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***Training and Education  
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***GUIDELINES FOR SCIENTIFIC AND TECHNICAL PAPERS BY WESTERN REGION  
EMPLOYEES***

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***SUMMARY OF REVISIONS:*** This directive supersedes NWSI 20-103, Guidelines for Scientific and Technical Papers by Western Region Employees dated 03/03/03. Changes: Section 2.3.1 to drop cataloging of Technical Memorandums to NTIS; Section 2.3.3 to change processing time to four to six weeks.

Signed

02/20/07

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Date

Director, Western Region

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1. Introduction. The purpose of this supplement is to establish policy and procedures to be followed in the National Weather Service (NWS) Western Region (WR) concerning the submission, review, and subsequent publication of Technical Attachments, Technical Memorandums, conference abstracts/papers (oral and/or written), and formal publications.

2. Policy and Procedures. All conference and professional papers (e.g. AMS, NWA, etc.) must be submitted to WR Scientific Services Division (SSD) for Regional Director approval prior to final submission. Participation in conferences by WR personnel for the purpose of submitting research which was conducted on official duty or used government resources to produce must also receive prior approval from the Regional Director.

2.1 Overview.

2.1.1 General Comments on Various Media. We encourage employees to carry out scientific studies and investigations and communicate the results to others. There are several ways the results can be documented. The appropriate medium varies from study to study and depends on the scope and depth of the investigation and its intended audience.

The easiest way to document a study is to informally write it up and include it in the office reference files. Documentation might include meteorological maps, analyses, interpretive discussions, satellite imagery, and so on. Form and content can vary. It is essential only that the results satisfy the intended purpose of the study and are shared with others. If they do not, then the effort may have been wasted.

More structured documentation is required for studies intended to receive wider distribution or use. The reasons are simple: (1) Readers expect to get quickly to the point of a study without wading through unnecessary discussion or material, and (2) the costs of publication and distribution usually have to be held to a minimum.

There are four usual avenues of documentation and distribution. Three of them, Technical Attachments, Technical Memorandums, and conference papers, are "informal publications" because they have not been subjected to external peer review. However, these papers serve an important purpose in informing a relatively wide audience of an investigation that was carried out. These documents allow others to learn from one's experiences. The fourth avenue is formal publication in the scientific literature. Journals require rigorous peer review and the process is generally quite time-consuming.

2.1.2 Quality of Work. It is the responsibility of the author to convey the message in a concise and logical manner. In addition, figures must be clean and legible. The office has final responsibility for manuscript and figure quality.

2.1.3 The Role of Supervisors. Meteorologists in Charge (MIC), Hydrologists in Charge(HIC), and Division Chiefs should encourage and support the development of studies by members of their staff. If a study warrants, supervisors should encourage an employee to carry the work through to publication. All manuscripts should be reviewed and approved by the manager of the office (MIC/HIC/Division Chief). The manager should use the Science and Operations Officer (SOO) or the Development and Operations Hydrologist (DOH) in the review and approval process.

Overseeing research and development work is a primary responsibility of the SOO or the DOH. The SOO or DOH will review all manuscripts before they are submitted to WR SSD. All locally reviewed and approved manuscripts must be submitted to SSD through the MIC, HIC, or Division Chief.

2.1.4 The Role of SSD. SSD can assist of the publication process. In the preparation phase, SSD can provide ideas for studies, review drafts, and guide research. It is SSD's responsibility to provide clearance for conference abstracts and papers, as well as for manuscripts intended for formal publication.

## 2.2 Technical Attachments and Technical Attachment-Lites

2.2.1 Purpose and Philosophy. Technical Attachments (TA) and TA-Lites are posted on the Western Region public web page. The TA is the appropriate media for (1) preliminary results of on-going research, (2) short case studies of significant events, (3) informational articles, and (4) documentation of forecast techniques. These publications are viewed by Western Region offices, other regions, NWS Headquarters, NOAA offices, and some external groups (universities, for example).

TA are intended to provide a mechanism for authors to quickly distribute information to a limited (but specific) audience of operational meteorologists and hydrologists. They afford the author more freedom than the other forms of publication. While TA are reviewed for scientific accuracy and technical correctness, the level of scrutiny is lower than that of other types of publications.

2.2.2 Format. As a general rule, TA should be no longer than four double-sided pages (text and figures included). Quality of content is much more important than length; many of the best TA are only one to two pages long.

No specific format is required, but SSD recommends the manuscript follow a science content similar to conference papers of the American Meteorological Society (AMS). See the AMS web site or the inside cover of an AMS journal, such as Weather and Forecasting, for details. Manuscripts submitted to SSD for review shall be in MS Word format with satellite images, radar pictures, figures, photographs, and tables embedded logically in the text or at the end of the document, and sent electronically for easy placement on the web. This will allow SSD to make changes after coordination with the author.

2.2.3 The Review Process. A manuscript review benefits both the author and the reader. The result is a more readable and scientifically correct product.

SSD will provide a final review of manuscripts submitted through the MIC/HIC/Division Chief. Appropriate subject matter experts outside of SSD might also be asked to provide a review. The purpose and philosophy of TA are kept in mind while a manuscript is being reviewed. Ideally, the review should take no longer than three weeks, but workload and staffing may extend this.

## 2.3 Technical Memorandums.

2.3.1 Purpose and Philosophy. A Technical Memorandum (TM) is used to informally publish (1) results of work in progress, (2) detailed case studies of hydrological or meteorological events, (3) documentation of technical procedures and practices which have interest beyond the local area, and (4) presentations which require the presentation of large amounts of data, tables, computer algorithms, and/or figures. The TMs are available to Western Region offices, other regions, NWS Headquarters, NOAA offices, research laboratories, and some external groups (universities, for example) via the Western Region Web Page.

A TM is designed to provide a medium in which authors can thoroughly explain results, techniques, and/or phenomena. This is often not possible in a TA or journal article. Also, a TM gives an author access to a wide audience without the lengthy review process required for formal publication.

2.3.2 Format. There is no page limit on TMs, but as with any formal scientific or technical document, authors should be concise. The manuscript should be in a format similar to refereed journals such as Weather and Forecasting (see Appendix). Manuscripts submitted to SSD for review should be double-spaced on one side only, and include an abstract. SSD should receive the manuscript, diskette, and original figures as described in Section 2.2.2.

2.3.3 The Review Process. SSD will review manuscripts submitted through the MIC/HIC/ Division Chief and may solicit an additional review for an appropriate subject-matter expert. Review will be made with the purpose and philosophy of the TM in mind. Ideally, the initial review process will take about four to six weeks.

## 2.4 Conference Papers

2.4.1 Purpose and Philosophy. Professional conferences are a means by which research may be shared with the scientific community in a timely fashion without a rigorous review process. Brief written papers are often a prerequisite to making a presentation at a professional conference. Typically, these papers are compiled into pre- or postprint volumes.

A conference presentation is an appropriate medium for (1) preliminary (or final) results of a research project that has broad-based scientific interest, (2) case studies of hydrological or meteorological events, and (3) documentation of new techniques relevant to both NWS and non-NWS interests.

Attendance at a conference offers a unique opportunity to interact on a face-to-face basis with others (from both the operational and research communities) who are interested in a specific scientific area. Often one's ideas are clarified and promising new areas of endeavor are opened because of these interactions.

Many conferences offer poster sessions as well as the traditional oral presentations. In this format, written summaries are still included in the pre- or postprint volumes; however, the author makes presentations on a one-to-one (or small group) basis rather than to a large congregation of people. Also, one or more posters rather than electronic presentations are used.

Financial support for attending conferences is out of the office travel funds with prior approval of the Regional Director. Personnel should avoid making any reservations or incurring any expenses until formal approval is received, either written or oral, from the Regional Director.

2.4.2 Format. Professional publications such as the Bulletin of the American Meteorological Society, or the National Weather Digest will frequently list a "Call for Papers" which describes the format, procedures, and deadlines for papers submitted to the conference for presentation.

If the abstract is accepted for the conference, the program chairperson may instruct the author to prepare a short manuscript. Often manuscripts are required to be in a format and style that can be photographed and directly published. This "camera ready" requirement precludes the use of dot matrix or other non-letter quality printers. Detailed instructions may be found at the organization's web site.

2.4.3 The Review Process. Most conferences request an abstract in their Call for Papers for use in selecting participants. The author (through the MIC/HIC/Division Chief) must submit a copy of the abstract to SSD, for review and approval, when the final version is sent to the conference. Sending a copy of the abstract to SSD will indicate to the Region that the author wishes to attend the conference.

After an abstract is accepted for a conference, there is usually no further review of the paper (or manuscript) by the professional organization. However, the manuscript must be sent to SSD for review before final submission. The primary purpose of this review is to ensure that the manuscript is technically correct. This review process should take no longer than two weeks. Since deadlines for submission of completed manuscripts are quite rigid, authors must allow time for this review in their plans.

## 2.5 Formal Publications

2.5.1 Purpose and Philosophy Formal publications in professional journals such as Weather and Forecasting or Monthly Weather Review receive international distribution among the scientific community. Each journal usually has a statement of purpose listed on its inside cover. Authors must determine which journal would be most appropriate for publication of their work. SSD should be consulted if there are any questions.

An article in a professional journal is the appropriate medium for (1) final results of a project that is of broad-based scientific interest, (2) case studies of meteorological or hydrological events, and (3) documentation of new techniques relevant to both NWS and non-NWS personnel.

2.5.2 Format. Most professional journals and the organization web site contain information on format and content. The author must follow these instructions. The text is usually professionally typeset after the journal editors have approved the manuscript for publication. However, some journals allow authors to prepare camera-ready text.

2.5.3 The Review Process. Manuscripts for formal publication must be sent to SSD (through the MIC/HIC/Division Chief) for review prior to their submission to a professional journal. The primary purpose of this review is to ensure that statements are in agreement with scientific practice and NWS policies and procedures. This also serves to advise the Region that support for publication expenses should be allocated. Ideally, the review should take no longer than three weeks. After review and approval by the Regional Director, it is the author's responsibility to submit the final manuscript to the organization (again through the MIC/HIC/Division Chief).

Most journals solicit three rigorous (and often anonymous) reviews by "peers" chosen by the editor. After seeing the reviews, the editors will either accept the paper outright, accept it with pending revision, or reject it (unconditional acceptance is rare). If the manuscript is accepted pending revision, the author must reply to each reviewer's comments by changing the text or presenting a good argument to the editor on why a specific point is not being changed. During the revision process, SSD (and the SOO, DOH) will assist in any way possible. The revised manuscript and comments are then returned to SSD for review and submission back to the journal editors. This entire process can take months. Publication is usually delayed for another four months or more after the manuscript is accepted.

## 2.6 Final Comments

This supplement has been written to assist Western Region personnel interested in writing a scientific or technical paper. It is intended to show prospective authors what is expected of them and what they can expect from others throughout all stages of a paper's development. If authors pay close attention to the information described above, the final paper will be a quality product that reflects favorably upon themselves and the National Weather Service.

## APPENDIX A

### Excerpts from the AMS Format for Manuscripts

Each manuscript must be as complete as possible. The text, tables, references, and figure captions must be sent electronically using Word or WordPerfect format. Figures need to be included separately. Each manuscript should include the following components, which should be presented in the order as follows:

1. Title, name, and affiliation of each author.
2. Abstract. A brief, concise abstract is required at the beginning of each contribution. Authors are reminded to summarize their conclusions and methodology in the abstract. References should be omitted.
3. Text. The text should be divided into sections, each with a separate heading and numbered consecutively. The section/subsection headings should be typed on a separate line, [e.g., 1. Introduction; a. Data; 1) Radiosonde] except for (I) Experiment 1. First word of sentence - -.
4. Appendix. Lengthy mathematical analyses whose details are subordinate to the main theme of the paper should normally appear in an appendix. Each appendix should have a title.
5. References. References should be arranged alphabetically without numbering. The text citation should consist of the author's name and year of publication [e.g., "according to Halley (1686)," or "as shown by an earlier study (Halley 1686)"]. When there are two or more papers by the same author in the same year, the distinguishing suffix (a, b, etc.) should be added.

In listing references, each one must be complete and in the following form.

For an article: [author(s), year: Title of article. Title of Journal (abbreviated), volume number, inclusive pages].

For a book: [author(s), year: Title of Book, Publisher, pages].

Abbreviations for journal titles should conform to the current Chemical Abstracts Service Source Index published by The American Chemical Society or the AMS Author's Guide.

6. Figure captions. Each figure must be provided with an adequate caption; all captions should be listed together (double-spaced).
7. Figures and tables. Each figure and table should be cited in the text.



8. Mathematical symbols and formulas. Authors should attempt to visualize mathematical expressions as they will appear in print. From the standpoint of readability, formulas should be composed carefully and with utmost economy. Some general rules are:

(i) The numbers that identify equations are to be placed at the right-hand margin in parentheses. References in text to the equations may then be made by the number in parentheses without use of the word equation. Parentheses should not be used for other sets of numbers (e.g., test 12, case 3, assumption 6). When the word equation is used with a number, it is to be abbreviated Eq. or Eqs. (plural) except at the beginning of a sentence.

(ii) Explain ambiguous or uncommon symbols by making marginal notes in pencil. If hand-written symbols must be used, they should be identified by the author to assist in recognition by SSD.

(iii) Double-line fractions should not be used in the body of the text. To indicate such fractions, use the solidus (/) or the negative exponent; e.g.,  $(a + b)/(c + d)$  or  $(a + b)(c + d)^{-1}$ ,  $a + b/cd$  or  $a + b(cd)^{-1}$ , etc. In displayed equations with fractions within the numerator and/or the denominator, a solidus may be used in combination with the primary built-up fraction.

(iv) The radical sign should be avoided. To indicate roots, use a positive or negative superscript fraction.

(v) When the exponential e is modified by a complicated argument, use the abbreviation exp.

(vi) In writing units, the negative exponent or solidus is preferred; i.e.,  $\text{cm}^2\text{s}^{-1}$ ,  $\text{cm s}^{-1}$ ,  $\text{W}^{-2}$ ,  $\text{sr}^{-1}$ ,  $\text{J kg}^{-1} \text{K}^{-1}$ ; or  $\text{J}/(\text{kg K})$  are acceptable, but  $\text{J}/\text{kg/K}$  or  $\text{J}/\text{kg K}$  is not. The solidus may be used to emphasize certain unit combinations such as  $\text{cm s}^{-1}/\text{d}$ ,  $\text{cm s}^{-1}/\text{m}$ .

9. Abbreviation. Abbreviations and acronyms should be identified with their first use, e.g., clear air turbulence (CAT). The abbreviation "U.S." is appropriate when it modifies another word, e.g., U.S. Department of Commerce. Names of states and months should be spelled out in the text except in tables and the Reference section.

10. Date/time. Date/time should be written as 1640 UTC 5 March 2002. Local time may be expressed as LST.