Researchers in the atmospheric science field rely on journal articles to gather information relevant to their work. These scientists use electronic journals and article databases more and more. Their use of these interfaces prompts questions of how they actually conduct their searches and, more specifically, what tools they utilize. This paper examines questionnaire responses from academic atmospheric scientists on why and how they use these databases. The data from these questionnaires were analyzed for trends. The results confirmed that many atmospheric scientists use article databases and electronic journals to find current as well as older literature. The results did not offer any startling discoveries but did help verify previous beliefs that atmospheric scientists use article databases and electronic journals regularly. These results can ultimately be used for the design of both better interfaces and more effective instructional courses.

Headings:

Information Seeking Behavior - Electronic

Atmospheric Scientists - User Surveys

Meteorologists – User Surveys

Electronic periodicals

Online Databases
THE USAGE OF ARTICLE DATABASES AND ELECTRONIC JOURNAL BY ACADEMIC ATMOSPHERIC SCIENTISTS

by
Kari A. Kozak

A Master's paper submitted to the faculty of the School of Information and Library Science of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in Library Science.

Chapel Hill, North Carolina
April, 2007

Approved By:

Advisor
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Introduction

In recent years, scientists have become more dependent on article databases and electronic journals to obtain information pertinent to their current research. The conclusions in this paper will show how and why atmospheric scientists search online for articles.

The general research parameter for this paper is serial publication use within the science field and the process of searching for relevant articles. This parameter includes serials that are in both electronic and print format. The electronic format has become more popular and allows for searches to be done in a more convenient and efficient manner.

The results of this research may assist in the evolution of methods for the scientist to obtain relevant articles in a more efficient way. In order for this to occur, there must first be an understanding of what scientists currently do and what they look for to ensure the articles are relevant. This study examined atmospheric scientists as a specific type of science researcher. Atmospheric scientists are an adequate model for this study since they use many different databases and a variety of science fields to conduct their research. Often, they look at a wide range of articles from areas such as chemistry, dynamics, environment studies, and medicine. An example of this would be a meteorologist studying air pollution. He or she may need to know about the dynamics of the atmosphere and the chemistry involved, in addition to what would be considered a health risk. It was later decided to
narrow the field to academic research meteorologists because a current, easily accessible list exists of these professionals through the American Meteorological Society.

There is very little known about how meteorologists currently conduct their searches using article databases and electronic journals. Another challenge emerges if scientists change their strategies over the years; this makes previous studies outdated. The constant change of the digital environment may be the cause of changes in search strategies, which makes them difficult to capture completely. This study will produce a better understanding of what scientists currently think and, in doing so, use the results to facilitate easier access to pertinent information.

There has been significant research done on serial search strategies, but there is an enormous amount of discord in the results of the studies. This study will hopefully help bridge this gap and will facilitate a better understanding of the needs of atmospheric scientists in their use of article databases and electronic journals.
Literary Review

Over the last decade, many researchers have studied the information seeking behavior of scientists, especially concerning scientists' use of electronic journals and article databases. The field of atmospheric science has been studied several times with varying results. Previous research has investigated a variety of scientists’ behaviors when using databases and electronic journals, and focused on the importance and problems of these resources. However, there has been little focus on the information seeking behavior of atmospheric scientists when using electronic journals or databases. The previous research has produced unclear results as to the information seeking behavior of atmospheric scientists in the use of databases and electronic journals. With a better understanding of this information seeking behavior, it will be possible to create improved interfaces and training sessions for scientists.

There is a vast amount of articles concerning the importance of electronic journals to scientists. The first of these articles is Information-Seeking Behavior of Academic Meteorologists and the Role of the Information Specialist by Julie Hallmark. This researcher interviewed 43 meteorologists to learn about their information seeking habits. Hallmark asked meteorologists to find an article and had them describe their search process. The results showed that two-thirds of the references cited by the interviewees were obtained through personal contacts or references in published journal articles rather than through database searching (“Academic Meteorologists” 57). It was also discovered that meteorologists depend to a great extent on Internet resources and used them almost exclusively to access new journal articles (“Academic Meteorologists” 58). Overall, this article demonstrated that “journal article access and
retrieval is a critical information need of meteorologists” (“Academic Meteorologists” 57).

Hallmark later published another article, *Access and Retrieval of Recent Journal Articles: a Comparative Study of Chemists and Geoscientists*, which also looked at the importance of databases and electronic journals to the science community. Questionnaires were sent to chemists and geoscientists to ask them about a specific citation that they had used in a published article. This study was conducted both in 1998 and in 2002, and the results were compared. There was a tremendous amount of change in the use of the internet to access and retrieve journal articles. Chemists used the Internet to access 85 percent of the journal articles they used in 2002 and 83 percent in 1998. This represents an infinitesimal change and exists in stark contrast to the change in usage seen by chemists when they used the internet to retrieve journal articles 5 percent of the time in 1998 to 96 percent in 2002. Geologists also saw a significant increase in use for retrieval of articles via the Internet, going from 4 percent in 1998 to 88 percent in 2002 (“Chemists and Geoscientists” 57-58). The internet has proven to be a great asset to scientists. One geologist pointed out simply that, “The Internet has streamlined my research” (“Chemists and Geoscientists” 59). In other words,

> “the Internet’s role in enhancing collaboration and communication among colleagues had revolutionized scientific communication in facilitating awareness, recommendations of useful articles to one another, and exchange of preprints and reprints” (“Chemists and Geoscientists” 59).

The third article that describes the importance of electronic journals to the science community is *Relying on Electronic Journals: Reading Patterns of Astronomers* by Carol Tenopir, et al. These authors sent surveys to members of the American
Astronomical Society that asked them about their reading patterns and electronic usage (Tenopir et al. 791). It was found that close to 80 percent of the journal articles read come from electronic sources (Tenopir et al. 800). There are three factors that may help explain why astronomers use electronic resources so extensively:

“First, among the predictors, the major bibliographic database in the field (ADS) is linked to all the major electronic journals and provides many special features oriented to user needs. … Second, astronomers in all subfields of the discipline have available convenient electronic access to their major journals in convenient and user-oriented formats as pioneered by the AAS. … Third, the abstracts and journals are seamlessly linked to the major astronomical databases, providing a complete information system, which serves the needs of the user” (Tenopir et al. 800-801).

This research can be used to show how scientists across many different disciplines, particularly those studying astronomy, are becoming increasingly more dependent on electronic journals.

The last journal article concerning the importance of electronic resources is entitled *The Use of Electronic Journals by Dutch Researchers: a Descriptive and Exploratory Study* by Voorbij and Ongering in 2006. The authors surveyed faculty in the Netherlands on their use of electronic journals and conducted personal interviews focused on understanding the differences between searching and browsing, as well as the effects of electronic journals on the interviewees’ research (Voorbij and Ongering 226). The researchers found that

“…the features that relate to functionality (full-text searching and hyperlinks from bibliographic description to the full-text of an article) are highly-valued… On the other hand, the features that relate to enrichment of the contents (discussion platforms, multimedia, adding of data files or software programs) are not considered very important” (Voorbij and Ongering 228).
“Written comments… illustrate that electronic journals shorten the time needed for literature searches, advances currency of research, and stimulate interdisciplinary research” (Voorbij and Ongering 231). This study shows that natural scientists and social scientists believe that electronic journals have motivated their research and have greatly impacted their research activities in a manner that was not possible with print journals. Thus, rendering electronic journals essential to more productive and useful research. (Voorbij and Ongering 232).

From these articles, it is evident that electronic journals play an important role in scientists’ research. Several of the articles show that electronic access to journals has decreased the amount of time a researcher must spend looking for citations. In addition, the electronic journals have proven to be incredibly convenient. This theoretically allows the scientist to spend more of his/her time actually doing new research. The use of electronic journals has also been shown to broaden the scope of reference literature used, while also facilitating more in-depth research. Both of these elements have created a greater literary base for the scientist and potentially allow him/her to produce a better study. The research conducted in this paper will attempt to understand how scientists use article databases and electronic journals to adapt the database features to better suit their needs.

Some research results indicate that some atmospheric scientists do not see the same benefits as their colleagues. Information-Seeking Behavior of Meteorologists and Other Atmospheric Scientists: Access and Retrieval of Cited References, by Julie Hallmark, discusses how electronic journals are not used as often the print format. Hallmark took one hundred articles from eight atmospheric journals and sent surveys
to the primary author to ask how they obtained the citations they used. She found that “35 percent of the respondents in this study do not use e-journals, citing expense and lack of availability” (“Meteorologists and Other Atmospheric Scientists” 8). She also stated that some scientists were upset by the lack of archives for online journals and were bewildered when using databases. One of the participants said, “Using MGA, ISI, and AMS for journal articles are overwhelming; there’s just too much stuff… It’s like drinking from a fire hose” (“Meteorologists and Other Atmospheric Scientists” 9). One the other hand, the few scientists who did use the American Meteorological Society’s electronic journals greatly enjoyed the usability, quality, and convenience of using the journals from their home or office (“Meteorologists and Other Atmospheric Scientists” 8).

Importance and problems of databases and electronic journals have been discussed by a wide variety of articles. This research shows that electronic journals and article databases are essential to the science community. With a better understanding of the online information seeking behaviors of atmospheric scientist, it is possible to know what is missing and needed to improve the design of interfaces and training.
Methodology

To research the usage of article databases and electronic journals, a questionnaire was distributed to academic atmospheric scientists. These questionnaires are the primary source for gathering information for this study.

This survey was a self-administered, electronic-format questionnaire sent to two hundred atmospheric scientists listed as faculty on the American Meteorological Society website. Using a questionnaire is an appropriate method to collect data concerning the usage of article databases, as it allows for a wide range of atmospheric scientists to be surveyed and minimizes geographical restrictions.

It was decided to narrow the field to academic faculty because a current list for the group was easily accessible. The scientists were chosen from a random sampling of this list. First, the list of atmospheric scientists was downloaded into Microsoft Excel and those without email addresses were removed. Next, each scientist was assigned a number using the random number generator located within Microsoft Excel. The top two hundred were chosen as the sample. This list of two hundred atmospheric scientists was downloaded into the Qualtrics.com survey distributing software.

The atmospheric scientists were sent an email that explained this research and provided a link to the survey (Appendix A). After ten days, the scientists were sent another email reminding them of the survey (Appendix B). The survey and distribution of the emails were handled through Qualtrics.com. This is a survey company that is available through the University of North Carolina at Chapel Hill’s Odum Institute. The researcher chose this software because the software had been
approved by the Odum Institute and allowed for secure and anonymous distribution and collection of the surveys.

The survey consisted of a series of twelve open-ended and close-ended questions that inquired about their online searching strategies and the use of different features of the interfaces (Appendix C). At the beginning of the questionnaire, the subject was asked background questions, such as years of experience in their field and areas of expertise, in addition to how often they look for journal articles and how they obtain these resources. Subjects were also asked if they use electronic journals or article databases as a contingency question so that it could be determined if the respondents were familiar with the online searching. This allowed for those who are not using article databases or electronic journals to not have to answer any further questions. Due to a review of the latest research that showed most scientists use article databases and electronic journals, this research did not focus on the use of print resources (Hallmark, 2003).

The analysis of this data was partially completed through the use of software provided by the company that hosted the survey. The author reviewed the data collected and grouped the answers for the open ended questions into relevant categories. The categories for the question, Where do you find information for your research?, were article databases, electronic journals, colleagues, conferences, paper journals, librarians, search engines, paper reviewer, bibliographies, and emailed table of contents. The categories for the question, What would you say is the main reason you use databases?, were obscure literature, current literature, older literature, fast,
keywords, ease of use, print from computer, listed in other resources, related articles, author search, convenient, specific article, and search a variety of sources.

The last open question was, What feature(s) on database or electronic journals would you like to see added to help in your research?, and the categories for this question were journal abbreviation, thesaurus, more coverage, index, times cited, links in bibliography, citation generator, related articles link, other articles by author link, and ease of name identification and date. The data from the questions were inserted into Microsoft Excel spreadsheets so that graphs and statistics could be constructed and analyzed.

With this survey, the researcher gathered information from academic atmospheric scientists around the United States, which allowed her to see how article databases and electronic journals are currently being used.
Results:

The results of the research add to the knowledge base of how atmospheric scientists use article databases and electronic journals. Even though the results did not offer any surprises, they did help to confirm previous beliefs.

The questionnaire received an 18.5 percent response rate of the two hundred surveys distributed and the responses came from a wide variety of atmospheric scientists. This allows for a more comprehensive assessment of their online information seeking behaviors. The atmospheric scientists’ background varied greatly in both years of experience (see Appendix E: Figure 1) and expertise. The list of expertise noted by survey respondents can be found in Appendix D. All but two of the respondents have a doctoral degree.

As a result of the survey’s findings, the research was able to confirm previous studies’ results about why and how atmospheric scientists use article databases and electronic journals. This began with the idea that most atmospheric scientists use electronic journals and article databases. This concept was illustrated in that only one scientist stated that he/she does not use them. The study also asked what resources the atmospheric scientists use to find articles. Most respondents stated that they considered electronic journals and article databases first, followed by talking to colleagues, attending conferences, referencing print journals, and referencing other bibliographies (see Appendix E: Figure 2). This illustrates that electronic journals and article database play key roles in the lives of atmospheric scientists. This is also seen in how respondents answered the question of how often they search for scientific articles (see Appendix E: Figure 3) and used electronic journals or databases (see
The results show that many scientists search for articles on a daily basis and use online resources increasingly more often. This study did not, however, show the scientist using the online resources as their main daily source, illustrating that the other methods are still beneficial and should be taken into account when looking into scientists’ searching behaviors.

The results also gave insight into why atmospheric scientists use article database and electronic journals. The scientists stated that they use the online resources mainly to find current literature, followed closely by looking for older literature (see Appendix E: Figure 5). This behavior can likely be attributed to the desire or need to stay up-to-date on the latest research. The survey also asked what features of the database atmospheric scientists used the most. They stated that they most often preformed searches by author and then by keyword (see Appendix E: Figure 6). This is likely due to many of the atmospheric scientists’ areas of expertise being very narrow so they know who is currently conducting research in the area. Another theory is that they have found the citation of the article they are looking for from another source and are now trying to find the entire article.

The survey also asked atmospheric scientists what article databases and electronic journals they used most often. From this research, the most popular databases were Web of Science, American Meteorological Society Journals, ScienceDirect, and Meteorological and Geophysical Abstracts (see Appendix E: Figure 7). There is a debate as to whether the American Meteorological Society Journals are considered a database or an electronic journal, but it does allow for cross searching multiple journals. Therefore, it will be labeled as both.
The electronic journals that were chosen most often by respondents were those by the American Meteorological Society and the American Geophysical Union (see Appendix E: Figure 8). Some specific journals that were ranked the highest include the Journal of Geophysical Research, Monthly Weather Review, and Journal of Climate (see Appendix E: Figure 9).

The questionnaire concluded by asking each atmospheric scientist what features he/she would like to see added to these online resources. The most common requests were from times cited, an index, and journal abbreviations (see Appendix E: Figure 10).

The results from this questionnaire did not offer any surprising insight but gave verification to what was already thought about how atmospheric scientists use article databases and electronic journals.
Summary and Conclusions:

Atmospheric science is a field that has unique information needs. Scientists rely heavily on journal articles to stay informed about developments in their area of expertise and to provide background for research they conduct. When looking for journal articles, most scientists use article databases and electronic journals.

This paper, specifically, examined how atmospheric scientists use article databases and electronic journals. Using a questionnaire, atmospheric scientists in academic settings with email addresses were asked about their information-seeking behavior. In particular, they were asked about their knowledge and usage of article databases and electronic journals. This questionnaire was used to explore the information needs of atmospheric scientists and to describe these needs in detail. The scientists were also asked about the different features of the interface and the search process they used.

The results from this questionnaire confirmed that many atmospheric scientists use article databases and electronic journals to search for articles. Many used online resources to find current and older literature and performed searches using either the author or keywords. The results also showed the most popular databases for the atmospheric scientists were ISI’s Web of Science, American Meteorological Society Journals, ScienceDirect, and Meteorological and Geophysical Abstracts. The most popular electronic journals were those by the American Meteorological Society and the American Geophysical Union. The results did not offer any startling discovers but helped verify previous beliefs that atmospheric scientists use article databases and electronic journals regularly.
The information gained from this study can be utilized in the development of better web interfaces and instruction courses for atmospheric scientists, as well as for use in budgeting decisions concerning serials. This study will be beneficial to both librarians, especially those within the science field, and system designers. It will help the librarians and designers when ascertaining patrons’ habits. These results may also help librarians when providing instruction to pinpoint new features to emphasize when assisting scientists. Both groups will have a larger understanding of the process atmospheric scientists use when collecting journal articles on the web and what features of the interface are used. With this knowledge, librarians will be better able to answer reference questions and develop instructional courses on search strategies and features that are most appropriate for scientists. The interface designers will be better able to take the information from this research and develop interfaces that will be geared toward their primary users.

This research set forth several questions concerning atmospheric scientists’ search for information, such as the purpose for the information being solicited and the need to know more details about how they conduct searches. These may be useful questions to ask in future studies.

This research brought forth needed information that showed how atmospheric scientists use article databases and electronic journals to search for articles used in their research. It will hopefully pave the way for further research in the area and help to bridge the gap between scientists and the information they need.
References:

<http://www.ametsoc.org/amsucar_curricula/curriculaFaculty.cfm?index=A>


Appendix A: Invitation Email

Initial Letter:
Subject: Questionnaire on usage of Databases and Electronic Journals

Date

Dear Participator’s Name:

Hello. My name is Kari Kozak and I am a graduate student at the School of Information and Library Science at the University of North Carolina – Chapel Hill. For my master’s paper, I am currently investigating the ways by which atmospheric scientists obtain the journal articles used in their research. I am specifically interested in the advantages and challenges arising from the use of article databases and electronic journals.

Studies such as this one which contribute to our overall knowledge of the information-seeking behavior of scientists should provide useful data for improving access to the journal literature, so critical to the scientific endeavor. The results for this data will be helpful in the design of better interfaces and the creation of more effective instructional courses.

Would you please take a moment to complete a brief questionnaire found at this web address (http://uncodum.qualtrics.com/SE?SID=SV_5sV1hCobFlk1qra&SVID=Prod)? It should only take roughly 15 minutes to complete.

Thanks very much for your help.

Sincerely,

Kari Kozak
kkozak@email.unc.edu
Master of Science in Library Science (Candidate May 2007)
University of North Carolina – Chapel Hill
Appendix B: Reminder Email

Reminder Email:
Subject: REMINDER: Questionnaire on usage of Databases and Electronic Journals

Date

Dear Participator’s Name:

Hello. This is a reminder email. If you have already completed the survey, then thank you very much. If not, my name is Kari Kozak and I am a graduate student at the School of Information and Library Science at the University of North Carolina – Chapel Hill. For my master’s paper, I am currently investigating the ways by which atmospheric scientists obtain the journal articles used in their research. I am specifically interested in the advantages and challenges arising from the use of article databases and electronic journals.

Studies such as this one which contribute to our overall knowledge of the information-seeking behavior of scientists should provide useful data for improving access to the journal literature, so critical to the scientific endeavor. The results for this data will be helpful in the design of better interfaces and the creation of more effective instructional courses.

Would you please take a moment to complete a brief questionnaire found at this web address (http://uncodum.qualtrics.com/SE?SID=SV_5sVlhCobFlk1qra&SVID=Prod)? It should only take roughly 15 minutes to complete.

Thanks very much for your help.

Sincerely,

Kari Kozak
kkozak@email.unc.edu
Master of Science in Library Science (Candidate May 2007)
University of North Carolina – Chapel Hill
Appendix C: Questionnaire

University of North Carolina-Chapel Hill
Information about a Research Study

IRB Study # 07-0407  Consent Form Version Date: 03-15-2007

Title of Study: The Usage of Databases and Electronic Journals by Atmospheric Scientists

Principal Investigator: Kari Kozak
UNC-Chapel Hill Department: School of Information and Library Science
Faculty Advisor: Dr. Claudia Gollop

Study Contact telephone number: 515-520-7191
Study Contact email: kkozak@email.unc.edu

What are some general things you should know about research studies?
You are being asked to take part in a research study. To join the study is voluntary. You may refuse to join, or you may withdraw your consent to be in the study, for any reason, without penalty.

Research studies are designed to obtain new knowledge. This new information may help people in the future. You may not receive any direct benefit from being in the research study. There also may be risks to being in research studies.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this research study. You will be given a copy of this consent form. You should ask the researchers named above any questions you have about this study at any time.

What is the purpose of this study?
The study looks into how databases and electronic journals are used by atmospheric scientists within the academic settings. The data from the questionnaires will be analyzed for trends, and these trends can then be used for the design of better interfaces and in the design of more effective instructional courses.

How many atmospheric scientists will take part in this study?
If you decide to be in this study, you will be one of approximately 200 people in this research study.

How long will your part in this study last?
The questionnaire will take around 15 minutes to complete. You can choose to stop the questionnaire at any time.
Appendix C: Questionnaire (Cont.)

What will happen if you take part in the study?
The online questionnaire will ask you questions about how you use databases and electronic journals. You do not have to answer any questions that you do not wish to answer, for any reason.

What are the possible benefits from being in this study?
Research is designed to benefit society by gaining new knowledge. Your participation is important to help us understand the way of which people in the atmospheric science community use databases and electronic journals, but you may not benefit personally from being in this research study.

What are the possible risks or discomforts involved from being in this study?
We do not think you will experience any discomfort or risk from the questionnaire.

How will your privacy be protected?
This questionnaire is completely anonymous. There will be no personal information asked. Since this is on an electronic platform, there will be no way to connect the questionnaire to you.

Will you receive anything for being in this study?
I am not going to pay you for your information, but your information is very important to us.

Will it cost you anything to be in this study?
There are no costs for being in the study.

What if you have questions about this study?
You have the right to ask, and have answered, any questions you may have about this research. If you have questions, or concerns, you should contact me by email at kkozak@email.unc.edu or by phone at 515-520-7191 or my advisor by email at gollop@ils.unc.edu or by phone at 919-962-8362.

What if you have questions about your rights as a research participant?
All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

Thank you for helping me with this study.

Do you understand this form and agree to participate in this study?
- I agree (Start Survey)
- I disagree
Appendix C: Questionnaire (Cont.)

1. How many years have you been employed as a research scientist?
   a. 1 - 5
   b. 6-10
   c. 11-20
   d. 20+
   e. Other – Please Explain

2. What is your area(s) of expertise?

3. What is your highest level of education?
   a. Bachelor’s Degree
   b. Master’s Degree
   c. Doctor of Philosophy
   d. Other – Please Explain

4. On average, how often do you need to find scientific articles?
   a. At least once a day
   b. At least once a week
   c. At least once a month
   d. At least once a year
   e. Never

5. Where do you find information for your research? (Please rank in order of priority) (Examples: article databases, electronic journals, paper journals, bibliographies in other resources, talking to colleagues, attending conferences, working with a librarian, etc)

6. Do you use databases or electronic journals to search for research information?
   a. Yes
   b. No

   If you answered no to question five, you may stop at this point, Thank you for your time. If you answered yes to question five, please continue to question seven.

7. On average, how often do you use databases or electronic journals?
   a. At least once a day
   b. At least once a week
   c. At least once a month
   d. At least once a year
   e. Never

8. What would you say is the main reason you use databases? (example: find older literature, to find information listed in other sources, to find current literature, to search for publications by an author)
Appendix C: Questionnaire (Cont.)

9. What is the main feature you use when searching for articles?
   a. Keyword
   b. Author
   c. Journal Title
   d. Specific Article
   e. Other - Please Explain

10. What database do you use most frequently? (Please rank in order of priority)
    (Examples: Web of Science, Meteorological and Geophysical Abstracts,
    ScienceDirect, Arctic and Antarctic, etc.)

11. What electronic journals do you use most frequently? (Please rank your top
    electronic journals in order of priority)

12. What feature(s) on database or electronic journals would you like to see added
    to help in your research? (Example: thesaurus, index, times cited, journal
    abbreviations, etc.)
Appendix D: List of Expertise

List of the respondents’ expertise:

Atmospheric chemistry
Atmospheric sciences
Ecosystem ecology, biogeochemistry
Tropical dynamics, mesoscale dynamics
Atmospheric Sciences- Climate Variability
Biogeochemical Cycles and Climate
Geochemistry
Tropical meteorology
Lightning, atmospheric chemistry, atmospheric thermodynamics
Ionospheric and magnetospheric physics
Climate change, land/atmosphere interaction
Mesoscale Meteorology and Cloud Microphysics
Data assimilation in meteorology
Radiative transfer atmospheric chemistry air quality planetary atmosphere airglow
Polar meteorology and climate, numerical modeling
Atmospheric chemistry
Oceanography
Synoptic Meteorology, Weather Analysis and Forecasting, Mesoscale Meteorology
Mesoscale meteorology, nwp, coastal meteorology
Hydrology
Synoptic and mesoscale meteorology
Geomagnetism, planetary magnetic fields
Climate dynamics
Ocean dynamics, data assimilation, tropical ocean processes
Agricultural Meteorology, crop simulation modeling
Arctic climate, climate change
Meteorology
Cloud physics and remote sensing
Synoptic meteorology and regional climate modeling
Mesoscale meteorology.
Physical meteorology
Paleoclimatology
Planetary Atmospheres
Appendix E: Figures

**Years of Experience**

![Bar chart showing the number of atmospheric scientists by years of experience.](image)

*Figure 1: Years of Experience*

**Methods of Finding Scientific Articles**

![Bar chart showing various methods of finding scientific articles.](image)

*Figure 2: Methods of Finding Scientific Articles*
Appendix E: Figures (Cont.)

**Figure 3: Frequency of Looking for Scientific Articles**

**Figure 4: Frequency of Using Database or Electronic Journals**
Appendix E: Figures (Cont.)

Reasons for Using Article Databases and Electronic Journals

Figure 5: Reasons for Using Article Databases and Electronic Journals

Favorite Features of Article Searching

Figure 6: Favorite Features of Article Searching
Appendix E: Figures (Cont.)

Popular Article Databases

Figure 7: Popular Article Databases

Publishers of Popular Electronic Journals

Figure 8: Publishers of Popular Electronic Journals
Appendix E: Figures (Cont.)

**Popular Electronic Journals**

![Bar chart showing popular electronic journals](chart.png)

**Figure 9: Popular Electronic Journals**

**Feature Wanted**

![Bar chart showing features wanted](chart2.png)

**Figure 9: Features Wanted**