

This is the sixth in a series of articles encouraged by the Board of Certified Consulting Meteorologists and the National Council of Industrial Meteorologists to explore the ethical issues that can be encountered conducting business in the meteorological community. The purpose is to initiate a discussion within the broader membership about how the professional guidelines section of the AMS constitution comes to life in the conduct of everyday life of professional meteorologists. Comments are welcome and should be addressed to the authors. More formal responses can also be made to the editor of BAMS.

ETHICS IN RESEARCH

BY GERALD J. MULVEY, CCM

Meteorologists who engage in research at the university level are increasingly affecting the world economically and politically. The significant impact of their research raises the importance of the ethical challenges they face. Several such challenges are related to the unique environment in which they work. Universities have sometimes been described as a “publish or perish” environment. Publications as a measure of scholarly activity are often applied to decisions about personnel retention, tenure, and research grants. This creates unique ethical dilemmas, including

- Recognition on publications (papers, posters, web postings, books, research reports, etc.)
- Access to research data
- Evaluating research grants
- Intellectual integrity regarding research paths
- Data rights and retention

Universities have recognized these challenges and responded with requirements to safeguard the integrity of the research results and provide mechanisms for debate of opposing opinions that is part of the scientific method. One such regulation is the open accessibility to data sources upon which the results are based.

Recently, widespread attention was drawn to questions of ethical research behavior, when about 1,000

e-mails from the University of East Anglia (UEA)’s Climatic Research Unit (CRU) were stolen and made public without authorization. Some people interpreted the e-mails as having placed in doubt the unbiased nature of the scientific opinion of some of the researchers. Furthermore, the researchers had delayed releasing basic data, even though open access to such data are a key to scientific research. Given the impact their research has on government policies around the world, their data need to be easily available to the public and to other scientists for additional analysis. In light of these transparency issues, accusations of data tampering arose.

After investigations by several panels, the scientists were cleared of manipulating their data to support preconceived ideas on global warming. Independent reviews exonerated the CRU of specific allegations made against the rigor and honesty of CRU scientists. The independent review commissioned by the UEA, however, did find that there had been a consistent pattern of failing to display the proper degree of openness, both on the part of the CRU scientists and on the part of the UEA. Both the CRU and UEA had failed to recognize not only the significance of statutory requirements but also the risk to the reputation of the university and to the credibility of climate science. This report also described multiple recommendations to prevent this kind of backlash from recurring, including:

- A recognition that challenges (objections) to scientific work can be based on nontraditional methods (thus) offering false conclusions and alternative hypotheses for peer review and publication. The “blogsphere” and other nontraditional scientific dialogue provide an opportunity for unmoderated comment to stand alongside peer-reviewed publications; for presentations or lectures at learned conferences to be challenged without

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inhibition; and for highly personalized critiques of individuals and their work to be promulgated without hindrance.

- The existence of the “blogosphere” and various social media demands openness and access to data. A failure to recognize this and to act appropriately can lead to immense reputational damage by feeding perceived allegations of a cover-up.
- All scientists must learn to communicate their work in ways that the public can access and understand.

This incident strengthened the public mistrust of scientists and their conclusions. Despite the independent assessments (Russell et al. 2010) and reports in the popular media (such as those listed below in *The Guardian*, *Scientific American*, *The New York Times*, and *Popular Mechanics*) clearing the researchers of data manipulation, the damage was already done and those unconvinced of the conclusions of the original climate assessment report used the controversy to cast doubt on the veracity of the report. The publication of the e-mails weeks before the 15th Conference of the Parties in Copenhagen (the United Nations summit on global warming) was politically explosive.

Another type of dilemma involving research data rights and data access is illustrated by a hypothetical case that involves conflicts faced by Certified Consulting Meteorologists operating in the academic sector. Suppose a professor is hired by a wind energy farm developer to evaluate site feasibility for several locations and to monitor performance during operations. The professor performs this work during the summer break when he is “out of contract” with the university. Working on his home computer, he uses data from a variety of sources including the National Weather Service, the Federal Aviation Administration, and data provided by the wind energy company. The consulting contract is successfully completed.

Sometime later, the professor is up for a tenure review, but he needs one more publication. This would move his relationship with the university from a semester-by-semester contract to one of permanent faculty. The professor, having continued his research on wind energy farms at the university, sees an opportunity to develop a model to help design wind farms by minimizing interference from other turbines. The work is completed and submitted to a peer-review journal. The reviewers like the work but require a real-world case study to validate

the model before final approval for publication. The professor needs to use all of the data acquired while under contract to the wind farm company to validate his model. The university has a strict policy that all data used in faculty publications must be made available to the public at the time of publication. The ethical challenge is, should the professor use the data, understanding that a delay in publication could jeopardize his chances for tenure? His options are:

1. Use the data without attribution and make it available according to university guidelines knowing that his paper would give a competitive advantage to other wind farm developers.
2. Request permission to use and release the data from the wind farm company before using it.
3. Use only the National Weather Service and Federal Aviation Administration data and accept a weaker validation of his model.
4. Use the data for validation but describe it briefly in the paper without attribution and argue with the university that he had other papers that depended on the data and would release it after he completed all his research.
5. Request a delay in the tenure evaluation so he could develop another publication, and accept the loss of salary until the data rights issue is resolved.

Clearly, option #1 is a violation of confidence between the wind farm company and the researcher. While the advanced model would help the design and development of wind farms, its publication would provide a competitive edge for other wind farm companies.

Option #2 is one of the appropriate options available to the researcher. The act of requesting permission to use that data would notify the wind farm company of the potential benefit and allow them to weigh the competitive advantage that they would be yielding.

Option #3 would weaken the substantiation for the accuracy of the model and at the same time maintain the confidential agreement with the wind farm company

Option #4 would serve the immediate needs of the researcher but hide the data source; it would furthermore reduce the competitive advantage the wind farm company had with the data. Use of the private wind farm company data without permission would violate general terms of the consulting agreement un-

less there was a specific contractual clause allowing its use and eventual public release.

Option #5 is also an acceptable solution.

SUMMARY. Those engaged in scientific research assume an extraordinary obligation to fellow researchers, and the world in general. They must observe accepted protocols associated with any confidential data or techniques derived under a consulting contract, abide by the regulations of their home institutions, and at the same time make their fellow researchers and the world in general aware of their findings and conclusions. It is a balancing act.

FOR FURTHER READING

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POLICY PROGRAM NOTES

AMSpolicyforum.org: Welcome to the Discussion

Recently, the AMS Policy Program launched www.amspolicyforum.org, a place for open discussions on policy topics relevant to the weather, water, and climate community. We hope it will create a platform for members of the community to learn about and engage with the policy process. Ultimately, we hope that the discussions on the policy forum will provide insights to our community, to decision makers in the executive and legislative branches, to members of the media, and to the public.

AMS Senior Policy Fellow Shali Mohleji, who came up with the idea for the online policy forum, developed and led an initial survey that focused on improving the cycle of applying weather, water, and climate information for societal benefit and identifying further information needs. The policy forum provided a great opportunity for us to draw on the experience of the community. Although the survey is now closed, you can still visit www.amspolicyforum.org to see results.

Our next topic, which we plan to have underway at the time this column is published, is intended to promote a discussion of priorities, opportunities, and needs for the weather, water, and climate community. Survey responses and the discussion that follows will help inform an AMS Policy Program study on this

topic and may contribute to an AMS policy statement that is in the early stages of development.

Policy choices with respect to weather, water, and climate can include decisions about how much to invest in (and how best to conduct) observations, science, and services; how to balance investments among disciplines and between basic research and applied objectives; or the creation of weather- and climate-related regulations (e.g., specification of building codes, land-use patterns, emission standards, disaster insurance requirements and subsidies, and efforts to monitor, prepare for, respond to and recover from disasters, etc.). These choices can influence vulnerability to and resilience in the face of weather, water, and climate events.

For example, **observations** reveal dangers from severe weather, create a long-term record for assessing variability and change, and provide a rigorous basis for the development, testing, and validation of the models used for forecasts and predictions. Observations provide information on temperature, precipitation, humidity, and cloud cover, among other atmospheric conditions. Observations also record physical conditions at the Earth's surface (e.g., coastal inundation, the status of water resources, timing of lake and river freezing and thawing, etc.), and bio-