Advocacy in the Atmospheric Sciences

Summary of Findings
from the UCAR Leadership Academy “Advocacy” Project

Team Members:
Christopher Cantrell (ACD)
Teresa Kennedy (GLOBE)
Rebecca Morss (MMM, ISSE)
Susi Moser (ISSE)
Greg Poulos (EOL)
Doug Wesley (COMET)

UCAR/NCAR
Boulder, CO
June 15, 2005
# Table of Contents

**EXECUTIVE SUMMARY** ........................................................................................................... 3

**I. THE CHALLENGE** ............................................................................................................... 5
  I.1 Why Our Group Was Brought Together: Purpose of Our Work ........................................ 5
  I.2 Current Situation in the (Atmospheric) Sciences ............................................................... 6
  I.3 Scope of Project and Methods Used .................................................................................. 7

**II. TEAM EXPERIENCE** ....................................................................................................... 8
  II.1 Team Interests and Strengths ......................................................................................... 8
  II.2 Team Process and Challenges ..................................................................................... 8
  II.3 Lessons Learned ........................................................................................................... 10

**III. INTRODUCTION TO ADVOCACY** .............................................................................. 11
  III.1 Definitions and Perceptions ....................................................................................... 11
  III.2 Generic Advocacy Process ........................................................................................ 13
  III.3 Scientists as Messengers? .......................................................................................... 14
  III.4 Section Summary ....................................................................................................... 17

**IV. ELEMENTS OF EFFECTIVE ADVOCACY IN THE ATMOSPHERIC SCIENCES** .............. 18
  IV.1 Unifying Vision and Goals .......................................................................................... 18
  IV.2 Advocacy Coalitions .................................................................................................... 20
  IV.3 Resources for Advocacy ............................................................................................. 22
  IV.4 Target-Specific Approaches ....................................................................................... 23
  IV.5 Gauges of Success: The Need for Evaluation .............................................................. 25
  IV.6 Section Summary ....................................................................................................... 26

**V. RECOMMENDATIONS** .................................................................................................... 26
  V.1 Improving Advocacy in the Atmospheric Sciences ...................................................... 26
  V.2 Team Projects as Part of the Leadership Academy ...................................................... 27

**ACKNOWLEDGMENTS** ........................................................................................................ 28

**APPENDICES** ...................................................................................................................... 29
  1. Individuals Interviewed for this Project ......................................................................... 29
  2. Additional Readings ........................................................................................................ 29
EXECUTIVE SUMMARY
This report summarizes our project findings regarding advocacy in the atmospheric sciences under the auspices of the first-ever execution of the Leadership Academy action learning team. Each member of the team voluntarily participated due to their interest in the topic and in expanded atmospheric sciences and applications in service to society. We believe that the private, academic, and government sectors have not reached their full potential in this regard, and were therefore curious and stimulated by the topic of advocating toward fuller realization.

This report details the challenge of advocating in the atmospheric sciences at present (Section I), reflects on our experience as a team (Section II), lays out the wide range of interpretations of what “advocacy” means (Section III), and details key elements of an effective advocacy effort in the atmospheric sciences in Section IV. The final Section V translates the findings and conclusions into a number of recommendations – both on advocacy and on the inclusion of an action learning team component in the Leadership Academy. These are also offered here.

Improving Advocacy in the Atmospheric Sciences
We know that UCAR/NCAR already recognize the need for advocacy in the atmospheric sciences and are involved in various advocacy efforts. The fact that this topic remains one that “keeps [Jack Fellows] up at night” suggests how important and difficult it is to do advocacy well and with sufficient effort.

Clearly, improving UCAR/NCAR’s advocacy efforts requires a comprehensive, concerted effort. Our research suggests that the community, and even those directly involved in advocacy at present, do not share a common understanding of advocacy, do not have a unifying vision, and under-utilize the rich resources available at NCAR and beyond. We therefore recommend the following:

- UCAR advocacy efforts would benefit from doing a full inventory of the rich and diverse advocacy expertise and interest present in our institution. We recommend that the current advocacy program seek to better utilize existing staff resources and their already significant messenger-audience relationships in planning and carrying out advocacy activities.
- Whether or not scientists should be involved in advocacy is a contested question. Considering the benefits and drawbacks in a formal process (e.g., using the polarity management tool) within the UCAR/NCAR community may be useful to determine a course of action that maximizes the advantages and minimizes the potential negative consequences. As a result, community involvement in advocacy might be increased.
- UCAR/NCAR should invest more in the development and training of advocacy skills among interested staff.
- Advocacy efforts are frequently most effective if carried out not alone, but in coalition. Acting in coalition can convey a message of greater importance, credibility, and weight in the eyes of the target audience. UCAR/NCAR should carefully review its existing and prospective coalitions and consider potential diversification and evaluation of its coalition efforts.
- Regardless of who will act as advocate/messenger, to be successful advocacy requires adequate investment in the process (e.g., preparation, training, execution, and rewards).
The investment in terms of staff, time, and financial resources should match the challenge of creating a robust advocacy program.

- Advocacy requires persuasive information. Relevant research is being conducted at NCAR. Depending on need and time requirements, more resources should be expended to study the economic impacts of atmospheric science and its applications in society.

**Team Projects as Part of the Leadership Academy**

The Advocacy project was a valuable, interesting, and enormously time-intensive undertaking. We believe that such an action learning team affords lessons that cannot be obtained in the LA generally. To make these lessons truly useful and useable beyond the action learning team, we recommend the following:

- Given the amount of additional time this project took, we recommend (1) revising the action learning team component of future Leadership Academies to reduce the time burden on participants, and/or (2) ensuring that LA participants are fully aware of the significant additional unscheduled time required to complete the project.

- Working on a real-life, real-time project is highly motivational. To ensure that the experience is satisfactory, it is critical to state clearly upfront the expectations for project outcomes, identify the intended audience, clarify how the information will be used, and for project sponsors to commit to offering a response to the action learning team upon completion of their project.

- No matter how future action learning projects are reconfigured, we suggest that staff partaking in the LA consider working with their supervisors to obtain adequate relief from other work responsibilities during the LA where possible. This will help make the leadership training a truly beneficial, not a burn-out experience.

- Efforts should be made at raising awareness of LA skills and techniques across UCAR/NCAR, and supervisors should work with trainees as appropriate to identify opportunities, so that LA graduates can better use the skills and lessons learned in the action learning teams in other UCAR/NCAR and external teams.

We look forward to hearing back from the UCAR/NCAR leadership and the organizers of the Leadership Academy on how these recommendations might be useful in considering changes in the future, and we would be happy to help implement them in appropriate ways.
“Science is not just an academic exercise.”
U.S. Representative Bart Gordon
House Committee on Science

I. THE CHALLENGE

I.1 Why Our Group Was Brought Together: Purpose of Our Work

In 2005, the UCAR Leadership Academy for the first time included a component in which Leadership Academy (LA) participants were asked to apply their newly acquired skills to a real-life, real-time UCAR/NCAR leadership or management challenge. Through an iterative process of prioritizing, exploring, and voting, our group reduced the 20 possible topics offered by Jack Fellows, as well as several additional challenges we identified, down to three. This report and accompanying presentation summarizes the findings on one of these topics: “advocacy in the atmospheric sciences.”

Jack Fellows presented the challenge of advocating for the atmospheric sciences to us as follows:

“Each year, our nation suffers $15-20 billion in weather- and climate-related damages and losses, and invests roughly $2 billion to better understand and deal with these issues. That is roughly five to six dollars per citizen for information they use nearly everyday of the year to plan their activities. One would think, therefore, that weather and climate community advocacy would be relatively easy, but historically it has been quite difficult, with few people understanding the importance of the underlying infrastructure and enterprise (i.e., “we just get this information for free from the Weather Channel”). Our community’s involvement in advocacy is dismal (~2-3%). How can we get more of the community involved and what message could we develop to make national decision makers more supportive of the weather and climate community’s needs and ability to serve the nation? The group could review the draft UCAR-AMS 2005 Advocacy document (Improved Weather and Climate Services for the Nation: An Urgent Priority for the President and the 109th Congress) and make recommendations.”

We did not focus our project on a review of the document Jack Fellows mentioned. Nor did we restrict our work to developing one persuasive piece of information that could be used in UCAR/NCAR advocacy efforts. Rather, we found very quickly in discussions and interviews with various knowledgeable informants that the scope of the advocacy issue is large, ambiguous, and wrought with contentious issues. Containing this topic was further complicated by the fact that – as part of the Leadership Academy learning experience – our focus was not only on the issue itself (and on producing a useful end product), but also on our team process. This report summarizes both, our substantive findings on the advocacy issue and our lessons learned from working together with the project- and people-management tools we had.

---

2 We use “UCAR/NCAR” whenever we refer to all of our organizations, including UOP and the members of UCAR. We use “NCAR” alone when we refer to specific activities of that organization alone.
3 See also: The Weather Coalition. (2005). *Improved Weather and Climate Services for the Nation: An Urgent Priority for the President and the 109th Congress*. UCAR/AMS.
Behind the process and product stand the enthusiasm and experience that each of our team members brought to this project: experience with the use of weather and climate information in the private sector; “doing advocacy” in the non-profit sector, on the Hill, and in the agencies; working at NSF, in Congress, and in federal agencies; and living or researching advocacy and science-policy interactions now as employees of UCAR and NCAR. We learned that our experience is but a small part of the vast pool of experience UCAR and NCAR have at their disposal to tap into for future advocacy activities.

### I.2 Current Situation in the (Atmospheric) Sciences

The challenge of advocating effectively for the atmospheric sciences must be seen in the context of several ongoing and currently pressing trends. At the broadest level of the American public, there is relatively little (and in fact declining) appreciation for science in general. While, as Jack Fellows described, everyone cares about the weather, the underlying science of atmospheric phenomena occurs far from daily life for most people, is largely not understood, and the extensive scientific effort producing better scientific understanding goes unappreciated. Much effort is required to demonstrate and communicate the relevance of atmospheric science to society.4

More specifically, the U.S. has entered a phase of shrinking financial support for Earth, atmospheric, and related social sciences as national budget deficits and expenses for wars and security efforts are growing, and other science priorities – such as the now urgently pressed Moon-Mars Initiative – are threatening to marginalize Earth-focused research needs.5 Particularly worrisome – from UCAR/NCAR’s perspective – are projected level or declining non-defense related research budgets for some of its key funding agencies: above all NSF, but also NASA, NOAA, DOE, and smaller agencies like EPA.6 The impact of the reorganization of House and Senate appropriation committees cannot yet be determined, but raises additional concerns. Moreover, while some in the House and Senate remain committed to making science funding a priority, others are less inclined.7 The rapid turn-over of Congressional staff, and their frequent lack of appreciation for science, creates a strong need for ongoing education and advocacy efforts directed at those making appropriations decisions.

This growing advocacy challenge has clearly been recognized by UCAR/NCAR leaders and far beyond. UCAR, NCAR, and UOP have dedicated staff to do outreach, education, advocacy, and – via a hired consultant in Washington – direct lobbying in Congress. UCAR and NCAR are also involved in The Weather Coalition, a recently formed consortium of professional associations, universities, and representatives from the private sector. Its purpose is to advocate for the atmospheric sciences through letters and visits to Congress, provide testimony before relevant Congressional committees, and conduct other Washington-focused outreach and

---

education. One example of the Coalition’s attempts to organize its advocacy efforts is an upcoming workshop hosted in Boulder on the future of weather prediction.

Importantly, however, the issue of advocating for continued and more financial support for the atmospheric sciences must be seen in light of a much larger “movement” that tries to connect science more effectively to decision- and policy-making and – as NCAR’s own mission states, and some of its scientists actively research – to produce science in service of society.

I.3 Scope of Project and Methods Used

The current funding situation and the limited general appreciation of science in Congress and the public make advocating for the atmospheric sciences a tremendous challenge. Not surprisingly, we have expanded and contracted our project scope accordingly several times. While we clearly hoped to make some useful contribution to UCAR/NCAR leaders’ discussions of how to improve advocacy here, we are fully aware that a side project to everyone’s full work load and to the LA commitment itself is entirely incommensurate with the advocacy challenge at hand. The results presented here should therefore not be viewed as the exhaustive findings of a comprehensive research effort, but as thoughtful input to ongoing discussions.

Our findings are based on two fundamentally different sources and approaches:

1) Modified appreciative inquiry approach in interviews with 16 individuals inside and outside UCAR/NCAR.

Individuals were chosen because of their advocacy roles or experience within and outside of UCAR/NCAR, but no attempt was made to be either exhaustive or systematic. The set of interview questions evolved slightly as our understanding and project focus shifted. The interviews lasted between 30-90 minutes, and interviewers took fairly comprehensive notes of the conversations in order to share them with other team members.

2) Other sources obtained through internet and literature searches, and from a presentation of the advocacy challenge by Cindy Schmidt to the entire LA Group on 10 May 2005.

Our goal was to extract from all of these information sources both commonalities and differences in how people viewed the advocacy challenge and thought to address it, and reflect these findings back to the UCAR/NCAR leadership. We believe much can be learned about how best to meet the advocacy challenge by examining areas of overlap and differences.

We begin in Section II with reflections on our team experience, and lay out different conceptions of “advocacy” in Section III. Then, in Section IV, we provide more details on what our research uncovered to be elements of an effective advocacy effort. Section V finally, summarizes our findings in the form of recommendations for UCAR/NCAR to consider in its future advocacy efforts and in the Leadership Academy.


II. TEAM EXPERIENCE

II.1 Team Interests and Strengths
Each member came to our team with a unique set of background knowledge, experiences, and perspectives related to advocacy. For example, in addition to their current roles at UCAR/NCAR:

- Chris Cantrell was a program manager at NSF for one year, during which he participated in an interagency committee involved in advocacy
- Teresa Kennedy has extensive experience in national and international community outreach and K-12 science education
- Rebecca Morss worked for the U.S. House of Representatives Science Committee for 6 months
- Susi Moser was a staff scientist for the Union of Concerned Scientists, coordinating and participating in a variety of federal, state, and local scientific advocacy efforts
- Greg Poulos co-founded a start-up company that promoted advanced mesoscale and global and seasonal forecasting seeking to improve private sector efficiency
- Doug Wesley worked as a Science Operations Officer for the National Weather Service

Although this diversity of interests and strengths raised challenges, it was also an advantage, giving the team a range of expertise and contacts to draw on in developing our project. Moreover, the diversity of our team is representative of the breadth of advocacy-related expertise (including relevant research expertise on the science-policy and science-society interface) available among UCAR/NCAR staff. Yet most UCAR/NCAR staff members are not regularly involved in (and may even be unaware of) UCAR’s advocacy-related activities. As a result, much of this in-house expertise remains untapped. This suggests that UCAR advocacy efforts might benefit from doing an inventory of this invaluable expertise and interest, and involving more of its staff in planning and carrying out advocacy activities.

II.2 Team Process and Challenges
Our team had two purposes: (1) to generate a product related to our chosen topic — advocacy; and (2) to put into practice the skills we were learning in LA, focusing particularly on the team process. To accomplish these goals, we held the following series of meetings (most lasting 1.5-2 hours; team meeting responsibilities were shared and rotated among members; meetings outside Leadership Academy classes are italicized):

- **February 10**: Team formation during LA class on “Effective Teams”; first team meeting to select topic, discuss group outcomes, and develop initial group norms
- **February 24**: First team meeting with Andy Churgin (Chain Reaction facilitator); Andy presents Appreciative Inquiry process, team discusses process and potential interviewees
- **March 2**: Team lunch meeting to discuss interview subjects and protocol
- **March 7**: Team interview with Jack Fellows
- **March 16-17**: Multiple team process and product activities during LA class on “Level 3 Leadership”
- **March 22**: Team meeting; focus on building consensus on project scope
- **April 1**: Team meeting; focus on team process, defining team member interests
• *April 18*: Team meeting; focus on defining end product, deciding on next steps
• *May 4*: Team meeting; focus on developing detailed report outline
• *May 11*: Team meeting with Andy; focus on team experience, report outline
• *June 2*: Team meeting with Andy; focus on project report and presentation
• *June 14*: Team meeting with Andy to finalize report and presentation

In between meetings, team members exchanged emails, conducted interviews and background research, drafted report outlines and sections, and engaged in a number of other individual activities related to our team and topic. Through this process, we shifted our focus from Jack Fellow’s original topic to a broader vision, presented in this report. At the same time, we faced – and worked through – a number of “human systems” team challenges.

**Time, Focus, and Scope.** One of the biggest challenges our team faced was limited time – particularly given that all of the team members were already overburdened from regular LA classes and other ongoing work responsibilities. The time constraints were further exacerbated by the broad nature of our topic; the advocacy issue incorporates multiple embedded and related issues, so it can be framed and addressed in many different ways (see Section III). At times, team members also found it challenging to focus on both process and outcome, especially given team members’ commitment to the topic and our interest in generating a high-quality product within the limited time available. It became apparent early on that scoping the project to fit within the time available would be an important determinant of our team’s success. The scoping process was complicated, however, by team members’ different perspectives on the project’s goals, the intended audience, and the implications of presenting results before the UCAR President’s Council, as well as members’ diverse interpretations of what “advocacy” means. The diversity found among interviewees and in the literature was echoed within our group. Team members were also unclear on the level of commitment from the project’s sponsors and the intended audience, which affected team commitment and focus. Different team members’ interpretations of the importance of performing before the UCAR President’s Council further complicated scoping, as did not having a clear set of externally defined expectations for the project’s outcomes.

**Absences.** Another significant challenge we faced was forming a team despite (or in the face of) frequent team member absences. One member was absent at the initial team-forming meeting; another team member was unavailable for all subsequent meetings. Only four of the six team members were present for most of the Mar 16-17 class, during which the team engaged in a number of team-building and project development activities. The team also had a potential seventh member, who did not participate in any team activities and ended up dropping out of the LA. With so many absences on a small team and no meetings with all team members present, the team felt fractured early on, and focusing and committing to a scope all could agree on remained challenging for a long time. Eventually, however, the available team members were able to come together to form a team and learn to build team consensus despite interruptions and absences.

**Diversity of Perspectives.** As mentioned above, a significant challenge was the team’s diversity; team members not only brought different experiences and perspectives, but also came from different fields and sometimes used different vocabularies. A related underlying challenge was
team members’ different perspectives on the roles of scientists, including federally-funded scientists, in advocacy. Learning to communicate and work together effectively given this diversity took time, effort, and practice of our leadership skills. To take advantage of this diversity, the team had to learn how to generate a group outcome and build consensus while preserving individual strengths and preferences.

Application of Tools. At times, team members also found it challenging to understand the value of some of the tools being presented to the action learning teams. Through discussion and trial and error, we adapted some of the tools to make them work best for our team and its most effective working style. For example, our team modified the Appreciative Inquiry process, and we found that our team sometimes worked best when we mixed time for individuals to develop their own ideas into group activities.

II.3 Lessons Learned
By paying attention to the team process while participating in the action learning team and working through the challenges discussed above, we furthered our learning about leadership and teamwork. One lesson learned is that the diversity of experiences, perspectives, and ideas can be accepted and even welcomed. Consensus does not mean complete agreement. On this premise, team members share some but not all of the following experiences and lessons learned:

- It is important to attend to both the “human system” and “business system” components of a team in a balanced way. At times it felt like the time we spent on process took time away from our work on outcome, but by the end we realized that the work on process furthered the outcome. Yet the emphasis on outcome, on an end product, offers a valuable goal to aim towards.
- Too much agreement in a team can mask underlying human system problems. We discovered that an important aspect of leadership is exploring different team members’ ideas and creating an environment where different people can express their views freely.
- Interdisciplinary membership on teams provides a valuable resource yet presents additional challenges. An interdisciplinary team may need to spend more time on the human system aspects of the team, or to spend more time on scoping to allow people to learn each other’s perspectives before focusing in.
- The action learning team provided our team with an environment to practice some of the techniques we learned in LA and to reflect on how the tools worked. This allowed team members to incorporate some of the new techniques into their everyday work interactions and adapt them to their personal styles.
- Learning (i.e., changing) is often difficult, and people can be resistant to new tools and techniques. Resistance to new ideas and techniques, such as those learned in LA, may be decreased if the new tools are presented with context and vision, rather than introducing them abruptly and without much explanation.
- It is important to adjust a project’s scope to the time and other resources available. Yet this matching is not a one-time effort. Defining expectations and boundaries early on in the project can be very helpful, as can early discussion of how much time and other resources team members have available for the project. Scoping may need to be iterative, however, since the balance of time and scope may adjust as the project and team evolves. A team may need more time to scope and focus a project if it contains diverse backgrounds and perspectives.
• When a team member is absent, one-on-one debriefing is valuable to help the absent member catch up and keep everyone on the team on the same page.

• Confusion about the end product can hinder project scoping and motivation, as can absence of clearly defined expectations for a project.

• Commitment of team members is a critical factor in a team’s success.

Some team members felt they learned more about themselves through the action learning team – in fact, for some members, the self-awareness and context-awareness fostered in the LA was the most enjoyable part of the experience. In addition, several members valued the closer connections they built with other team members, beyond those they would have developed simply by participating in the LA. Some members also noted that vivid, challenging aspects of the action learning team, such as the lack of clear externally-defined expectations for outcomes, provided significant learning opportunities.

Because the action learning team has similarities to other teams we participate in at UCAR and beyond, carrying these lessons to our daily work environments is likely to make our future teams more effective. More generally, we believe that some of these lessons and the techniques we learned in LA could be applied more broadly across UCAR, benefiting teams throughout the organization.

III. INTRODUCTION TO ADVOCACY

There exists a wide variety of definitions, perceptions, and interpretations of advocacy. The purpose of this section is to examine this variety through examples from several sources, with the goal to describe advocacy and present the range of perceptions of what advocacy is and who might be involved. Of the many components of advocacy, we discuss potential participants and mechanisms in more detail because of their particular importance to the overall process. This material prefaces the discussion of advocacy as it applies to science in general and to atmospheric sciences in particular.

III.1 Definitions and Perceptions

The American Heritage Dictionary defines advocacy as “the action of advocating, pleading for, or supporting a cause or proposal.” The definition of advocacy in Merriam-Webster’s Dictionary of Law is “active support; especially the act of pleading or arguing for something.” It is often used in a legal sense as in “a lawyer advocating for a client.” Roget’s Thesaurus lists the following synonyms for advocacy: advancement, aid, assistance, backing, campaigning for, championing, defense, encouragement, justification, promotion, promulgation, propagation, proposal, recommendation, upholding, and urging. These broad definitions encompass activities with a wide variety of purposes, target audiences, messages, and messengers. The American Heritage Dictionary definition of lobbying, in contrast, is “to try to influence the thinking of legislators or other public officials for or against a specific cause.” The key

12 Merriam-Webster's Dictionary of Law, © 1996 Merriam-Webster, Inc.
13 Roget's New Millennium™ Thesaurus, First Edition (v 1.0.5), edited by Barbara Ann Kipfer, PhD. Copyright © 2005 by Lexico Publishing Group, LLC.
differences in definition between lobbying and advocacy are the word “specific” and the explicit involvement of the policy process.

Our interviews provide additional perspectives and perceptions. Almost everyone we interviewed identified interactions with Congress and Congressional staffers as an important aspect of advocacy; many thought it was the only activity. Some specifically mentioned developing close relationships with potential information users as an avenue for two-way flow of information. A few pointed out that advocacy also includes activities at the local level such as visits to schools and letters to the editor of local newspapers. To some, it also includes staff visits to universities, staff-faculty swapping, exporting top scientists to universities, communications with NSF about successes and challenges in our research, leadership in future field campaigns and programs, and efforts to get our research recognized (though nominations for awards, for example).

Web sites of various organizations provide additional viewpoints. The Botanical Society of America (a professional membership organization for botany), for example, lists the following as potential advocacy activities: formal and informal education; encouraging basic research; providing expertise; developing direction and position statements; and fostering communication within the professional community, and between professionals and the rest of humankind through publications, meetings and committees.\(^\text{14}\) The Advocacy Institute (an organization promoting social justice) defines the purpose of advocacy as: to enable advocates to gain access and voice in the decision-making of relevant institutions; to change the power relationships between these institutions and the people affected by their decisions; and to bring a clear improvement in people’s lives.\(^\text{15}\) The Office of Advocacy of the U.S. Small Business Administration sees itself as an independent voice for small business.\(^\text{16}\) Research!America (a coalition of researchers in health-related fields leading the movement for funding increases for NIH, CDC and NSF) views advocacy as communication with elected officials.\(^\text{17}\) The Conservation Council of North Carolina (a non-profit organization lobbying for North Carolina’s environment) considers advocacy as “promoting better environmental rules, laws and regulations.”\(^\text{18}\) Sigma Xi (an international honor society of science and engineering) perceives advocacy as “activities that serve to educate the public and elected officials about the nature and conduct of science.”\(^\text{19}\) The American Psychological Association (a professional membership organization), in addition to identifying Congressional contacts, also mentions the importance of advocacy coalitions.\(^\text{20}\) The Coalition for National Science Funding (an alliance of over 100 organizations seeking to increase the National Science Foundation’s budgets for research and education) disseminates information to Congress and interested parties related to Federal Funding of Science.\(^\text{21}\) The library web page of Widener University defines an advocacy organization as one “attempting to influence public opinion (that is, one trying to sell ideas).”\(^\text{22}\) The Create Change web site (a resource designed for librarians) describes advocacy as

\(^{14}\) http://www.botany.org/newsite/advocacy/
\(^{15}\) http://www.advocacy.org
\(^{16}\) http://www.sba.gov/advo/about.html
\(^{17}\) http://www.researchamerica.org/advocacy/
\(^{18}\) http://www.conservationcouncilinc.org/advocacy/
\(^{19}\) http://www.sigmaxi.org/programs/advocacy/index.shtml
\(^{21}\) http://www.cnsfweb.org
\(^{22}\) http://www2.widener.edu/Wolfram-Memorial-Library/webevaluation/advoc.htm
“organized influence.” This diverse range of definitions of advocacy shows that there are a variety of purposes for advocacy activities and wide-ranging approaches to accomplishing those goals.

For federally funded scientists in general and Federally Funded Research and Development Centers (FFRDCs) in particular, some of these meanings of advocacy imply restrictions. For example, it is permissible for non-profit organizations to participate in lobbying as long as it is nonpartisan. Federal or state funds cannot be used to lobby for specific policies. However, these funds can be used to provide testimony. In addition, there are IRS reporting requirements related to lobbying. Scientists are not restricted by law in participating in general educational outreach. UCAR and other organizations, to avoid potential difficulties with legal limitations, often describe their advocacy activities as “education and outreach.”

III.2 Generic Advocacy Process

Regardless of one’s definition of the most important advocacy activities, nearly all aspects involved in the process can be described in a rather generic way. This general view helps to identify the components and thus to develop strategies most appropriate for each advocacy situation. There are nine components of advocacy that are important to consider when trying to make strategies more effective:

1. **Why** – What do we want (goals)? What is it you want your audience to do once they have heard your message? These goals could include improved understanding of our research, enhanced funding for science, support for specific projects or facilities, or influence of governmental policy.

2. **To Whom** – Who can implement these goals (target audience)? Which segment of the public is in the best position to hear and act effectively upon our message? Who makes funding or policy decisions? Example targets are Congress, funding agencies, the general public, universities, and particular individuals or branches therein.

3. **What** – What do they need to hear (messages)? What is the most relevant information, best language, and use of words, which will affect them powerfully and move them to action? What preconceived notions of the target audience need to be addressed? How can educators and communication experts help construct these messages?

4. **Who** – Who do they need to hear it from (messengers)? Who is this particular target audience most likely to listen to? Who would be credible and persuasive messengers to the target audience? Should the message come from scientists, interest groups, professional organizations or advocacy groups? Is there a persuasive coalition of messengers that would be more effective in delivering the message than a single individual?

5. **Channel** – How do we get them to hear it (delivery)? What is the best medium to reach them (e.g., print, radio, television, email, face-to-face meeting, public meeting)? This should be selected based on the target audience (including their education, interest in the topic, level of detail needed, time availability, accessibility, etc.).

6. **Resources** – What do we have available to us already (resources, strengths)? What resources do we already have at our disposal – good messages, graphic artists, web-

---

23 http://www.createchange.org/librarians/advocacy/intro.html
24 See, for example, http://www.afb.org
25 After the information found at http://www.advocacy.org
savvy specialists, eloquent and motivating speakers, sufficient funds, etc. – that can help us achieve our communication objectives? What resources could be developed further?

7. **Barriers** – What do we need to develop (challenges, gaps)? Whom do we need to bring in? What skills do we need that we do not have? What organizational culture issues might hamper our efforts? What are the legal limitations? What are common communication gaps or misunderstandings? What is in the way of acting on our message?

8. **Start** – How do we begin (first steps)? What are some things we can do right away to get the effort moving forward? Then what will we do after that? Can we make use of activities already in motion, or should we start something new?

9. **Evaluation** – How will we know whether it is working or not working (evaluation)? What mechanisms will we put into place to measure the impact of our message and our approach? How can we know whether these activities are accomplishing their intended goals?

Reflection on these advocacy components makes clear that approaches need to be specifically designed for the various purposes of an organization. A single, one-time approach will be less than optimal and perhaps ineffective. Obviously, the advocacy message will be different for various target audiences. Persons may have better skills as messengers in some situations than others, and some may have little advocacy aptitude. There may be connections between messengers and target audiences that are already strong and can be taken advantage of. The organization may not currently have the skills required for some types of activities, and thus may need to develop or expand them. It is also very important to attempt to assess the degree to which advocacy activities are accomplishing their intended goals, as difficult as this might be (see Section IV).

**III.3 Scientists as Messengers?**

Scientists are trained to undertake and report results of scientific research to their respective communities. Most are not trained to communicate with policy-makers and the general public. Their technical expertise and their public perception as impartial messengers makes active research scientists excellent candidates for participants in advocacy. Most scientists agree that education and outreach by competent researchers are appropriate activities to partake in. However, there is not universal agreement that scientists should be involved in advocacy related to policy and science funding decisions. This section provides some examples of the diversity of opinions on scientists as advocates. It is not intended to provide an exhaustive review of the topic.

One can envision science advocates in a variety of strategic locations. There are those within organizations whose primary function is advocacy (e.g., in interest groups); others may represent professional organizations; and yet others may advocate for research and research institutions such as NCAR. Scientists could be part of any one of these efforts, acting independently, or within advocacy coalitions.

**1. Opinions against advocacy by scientists**

To some, a scientist in a given field who advocates even in a general way for his or her field is in conflict of interest; to them, it is unethical to influence policy or funding in their area. This
is related to the traditional view that there is a linear process in which scientists undertake research and publish their results, “advocacy groups translate the science to meet their own particular goals, and policy-makers sift the information received and balance it with societal issues and constraints, and then make policy.”

In this paradigm, scientists are mostly removed from speaking to the societal relevance of their research.

For example, Wagner, in a discussion of the role of ecologists in influencing policy, asks “can ecologists be both analysts and advocates without damaging the image, if not the essence of objectivity? ... [The author’s] view is that we cannot.”

The writer offers two options: (1) continuing on a path of scientists attempting to influence the policy process, or (2) “to avoid public advocacy of policy options.” Wagner favors the latter option, but clarifies that there should be advocacy that is done exclusively by advocacy groups, not scientists.

Similarly, Mills takes the stand that a scientist cannot “play two roles simultaneously: that of credible, neutral scientist and that of position advocate.” He continues by stating that a scientist’s “passion for good decisions should be focused on assertively communicating the rich fabric of science information into the decision process. It should not be translated into an indulgence of personal values or into thinking that their experiences give them unique insights that all others lack.” The bottom line for the author is that “[a]n attempt by the scientist to simultaneously be a science information provider and a position advocate is an inherent conflict of interest” and thus “scientists should avoid position advocacy.”

2. Opinions favoring advocacy by scientists

On the other hand, many writers argue that “scientists have always been advocates for certain positions or approaches, at least on how science operates and how it is utilized.” For example, they “are advocates of the peer review system, the scientific method, ... and so forth.” One of the most important skills needed as an advocate is the ability “to speak in terms that other segments of society can understand.” Therefore, some think that it is “a responsibility of scientists to give their knowledge on relevant issues related to public welfare.”

Lach et al. examined, via interviews and questionnaires, the opinions of scientists, managers, interest groups, and the attentive public on the proper involvement of scientists in natural resource management. Ranking five degrees of involvement by scientists (report, interpret, integrate, advocate, and make decisions) on a 1-to-5 scale (1 − strongly disagree; 2 − disagree; 3 − neutral; 4 − agree; 5 − strongly agree), three of the groups (except scientists) found

27 ibid.
28 ibid.
29 ibid.
30 ibid.
31 ibid.
32 ibid.
33 ibid.
the role of scientists working closely with managers and others to integrate scientific results into management decisions most preferable. Scientists’ preference was to report and interpret results, although integrating results was also ranked highly. All four groups were near neutral for the reporting level of involvement, while scientists and managers were reticent for scientists to make decisions (scores of 1.66 and 1.79, respectively). Members of interest groups and the attentive public, on the other hand were more in agreement with this level of involvement (scores of 2.65 and 2.47, respectively). The four groups had slightly higher scores regarding the role of scientists in advocacy (scores of 2.20, 2.19, 3.21, and 2.95, for scientists, managers, interest groups, and the attentive public, respectively). In summary, while scientists and managers feel that too much involvement in the decision-making process might reduce their credibility as scientists, interest groups and the attentive public welcome some intermediate degree of involvement because of the scientists’ expertise.

The involvement of scientists in policy debates carries risks. Pielke states “[f]ew would disagree with the premise that scientific outcomes should not be predetermined by political perspectives. Why? The result, invariably, would be bad science and most likely bad policy.” A solution suggested by Pielke is for “the scientific community itself … [to assume] a greater responsibility for addressing the significance of policy of scientific results.” The author explains that a policy perspective is different from a political perspective, in that the former implies increasing or elucidating the range of alternatives available, while the latter seeks to decrease the range of alternatives available. These are important distinctions for scientists involved in interactions with policy-makers. For science to be valuable to society, it must be separated from the political views of the scientist.

Finally, Marincola thinks scientists should advocate, because “professional advocates can be perceived…as just another lobbyist.” She also believes that “only researchers themselves can convey the full excitement, promise, and potential of scientific research from their own experience.” The author continues that “[s]cientists have a moral obligation to respond to and preempt ideological demands and to ensure that federal policy decisions are based on sound fact and science.”

3. Polarity Management

A tool to help analyze and weigh the factors contributing to two opposite viewpoints on an issue such as scientists’ involvement in advocacy is called “Polarity Management” – a tool also taught in the L.A. The procedure involves articulating the positive and negative aspects of the two extremes of a polarized issue as an aid in determining and deliberating where on the spectrum one can maximize the positives while minimizing the negatives of the respective positions. In our team, we examined the factors contributing to the involvement of scientists in advocacy. The extremes considered were “no scientists involved in advocacy” and “all scientists involved in advocacy.” The results of the ideas of our team are presented in Table 1.

36 ibid.
38 ibid.
39 ibid.
Table 1. Polarity Management Exercise on the Involvement of Scientists in Advocacy

<table>
<thead>
<tr>
<th>Positive factors</th>
<th>Negative factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure and credible</td>
<td>Messiness of involvement in politics</td>
</tr>
<tr>
<td>More efficient, more scientific productivity</td>
<td>Less time for science, less scientific progress</td>
</tr>
<tr>
<td>More time for science</td>
<td>Science becomes a special interest (just like any other)</td>
</tr>
<tr>
<td>Ego and intellectual satisfaction</td>
<td>Less independence</td>
</tr>
<tr>
<td>Breakthrough science</td>
<td>Confusion about the role of science/scientists</td>
</tr>
<tr>
<td>Rewarded in tradition system</td>
<td>Loss of societal status</td>
</tr>
<tr>
<td>Independent</td>
<td>Conflicts of interest</td>
</tr>
<tr>
<td>Ideal of disinterested science</td>
<td>Lack of aptitude for advocacy</td>
</tr>
<tr>
<td>Comfortable</td>
<td>Blurring of science and politics</td>
</tr>
</tbody>
</table>

Table 1 suggests that there may be an intermediate state of scientist involvement that strikes a balance between the two polarities. For example, only well-trained and inclined scientists could do the advocacy, while less inclined colleagues would refrain from it. The performance and promotion system could be adjusted to reward advocacy as an acceptable community service activity. This middle ground requires continual awareness and addressing the possible negative factors of both poles. For example, aptitude and skill for advocacy needs to be developed in individuals before they can be expected to contribute positively to the process.

The available data and opinions differ on the question whether scientists should be involved in advocacy, and in particular in advocacy of research funding or specific political positions. It is important to examine and discuss the range of perceptions as our organization develops strategies for advocacy.

III.4 Section Summary
The components of the generic advocacy process have been described from a variety of viewpoints (dictionary definitions, journal articles, web sites, and interviews). While many focus on the role of advocacy in the funding of research (in particular, interactions with Congress and
Advocacy in the Atmospheric Sciences

staffers), some view other roles for advocacy within the organization, in the local community, and in relation to the wider university community.

There is considerable disagreement regarding who should act as advocates, both from the standpoint of who could be most effective, and (in the case of scientists) whether it is appropriate for them to do so. There is no simple answer to this dilemma, but it is important enough that discussions take place so that the views can be aired and evaluated.

The next section will provide perspectives from the interviews and other sources on the types of activities and the messengers involved in advocacy in the atmospheric sciences.

IV. ELEMENTS OF EFFECTIVE ADVOCACY IN THE ATMOSPHERIC SCIENCES

As clearly described in Section III, the advocacy process has several definable steps. This section focuses on five key elements of effective advocacy that emerged from our interviews, or were conspicuous by their absence. First we focus on the development of a common vision and on advocacy coalitions, the necessary access to resources and the concomitant level of effort, and key advocacy approaches. Then we focus on assessment of UCAR/NCAR efforts to judge the organization’s success in advocating.

While some become discouraged by the shear magnitude of the needed advocacy effort and the downward budget trends emerging from governmental sources, we should not forget the few allies in Congress who clearly understand the importance of science. Congressman John Porter, former chairman of the House Labor, Health and Human Service, Education Appropriations Subcommittee (R-IL) is a good example. He recently stated the following regarding the role of science in society:

“You can change the image of things to come. But you can't do it wringing your hands, and you can't do it sitting on your fingers, you've got to get out and get involved and defend science as you have never defended science before. Science can, in my judgment, be sold to this Administration and this Congress. I suggest that the best way to do that is to recount to them over and over again...that the economic destiny of America lies in science and technology, in science and research. And if we don't invest in research, and we don't inspire our children, and if we don’t educate them in Congress, the competition out there, and China is a good example, but Europe also, will begin to eat our scientific lunch.”

In our judgment, this and other similar statements from our interviewees, show that an appropriate advocacy approach not only can be successful, but will be, if undertaken with a bold vision, strong allies, adequate resources, and proven approaches.

IV.1 Unifying Vision and Goals

A common vision serves to unite the various individuals, organizations, and groups interested in a joint advocacy effort. Our interviewees considered such unity a critical requirement of an effective advocacy effort, especially when it involves coalitions of individuals or organizations with different objectives by themselves. Indeed, the development of a unifying vision is a crucial element in resolving competition or conflict among parties, which normally might be at odds in
Advocacy in the Atmospheric Sciences

lobbying for their specific interests in a scarce-resource environment. Below, we provide some examples of potentially unifying statements that could be used to advocate atmospheric sciences.

**Example 1: Vision of an Existing Organization**

The Weather Coalition’s goals statement is well-intentioned with regard to unifying a broad array of interested parties and for that reason has promise to unify its members for a successful advocacy effort:

*The goal of the Weather Coalition is to bring together industry, state and local governments, and academia in an organized effort to urge Congress and the Executive Branch to fund national initiatives to expand research collaborations between these groups and federal agencies in the area of mesoscale observations and predictions. This effort will improve the country’s weather prediction and warning capabilities and provide assessments of the nation’s socioeconomic vulnerability to weather. The results will be enhanced competitiveness for U.S. industry, improved support for national defense, and increased protection of life and property.*

These goals contain elements of a unified vision, though in many instances our interviewees noted and our research found that a unified purpose does not currently exist or does not sufficiently garner attention of all interested parties. In general, such a common vision should be specific to the advocacy goal, context, and players involved, and the Weather Coalition statement is successful in that regard.

**Example 2: Vision Emerging from an LA Exercise**

As a group, using the tools of the LA, we worked through a stepwise process to develop our own vision for successful advocacy in the atmospheric sciences with UCAR/NCAR participation:

1. An active and broadly-representative advocacy effort would be united around the common goal of *expanded atmospheric activities in service to society.*
2. To this end, obtaining the appropriate financial support to match brilliant atmospheric science with pressing societal needs requires that we:
   - use community advocacy partnerships that take advantage of the breadth and depth of skill, expertise, and passion available in our organization and community, as well as existing programs at the science-society interface
   - draw on these resources and talents by enhancing them through training, and by incorporating them into the planning and realization of our advocacy efforts, and
   - demonstrate the value of our atmospheric science and related work by using our diverse expertise to match our interests with those targeted by our advocacy efforts
3. To facilitate this process, we would coalesce the advocacy-related expertise and resources at UCAR/NCAR, as well as those in the stakeholder community, toward amplifying the perceived value of the basic and applied atmospheric sciences to the general public. Our advocacy would include an effort toward deepened atmospheric science knowledge in the

---

public, including K-12 education, and outreach to the adult public and to decision-makers in weather/climate-sensitive sectors.

4. Finally, we developed the following justification for an advocacy effort and the vision for an appropriately robust atmospheric science community:

Food, fresh water and shelter – basic human needs – are fundamentally reliant on processes in the Earth’s atmosphere. Geopolitical stability and the productivity of economies are significantly dependent on mitigating the impacts of weather disasters, everyday weather extremes, and short- and long-term climatic shifts. Therefore, ensuring a leadership position in the atmospheric and related sciences is crucial to the advancement of society and for America to lead the world. We envision a step-change in the value derived from all manner of atmospheric science-related activities, including industry desensitized to weather, weather disasters minimized through preparation, economic robustness, acuity with regard to the impact of environmental changes, advanced defense/homeland security and streamlined government weather and climate services.

While the above examples of unifying visions are instructive and to some degree outline roughly the type of vision or goals that we believe could unite stakeholders (similar visions are promulgated by the Integrated Earth Observing System), it is the very constitution of, and drive within, the coalition that will determine its ability to broadly advocate on behalf of the vision.

IV.2 Advocacy Coalitions

Several interviewees argued that doing advocacy in coalition, as opposed to through an individualized effort, has important advantages. The impact is typically greater if one approaches the target with several individuals, representing various interests, who share the same vision and complementary goals. While the primary interests and potential benefits may vary among the constituents, it is important that the representatives are united in the overall goal(s) of the coalition. Several efforts are underway within the atmospheric science community. It is entirely possible that the expertise and drive to execute a successful advocacy effort exists within those groups. But our interviews suggest that it is currently disjointed, under-funded, and lacking a persuasive message for the target audiences.

For example, if a Congressperson or Congressional staffer is approached by a coalition that includes several interests as opposed to only one (e.g., the scientific community), then that Congress person may be much more likely to deem the presented material important to his or her constituency. One interviewee reported of an effective coalition that consisted of a scientist, a religious leader, an economist, and a business pioneer. Another example might include a coalition of information producers (scientists) and information users (e.g., in industry, agriculture, the energy sector). The fact that different representatives consider their issue(s) important enough to bring before Congress together says a lot, and the individual contributions to the overall effort are more likely to gel into a high-impact presentation from several viewpoints, rather than just one. The likelihood of “touching a nerve” with the Congress person is thus much higher.

---

42 http://www.strategies.org/IEOS_PUblicWorkshop/ContinuingDialogue.html
Community advocacy partnerships in this way draw on the breadth and depth of skill, expertise, interests, and passion pertinent to the issue. Many are available in our organizations. Below we list additional examples of existing or potential coalitions or their related activities that UCAR/NCAR currently is engaged in (in fact, UCAR itself is a coalition):

- **The Weather Coalition** (http://www.weathercoalition.org/). The membership currently includes eight private sector firms from six distinct industries, six different associations and 19 universities. Its activities to date have focused primarily on advocacy to Congress and NOAA. The Coalition has organized a July 2005 meeting of the broader weather community regarding the future of numerical weather prediction. This is one example where UCAR can partner with the private sector which has an alternate powerful voice to advocacy targets. Private companies risk a lot in terms of money through their exposure to the vagaries of weather and climate. They need the instruments and the research for new products, but also the shield from government vagaries. The Weather Coalition could be strengthened by an expanded private sector component, e.g. with the Commercial Weather Services Association (a private sector-only organization).

- **Potential UCAR/CORE/AMS partnership.** UCAR is currently exploring forming a partnership with the Consortium for Oceanographic Research and Education (CORE) and the American Meteorological Society (AMS) to advocate for Integrated Earth Observing System (IEOS) and the Global Earth Observing System of Systems (GEOSS) and for the maintenance of key climate research programs within NSF, NASA, NOAA, and DOE. IEOS expresses a strong vision for enhanced weather activities in our nation.

- **NCAR/AMS 2005 Policy Symposium.** NCAR will work with the AMS to explore how the weather and climate community has contributed to our nation over the past 50 years and develop recommendations for future goals. This includes the impact of NASA exploration on weather and climate. The results of the NCAR/AMS Policy Symposium could be used, and should be geared toward ultimate use in community advocacy activities. Another potential partner in this work is the National Science Board.

- **The Aircraft Communications and Reporting System (ACARS).** ACARS is the result of an effective coalition process – one whose success could be replicated elsewhere. It builds on an agreement between the National Weather Service and the airline industry to improve forecasts in exchange for funding for development of the necessary instruments. This coalition worked for both sides: the airlines saved substantially on fuel and ACARS’ input into the models was effective.

Researchers at universities and in research centers like NCAR may be critical partners – and maybe even leaders – in such coalitions. While sometimes reluctant (see Section III), scientists are credible messengers and can plead effectively for the continued need for educational, research, and development funding. In order to fulfill societal needs for atmospheric research, a continuous flow of adequately trained researchers, statisticians, and forecasters will be needed.

Not all coalitions will be effective in advocacy, however, and creating them pro forma or just because they seem like a good idea is insufficient. Our interviewees identified several factors that might cause a coalition to be ineffective:

- Lack of a common vision
- Lack of correct, meaningful, and persuasive information
- Lack of understanding of the federal funding process, including target audiences, timing, and other nuances
Advocacy in the Atmospheric Sciences

- Ineffective communications between coalition members
- Lack of commitment to the joint advocacy process
- Cultural barriers between coalition partners
- Inadequate fit between advocacy and the interests of Congressional members on appropriations committees

One example is the occasionally problematic relationship between the AMS and some portions of the private sector. It reflects a science culture that says, “we have the answers…you just need to use them.” One possible way to address cultural barriers is through the use of “boundary organizations.” The key functions of boundary organizations are communication, translation, and facilitation of interactions across disciplinary, cultural, and institutional boundaries. They broker between institutions on either side of the boundary, or for them, and assist in the exchange and understanding of relevant information, while allowing them to continue doing what each does best.

Members in the House and Senate represent various locales and are accountable to their districts. A coalition needs to speak their language and address the issues these members care about (e.g., high-tech industries, energy, defense, homeland security, agriculture, health care, education). It is paramount that advocates learn about their audience first, and then relate what scientists have to offer in ways that is relevant to that audience. The most credible and legitimate advocates might be those that come from the district of the Congress member. Moreover, coalitions can be more effective in speaking to the Congress member’s interests than individual advocates.

In summary, a coordinated, joint effort is often more effective, and sometimes required for substantial progress in achieving a vision for expanded atmospheric sciences and applications in service to society. What resources would be required to implement an effective advocacy program?

IV.3 Resources for Advocacy

Effective advocacy requires a number of resources and our interviewees emphasized this point repeatedly. The most important resource is time – that required to prepare for effective advocacy and to execute it. Other important resources are funding, training, and persuasive information. These resources make advocacy possible and effective, and illustrative examples are included.

**Time.** There is no substitute for a comprehensive plan that includes dedicated personnel time for execution. Specifically, each organization in a given coalition needs to acknowledge the need for, and value of, a dedicated effort and expend the resources to ensure participation. Although we have not endeavored to estimate the time over which a focused advocacy effort would be successful, it is clear that some may take several years, with major shifts more likely at or beyond five years.

**Adequate Funding.** In addition to organizational contributions, some dedicated financial support is needed to generate persuasive information such as economic impact graphics. Those funds might be generated from those who can extract significant fiscal benefits from incremental improvements in weather and climate information. Such economic graphics, developed by economists in concert with weather-stakeholders, are excellent resources in the advocacy
In the short-term, advocates would need to commission a study to develop the
information that will demand attention from the target audience.

**Training in Communication and Advocacy.** Generally, interviewees noted that there is very
limited training (e.g., media and advocacy training, giving effective presentations to non-
scientific audiences), but UCAR/NCAR could develop better training programs for advocacy-
inclined scientists. This could be modeled after existing training programs of this sort, such as
the Aldo Leopold Leadership Program.  

In fact, there are people at UCAR/NCAR who have training in communicating effectively to
various audiences and there is research underway at NCAR on how to communicate more
effectively. To improve or expand advocacy activities, these currently underutilize resources
could be tapped. Similarly, there are expert resources within UCAR/NCAR (e.g., Peter Backlund
or Brant Foote) who can give very programmatically relevant testimony on topics to which target
audiences are likely to be sensitive.

**Persuasive Information.** Many CEOs are beginning to communicate to Congress about the need
to educate new scientists, and funding government research which produces new technology for
industry. As part of a coalition, these CEOs could elaborate specifically on the impacts on
business that would be influential in Congressional districts. Qualitative and quantitative
information regarding economic weather/climate-related losses can be very useful if it
communicates a message effectively to the target. While coalition members might effectively
collaborate to generate such graphics, it is likely that scientific organizations will have to expend
resources to produce (or seek out) the data that supports their portion of the guiding vision. The
goal of such information would be to raise the level of urgency for action related to expanded
atmospheric activities in service to society.

**IV.4 Target-Specific Approaches**

Given sufficient resources, there are wide arrays of techniques that can be employed in the
pursuit of advocacy goals. Our interviewees offered examples of various effective methods they
or others have utilized to carry out advocacy. Strategic thinking that optimizes the application of
these methods to the problem is the critical ingredient. The spectrum of approaches ranges from
individual meetings with Congressional or agency staff to professional society coalitions to
contracting with advocacy or lobbying experts and beyond. To be effective, the approach should
match the message, messenger, and intended goal. Such a requirement poses a large challenge to
the atmospheric science community as outlined in Section III – scientists are often
uncomfortable with, or suffer potential drawbacks in the pursuit of, advocacy activities, but
many are willing to participate and have valuable experience and expertise in advocacy
activities.

Our research indicated that effective advocacy was often linked to the details of three
principal components – preparation, timeliness, and communication/education. Some salient
examples of each, summarized from our interviewees, are listed below.

---

43 Research to this effect is underway at NCAR, for example, in the Societal Impacts Program (ISSE/RAL) under
the lead of Laszlo and Morss. See also NOAA’s web site dedicated to this topic (“NOAA Economics & Social
Science Web Site” at [http://www.economics.noaa.gov/index.htm](http://www.economics.noaa.gov/index.htm).

44 For more information, see [http://www.leopoldleadership.org](http://www.leopoldleadership.org).

45 See [http://www.isse.ucar.edu/communication/](http://www.isse.ucar.edu/communication/).
Tailoring the Message for the Target Audience. One should first get to know traits of the audience, their knowledge, their interests, and what could possibly be influenced. Advocates should condense the information presented to fit those needs, distill the pieces that are relevant to the audience, and deliver it in audience-specific language. If advocates cannot or do not answer the questions a particular target audience might have, they will be less credible and effective. Scientific culture is suited to the production of new findings rather than the repetition and elaboration of other people’s findings. Scientists are most comfortable working on specific problems. Yet, politicians are – by necessity – more often generalists and interested in their constituency’s concerns. Good advocacy must address these.

One good example of NCAR’s recent advocacy efforts is to point out the positive impact of scientific progress on the aviation world, e.g., contributing to the economy and saving lives. Economic impacts and human well-being matter in all weather- and climate-sensitive contexts, and thus are generally attractive aspects for Congressional audiences.

Timeliness. Since resources are limited, strategic planning of the timing of focused advocacy activities can determine whether the effort will be fruitful. Advocacy must closely follow Congressional calendars, but also consider other dynamics “on the Hill.” For example, one of our interviewees noted that while Congressional staff play a significant role in Congressional committees where much of the fate of programs is determined, their turnover rate is often high. New staffers have little experience with meteorology and most of them have no idea what the money is for or how agencies work. While this ignorance is a hindrance, it is also a significant opportunity to educate staffers and build a good relationship that ultimately benefits the advocacy goals. UCAR/NCAR routinely faces this reality in education of the key persons involved in deciding how much funding NSF receives (agencies and the elected officials). A key element of executing advocacy effectively is therefore determining when the windows of opportunity are open, and to concentrate efforts at those times. Maintaining a visible presence at other times is equally important, and wider education of the general public could expand societal support for atmospheric science.

Education. Education of members of Congress, staffers, community members, and other important decision-makers or coalition members forms the basis for effective advocacy. Our interviewees made the following observations regarding educating different groups:

- Better understanding of science does not automatically translate into more financial support for science (e.g., compare scientific literacy and funding rates in Europe and the U.S.). Yet, a public that does not appreciate science at all will also not stand up to fight for it. Thus, the general public – locally and nationwide – should not be neglected in our education and advocacy efforts.
- Aiding the process of educating or preparing the member of Congress for their presentation to Congress can be a key component in getting results.
- It is important to find effective ways to illustrate beneficial scientific applications in the past that have had a positive impact on the public and the economy. NCAR has the potential to expand the range of people who care about what we do. One suggestion made by an interviewee was to include little educational stories in the in-flight magazines of United (or other Denver-based) airlines to tell them that they are safer now due to what
NCAR has done in aviation research. Many similar opportunities exist in other economic sectors.

IV.5 Gauges of Success: The Need for Evaluation

As UCAR/NCAR and the broader community place ever greater emphasis on advocacy, we need to know whether our efforts are achieving the desired results. Such evaluation should be routine to provide critical feedback on the effectiveness of a given advocacy approach or effort. Perhaps most conspicuous by its absence in our interviews was the fact that none of the interviewees brought up this assessment aspect. No one offered ideas on the form that such gauges might take. How can we measure that our advocacy is “working”?

If the advocacy approach being used to pursue a goal requires change, the metrics should reveal that need. Regularly reviewing our advocacy practices and outcomes would also serve as a useful measure of accountability to the contributing coalition members. As a general rule, the different parties within a coalition should define measures to assess whether their contribution to an advocacy effort is having the desired results in the direction important to them. We offer the following assessment metrics to begin thinking about this critical element of successful practice:

Tally of Accomplished Advocacy Efforts

These measures would likely be more quantitative and more easily collected.

- Number of partnerships/coalitions of which UCAR and NCAR are a part
- Types and numbers of activities per year that UCAR/NCAR alone or in coalition has participated in, including symposia and discussions/meetings with coalition partners
- A break-down of the number of Congresspersons advocated per year
- Number of NCAR scientists trained in effective communication and in the principles of appropriate advocacy (this could serve as a benchmark against which increases can be measured over time)
- Formation of a UCAR/NCAR-internal “Advocacy Council” – involving people with experience in doing it, people researching it, and key NCAR leaders

Achievement of Intended Goals

These measures would most likely be more qualitative in nature and are generally more difficult to ascertain.

- Science funding trends looking better
- Testimonials from Congress members who appreciated our education/advocacy
- Substantiated evidence that science-skeptical Congress members changed their minds, i.e., support for science funding due to our efforts
- Tracking the results of a yearly local and/or broader survey regarding the public’s image and knowledge of what NCAR does and how it benefits society
- Occasional surveys of specific industries eliciting whether they now better understand how atmospheric science is useful to them and that they in fact use our services more than before
- Tracking the profitability and health of the most weather-impacted industries
- Testimonials on how our research has changed as a result of closer collaboration with industry (i.e., we are getting better at serving society better)
• Measures that demonstrate that UCAR/NCAR advocates make better use of in-house expertise (e.g., the research insights and experience gained) on how to communicate and advocate effectively, how to best link science and society (research by ISSE, RAL, COMET, E&O, etc.)
• High-order impacts, such as availability of weather information, forecast accuracy improvements, growth of private sector weather services industry, number of new weather companies per year, number of new meteorology/atmospheric science students

IV.6 Section Summary
In this section we have gleaned from our research key elements of effective advocacy that can be utilized in the pursuit of any specified advocacy goal (directly relevant to UCAR/NCAR, more broadly for the atmospheric sciences, or more broadly yet for all sciences).
We find that the most crucial elements to successful advocacy include:
• A unifying vision
• A suitable coalition united under that vision
• The availability of dedicated adequate resources toward coalition goals
• The development of salient, audience-specific information for strategic education of the target audience(s) and
• The development of appropriate measures of success, routinely reviewed to assess the progress and achievements of the coalition and broader advocacy effort

Ultimately, advocacy coalition members will have their own reasons for pursuing advocacy and making it relevant to their institution, whether it be private sector, academic, or government. To bring them together under one powerful umbrella requires visionary leadership to unite them, leverage the skills each brings to the coalition, identify available and needed resources, and apply them effectively to see the effort to its successful conclusion. The final section summarizes the recommendations emerging from these insights.

V. RECOMMENDATIONS
In this report we have summarized our findings regarding advocacy in the atmospheric sciences under the auspices of the first-ever execution of the Leadership Academy action learning team process. Each member of the team voluntarily participated due to their interest in the topic and in expanded atmospheric sciences and applications in service to society. We believe that the private, academic, and government sectors have not reached their full potential in this regard, and were therefore curious and stimulated by the topic of advocating toward fuller realization. Our recommendations thus consider two areas, the topic at hand, and the action learning team as part of the LA itself.

V.1 Improving Advocacy in the Atmospheric Sciences
We know that UCAR/NCAR already recognize the need for advocacy in the atmospheric sciences and are involved in various advocacy efforts. The fact that this topic remains one that
“keeps [Jack Fellows] up at night” suggests how important and difficult it is to do advocacy well and with sufficient effort. Clearly, improving UCAR/NCAR’s advocacy efforts requires a comprehensive, concerted effort. Our research suggests that the community, and even those directly involved in advocacy at present, do not share a common understanding of advocacy, do not have a unifying vision, and under-utilize the rich resources available at NCAR and beyond. We therefore recommend the following:

- UCAR advocacy efforts will benefit from doing a full inventory of the rich and diverse expertise and interest present in our institution. We recommend that the current advocacy program seek to better utilize existing staff resources and their already significant messenger-audience relationships and expertise in planning and carrying out advocacy activities.
- Whether or not scientists should be involved in advocacy is a contested question. Considering the benefits and draw-backs in a formal process (e.g., using the polarity management tool) within the UCAR/NCAR community may be useful to determine a course of action that maximizes the advantages and minimizes the potential negative consequences.
- UCAR/NCAR should invest more in the development and training of advocacy skills among interested staff.
- Advocacy efforts are frequently most effectively carried out not alone, but in coalition. Acting in coalition can convey a message of greater importance, credibility, and weight in the eyes of the target audience. UCAR/NCAR should carefully review its existing and prospective coalitions and consider potential diversification and evaluation of its coalition efforts.
- Regardless of who will act as advocate/messenger, to be successful advocacy requires adequate investment in the process (e.g., preparation, training, execution, and rewards). The investment in terms of staff, time, and financial resources should match the challenge of creating a robust advocacy program.
- Advocacy requires persuasive information. Relevant research is being conducted at NCAR. Depending on need and time requirements, more resources should be expended to study the economic impacts of atmospheric science and its applications in society.

V.2 Team Projects as Part of the Leadership Academy

The Advocacy project was a valuable, interesting, and enormously time-intensive undertaking. We believe that such an action learning team affords lessons that cannot be obtained in the LA generally. To make these lessons truly useful and useable beyond the action learning team, we recommend the following:

- Given the amount of additional time this project took, we recommend (1) revising the action learning team component of future Leadership Academies to reduce the time burden on participants, and/or (2) ensuring that LA participants are fully aware of the significant additional unscheduled time required to complete the project.
- Working on a real-life, real-time project is highly motivational. To ensure that the experience is satisfactory, it is critical to state clearly upfront the expectations for project

---

46 Jack Fellows, interview on March 7.
outcomes, identify the intended audience, clarify how the information will be used, and for project sponsors to commit to offering a response to the action learning team upon completion of their project.

- No matter how future action learning projects are reconfigured, we suggest that staff partaking in the LA consider working with their supervisors to obtain adequate relief from other work responsibilities during the LA where possible. This will help make the leadership training a truly beneficial, not a burn-out experience.

- Efforts should be made at raising awareness of LA skills and techniques across UCAR/NCAR, and supervisors should work with trainees as appropriate to identify opportunities, so that LA graduates can better use the skills and lessons learned in the action learning teams in other UCAR/NCAR and external teams.

We look forward to hearing back from the UCAR/NCAR leadership and the organizers of the Leadership Academy on how these recommendations might be useful in considering changes in the future, and we would be happy to help implement them in appropriate ways.

ACKNOWLEDGMENTS

We would like to thank Jack Fellows for posing to us the challenge of identifying ways to improve UCAR/NCAR’s advocacy efforts. Our interviewees – inside and outside UCAR/NCAR – offered invaluable ideas and insights. Thank you also to Andy Churgin who frequently joined us to facilitate our meetings and to remind us of the process-product balance. Last, but not least, thank you to Cheryl Cristanelli and Michelle Schmauss for their able and cheerful leadership of the Leadership Academy 2005, and to all of this year’s participants.
APPENDICES

1. Individuals Interviewed for this Project

Individuals are listed in alphabetical order.

Tom Bogdan, NCAR/HAO
Chris Cantrell, NCAR/ACD
Laura Curtis, UCAR/CA
Jack Fellows, UCAR/CA
Ed Geary, UOP/DLESE/GLOBE
Teresa Kennedy, UOP/GLOBE
Margaret Kieffer, NASA/Legislative Affairs Office
Peggy LeMone, NCAR/MMM
Sarah Michaels, University of Waterloo, Canada (currently visiting scholar at ISSE)
Rebecca Morss, NCAR/MMM and ISSE
Susi Moser, NCAR/ISSE
Greg Poulos, NCAR/EOL
Tim Spangler, UOP/COMET
Doug Wesley, UOP/COMET
Greg Williams, NASA/Senior Policy Advisor, Earth Science Division
Tim Killeen, NCAR Director

2. Additional Readings

This reference list is long, yet but a sampling of articles and resources on advocacy, involvement of scientists in advocacy, and related issues. Many can be found on the internet and we provide the web site addresses where available. We organized them topically to aid interest readers in quickly finding appropriate resources.

Selected Background Readings on Science-Policy-Society Interactions


**Research on the Science-Policy-Society Interaction**


**Scientists as Advocates – The Pro-Side**


**Examples of Advocacy for (Atmospheric) Science**


Scientists as Advocates – The Reluctant, Critical Side


Advocacy Resources


