

## Live, Breathe, and Check In With the Weather: How to Share the Weather with the Online Community through Geolocation-based Applications and Social Media

by Karen Freberg\*



Social media are revolutionizing how people conduct business, communicate with others, and share information about similar interests online. From sharing reviews of consumer products to voicing their opinions about celebrities (ex. Tiger Woods) or corporations in crises (ex. Toyota and BP), members of the global online community use social media to express their personal feelings. Social media impact any entity wishing to communicate effectively with large numbers of people, and thus have implications for the weather and disaster response communities. In this piece, I will provide a brief overview of social media, descriptions of current trends involving new technology and mobile devices, and suggestions for best practices and future trends in geolocation-based applications relevant to weather professionals.

### Overview of Social Media

Social media are defined as “online practices that utilize technology and enable people to share content, opinions, experiences, insights, and media themselves”

(Lariscy, Avery, Sweetser, and Howes, 2009, p. 1). These shared communications take place in “a wide range of online, word-of-mouth forums including blogs, company-sponsored discussion boards and chat rooms, consumer-to-consumer email, consumer product or service ratings Web sites and forums, Internet discussion boards and forums, and microblogs” (Mangold & Faulds, 2009, p. 358). In contrast to the one-way communication that characterizes traditional mass media, social media are “demassified,” in the sense that each user can also be a contributor, sharing information both visually and rhetorically, and serving as a virtual hub of information within an online community.

Advances in communication technologies making social media possible include computers, but most especially digital hand-held devices, including mobile phones, personal digital assistants (PDAs), and wireless tablets such as the iPad. The evolution of the mobile phone device has taken center stage in the communication technology

realm, shaping the network communications framework and the ways we connect with each other. New applications including text messaging (signal messaging services; SMS), one-to-many communication messages,

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July 2010 flash flooding on the Uncompahgre River near Ouray, Colo. (Photo by Blake Beyea)

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# Fieldwork in Indian Country: A Conversational Experience

by Randy Pepler\*

Instead of coming home with a bright red sports car (though I do have a bright red pickup truck), I decided one day in April 2005 to finally pursue that elusive Ph.D. While my career in the atmospheric sciences has gone well, it has been limited in several fundamental ways by not having that ultimate sheepskin. As someone in a position of authority once told me, it doesn't really matter what the Ph.D. is in (basket weaving was cited as a valid example) – “*just get one.*” Instead of pursuing this in meteorology—within which I had done research for a number of years in the climate diagnostics area and more recently as part of an international climate observing/modeling program—I picked human geography and, specifically, its “nature and society” subfield. I've always been fascinated with how we as human beings mediate, exploit, and even “create” nature in order to live in it the ways we want to, and how people who are not scientists “know” nature, particularly weather and climate, so this allowed me to put some meat to the bone. As someone who has camped and backpacked quite a bit, often in places with little or no communication potential with the outside world (including the Sangre de Cristo mountains of New Mexico when 9/11 was taking place), I have wondered how people who had no access to

“weather information” anticipated its changes. How did they know? As I'm finding, and as Bob Dylan once said, “*You don't need a weatherman to know which way the wind blows.*”

In the very first graduate seminar course of my first semester back (“Nature and Society”), I was able to connect with a political ecologist, Karl Offen, who shares many of my views and interests on such topics. I honestly had no idea what I wanted to do in terms of a dissertation, but through this course and a subsequent one on Latin American environmental history, I became officially interested in how Native peoples know nature and how they adapt within it. This has been variously termed local, indigenous, or traditional knowledge, or even “wisdom” (e.g., Suzuki and Knudtson 1992). There is a vast literature in this area that crosses several disciplines. Karl had done extensive fieldwork in Nicaragua with the Miskitu Indians and encouraged me to pursue my interest. Although much of this sort of research is done in Third World locales, it turns out that I live in a good place to do this in a First World setting—Oklahoma.

Before statehood, Oklahoma was known as the Oklahoma Territory to the west and the Indian Territory to the east. Tribes engaged in a sedentary agricultural lifestyle were “removed” to the territory during the 1800s along the Trail



*Several interviews mentioned in the article were conducted at the Anadarko Community Library in Anadarko, Okla. (Photo by Randy Pepler)*

of Tears and other routes from the southeastern United States. Other more nomadic tribes arrived via various treaties that forced them into the territory from the Great Plains. The result today is a vibrant Native population in Oklahoma that is increasingly aiming to become more self-sufficient and sovereign—or as once explained, to “decolonize.” Based on some historical documents work I did as pre-research for my dissertation proposal (Pepler 2010, in press), I found evidence of traditional weather and climate knowledge within tribes in Oklahoma. Some of this knowledge is observational, while some is part of ceremonial or oral tradition (e.g., Momaday 1969, p. 48-51 – regarding the Kiowa Storm Spirit). Based on these leads, I sought contemporary knowledge of these topics and chose interview research of Native farmers in southwestern

Oklahoma. I want to know how they observe and conceptualize weather and climate, including in traditional ways, and how they use this knowledge in efforts to farm, ranch and garden, in some cases within the broader framework of achieving food sovereignty.

So how does one get started in this sort of work? Through the help of an in-house Oklahoma State University agricultural extension agent, I was able to contact several county extension agents in “Indian Country,” those parts of Oklahoma in which tribal populations remain abundant and strong. The agent in Caddo County, to the southwest of Norman where I live, said he knew a fellow who works with Native farmers and that he might be able to help me. He copied this man in an email response to me, and within 13 minutes I heard from a man who is now is my friend Randall. He is based in Anadarko and Fort Cobb and helps Native men and women enter and remain in farming, ranching and gardening. Randall wrote to me,

*“Mr. Peppler, My name is Randall [ ], and I am extension outreach for*



*A self esteem garden located at a church in Caddo County, Okla. (Photo by Randy Peppler)*

*Langston University to the Native American Indian Farmers and Ranchers. Also, I am a full blood member of the Kiowa Tribe of Oklahoma, am very active culturally and traditionally to my Indian People to help with their farming needs and I am also, a farmer myself. I have a list of 280 Native Farmers we can talk to...Randy, call me at 10:00AM. I shall be awaiting your call!! A-ho!! (thank you).”* The rest, as they say, is history.

I have been working with Randall since February 2009 to line up interviews and to attend various farmer and community functions (small farmer meetings and workshops, conservation meetings, environmental camps for children) to not only learn more about what is going on in farming but also to know the people and the communities. Randall wears many hats, all with the goal of helping Native people farm and ranch their own lands: In addition to [Langston Outreach](#), he helps lead the Native American Indian Farming & Ranching Cooperative that serves about 280 Native farming families, and Kiowa Native Farms LLC, a group that seeks to create community gardens and farmers markets, and “kill facilities” for buffalo—it will be sponsoring the first annual “Native American Vegetable Contest” on August 5-6. Ours is a reciprocal relationship of helping each other achieve our goals; while he helps spread the word about what I’m doing and finds people for me to talk to, I’ve talked to children at the Apache Tribe Environmental Camp accompanied by a VORTEX2 reconnaissance vehicle that was a big hit. As part of my outreach I also became aware of the [Mvskoke Food Sovereignty Initiative](#) in

eastern Oklahoma – the Muscogee (Creek) people came to Oklahoma from the southeastern U.S. and have a legacy of farming (and rainmakers!). The MFSI is involved in creating sustainable agriculture by planting and saving traditional vegetable seed lines and promoting healthier diets and lifestyles. I hope to extend my research to this part of the state someday.

My experiences with Randall and others in Indian Country have been a rewarding privilege. I have met farmers of Kiowa, Comanche, Delaware, Caddo, Wichita, and Creek heritage. To sit in a room with these folks, where meetings begin with a blessing (and sometimes a ceremony) and food breaks are amazing, is much different than being in a conference session full of academics. My IRB-approved interview protocol includes a number of topical areas, including background information about the farmers and their heritage, their weather knowledge and how they farm and use it, how they farm, and how they network (the social and farming institutions they are involved in). I also engage them in a conversation about climate change, asking whether they have noticed it and if so, have they done anything in response to it (the thinking here being that people who are outdoors a lot and depend on the outdoors for their living are keen to notice and adapt to its changes). My conversations have lasted anywhere from 30 to 90 minutes. While I have an interview protocol that appears structured, I often go with the

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# An Economic Postcard from Sunny (So Far) Miami. June 1, 2010

by David Letson\*

Our enjoyable beach weather here in Miami over the Memorial Day weekend was a reminder of how much weather affects our quality of life. Our weather and our coasts attract 80 million visitors to Florida annually, helping to make tourism our top industry. Yet these days I am more than a little nervous. Few people seem to appreciate how weather-dependent we are in our economic lives.

Case in point: Today marks the first day of the 2010 hurricane season. While 2009 was quiet, with no U.S. landfalling storms, the National Weather Service forecasts an active 2010 season. Already the first tropical storm of the season, Agatha, has killed at least 180 people in Guatemala, Honduras and El Salvador over the Memorial Day weekend. Earthquake-ravaged Haiti and the Deepwater Horizon oil spill are particularly vulnerable to extreme weather. Are we ready for whatever nature may have in store?

In many circumstances, the economic contribution of weather, good or bad, may be subtle; in a few others, though, weather may have devastating societal impacts. Either way, be it a thousand rained-out fishing trips or a single tornado, there's no escaping the economic importance of weather. While the economic value of most weather-related experiences may be small, their sum total surely is not,

judging from the estimated 300 billion weather forecast accesses in the United States each year, which implies a value of current weather forecast information of \$286 per U.S. household per year, or \$31.5 billion in total value to U.S. households (Lazo et al. 2009). Weather affects crop yields, recreational decisions, construction activity, energy use, transportation, and so on. In particular, how we manage the economic risks posed by extreme weather is crucial for many regions, including the southeastern United States where I live.

Preparation is the essence of how to lessen the likelihood and severity of severe weather, such as hurricanes. We may prepare for hurricanes in a variety of ways, including our choices about where we live, what sort of structures to build, and how to insure them. Each of these economic decisions poses important challenges, but for brevity and because of its linkages with the ongoing global financial crisis, I will focus here on property insurance.

As recent events have shown, modern economies cannot function without insurance, which disperses risk, making loss—when it occurs—manageable. Insurance payouts also provide recovery resources in the aftermath of a disaster. Often insurance is required for investments in physical property, since it facilitates the use of the property as collateral for loans. In short, an insurance crisis would be nothing less than a full-blown

economic crisis. Unfortunately, that's where we seem to be going in the southeastern United States. The rapid escalation of hurricane insurance claims over recent decades is nothing short of alarming; since 1985, insurers have experienced negative cumulative profits for coastal properties extending from North Carolina to Texas (Michel-Kerjan 2009). Insured catastrophic losses are doubling roughly every 10 years (Pielke et al. 2008).

Not surprisingly, the root problem with hurricane insurance is an inadequate spread of risk. Insurance is predicated on pooling; it works effectively when losses from any individual event are embedded in a pool of funds so large that the loss from any single event is manageable. Yet that is far less likely for events such as hurricanes that affect large numbers of policy holders at once. What is surprising is the sizable, additional capital needed for insurers of events, such as hurricanes, which pose correlated risks.

The hurricane insurance problem and the correlated risk that underlies it are perhaps best understood as an instance of Pareto's Law, more commonly known as the "80-20 rule". In 1906, the economist Vilfredo Pareto discovered that 20% of the Italian population owned 80% of the wealth. Stated more generally, it suggests that, for many events, roughly 80% of the effects come from 20% of the causes. The idea is that extreme and rare events,

in complex systems such as economics and meteorology, have a far greater than expected impact. For anyone used to thinking of averages as being most useful in characterizing possible outcomes (i.e., bell curves), Pareto's Law is a radical departure. Yet the 80/20 rule does appear to fit common sense better than what we were told in Statistics 101. Most of the total movement in any stock over a single year is often attributable to abrupt changes on a few select days. Similarly, in any decade, a handful of the strongest hurricanes do more property damage than the rest put together.

Natural and economic hazards have eerie similarities. The worst event is twice as bad as the second, which is double the next, and so on. In response, we should train ourselves to expect hazards to arrive not gradually but in sudden discontinuities that reshape us. Like the hurricane seasons of 2004-05, the ongoing global financial crisis serves as a reminder that we ignore our exposure to systemic, correlated risks at our considerable peril. (Remember hearing, "Housing markets can't all tumble at the same time"?) Those who have lacked the discipline to avoid risks that they did not understand have destroyed wealth on an unprecedented scale. Economic history suggests that it will happen again, unfortunately. One catastrophe modeling firm has estimated that a large hurricane in southeast Florida could cause insured losses of \$130 billion and a total economic loss of \$260 billion (USGAO 2007).<sup>[1]</sup>

A numerical example helps show just how big a problem correlated

risk is for insurers. Consider Rade Musulin's comparison of two insurance companies, one writing hurricane coverage (correlated risks) and the other writing for fire (independent risks). Suppose that the hurricane insurer can expect a single \$100 million loss per 100 years, while annual fire losses will vary between \$0.8 million and \$1.2 million. Annual premiums of \$1 million would cover each sort of expected loss. But to meet claims in any given year, the fire insurer would need \$200,000 in capital. The hurricane insurer, however, would need \$99 million for the single \$100 million loss that occurs each 100 years (Musulin 1997).

Catastrophic insurers face spatially correlated risks, which require significantly more capital for the insurer to protect itself against large losses. Because hurricane damages tend to follow Pareto's Law, hurricane insurers must be prepared to pay out in any given year for the 20% of the storms that may cause 80% of the damages. Those in Florida and elsewhere attempting to limit the cost of windstorm coverage confuse it with fire insurance and, in doing so, mistake a risk subsidy problem for what is actually a risk pooling problem. Too cheap insurance, in turn, only makes matters worse, by encouraging further coastal migration.

Can our insurers (and those who regulate them) deliver? As I said, I'm nervous this hurricane season. Future hurricanes will come, and we must decide in advance how we will pay for them. The crucial question is whether we wish to pay for hurricane damages ourselves in advance or whether to shift that

burden to someone else. While my windstorm coverage is still affordable, that means little if my insurer (the State of Florida, in my case) becomes insolvent in a crisis.<sup>[2]</sup> Insurers sell a promise, one crucial to the flow of credit, whose value comes from insurers' ability to pay claims. While the sun is out today, Florida may be one major hurricane away from needing a Federal bailout. Failure to appreciate how weather-dependent we are in our economic lives can be expensive, indeed.

\*David Letson ([dletson@rsmas.miami.edu](mailto:dletson@rsmas.miami.edu)) is a professor at the University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS).

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#### Footnotes

<sup>1</sup> One rule of thumb is that insured losses, which are carefully measured, tend to be about half of overall economic losses, which are estimated with great difficulty.

<sup>2</sup> The Florida Hurricane Catastrophe Fund, the State-run re-insurer, faced an \$18 billion shortfall as a worst-case scenario for the 2009 season and faces a \$7 billion worst-case shortfall for 2010.

and photo sharing transform messages into multimedia message services (MMS). Professional predictions point to the remarkable power of the hand-held device in the future (Baekel, June, 23, 2008). According to expert opinion, the very near future will see social networking done entirely on these mobile devices, as opposed to static workstations, and up to 80 percent of internet traffic will occur on mobile phones or other transferable devices (Baekel, June 23, 2008). Mobile web will be the dominant force for obtaining information no later than 2015 (“New study shows the mobile web will rule by 2015,” April 2010).

Use of the devices continues to grow at a very rapid pace, both in the United States and globally. According to the United Nations Foundation report on technology in emergency situations, the number of individuals using mobile phones in 2010 has increased to four billion, or 61 out of every 100 people worldwide (“New technologies in emergencies and conflicts report,” 2010). In the United States alone, over 4 million text messages are exchanged each day, and use is continuing to increase with the evolution of technology and affordability of cell phones (Nichols, June 7, 2010).

Mobile devices support traditional connectivity while expanding the influence of the individual among larger communities. Mobile

devices not only enhance the communication individuals have with their personal contacts, but the technology also forges connections with an entire online virtual community (Palen, 2002). Users not only receive information through the devices, but they can use the technology to create their own content or forward content to others. By doing so, users contribute directly to the media by providing eyewitness perspectives through video, photos, or texted accounts of an event, often bypassing the professional reporters on the scene and providing unfiltered views of what is happening in the world (Gordon, 2007).

Mobile devices are especially helpful in disaster situations because they are “more readily available than battery-operated radios, as an increasing number of residents carry them everywhere. Further, they can serve as both input and output devices, facilitating one-to-one, many-to-one, and many-to-many communication” (Jaeger, et al., 2007, p. 599).

### **Overview of Geolocation-based Applications**

Mobile phones offer a number of pathways for effective communication. Traditional one-to-one verbal communication has been augmented with other variations. In one-to-many communication, a sender can broadcast information directly to a large segment of the population or to a large stakeholder group. The information can be disseminated in various forms, including visual information (photos and videos)

and textual information (SMSs and short press releases) (“New technologies in emergencies and conflicts report,” 2010). In many-to-many communication, the mobile device is used to connect groups of people using mobile internet capabilities and social networking sites, including Facebook, Twitter, Foursquare, and Gowalla (“New technologies in emergencies and conflicts report,” 2010).

A growing use of mobile devices, especially smartphones, involves geolocation, or the identification of the real-world location of an object, such as a cell phone. A recent comScore MobiLens data study among mobile users reported that 26 percent of the participants using smartphones used their mobile devices to get access to maps through applications, while 19 percent accessed this information via a web browser on their phone (“US mobile navigation on the rise,” June 25, 2010).

Foursquare ([www.foursquare.com](http://www.foursquare.com)) and Gowalla ([www.gowalla.com](http://www.gowalla.com)) are becoming very popular as applications for mobile devices and are particularly well-suited to the mobile device because they combine location-based features such as geographical information with social networking capabilities. Foursquare is a mobile application for both phones and the web that allows individuals to connect with friends online and to check in at a specific location. People can check in and earn badges at well known locations (ex. landmarks), businesses, universities, and other locations. If you are the person that checks in the most at a specific location, you become the “Mayor” of the location on Foursquare.

**Gowalla** ([www.gowalla.com](http://www.gowalla.com)) is a similar location-based application that allows users to check in at specific locations, but you do not necessarily have “friends” like you do on Foursquare. Gowalla allows you to check in at specific locations to receive “stamps.” In addition, Gowalla serves as a geo-scavenger hunt application, meaning that businesses and cities have used this application to encourage individuals to check in various locations around the city (e.g. tour of the city based on landmarks, etc).

### **Best Practices with Geolocation-based Applications for Weather Professionals**

Listed below are some best practices for weather professionals using Foursquare, Gowalla, or other location-based application tools in social media to communicate effectively and proactively with local and national law enforcement and fire departments, hospitals, schools and universities, government agencies, media, and local community residents.

- *Use location-based applications like Foursquare, Gowalla, Google My Maps services* (see Figure 1). My Maps is a service for mobile devices that allows you to create a specific route along major locations and landmarks in your city. This could be used to specify particular routes during an emergency (“How to use social media in disaster,” n.d.). Foursquare and Gowalla accounts can be synced up with Facebook and Twitter accounts. By linking these sites together, weather professionals can ensure that information is available to

all targeted online community audiences.

- *Design emergency preparedness applications specifically for weather-related situations.* Custom applications for mobile devices (see <http://mashable.com/2010/07/07/designing-mobile-apps/> for more information) provide people with detailed information about what to do in emergencies and how to obtain further information. This information should be linked not only on geolocation-based application sites, but also on main social media sites (ex. Facebook, Twitter, YouTube) and the sponsoring organization’s main Web site. These applications should feature concise messages (e.g. texts, updates, podcasts), as well as visual presentations (e.g. pictures and videos) showing people how to prepare for and respond to a natural weather event or disaster.
- *Create specific updates about the weather at key locations through geolocation-based applications like Foursquare and Gowalla* (ex. weather stations, landmarks, businesses). Specific businesses and well-visited locations within the radius of a weather event should have relevant information for people checking in at specific locations. Integration of organizational messages with these other information outlets increases the chance that people in an affected area obtain important updates. This should help reduce fear and anxiety due to uncertainty and lack of information (Shklovski et al., 2010). It is particularly important to reach people who are not at home, where they might hear more traditional messages through television or radio.
- *Design and initiate geolocation location protocol for weather situations:* Using Gowalla, weather professionals could encourage users to check in at specific locations for further information and supplies to prepare for weather situations. Awareness of other locations important to weather preparedness, such as shelters, local hospitals, law enforcement centers, fire departments, and health clinics, could be increased among users. Mobile communication channels serve as a valuable resource for the community, providing information, contributing to a sense of normal life, and supplying ways to pass the time until a crisis situation returns to normal (Shklovski et al., 2010).
- *Create public partnerships with local businesses in your area on Foursquare and Gowalla, incorporating specific weather updates on their sites.* Weather professionals and businesses can work together to raise community awareness of weather situations. This strategic online partnership will allow businesses to practice proactive communication measures while establishing and validating the credibility of the weather professionals. Weather professionals can collaborate with local and national law enforcement, local hospitals, schools and universities, and the media to integrate location-based applications in emergency management preparedness and response campaigns.
- *Initiate a teleweather mobile and social media campaign:* Weather professionals can enhance proactive emergency management and risk communication plans by designing a mobile and social

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## Social Media (continued from page 7)

media campaign focused on distributing information to community residents and other audiences about natural disasters and weather situations. These campaigns constitute one of the emerging trends currently impacting businesses, universities, and the military. For example, the Army has recently initiated a telemedicine campaign to send out health tips, reminders, and general announcements to soldiers (“Army using telemedicine,” June 30, 2010).

## Closing Statements

In spite of the many advantages provided by mobile devices in a natural disaster or weather emergency, the history of responses to these events in the era of new technologies demonstrates that this is a rapidly changing landscape requiring constant analysis and proactive planning. Recognizing the opportunities and challenges posed by geolocation-based applications and new technologies will help weather professionals and responders prepare for and anticipate problems to maximize performance during a weather situation.

Although personal use of mobile media is quite common and continues to improve—leading to relatively high levels of competence among the public—weather professionals should not assume that all organizational personnel have the knowledge and training to use the technology appropriately during a weather event. A proactive approach

constantly updates the awareness and training of personnel in these rapidly changing technologies.

Mobile communication using geolocation-based applications within social media not only provides the effective dissemination of necessary information, but it also reduces fear and levels of uncertainty about a weather event through shared communication. Today’s audiences expect to be informed rather than controlled or commanded—even during a natural disaster or weather event—and location-based social media provide the perfect platform for ensuring public safety.

\*Karen Freberg (@kfreberg) is a doctoral candidate studying public relations at the University of Tennessee, Knoxville. Freberg’s research interests include social media, reputation management, and crisis communications. She writes on these various topics on her personal blog [www.karenfreberg.com/blog](http://www.karenfreberg.com/blog).

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## Conferences & Opportunities

### ***Call for Papers: Ways of Knowing: Dismantling the Divide***

**Host:** American Meteorological Society (AMS) Annual Meeting

**Date:** January 23-27, 2011

**Location:** Seattle, Washington

**For More Information:** Please visit: <http://www.ametsoc.org/meet/annual/call.html>.

Papers are sought for a session entitled “Ways of Knowing: Dismantling the Divide between Social and Natural Sciences in Weather and Climate Research” to be held in the Sixth Symposium on Policy and Socio-Economic Research at the 91st American Meteorological Society Annual Meeting in Seattle, Washington, January 23-27, 2011. Reflecting this year’s annual meeting theme of “Communicating Weather and Climate,” this session will explore the contributions of diverse disciplines needed to understand the influences of weather and climate on human society. Research at the interface of weather, climate, and society demands interdisciplinary approaches, which are becoming increasingly popular ways to address complex contemporary issues. We will pay particular attention to communication between and across disciplines, focusing on explaining the epistemological background and methodological rigor of different social science disciplines. This session will take a broad view of social science contributions to weather and climate research by building upon presentations at the 2010 AMS Annual Meeting in a session entitled “Ways of Knowing: Traditional Knowledge as Key Insight for Dealing with Environmental Change.” For more information, please visit <http://www.ametsoc.org/meet/annual/call.html>.

### ***Call for Papers: More effectively communicating the science of tropical climate and tropical cyclones***

**Host:** American Meteorological Society (AMS) Annual Meeting

**Date:** January 23-27, 2011

**Location:** Seattle, Washington

**For More Information:** Please visit: <http://www.ametsoc.org/meet/annual/call.html>.

This one-day symposium during the 91st AMS Annual Meeting will consist of invited oral and poster presentations with emphasis on how we can, as scientists, better communicate both the information, predictions, and knowledge of our tropical climate and weather, as well as the uncertainties of our data to direct users and to the public. The symposium will address the use of remotely-sensed data, proxy data sets, numerical models, reanalysis data, climate models, and their uncertainties to both understand, predict, and communicate the impacts of tropical weather on days to seasonal to interannual and multidecadal timescales. A special component of the symposium will address ways contribute to the education of K-12 class levels to help build a scientifically more informed society in the future. For more information, please visit <http://www.ametsoc.org/meet/annual/call.html>.

### ***Call for Papers: Societal Impacts of Snowstorms***

**Host:** American Geophysical Union (AGU)

**Date:** December 13-17, 2010

**Location:** San Francisco, California

**For More Information:** Please visit: <http://www.agu.org/meetings/fm10/>

The purpose of this session, held as part of the 2010 AGU fall meeting, is to explore the impacts levied on society by snowstorms and other associated winter hazards such as freezing rain, strong winds, and cold temperatures. Impacts to transportation networks, infrastructure, and the economy are all relevant to this session. Papers discussing impacts in the context of a changing climate and relevance to national climate services are also welcome. We invite contributions from a wide range of disciplines including meteorology, climatology, geography, economics, sociology, and civil engineering. Papers exploring the relationship of winter weather to societal impacts using Geographical Information System technology are encouraged.

The abstract submission site is now open, and the deadline for abstract submissions is September 2. See the AGU Fall Meeting web site for details: <http://www.agu.org/meetings/fm10/>.

**Indian Country** (continued from pg 3)  
flow—if people are willing to talk, I just let them.

My first interviewee, Garrett, talked for over 10 minutes before I ever asked a question or got him to sign a consent form (fortunately my recorder was on). He told me about how he knew there would be a dry spell because the beavers were building dams on his property. Some interviews have been conducted in a motel restaurant that is a popular local spot (I've used its Wi-Fi during past storm chases—who knew?). Other interviews have been conducted in the local library. The most recent interview was conducted in a garden at a historic rural church that dates back to Oklahoma statehood and was the site of the [Indigenous Environmental Philosophy 2010 summit](#) this spring that I was lucky enough to attend for one day. This gardening informant, Maya, is helping to connect me with traditional people she knows. She gardens with girls ages 12-18 as part of a [self-esteem program](#) she founded.

I have heard some amazing things so far that will be fully written up in my dissertation. I have been told about observational signs that some of the farmers still use to help guide them. These include animal and plant behavior (gathering habits of beavers, size and thickness of squirrel and bird nests, horse and cattle behavior, ant movements, thickness of pecan shells, greenness of plums) and celestial occurrences (star visibility, moon rings, sunrise color). Randall

will call to tell me the cattle are gathering in the woods to lie down, and subsequently ask what's up; it turns out these have been on severe weather threat days. An interesting point made is that *"knowing the moods of things is important... weather can get mixed up and turned around."* Some of these observational signs have been passed down by elders and are things I ran across when doing my background research. On climate change, a couple of farmers told me they don't think much about the climate change debate but that they think climate change is happening based on their everyday observations. Comments include, *"...the past 10 years have not been the same...not balancing out... more unpredictable...more downs than ups"* and *"...water tables have been affected and creeks are drying up...rivers fall so low that you can walk through them."*

One man made an alarming comment about his ability to observe nature: *"...things [should] go by the calendar...but have to go on intuition more now because you cannot rely on nature due to all the changes taking place"*. An interesting point made is that *"... everything works together. Nature as we know it is being lost. It is taken for granted by society. People don't value the land anymore; they trash and waste it. There's a loss of respect for what God has given us."* On farming, they find their perception of a more variable climate to affect their ability to farm. Increased variation and decreased reliability of their observational signs over time led one person to say *"everything is confused."* However, the farmers are trying to do the right thing,

employing, for example, no-till farming methods for wheat that lead to soil and moisture conservation, resulting in less erosion and clearer streams for fishing. Gardening efforts that aim to maintain traditional seed lines also promote community gardening and farmers' markets, with the hope of encouraging healthier eating.

In the end, the farmers I've talked to so far feel their insight could contribute to the public discussion on climate change adaptation. But, to them it is just common sense—it is what they "just know" from being rooted to the land in deeply reciprocal and increasingly sustainable ways (e.g., Ingold and Kurttila 2000), and we should pay attention. There is a strong element of situational awareness to their observational knowledge of weather and climate (some seem to trust their own reading of nature as much or more than what they see from television or Internet weather, which often is not specific enough in time or space). Almost universally, the farmers are worried about losing traditional ways; one said *"...it is important to take a stance to preserve our knowledge for the children; they need to know 'this is what used to happen'."* They see traditional knowledge as important as a comparison to *"changes that could happen."*

Conversations in Indian Country are rekindling memories of weather knowledge and stories once passed down, and it is my hope that we can collectively save them. As a broader research and development goal, exploring

## Jobs & Opportunities

**Assistant Professor in Environmental Sociology**  
**Department of Sociology**  
**Rutgers University**

**To Apply: See Instructions Below**  
**Application Deadline: October 18, 2010**

The Department of Sociology at Rutgers University-New Brunswick seeks to hire a tenure track assistant professor specializing in environmental sociology, broadly defined. The position will begin Fall 2011, pending budgetary approval. Research and teaching interests could include (but are not limited to) environmental change, sustainable development, population and environment, environmental knowledge production, information technology, environmental justice and inequality, environmental networks, and social movements. Theoretical and methodological orientations are open. We will begin reviewing applications on October 18, 2010. Applications received after that date cannot be assured full consideration. Please send a cover letter, curriculum vitae, and 1-2 writing samples to [rusocsearch@sociology.rutgers.edu](mailto:rusocsearch@sociology.rutgers.edu). We also require three recommendation letters; letters should be sent to [rusocsearch@sociology.rutgers.edu](mailto:rusocsearch@sociology.rutgers.edu) as well. Rutgers is an AA/EEO employer and has a historical commitment to hiring a highly diverse faculty. We are also an NSF ADVANCE institutional transformation university, working to support the careers of women faculty, especially in the science and engineering disciplines.

different ways of knowing—not just recent advances in science but also on-the-ground, rooted-in-place-and-meaning observations of, experiences in, and adaptations to the natural world—may contribute unique, unexpected, and non-intuitive perspectives (e.g., Cruikshank 2001; Berkes 1999; Pierotti and Wildcat 2000; Herman 2008; Basso 1996; American Meteorological Society 2010 Annual Meeting session “*Ways of Knowing: Traditional Knowledge as a Key Insight for Dealing with a Changing Climate*” – R. Pepler and H. Lazrus, co-organizers) and, as such, prove useful within cross-cultural research and co-managements efforts (e.g., Stephenson and Moller 2009; Krupnik 2009) for better conceptualizing, recognizing, and understanding shifting environmental conditions such as a changing climate.

\*Randy Pepler ([rpepler@ou.edu](mailto:rpepler@ou.edu)) is associate director of the Cooperative Institute for Mesoscale Meteorological Studies and a PhD candidate in the Department of Geography at the University of Oklahoma.

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The purpose of *Weather and Society Watch* is to provide a forum for those interested in the societal impacts of weather and weather forecasting to discuss and debate relevant issues, ask questions, and stimulate perspective. The newsletter is intended to serve as a vehicle for building a stronger, more informed societal impacts community.

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## Contact Us

*For additional information or to submit ideas for a news item, please contact:*

SIP Director: Jeff Lazo ([lazo@ucar.edu](mailto:lazo@ucar.edu))  
Managing Editor: Emily Laidlaw ([laidlaw@ucar.edu](mailto:laidlaw@ucar.edu))  
Contributing Editor: Rene Howard

To send mail about *Weather and Society Watch*, please write to:

Jeff Lazo  
Societal Impacts Program  
National Center for Atmospheric Research  
P.O. Box 3000  
Boulder, CO 80307



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All aspects of the U.S. public sector, along with the nation's economy, are directly and indirectly affected by weather. Although the economic impacts of weather and weather information on U.S. economic agents have been loosely documented over the years, no definitive assessments have been performed, and information generated from the previous studies is difficult to locate and synthesize.

SIP, initiated in 2004 and funded by NOAA's U.S. Weather Research Program (USWRP) and NCAR, aims to improve the societal gains from weather forecasting. SIP researchers work to infuse social science and economic research, methods and capabilities into the planning, execution and analysis of weather information, applications, and research directions. SIP serves as a focal point for developing and supporting a closer relationship between researchers, operational forecasters, relevant end users, and social scientists concerned with the impacts of weather and weather information on society. Program activities include primary research, outreach and education, and development and support for the weather impacts community.

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