SURFACE WEATHER ANALYSIS: WHERE IT'S BEEN, WHERE IT'S GOING

ORAL HISTORIES

PAUL KOCIN
JULY 29TH, 2010
WORLD WEATHER BUILDING IN CAMP SPRINGS, MD

INTERVIEWER: Can you state your name, birth date, and hometown?

PAUL KOCIN: Paul Jeffrey Kocin [Chuckles]. My hometown is Siasat, New York and my birth date, May 6, 1955.

INTERVIEWER: Where did you study meteorology?

PAUL KOCIN: I went to school at Cornell University and Penn State University.

INTERVIEWER: Uhm, how and when did you become interested in weather?

PAUL KOCIN: Ahh, I was a kid with very many interests, going one to the next to the next to the next and I just happened to be interested in the weather at the very impressionable age of around eleven and it stuck.

INTERVIEWER: Is there any particular reason?

PAUL KOCIN: Well there was, we were in Mexico with my parents, as I remember, and I remember finding out it was like forty-two degrees in New York, and I said, "Wow! That's really cold." [Chuckles] And it was just really interesting. No I found out no, that was in Celsius, oh what was that? So it was like a hundred and seven and I am like, Oh! that's really hot. I just thought that was very fascinating at the time. So I was just getting into the weather and that kinda like I thought was cool. Anyway, ahh the real bigger answer – I got interested in the weather because I grew up in the suburbs of New York and we had all these huge snowstorms back in the late 1950's and early 1960's, so what's not to like?

INTERVIEWER: All right, how long have you been with the Weather Service?

PAUL KOCIN: Well, I have dual careers with the Weather Service. I was with the Weather Service from 1989 through 1998, and I've been with them now again, from 2007 to the present.

INTERVIEWER: Can you tell me a little bit about your career as a meteorologist?

PAUL KOCIN: I probably could tell you something about my career. My career began in 1979, following graduate school. I became a contractor for the NASA Godard Space Flight Center. I met a fellow by the name of Louis Uccellini who was an up and coming scientist and he asked me if I was interested in snow storms, so I just answered YES!! So we started collaborating, uhm, so we first worked at NASA Godard Space Flight Center. He then went over to what was then the National Meteorological Center, I followed soon after and I worked for – NMC, now known as NCEP from

the years 1989 and 1998, then I went to The Weather Channel right at the turn of – right at the beginning of 1999. I worked there through 2006, and then I came back to NCEP in 2007.

INTERVIEWER: All right. So now, we're going to move on and talk specifically about surface analysis.

PAUL KOCIN: I've heard of that.

INTERVIEWER: So to start with, can you please give me a definition of surface weather analysis?

PAUL KOCIN: Ooh…surface weather analysis is taking many, many, many observations, probably the largest data set that we actually have to use in the Weather Service and we apply techniques we've learned over many years of school and then through personal experience, to analyze all sorts of phenomena according to the latest scientific principles.

INTERVIEWER: Okay. What features are specifically included on a surface weather map?

PAUL KOCIN: Well, the standard features are high and low pressure centers, cold fronts, warm fronts, occlusions. We can also put mesoscale boundaries, outflow boundaries, convective complexes, sea breeze fronts -- we can put any number of phenomena.

INTERVIEWER: Why do you think surface analysis is important to the field?

PAUL KOCIN: Ahh, good question. I personally think that surface analysis is important to the field because, number one we live at the earth's surface and every single model for the forecasts we do, involves interpretation of what eventually is a surface weather analysis. So, if you're looking at a numerical weather forecast, the best way of knowing what you're looking at is having experience doing surface weather analysis, so you can predict what you can actually diagnose by doing it yourself.

INTERVIEWER: All right…and…

PAUL KOCIN: ...something like that.

INTERVIEWER: Who are the main users of the surface weather analysis?

PAUL KOCIN: Well, uhm, I would say all meteorologists involved in forecasting should be using surface weather analyses. Uhm, students, uhm, weather enthusiasts, the media, of course – any time you see a weather map on television, those are typically surface analyses, the ones you see in the newspaper, the ones you see on the internet, uhm, they're all typically surface analyses.

INTERVIEWER: Okay and do you use these charts and what do you use them for?

PAUL KOCIN: Uhm, personally, I use these charts to get the best I know of what actually is going on. If I don't get my fix of doing a surface weather map, I feel like – sort of like one arm is missing. I can tell you sort of what's going on, but I can't give you a real idea of what's happening, without having done my own surface analysis.

INTERVIEWER: All right, ahh how is….

PAUL KOCIN: That was a good one.

INTERVIEWER: …how has surface analysis changed since you started working at that desk?

PAUL KOCIN: Ahh, oh boy. Well, uhm, I started at ahh NMC back in the late 1980's and early 90's and surface analyses were – what I would call not a particularly modern fashion. We used acetates to trace maps and then to redraw, retrace them, redraw them again, and retrace them and eventually scanned them in some fashion to get them out to the public. Uhm, during the following years, I actually helped in designing or setting the specifications for updating surface analysis from this antiquated technique to one that's done on the workstations. And I guess the point of using me in that analysis – since I'm such a stickler for detail, I would be very difficult – it would be hard for me to reconcile a system that I felt wasn't as good as doing it by hand. So, that's why I helped set the requirements so we could do a variety of things, like redraw fronts, cut them in little corners, cut and paste, change the names of the fronts, being able to flip them back and forth in case you entered it the wrong way. And just basically to help create a system replicated it as best we could, the best we could do by hand.

It took a long time to go from acetates to workstations, because any time you impose a change where people are used to doing it a certain way, where it has obvious advantages to the unknown, creates a lot of friction. And again, I think part of why I was chosen to help set the requirements is because I was, in fact, a real stickler. So it's like you know – you better damn make it good or else I am going to give you a hard time. 'Cause if we can't do it like I'm used to doing it, you know – I don't want to change. So I was sort of one of the biggest skeptics that had to be – number one not only shown what to do, but be part of the process in recommending – can we – can we redraw that? Can we do something like that? Is it something that is something more than – resembles like doing it by hand? I think there would there would be a lot less resistance to having it come by.

So there was a lot of trial and error. One thing that actually did surprise me is that we worked on this back – I guess it was back in the early 1990's and I was away from the Weather Service for like seven or eight years and I basically came back to like – well how did it change – how has it changed? Well it actually hasn't changed all that much, meaning that we must have done something okay uhm, to make the system…there didn't seem to be a lot of resistance to the workstation, once it came about. I think there was an incredible amount of like – I don't know about this, but when it was actually used, I don't think it met as much resistance as we expected.

So uhm, that process probably took a couple of years. We first did it on what was called this Intergraph workstation, when we first started [background noise] – we used to get our weather map, rather than starting the operation, because we have a lot more time with that. And ahh, the first thing there was you know – can we just produce a quality map? And the answer was absolutely. You know we can change things, we can set it up in such a way that it all can be done ahh, electronically. So the next test was whether or not we could actually do it in real time. That was a much bigger test. Uhm, but it turns out that I think as we can see now, we, we, had those same time limits back then, but a lot of that time was spent drawing one acetate, tracing it over, then cleaning the acetate – uhm, drawing it again, then transferring – it was just a mess. It was kinda like doing things in the dinosaur ages, so we knew it had to go that way, we just had to make sure that it was going to go in a way that was you know – going to work.

INTERVIEWER: Right.

PAUL KOCIN: So I think it worked.

INTERVIEWER: What are the pros and cons of using the workstations?

PAUL KOCIN: Okay, the pros and cons of workstations. Uhm, the pro obviously is potentially all the data is there, uhm, it's, it's, done efficiently, automatically, it's nonrepetitive – you do it once that's it, you don't have to transfer it back and forth. Uhm, some of the problems with the workstations are that they don't quite resemble what's actually the data and drawing it by hand. So there are a few trade-offs, but I think the trade-offs are actually kind of worthwhile – saving the time and space and being able to get the quality you want, I think are important qualities.

INTERVIEWER: All right. After the observations come, what is your procedure for creating a service map?

PAUL KOCIN: Ooh! Okay, my procedures for creating a surface map are all dependent on how much time I have. So typically if we are doing like the North American surface analyses, I almost instantly when I see the data start going to work on it. With the last analysis, I will start drawing in my own lines, just to get an idea before the projected analysis comes in that I have already based on what's coming up. Uhm, eventually the objective analysis comes in – once that does and I've got the data and the objective analysis there and all the underlying fields, I can go to work. Uhm, adjusting, manipulating, checking, looking at time series of data to check whether or not the features move through or not. Uhm, it's just a very iterative process going back and forth, really getting the best sense of what is going on. So given the hour and a half that we are working on it, uhm, I've always felt that ahh, uhm, it's just enough time.

INTERVIEWER: All right. Now a couple of questions, to put you on the spot.

PAUL KOCIN: [Gasps] Why did you –

INTERVIEWER: How did you find – how do you find a cold front?

PAUL KOCIN: How do I find a cold front. Well their – it's not all that necessarily clear. Actually the best way I can find a cold front is to first look at the model forecast and determine where on the models, what information is telling me that there's a bar--- enhanced baroclinic zone, the leading edge of which might indicate a cold front. It might also be associated with a – ahh change of wind direction, ahh change of temperature, change of dew point. Uhm, sometimes in the summertime, they are very difficult to find, so continuity becomes a very important part. And some very subtle features – you know maybe subtle shift in wind or subtle change in dew point, might be some indication, but then you have to look at sort of surrounding stations and time series to try and sense if this one feature at one point actually has some consistency with some other features that would define a cold front.

INTERVIEWER: Awesome. Okay.

PAUL KOCIN: So, [whispers] you got your answer.

INTERVIWERE: All right and then how do you find a warm front?

PAUL KOCIN: Warm front. Well it probably works on the same – same level. I think typically cold fronts are, at least in the wintertime, are little more distinguishable, while warm fronts can be a little more subtle in terms of where they are located. But I think the principals are basically the same.

INTERVIEWER: Are there ever differences in opinion on frontal structure and placement?

PAUL KOCIN: [Laughter] Uhm, are they ever – are there any differences in uhm – let's see what's the best word – differences of opinions on where we place frontal structures. We have differences of opinions all the time. Some people are just plain wrong [Laughs] and other people have some very valid points and sometimes uhm, it's not all that clear when a lot of these boundaries are actually not very well resolved. So uhm, you know distinguishing between wind shift that's accompanied by known temperature change or you are looking at the model forecast and it's located say in a warm ridge, as opposed to looking at the leading edge of a baroclinic zone, where there may actually be a subtle wind shift, there are subtleties that require, I think ahh an incredible amount of experience to validate.

INTERVIEWER: Okay, all right. How about differences in opinions about including mesoscale features or tropical features?

PAUL: Well uhm, we have within our National Weather Service, at least within HPC, we have a set of rules. Uhm, and those rules determine which of features you include and which kinds are not. If we were to include every sea breeze front that occurred every day, we would be drawing the same front in the same location, say over the west coast all the time. So we make choices about which features we do. A lot of it has to do with saving time, uhm a lot of it has to do with if they are just sort of topographical features that show up every day, then there is probably less reason to use it. As far as mesoscale boundaries go, sometimes they are much more important than the larger scale features, especially in the summertime – we can have a cold front that really doesn't look like a cold front, but everything is developing actually along these mesoscale boundaries around full boundaries from thunder storms that actually reflect better with the edges – leading edges of where temperature gradients are going to be located, which is also where the active weather is going to be.

So uhm, it's – it sometimes gets very complicated, like is that an outflow boundary, is that a squall line, is that a super cell – uhm or some other phenomena – in the wintertime it can do the same thing. Is it radiation fog, is the temperature difference due to clouds versus clear skies? There are so many elements that come into it that uhm, you know all of it is actually important, but I have to use some discretion in terms of like what's a real boundary and what's not.

INTERVIEWER: All right. When coordinating with other offices for a unified surface analysis, what is some of the more common debates?

PAUL KOCIN: Ahh, some of the more common debates are locations of fronts over the tropics, so that would be something we often need to coordinate with the tropical prediction center. And especially over the uhm, over the oceans, uhm, I'm going to say it --- [Laughs] uhm, we coordinate when we have features that actually look like satellite images of upper level features, but don't actually look like what they would be at the surface. So we've got to coordinate and ahh, try to have it actually – I'm a big believer in the models. Models aren't always correct, but the models have come to a point where they look pretty darn good. I am a big believer that if it looks kind of like the

models, prove to me that it actually is not really looking like the models. And a lot of times, I think the models do great, so uhm, I think it will involve interpretation of the oceans, especially.

INTERVIEWER: Okay. All right. What do you see as the next step in technology for surface analysis?

PAUL KOCIN: Actually, I think the next step in technology, uhm for surface analysis is probably a little bit controversial. I think the – this is something I never used to believe, 'cause I never thought that the models had gotten to a point where we're really reproducing features accurately. And especially the smaller scale features that uhm, that really drive some of the more interesting weather. Uhm, I think technology might be at a point where we have very little interaction in terms of producing the surface analyses, perhaps in changing fronts. But much of it can be done uhm, sort of automatically. And at times, there needs to be somebody who basically checks it, 'cause at times there will be rapidly developing small scale phenomena that models are not going to pick up, so we would still edit it at that point. So, I mean the goal ultimately is no surprise, no nothing, everything could be done automatically, and it looks fabulous.

INTERVIEWER: All right [Laughs].

PAUL KOCIN: [Whispers] fabulous.

INTERVIEWER: Okay, what do you think about changes maybe for the future in the use of the actual surface analysis?

PAUL KOCIN: I am actually hoping that there will be a change back uhm, to the way things used to be. Because I think surface analysis is kind of a lost art. It used to be such a primary means of making forecasts before the advent of all these computer models that I think reliance on the models alone – ahh gee after I just said what I think I did [Laughs] uhm, that uhm, a lot of meteorologists rely only on the models and lose sight of actually looking at the data. Now, until models really do become close to being perfect, but they're not – over reliance I think on the models and just not actually looking at the relationship between the surface data, the radar data, satellite data, looking at changes over time – I think meteorologists lose a lot of perspective on what's going on. Those really small subtle changes that actually have important ramifications on the weather. So I hope there is actually a little more attention focus placed back on surface analysis, doing it and looking at it, that has sort of been lost over the last twenty years. And actually, I think there has been a little bit of resurgence, certainly at NCEP – Louis (Uccellini) has actually done quite a bit to keep surface analyses very much a part of the forecast process.