

**National Center for Atmospheric Research
University Corporation for Atmospheric Research**

ORAL HISTORY PROJECT

**Interview of: William Kellogg
10 February 1987**

Interviewers: Ed Wolff and Nancy Gauss

Gauss: This is Nancy Gauss. Ed Wolff and I from NCAR are interviewing Will Kellogg. The date is February 10th 1987, and we are in the Chapman Room at the Mesa Lab.

Will, you have had an illustrious career in many areas, including your pioneering work on the development of meteorological satellites and your research on the effects of human activity on the atmosphere. At some time I would like to arrange to have some of your colleagues interview you on these areas. The purpose of this interview, however, is to focus on your impressions and observations of NCAR and what in your opinion has attributed to NCAR's success as a national laboratory.

Ed, you will be starting with the questions so you can go ahead and jump right in.

Wolff: Will, you came here very early in NCAR's history. When did you first learn about NCAR and become interested in coming here?

Kellogg: Of course people who know about the history of NCAR realize that there was a series of conferences organized by Tom Malone, Roscoe Braham and Bill Von Arcx under the aegis of the National Academy of Sciences, Atmospheric Science committee, to describe what NCAR ought to be like, to set terms of reference for something that didn't exist yet, and what it should contain. I was part of that in the sense that I attended a couple of the committees, particularly the one as I recall having to do with upper atmosphere research. So, that's when I first heard about NCAR even before it existed, while it was still a gleam in the eye of Tom Malone, etc...

Wolff: What was it about NCAR that attracted you to come here?

Kellogg: To me the whole idea of an “NCAR” was very appealing. You have to remember that I was working for a think tank called the Rand Corporation and I saw NCAR as an organization that would be somewhat like Rand only devoted to atmospheric science in the very broad sense. I was a believer in team research, in big science, so it seemed to me this was exactly the way to go.

Wolff: So, you arrived. What were your first impressions? Did anything surprise you?

Kellogg: I didn’t arrive just with both feet with a big splash. I met Walt Roberts at the meetings in Moscow in 1958 that wound up the IGY and already he was very aware of NCAR. I remember talking a little bit about whether it would make sense or not. Then a few years later when NCAR was on its way he got in touch with me and said, “Would you be willing to come and join NCAR?” As sort of an opener I came and attended one of the retreat meetings of the directors, it was one that was held up at Estes Park, one of the early ones. I decided after a couple of days of talking with Walt and John Firor, Dan Rex and Phil Thompson -I have forgotten all of the people who were there at that particular time in history- but it seemed to me that this was going to be a very exciting place and there was no question in my mind that I wanted to leave Rand and come here, and I did come finally in July, 1964.

Wolff: You had impressions of NCAR coming in. How does it look in retrospect those first years?

Kellogg: It’s hard to remember back that far but I have a few recollections. First of all, of course I had to get familiar with the scientists in the Laboratory of Atmospheric Science. I was being put in charge as the director of that laboratory, “LAS” it was called, and I had to meet the people. Some of them, most of them in fact, I knew to some extent but I had to get to know them better. The first impression that I had was that we already, thanks to Walt and Phil Thompson who had preceded me, had assembled a very competent group of people, and I knew that this was going to be a good group to work with. Rather early in the game I felt the need for this group, which was then rather small -I have forgotten exactly how many but I suppose something like 30 scientists- that we should have the chance to get together and talk about the direction that LAS was going to go. After all it was an interdisciplinary group. It wasn’t something, which I as just one person could direct in detail. I wanted the scientists to have something to say about the direction that LAS was going to take. We had our first retreat meeting and that was at a place called Keystone Lodge. It was before the present big resort and it was a little lodge then.

Wolff: It's called the Ski Tip Lodge.

Kellogg: Ski Tip.

Wolff: Run by Max and Edna Durkheim.

Kellogg: Aren't you wonderful to remember Max and Edna Durkheim. As a matter of fact I went back once after that to stay there.

That was to me the real kickoff, and I think for quite a few of the others, because we had a chance for two days to sit around and really exchange ideas on the direction that we thought LAS ought to go and find things that we could work on in an interdisciplinary sense, because academic types tend to be isolated in their departments at the universities –that's no secret. It seemed to me that the orientation that we had was to learn to work across these boundaries, across these interfaces between the disciplines. One of my favorite examples of the need for this was the chemists making observations of the chemistry of the atmosphere and when I would ask, "Where did the air come from that you were sampling?" they wouldn't know. So, this was clearly a job for meteorologists to find out where the air was coming from. Eventually I got Ed Danielsen and Phil Hogenson to work with the chemists pretty much full time and give them that kind of help. This was just one example of interdisciplinary work. Another one would be, I think, the need for the dynamical meteorologists to extend their models upward into the upper atmosphere and apply the kind of models that they use for the lower atmosphere to the upper atmosphere. This was slow in coming because it was very hard, but this was a subject that I was particularly interested in at that time and I felt it was another good example of where different disciplines could come together and work on a problem.

Subsequently, quite a bit later it became clear that the whole area of climate research, which at that time when I first went to NCAR was kind of on the backburner, would become most important. Climate research has turned out to be one of the most exciting interdisciplinary, multidisciplinary subjects that we could have taken on. I didn't really get turned on to the problem of climate, and the causes of climate change, until several years after I had been there. I suppose the light on that particular subject turned on most brightly in 1970 during the summer study in Williamstown when I was chairman of a working group for a larger study called the Study of Critical Environmental Problems, called the "SCEP" study for short. This resulted in a book and one of the chapters in the book was the one that my working group wrote and it had to do with the human influences on the climate. And I've been interested in that subject ever since.

Wolff: You mentioned that in getting interdisciplinary research going, quite often we are swimming upstream against the tradition of the individual scientists doing individual work. To what extent do you think NCAR has been successful in promoting interdisciplinary work?

Kellogg: I think NCAR has been successful in promoting interdisciplinary work, but it was very slow in coming. To me the strength of NCAR and the thing that made it different from the universities was the fact that it could do interdisciplinary research, but I must say that the scientists by in large were clinging to their academic traditions of doing their own thing. One of the early bad experiences I had was having to ask a very good dynamic meteorologist to leave, not because he wasn't doing good research, but because he was not contributing, I felt, to the larger problems that we had. He wanted to just work on his own thing, which turned out was gravity waves. That's a good subject, but he didn't interact with anybody else. That was an example of where I finally had to pull a tooth as it were, and it was unpleasant.

Wolff: How well are we doing on promoting and carrying out interdisciplinary work now?

Kellogg: We're much better at it. I suspect this because the generation of scientists that have grown up in the post-Sputnik era are more willing to work on big science problems. I suspect this is true but I can't prove it obviously. But it seems to me that team research has improved a great deal, which we have in for example developing the community climate model, developing the thunderstorm mesoscale models, in the chemists working together in their big field projects starting with the one downwind from St. Louis.

Gauss: Is that FAPS?

Kellogg: Metromex. That was it. I think NCAR was a real pioneer in getting the Metromex going where it involved chemists and meteorologists and people in the field that is our Field Observing Facility, that is, to observe what was happening in the air that came off St. Louis and blew down wind. It was a good show. It was the first one. It didn't answer all the problems by any means, but it showed how to do this kind of a project. EPA subsequently sponsored several similar experiments.

Wolff: NCAR was a leader in promoting interdisciplinary research. To what extent, however, do you think that the evolution of atmospheric science, the way the sciences evolved over the last 25-30 years has brought interdisciplinary research to the fore?

Kellogg: Meteorology has always been a science that has required in a sense global participation. From way back in the last century it became obvious that in

order to understand the atmosphere you had to get observations from all over the world. When the WMO was formed in 1952 out of the earlier International Meteorological Organization, the purpose was to organize global meteorology in the sense of not only the operational meteorological services but the research. So, more than, say, the nuclear physicists or the astronomers, I think the meteorologists have always had a sense of working together. The IGY, which came along in 1958, '57-'58, dramatized that in a very real sense. It showed how scientists from all over the world work together and I think this caught the imagination of the university types who might otherwise have been rather isolated and swept them up, if you will, in some of the larger programs. As time has gone on I have seen the World Meteorology Organization and our own National Academy of Sciences and the government agencies that support research; NSF, NASA and NOAA helping to organize larger projects, interdisciplinary projects. It doesn't mean that the individual scientist is obsolete by any means, it just means that he can work in a somewhat larger context, one involving radars and satellites and global observations and big computers. That is something which requires, as we know here at NCAR, a big team just to keep a big computer going. So, it is big science and it is going to stay that way in my opinion.

Wolff: Do you see any danger as to the attainment of scientific excellence and such a heavy stress on group research and interdisciplinary research?

Kellogg: Yes, sure. I think that is a very good question, Ed. It worries me a little bit because of course if you have a team, a group of scientists working on a big project the weaker scientists can sort of get carried along the coattails of the ones who are really producing. That's always the case with a team effort. I think at NCAR since we're...the left hand knows what the right hand is doing to a large extent and we have good leaders. I think the weaker scientists do get weeded out because they can't just hang onto the coattails. It becomes obvious in the context of a team who isn't pulling his weight or her weight. So, I think it takes care of itself. It worries me less at NCAR than it does in some of the big government-sponsored projects.

Wolff: I would like to take a brief break now if I could, Nancy.

Gauss: What I was interested in asking you in regards to the interdisciplinary approach is when you first came to NCAR how did you encourage that among the scientists that might have been here already or when you brought in new scientists how did you indoctrinate them into this larger focus of interdisciplinary approach? Especially since you mentioned that historically scientists weren't used to working in isolated environments and not through a team effort. You as the manager how did you group them together and try to get them to work as a unit?

Kellogg: Well, Nancy, I guess in a sense there are two questions there because first of all the job of a director of a laboratory is to attract the very best people you possibly can, the best scientists, and these may or may not turn out to be willing to work as a team to team up with other people. It's a little hard to tell ahead of time whether a person is likely to do that or not. So, I think my job was just simply to attract the best and most articulate scientists. Then the question of getting them to work together was something I think happened after the scientists were here. I mentioned the retreats that we had and we had an annual retreat for a good many years during the life of LAS until it got so hard that it was sort of cumbersome. But these retreats were a time when I and the various leaders of the group, group leaders, would talk about their work and we would think about how to work together. We would try to identify areas where collaboration, say, between the chemists and the physicists and the meteorologists would make sense. That was the process that I tried to encourage and I am not sure that it was entirely successful, in fact it wasn't entirely successful but it helped. We did see certain things emerging, which were exciting in which we could work together on.

I was enumerating some of the larger projects and another one which I think was a great success and it was really an NCAR idea was the Line Island Experiment [**Line Islands—ed.**] We realized following the IGY and as we were getting ready for the Global Atmospheric Research Program that the tropics was an area that we didn't know too much about and so NCAR was largely responsible for putting together one of the first major studies of a tropical region. The Line Island Experiment was kind of a much smaller but I think it was in a sense a model for the GATE project, which occurred later, which was a much bigger one.

Gauss: Was the concept of the Line Island experiment conceived during one of these retreats?

Kellogg: I can't remember when the seed was first sown. It very likely was something that was discussed then. It was pretty well understood that the tropics was going to be a real problem as we went to our larger and larger global general circulation models because first of all the observations weren't very good in the tropics and secondly we knew that there were certain assumptions in the physics of our general circulation models that didn't apply too well in the tropics. For instance the geostrophic equation and the laws of motion in the tropics are different from the laws of motion in the middle latitudes; I should say the laws are the same, the laws of physics are the same but the way in which we handle them in our models was different, it had to be.

Gauss: Do you know if there are any records of minutes or any other kind of documentation from you retreats, your LAS retreats that might be around? If they are available they would be fascinating archival material.

Kellogg: We didn't publish; we didn't write up minutes of the retreats I'm pretty sure of that. A good many of us were taking notes and I might have my notes still.

Gauss: Those would be interesting.

Wolff: Will, in 1973 there was a reorganization of NCAR. LAS faded away and new divisions were organized and this was partly as a result of a change in leadership at NCAR and partly as a result of a report that was issued by a committee looking at the history of NCAR since its inception 12 or 13 years prior. You were pretty much in the midst of some of that and I was wondering if you had some views about that episode.

Kellogg: Yes, well I certainly do and I certainly did at the time. That was the report of the Joint Evaluation Committee (JEC) that you are referring to and I guess it was joint between the universities and the National Science Foundation and it had some pretty hardheaded people on it. Was Werner Baum the chairman of it as I recall?

Wolff: Yes.

Kellogg: And George Benton, I can't remember all the people on it but there were people with a lot of experience in research and management of research. The JEC report was pretty scathing and I could have gone back and looked at it to prepare myself for this interview but some of the conclusions are pretty well branded on my bottom as it were because they hurt and I had to admit that a good many of them were probably, the comments that is, were true. I realized that the leadership of LAS was not all that it might be that we hadn't been able to attract some of the really good people that I had wanted to attract. We were simply not at the forefront in certain areas. I won't say that that was because the various division leaders weren't capable of getting us to the forefront but the fact is that we had to admit that we weren't. So, of course a lot of the JEC criticism also was directed towards our Facilities division and that I won't comment on whether that was well taken or not. But certainly the criticism of LAS was directed at me. After all I had to take the responsibility for it and it was a very tough time for me because there was nothing left to do but in a sense let LAS be reorganized. It was not something that I could do myself at that point.

Wolff: Let's move on to a question of how science has evolved over the last 20 years or so. Some subjects have become much more important than they were thought to be 20 years ago and some have become somewhat less. I

wonder if you had some general views about the things that have become more important over the last 20 years, both at NCAR and into science in general. And to what extent has some of this surprised you?

Kellogg: The building blocks of atmospheric science haven't changed all that much. That is the building blocks I suppose that would be the basic fields of physics and chemistry and fluid dynamics and astronomy, solar astronomy. These are the building blocks that we have used all along. I conceived of NCAR as having several sort of functions, that is to promote better forecasts of the weather and to study air pollution and try to do something about air pollution, and also to study the way in which mankind is influencing the atmosphere and the planet. That last one was pretty far down on the list compared to making better weather forecasts and doing something about air pollution; at least it seemed so in the early days. Then as time went on and we began to be convinced that we were in fact influencing the climate and that there was going to be a major climate change, the subject of climate research began to poke its head up and become more and more visible.

There was a change in that area from the time I was a student at UCLA when climatology wasn't even taught. I think it might have been taught across the campus in the geography department but it certainly wasn't done in the meteorology department, it was considered too dull. Then in the late 1960's thanks to the work of people like Bill Sellers in Arizona and Michael Podico in Leningrad, it became obvious that you could develop a physical theory of climate, which would explain the climate and this changed the whole ballgame from one of description to one where you could really do some good research and try to get at the causes of climate and climate change. So, it became obvious that this was something NCAR ought to do. It had been interesting to me to watch the enthusiasm with which the climate research bandwagon has been greeted. Our directors are still pointing to climate research, or increasingly I should say pointing to climate research as kind of a theme, which runs through an awful lot of the other things that are going on at NCAR. It's going on now, too.

Wolff: Do you see a similar ascendancy and revelation in atmospheric chemistry over the last 15 or 20 years?

Kellogg: It's interesting that the atmospheric chemistry has been...from the very start we have thought of NCAR's atmospheric chemistry program as not being concerned with urban air pollution but rather with the global changes and the more subtle things that are happening in far places of the world. This was even before we were aware of the importance of climate change. The sources and sinks of the trace gases was what was interesting. Then now that we have what we call the global change or the international geosphere/biosphere program obviously atmospheric

chemistry is a very important part and the role that biological processes play is a very important part of that. So, in a sense NCAR's hunch that global atmospheric chemistry was important is now being nearly accepted in a much larger community. More and more people are interested in that aspect of atmospheric chemistry.

Wolff: I guess my recollection from early days was that people looked a little bit peculiar at us in terms of our...because we put atmospheric chemistry on the same level as some of the other studies back in the beginning.

Kellogg: That's true. I remember being very proud of the fact that LAS had a good atmospheric chemistry program; much better than any of the other universities had at that point as far as I can remember. That was because it had been neglected elsewhere.

Wolff: What should NCAR be stressing most in the future?

Kellogg: I would like to see NCAR continue with both feet squarely in the global change area. It's obvious that it is going to anyway because this has captured the imagination of the whole geophysical community. We see UCAR setting up a special group under Jack Eddy to help organize the international global change. Jim McCarthy who is here for the year is chairman of the international committee under ICSU that is going to be erecting that international program. I think we are committed to moving ahead in this area. Interestingly enough it has a big ecological component and NCAR has never gotten into the ecological area very heavily. We include some ecological aspects in our boundary layer. For instance, Michelle Verstraught with the help of David Gates from the University of Michigan and Bob Dickenson are all working to include the plants as part of the boundary layer of the atmosphere. That is a special aspect of ecology. We may have to get into ecology a little more in the interactions between living things in a broad sense and the atmosphere and the climate. I don't know just how we do that because it seems to me that you have to get a kind of a critical mass of scientists in some area like that before you can really contribute very much. It wouldn't be too useful in my opinion just to hire one ecologist; you would have to have a group. This is what we did when we got into oceanography; we organized a group and it had a critical mass and then it took off.

Wolff: Would you advocate doing that for ecology?

Kellogg: I'm not sure that the time is right for that but I think ten years from now it will be obvious that we'll have to get into this area. Of course NCAR can't do everything; you have to realize that. First it's a very conscious decision was made back the time when I first came here, even before that, that we would not get heavily involved in upper air research; that was

being done down the hill at NOAA very well and quite a few universities were interested in aeronomy, as it's called. So, we would not have a good program in that. We always had some aeronomy going on both HAO and in the AAP but not much. That's an area where some people have wondered why don't you do more and we have said we can't do everything. Ecology may still be in the category that you can't do everything so we'll leave that for somebody else to handle.

Wolff: I would like to get you to talk a little bit about some of the people who have been most influential in NCAR's development and success. Obviously the roll would be too long if we were to try to call it all but I thought you might have some comments about some of the people who have helped set the style and the agenda for NCAR over the years.

Kellogg: That's a hard question because there are so many people that come to mind; a whole gallery of faces that I can see looking over our shoulder through the years and helping us. I guess if we start with Walt Roberts obviously being the most influential single person in getting NCAR started and he had some interesting people working with him in the early days even before I got here. Phil Thompson in a sense organized the Laboratory of Atmospheric Science. He got tired of running it and that's where I took over from him. He had a remarkable man working for him, Aksel Wiin-Nielsen, who also helped shape the early days of NCAR. Aksel of course went on to become secretary-general of the World Meteorological Organization, and is still playing a part in some of the things that we do. For instance he helped us to organize an oceanographic research group for the Navy. So, Aksel is still playing a part.

I had an occasion to interview, just as you're interviewing me, Roscoe Braham about a month ago and got him to talk about his role in the early days of NCAR. He was one of the people that helped write the "Blue Book" [**"Preliminary Plans for a National Institute for Atmospheric Research"—ed.**], which described NCAR, and I think through the years Roscoe has played a very important part in trying to get NCAR to live up to its early expectations. Tom Malone, who I admire very much, has been in and out of NCAR with a lot of wisdom and a very farsighted person in my opinion. I think he has been one of the hands that has helped to guide NCAR. Vern Suomi is another person who comes in and out of our lives and has been very influential at various times. I think it was Vern wasn't he who was chairman of the group that organized our hail research project [**National Hail Research Project**].

Wolff: He was certainly one of the prime movers in getting it started, that's right.

Kellogg: Walter Hitchfield, who is dead now, but Hitchfield is another person who pushed us in that area. These are some of the people that come to mind and there are many others.

Wolff: Most of these people are people who were here in the very early days or were people from outside of NCAR. Within NCAR are there people who come to your mind as outstanding scientific leaders that have helped push NCAR in its current direction?

Kellogg: Of course I mentioned Phil Thompson; he is still here. Chuck Leith came here and put our dynamic meteorology or our modeling work on a very firm footing. I think we owe a lot to Chuck Leith. He has gone back to Livermore now to do experimental physics of all things but he was a very strong force. When we were first becoming interested in tropical meteorology there was a young graduate student from Florida State University named Ed Zipser that seemed to have a lot on the ball. We recruited him and when the Line Island Experiment began to shape up, it was clear that Ed Zipser was going to be one of the leading scientific...one of the scientists who would guide the Line Island Experiment and eventually he was put in charge of the scientific aspects of it. He is still here of course. I think we owe a lot to Dan Rex, who is no longer here, the original head of our Facilities division, as we used to call it. We used to laugh about the people that Dan attracted to him because a lot of them were Navy people and Dan himself was a retired Navy captain so we used to call it "Rex's Navy." I think we owe a lot of the strength of our Atmospheric Technology Division to the early days of Dan Rex's Facilities division and the fact that they did do a good job in spite of what the Joint Evaluation Committee said about it. They were doing a good job and they had pushed a lot of new technology out into the field.

Wolff: To the extent that NCAR has been a success, what is there about the style of NCAR, the way we run this place, the atmosphere that is created here that makes it a good place to do science and how could it be better?

Kellogg: That's kind of a hard question to answer because NCAR does have a feeling about it, kind of a mystique, which I can't put my finger on. When I first came to NCAR I had a vision of a place where a group of scientists would work together as sort of a team to solve some of the big problems of atmospheric science and it hasn't worked out quite that way but we have obviously contributed to many aspects of meteorology, atmospheric physics and atmospheric chemistry. The original concept of NCAR was not only a place to do research but was also a place to recharge the batteries of science from other places, government, universities, science from abroad. It would be a melting pot of the top scientists in various aspects of atmospheric research. To some extent it has fulfilled that also. Referring again to Roscoe Braham's reminiscences, he feels that we

should do more than that, that is that our post-doc program is fine but it is too small and that we should have a much larger program to bring more senior researchers back to NCAR for a few months to a year maybe two years. It would be a place where scientists would come here and interact with us and then go back to their universities. This hasn't happened to the extent that the early planners of NCAR visualized and maybe that's one of our weaknesses but I can't explain why it hasn't worked out better in that sense. Perhaps it's because university scientists don't necessarily want to come and leave their home base and come to NCAR and do more research. They want to do something different. That's something I haven't really figured out.

Another aspect of NCAR that perhaps has attracted a certain type of people is our Facilities division, the development of new technology for observing the atmosphere. I suppose that one should also mention the development of the technology of how to use computers in atmospheric research. That has attracted quite a few people here and I think through the years we have done an extraordinarily good job of developing new tools. The balloon work under Vin Lally's camp has been unique. The development of Doppler radar was fostered by NCAR. We have not done very much in the area of satellite research but what we're doing now in the area in how to analyze the clouds observed in various parts of the spectrum from satellites is, I think, the sort of cutting edge of that particular aspect of satellite meteorology. And obviously our atmospheric chemists have been leaders in developing tools to measure very small concentrations of trace gases. I remember in the early days the atmospheric chemists saying that they would never be able to equal the human nose detecting very small quantities of certain trace gases but I think they have gotten there now. They're as good as the human nose.

Wolff: You mentioned...

END OF SIDE 1

Interview with William Kellogg

SIDE 2

Gauss: This is side B of Tape 1 of an interview with Will Kellogg.

Wolff: Will, you mentioned just a minute ago some of our relationships with universities and how we interact with them. How successful have we been in helping universities to extend their opportunities for research and how is the university's view of NCAR changed since you have been here?

Kellogg: I think the universities' view of NCAR has changed enormously since the early days. It was always a shock to me to find that among "our friends" in the universities, there were quite a few meteorologists and other atmospheric scientists who resented NCAR because they felt that it was a monster that was going to eat up the budget for atmospheric research and that would leave less for the universities and they were not persuaded by the thought that NCAR was somehow to serve the universities. They felt that it was a competitor. In a sense it was, I suppose, in the early days because in the 1960's the atmospheric science budget was expanding but NCAR was expanding so fast that it was chewing up the new funds for atmospheric research, as I recall.

Now that things are sort of settled down NCAR is not expanding the way it was in the 1960's, I think the view of the universities is much more kindly towards NCAR because they have realized first of all that we're not... first of all put it this way from the budget point of view as Gene Bierly has pointed out at one of the meetings of UCAR, if you were to take NCAR away and save the \$40 million or so that is now going to NCAR, that money would not necessarily go to the universities. This was coming from the man at NSF who was most likely to know; I think it was a very persuasive point.

Secondly I do think that the universities realized now that they can have access to our Computing Facility by remote links now that they can use our aircraft and Field Observing Facilities, they realized that they couldn't do this kind of thing themselves. They see NCAR now as a center for organizing this kind of service to the universities. So, I think there has been a real change in the attitudes of most of the university people towards NCAR. Although there is still a sore point in the sense that I pick up every so often talking to university friends, we don't have to write proposals to get money. The administration of NCAR and UCAR writes one big proposal in a sense every year and it's been doing it every five years and then the NCAR scientists don't have to go through this rat race that the university scientists have to go through. Then a proposal is accepted. The fact that we have the SPEC, that is the Scientific Program

Evaluation Committee, which is a tough committee which reviews NCAR, doesn't satisfy the universities entirely because they realize this is a pretty soft way of getting out and having to write proposals that have to be reviewed just once every three years by a committee. This is one point, I think, where some of the university scientists have a certain amount of jealousy: wouldn't it be nice to be at NCAR and not have to write proposals.

Wolff: So far in our relationship with the university you have talked about jealousy, you've talked about budget pressures and you've talked about the usefulness of NCAR as a place for university people to use facilities. What about research relationships and research collaboration of the universities? Is that looked upon in your view by universities as being important to them?

Kellogg: I doubt it, except where our technology can help the university scientists get a better instrument or better observation. After all university scientists take sabbaticals and go to universities all the time. This is traditional in the academic environment. The fact that NCAR scientists have sabbaticals and take residence at universities is no big deal. I see an awful lot of university scientists that come here quite regularly; usually it's to use our computer and incidentally, to talk to their colleagues here at NCAR. In a few cases there is a real collaboration going on, but I don't sense that there is a lot of that; maybe it should be more.

Wolff: Does this mean that NCAR has been less successful than it might have been in drawing university people into collaborative research on the kind of interdisciplinary work that you think ought to be stressed here and is being stressed here?

Kellogg: I think we could do better. I think we are doing better now than we did in the early days but I'm not sure that the university people are satisfied that NCAR is a home for them to collaborate with and I don't quite know what you do to prove that situation. The NCAR scientists are perfectly willing to collaborate with the university people and they do occasionally but it's much easier for them to collaborate with somebody sitting down the hall day after day.

Wolff: Has NCAR management over the years created a good atmosphere here to do research?

Kellogg: Oh, I think definitely, yes. NCAR management has been...It's hard as I have already talked about some of the problems we had in the early days where we were floundering for a while before LAS was reorganized, but I think on the whole we have done a pretty good job of organizing the research, that is, our division directors and our NCAR director have been

wise and fair on the whole. The periods of low morale correspond almost one to one with periods of budget cuts when we had to ask some of our NCAR scientists to leave. That's, I think, inevitable. NCAR can't go on expanding forever and it shouldn't. I remember in the early days and maybe you remember this remark at Walt Roberts saying that he was going to wash his hands of NCAR when it passed 500 people.

Wolff: I remember when it was 300 people.

Kellogg: But that kind of growth is ... a sort of corollary to Parkinson's Law, and the only way you could stop it is to cut the budget from time to time or pull in the purse strings and this is what's happening and this always hurts.

Wolff: Would NCAR be a better place to do science if it were somewhat smaller and had fewer scientists, fewer people?

Kellogg: I have often thought that it would be and this is sort of my own feeling about the good old days when we could pack up the entire Laboratory of Atmospheric Science and go to Estes Park or Morrison or Bailey, I guess it was, and have a couple of days of sitting around and talking and becoming familiar with what everybody else was doing and becoming good friends. I don't think the size that we are now that we could do that anymore as a practical matter and that's too bad. There isn't the sense of, well, this familiarity with what other divisions are doing. I tried to have lunch with my atmospheric chemists and my HAO friends and so forth that I have to admit that there are not very many people who bother to go across to the other table as it were, that is, across that boundary between divisions.

Wolff: Can we have a brief pause?

Wolff: Well, in looking the success that NCAR has had, it seems to me that much of this is due to our ability to attract and keep really excellent scientists. What do you think there is about NCAR that's made it possible for us to do that?

Kellogg: First of all good scientists will come where the action is. So that, in order to attract good scientists you have to convince them and the scientific community generally that NCAR is an exciting place, intellectually exciting, it's where things are happening. When NCAR was first formed it was a small group and they weren't necessarily the very top of the field. Some of them were, but by and large, they were people that were willing to, in a sense, take their chances with this new organization. Of course I could be included in that group. I took my chances and it was only three years old when I said I would join it.

I think for a long time the leadership of NCAR—and I'll just speak about LAS, my own division—was not so pre-eminent that we could just wave our hand and get the very best people from the universities to come and join us. We got off to a good start but not a very fast running start. Chuck Leith, for instance, I remember talking with him at great length and Phil Thompson and I were both wooing him to get him to come here, and he wasn't sure that he wanted to come and join NCAR at that time because he didn't really think that this was where the action was and we tried to convince him that as a leader of our dynamics program that he could make it where the action was and, in fact, that is what he did. That's the way one moves ahead in getting people. In the last few years we have attracted some really topnotch people. I think we could tap the very best person in dynamic meteorology, for instance, when the division head of AAP opened up, we got Rick Anthes who then went on to become the director and he is obviously in my opinion and I think most people's opinions one of the best people we could have gotten. I'm not sure that 20 years ago we could have persuaded Rick or a Rick, somebody like that, to come here who would sort of had the choice of any university department he wanted.

Wolff: What aspects of NCAR do you think are most important to preserve and promote in order to make it possible for us to continue to get and keep good scientists?

Kellogg: Whatever we're doing we seem to be doing right on the whole. We are attracting good scientists. We are doing good research. So, we should continue to do what we are doing. I am thinking about the way in which the staff of NCAR has not had the turnover, which was originally envisaged in the "Blue Book," that it was a place where they become a flow-through of scientists going back to the universities. This hasn't taken place and our scientists stay, they like it here and they grow old and finally retire like I am doing. It would probably be a healthier place if we could have more turnover and bring in fresh new blood all the time. It's a little bit like pulling teeth to get scientists to move on and go back to the universities. They don't want to, they like it here at NCAR. So, that is a good sign, the fact that they like it here but it also means that there's a danger of the average age of the scientists becoming one year older every year. You wouldn't want that to happen.

Wolff: If you had to summarize the view of the scientific community not only nationally but internationally, how does that community view NCAR today?

Kellogg: I think they view NCAR as unique and preeminent. There are a number of countries that would like to have an NCAR. In fact when I was in Japan quite a few years ago, I visited Kyoto and my friend ?Kotto who was head of the ionospheric laboratory showed me a vacant lot owned by the

University of Kyoto, “That’s where the Japanese NCAR will be someday,” he said. He admired NCAR enormously and felt that Japan needed something like NCAR. I think all over the world you mention that you’re from NCAR and they know about it. We’ve got a reputation and we’re famous.

Wolff: Has NCAR done what it should and is it doing what it should to bring the community into more intensive work on the large interdisciplinary problems that we discussed earlier in the interview?

Kellogg: Not as well as it should and I think I mentioned this before that there is a...the university scientists aren’t flooding, aren’t knocking down the gates of NCAR to come here and work with us. They by and large see their own research programs as something which will occupy them for the rest of their careers. They don’t need NCAR to collaborate with them. This is not true invariably and we have a number of really topnotch people who do work with our scientists but their rather small in number. There is David Gates, the biologist from Michigan, and Steve Warren, from the University of Washington, who comes and goes. I could mention others if I sort of looked through the roster of visitors who are regular visitors and do work with the NCAR scientists, but they’re a very small group.

Wolff: I see it quite often quoted that 40% or so of all the papers that are published by NCAR scientists are done in collaboration with a university college. Does that mean that that is not a very significant number, it doesn’t mean much?

Kellogg: I don’t know where you got that statistic; I’m impressed. That’s a good statistic. I would shout it from the rooftops.

Wolff: ...I don’t think I have more questions for this segment of the interview, Will. I know that you will probably be interviewed by someone else to go into more detail about the evolution of the science at NCAR and your own scientific history and I appreciate very much the opportunity to participate in this. I feel honored to have done it.

Kellogg: It’s been fun for me to think about the past of NCAR and think about the direction that NCAR is going to be taking even though I won’t be involved directly or at least as much in the future of NCAR. I’ve enjoyed this and it will be interesting to know whether future students of the history of NCAR will find anything very useful in what I have said.

Gauss: I’m sure we will. I have one question that popped into mind as you were talking before we close. Would it be possible for you to talk about what you think NCAR’s biggest challenges might be facing in the future?

Kellogg: You mean right now?

Gauss: Yes.

Kellogg: I think when I talked about the direction that the science was taking, namely the global problem, global change problem, and the fact that it has been generally recognized in the scientific community that this is the direction in which geophysics generally would take, but NCAR is moving in this direction pretty strongly. I felt a little alone for a while in my preoccupation with climate and climate change, but I don't think I'm alone at all anymore.

Wolff and Gauss: Thank you, Will.

Kellogg: I have enjoyed the morning.

END OF INTERVIEW