

GUIDELINES FOR FIELD TRIPS AND REPORTS

EQUIPMENT: Field notebook (K & E, Post, Rite-in-the Rain, etc.)
 Pocket ruler (at least one edge in metric scale)
 Mapping board or clipboard
 Protractor
 Pencils (several colors)
 Compass
 Umbrella

We assume you know what to wear for the weather.

The water will be about knee high on the first two trips. Bring appropriate river attire; hip waders are recommended.

EVALUATION OF FIELD WORK:

Each field exercise will be worth 33% of your grade. You will be graded on several criteria:

- 1) Field notebook. *Turn in your notebook with your report.* We will be evaluating the care with which you have recorded your observations, i.e. the book's readability, organization, and content.
- 2) Report: A typewritten report will be required for each exercise. Its length should not exceed five pages (single-spaced, although we will ask for a double-spaced version to review). Each report will be evaluated on the basis of scientific content and quality of English. The format for each report will be specified for each exercise. If you have specific questions about form, phrasing, etc. ask someone about it. In all cases, a report will require a title page, an abstract, the body of the report, a list of cited references, and appendices (e.g., data and calculations)
- 3) Calculations: These should be included as an appendix to the report (not part of the 5-page limit). They should be typed or carefully handwritten in ink. Take care to keep track of the meaning of the numbers, i.e. their dimensions and realistic significant figures. This is not a data dump; outline or tabular form is fine, but

everything (including why you are making a calculation) must be clearly labeled and appropriately condensed.

- 4) Figures: Figures must be neat and adequately labeled; maps must have a scale, north arrow, and legend. If you include them, be sure to use and discuss them in the body of the report.

MORE ON REPORTS

The preparation of a geologic (or any type of scientific) report is not easy. The writer must describe his or her topic so that proper emphasis is placed upon significant aspects of the problem. Remember that your principal aim is to give any reader a vivid picture of the region or problem that you have studied, and that he/she is always interested in obtaining this information with a minimum expenditure of time and effort. Whether the reader finds this task an easy one depends on the way you organize and write your report.

Advice as to how best to write a scientific report can generally be classified into two rather different categories.

First, the mechanical elements of report writing are those which are most often described. Acceptable form and organization, rules of grammar and sentence structure, and suggestions about phrasing and style are topics which are well covered in various references (such as *Suggestions to Authors* by the US Geological Survey, or *The Elements of Style* by Strunk and White). We will assume (at least to start) that you are familiar with these rules; if you are not, some early independent study is highly recommended!

The second kind of advice is only rarely offered and even more rarely recognized. An example of this kind of advice is the following quotation by G. O. Smith, former director of the USGS:

"At its best, science is simple; for science is not much more than arranging the facts so as to set forth the truth. Scientific thought is exact and direct, and scientific writing must therefore be accurate and to the point. The scientist should think directly and with the precision of one of the instruments of his trade, and above all his language must present that thought exactly.

“It is not a coincidence that some of the deepest thinkers in geological science have also possessed a literary style conspicuous for clarity of expression. On the other hand, some authors whose English needs the most editing are equally careless in the quotation of facts determined by others, and, indeed, in the statement of their own observations. I mention this simply to show that I am strong in my belief that plain writing is not something beneath the plane of endeavor of the scientific investigator—indeed, it is something so hard to attain that most of us need to aim high, to raise our standards of scientific thinking. The use of common words is worthy of any writer if his purpose is to transmit thought.”

Before you begin to write your report, make a complete outline. You will save a great deal of time, and your report will be better organized, if you make the outline complete enough so that you know what topics will be included in each paragraph. With the outline in hand, you will then be ready to write, with the general aim always to be as brief as possible, so far as is consistent with clarity and important detail.

Strive at the outset for a clear style, written in good grammar. No author achieves this goal by means of one draft. Therefore, work over your original draft with these goals in mind:

- 1) Decreasing the total number of words, while striving to make your descriptions as clear as possible;
- 2) Increasing the amount of information in your text;
- 3) Smoothing out the language—each phrase, clause, sentence, and paragraph should follow the last in logical and easy sequence;
- 4) Correcting your grammar and style—it is of the utmost importance that errors of grammar, punctuation, spelling, sentence structure, redundancy, etc. be removed from the report; refer to a dictionary, thesaurus, and handbook of English usage; keep your style consistent throughout the paper.

Your report must be typewritten on standard-sized paper, and fastened into a cover. Appropriate title with the author's name and date should appear on the front page or cover.

The paper itself should be organized in more or less the same style as articles in any of the standard geological journals. You will need:

- 1) An introduction or statement of purpose that clearly states what you intend to accomplish in the report. This may not be identical to what you intended to accomplish in the field, so a mere restatement of the assignment handout is not appropriate.
- 2) A description of methods, including co-workers, equipment and procedures, and likely measurement error. This should be brief yet complete; once written, data may be presented and discussed without further reference to *how* they were obtained.
- 3) Results and discussion, which form the body of the report. Organization will vary but should always be clearly delineated by headings and subheadings. As in all scientific writing, individual paragraphs should relate to a single thought as expressed in the topic (typically the first) sentence. Incorporate specific results or observations liberally into the discussion, but remember that you should always proceed from the *typical* to the *unusual* to the *exceptional*, not the other way around.
- 4) A conclusion or summary, which should introduce *no* new information or results. Instead, it should highlight your central results, rationale, and conclusions as presented earlier. Note that a conclusion is not a summary of the *entire* report; in particular, methods are rarely restated here.
- 5) An abstract. Although it appears first in the document, it is always prepared last. Some additional information on writing abstracts is attached on the next page.

The Abstract Rescrutinized

It would seem that little more could be said about writing abstracts after K. K. Landes's (1951, 1966) concise classics, but an irritating new weakness seems to be creeping into manuscripts, calling for further scrutiny. I refer to the growing tendency of authors to write long, eloquent abstracts that are actually *introductions* rather than summaries. Let me reproduce one sentence (slightly disguised) that begins the "abstract" of an otherwise excellent manuscript I am currently reviewing: "The long-standing concept of the _____ region of _____ as part of the stable craton which has undergone only minor tectonism during the past several hundred million years is being modified in view of accumulating evidence for minor, but widespread Quaternary and recent activity." This preamble is followed by 1½ similar pages, which would be a good introduction but is not a good abstract.

I would like to help authors avoid this problem by adding a few refinements to Landes's maxims. First, start the abstract by telling the reader at once what the paper *is*: new data, a review of progress, a new technique, a synthesis, or whatever describes the *nature of the paper*. To be sure, this recommendation can in principle be followed by a well-designed title, such as Isachsen's (1975) "Possible evidence for contemporary doming of the Adirondack Mountains, New York, and suggested implications for regional tectonics and seismicity," almost an abstract by itself. But if the title does not make it clear what the paper is, the abstract should, preferably in the first line: "This paper reports a comparative study of digital image enhancement techniques for synthetic aperture radar (SAR) using SIR-B and Seasat images of the Canadian Shield" (Masuoka et al., 1988). This first line should not be a simple restatement of the paper's title.

A second suggestion: write the abstract in a terse, almost telegraphic style, saving your eloquence for the body of the paper. The abstract is not an introduction to the paper, but a freeze-dried version of it, so to speak, intended as a "condensation and concentration of the essential information in the paper" (Landes, 1966). It should be written for quick reading, with the assumption that interested readers can go on to (or look up) the paper itself. Unnecessary descriptive phrases ("critically placed"), qualifiers ("limited number"), and caveats ("it must be pointed out") that may be necessary for completeness in the text should be left out of the abstract if at all possible. (The examples quoted are from actual manuscripts I have recently reviewed.)

A final suggestion: pack as much specific information into the abstract as possible—locations, rock names, temperatures, pressures, anomaly values, stratigraphic thicknesses, petrologic systems, and the like. The

way to do this is to cancel temporarily the assumption of the previous paragraph, and to write the abstract as if it were all that would survive the fall of civilization. There are obviously limits to how much can be included in an abstract, especially without figures, and it may even be necessary to use phrases detested by Landes, such as "is described" or "is presented." But abstracts can be surprisingly informative and self-sufficient if properly written.

A word on timing: I suspect that many authors make the mistake of writing the abstract before the paper. I used to do this myself, until I found I was writing—yes—introductions. The way to avoid this is obviously to write the abstract after the paper is finished, when you will know exactly what you are summarizing.

Following Landes's precedent, I present an abstract of this paper.

This paper presents three suggestions for better scientific abstracts: begin the abstract by briefly describing the *nature of the paper* (new data, review, critique, etc.); write the abstract not as an introduction to the paper but as a *tersely styled summary* of its essential information; and include as much *specific information* (locations, compositions, temperatures, etc.) as possible. Write the abstract after finishing the paper, to avoid the common fault of abstracts that are good introductions but poor summaries.

REFERENCES CITED

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ACKNOWLEDGMENTS

I thank Ruth Freitag, Bruce Martin, and Barbara Christy for helpful reviews of this note.

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