deserves as a basis for land hydrology, and that hydrologists (who should know the right questions to ask) had effectively ceded all attention of it to the climate folks.

The upshot is that, since then, I've worked closely with those guys from NOAA (and elsewhere) to better document and understand atmospheric rivers as a phenomenon. My main roles have been to provide the long-view perspective on these storms in order to augment the more case-study perspective that had dominated much of the work previously. My other role has been to hunt down and document the on-the-land practical implications and impacts, both good and bad, of these "rivers" in the sky for California and the West.

Connie: OK, let me generalize my question: Your career has been characterized by a succession of key climate studies on distinct, if related, climate problems. How in general do you make decisions about selecting research topics and directions along the way, given that there are so many interesting and seemingly important problems you could follow?

Mike: Dan Cayan has in the past referred to his pursuits (and mine) in terms of us being "old timey naturalists", indicating that we both pursue topics stoked by very wide-ranging, none-too-stovepiped curiosities. So, yes, there is an almost limitless range of topics that I am tempted to pursue. The good news is that there is still a ton of good science lurking in existing meteorological data sets from the past 50-60 years, science just waiting to be extracted and explored. (So don't ever imagine that all the good stuff is done, nor that ONLY with new data can new science get

done.) Thus topics are pretty easy to come by, results are all around, and the operative question really is “what are the most useful problems to pursue and address?”

It’s a combination of a gnawing curiosity and, like all of us, an underlying desire to make a societal difference with my work that determines which questions I pursue. I like to think that I have a good instinct for what is a fruitful set of questions, and I strategically tend to pursue ones that I know will set me up with tools to answer other later questions in other areas too. The vapor-transport analysis mentioned above is an example of what I mean: I thought it would be useful to do that original PACLIM analysis but probably wouldn’t have if I hadn’t realized that, once I had that particular data set compiled for the PACLIM poster, a large number of other equally interesting but different questions would suddenly become address-able in new ways (like long-term orographic precipitation variations and like the history and future of pineapple expresses, and so on). So I choose strategically, looking forward a couple of studies, when possible.

I guess I’d also say it’s really useful to value/develop the skills, tools, and datasets that allow you to analyze quickly. That may seem obvious, but in this context I mean mostly that, for me, interesting ideas are cheap and easy. But most of mine are wrong. However, because I have valued work that yields tools and datasets that make the next study and the one after that easier and faster, I am pretty quick. Thus I am able to pursue a lot of faulty ideas in order to root out my few good ones. If I were slower, I’d never get through all my bad ideas to the good ones, and I wouldn’t seem to have any good ones. You wouldn’t believe how many dead ends I visit in my travels.

Connie: What is it about mountain environments that has attracted your research interest and attention?

Mike: I just love them personally. I make all sorts of justifications for why they are important to study (like in “Mapping New Terrains” [CIRMOUNT’s early position document]), but really I just love the mountains. It’s an odd mix of their tremendous scale and quiet, combined with the fact that our western mountains are these huge landscapes made up of small human-sized alcoves.

I like the grandeur, but even more I like the small settings that are scaled like something that I fantasize I could someday really understand.

Connie: What key research problems or questions in coming years do you hope to tackle, and that you hope to motivate others also to work on?

Mike: Okay, so to be honest, the other thing that drives my selection of research topics is a tendency to prefer to work on issues that are important before they are

too popular. I studied groundwater issues a step before they became the most heavily pursued issues in western hydrology (a few decades ago). I jumped off of that and onto hydroclimate variability topics back when there weren't many of us, when Dan Cayan was still chumming the waters with all his remarkable early discoveries, when students in that area were precious few and jealously guarded. I didn't exactly jump onto the climate-change topic but rather was pulled onto it by a few key (historical) findings and a lot of interest from key agencies in California, back when it wasn't the most popular topic around. More recently, I recognized that atmospheric rivers had the potential to prove critical to understanding a lot of problems that I'd been mystified by for much of my career...in particular, I realized that they might be just the piece that was needed to fill in the gap between weather events and climate variations of many shapes and sizes. That realization continues to yield fruit, with recent connections that I've found tying California's droughts (a mystifying climate scale phenomenon) almost exclusively to the largest few atmospheric rivers, or lack thereof.

But indeed as with all the previous topics, I am struggling now because atmospheric rivers have become a hot topic, and the number of folks working on them has burgeoned in the past couple of years...to the point where I am feeling a bit antsy. Honestly, I am sort of scanning the horizon wondering what might be the next good, less populated topic to pursue.

I have lots of commitments re: atmospheric rivers, so it's not like I'll stop doing that but, right now, I am thinking about two attractive directions, bearing in mind that—let's face it—I don't have time for too many more switches in my career:

(i) I started down the road towards trying to do syntheses of the atmospheric arm of the water cycle, how it works and varies at essentially global scales, how understanding those workings might allow us to better understand, forecast, and track water processes on land. But I got diverted (in a very good way) onto this specific phenomenon, atmospheric rivers. I have been thinking lately about how to step back and re-engage with those original, even-larger scale processes that I thought I was going to pursue initially.

(ii) On the completely other end of the space scale, I have been increasingly attracted to issues up in the Lake Tahoe Basin. It seems to me that Tahoe has the benefit of being the one place in the whole of the Sierra Nevada—and maybe of the whole West—where lots of people live in the mountains in one place and with at least some attempts to do right by it. I know it's an urban lake at this point, but it seems to me that if I really do want to contribute to how people live with mountains, Tahoe is sort of ground zero.

Of course, the problem is that, if you'd asked me a couple of years ago, I was already starting to feel a bit antsy, and I had two other new directions I was

thinking about (very different and way off the track). The catch is that I simply don't have the skill sets to make real contributions in those areas and, yes, I have explored them long enough to find that out for sure. They were goooood ideas, but not for me. Regrouping, the two above feel like directions that I am actually suited for, so they are my best guesses as to "what's next" I think. I hope.



*Mike between the Sunrise and Merced Lake camps in Yosemite National Park, July 2014.
Photo credit: Julia Dettinger*