

AN INTEGRATED MULTI-PLATFORM APPROACH FOR EVALUATING BRUSH MANAGEMENT CONSERVATION EFFORTS IN SEMIARID RANGELANDS

C. Holifield Collins ^{a,*}, M. Kautz ^b, G. Ponce-Campos ^c, J. Hottenstein ^b

^a USDA Agricultural Research Service, Southwest Watershed Research Center, 2000 E. Allen Rd., Tucson, Arizona 85719 USA - chandra.holifield@ars.usda.gov

^b University of Arizona, Tucson, Arizona 85721 USA - (kautz, jdhoten)@email.arizona.edu

^c University of Arizona, Tucson, Arizona 85721 USA – geponce@gmail.com

Commission VI, WG VI/4

KEY WORDS: Multi-platform Imagery, Vegetation Change, Conservation, Rangelands

ABSTRACT:

Increases in woody species on rangeland systems are a common occurrence worldwide, but when left unchecked can lead to degradation and loss of eco-system function. Millions of dollars have been spent on brush management, or removal of unwanted woody vegetation, as a conservation practice to control the presence of woody species. With such a large investment of resources, it is essential that there be a mechanism for evaluating the effectiveness of this practice over space and time. Using on-the-ground resources alone to evaluate the vast landscape where brush management is implemented is not feasible and a new large-area method is required. An integrated multi-platform approach was developed using no-cost, high resolution aerial photography and moderate resolution Landsat satellite imagery to produce large-area temporal maps of woody cover. These maps were then used to assess effectiveness of the brush management conservation practice on semiarid rangelands in southeastern Arizona. Results showed that it was possible to produce accurate maps of woody cover that could be used to successfully track the occurrence of brush removal, as well as monitor presence or lack of subsequent reemergence. This work provides land managers with an operational means of determining where to allocate resources to implement brush management, as well as a cost effective method of monitoring the effects of their efforts.

1. MANUSCRIPT

1.1 General Instructions

The maximum paper length is restricted to 8 pages. Invited papers can be increased to 12 pages. The paper should have the following structure:

1. Title of the paper
2. Authors and affiliation
3. Keywords (6-8 words)
4. Abstract (100 – 250 words)
5. Introduction
6. Main body
7. Conclusions
8. Acknowledgements (if applicable)
9. References
10. Appendix (if applicable)

1.2 Page Layout, Spacing and Margins

The paper must be compiled in one column for the Title and Abstract and in two columns for all subsequent text. All text should be single-spaced, unless otherwise stated. Left and right justified typing is preferred.

1.3 Preparation in Electronic form

To assist authors in preparing their papers, styleguides for preparing digital versions of papers are provided in Word and/or LaTeX on the ISPRS web Page, see. <http://www.isprs.org/documents/orangebook/app5.aspx>.

1.4 Length and Font

All manuscripts, except Invited Papers are limited to a size of no more than eight (8) single-spaced pages (A4 size), including abstracts, figures, tables and references. ISPRS Invited Papers are limited to 12 pages. The font type Times New Roman with a size of nine (9) points is to be used.

| Setting | A4 size paper | |
|----------------|---------------|--------|
| | mm | inches |
| Top | 25 | 1.0 |
| Bottom | 25 | 1.0 |
| Left | 20 | 0.8 |
| Right | 20 | 0.8 |
| Column Width | 82 | 3.2 |
| Column Spacing | 6 | 0.25 |

Table 1. Margin settings for A4 size paper

* Corresponding author. This is useful to know for communication with the appropriate person in cases with more than one author.

2. TITLE AND ABSTRACT BLOCK

2.1 Title

The title should appear centered in bold capital letters, at the top of the first page of the paper with a size of twelve (12) points and single-spacing. After one blank line, type the author(s) name(s), affiliation and mailing address (including e-mail) in upper and lower case letters, centred under the title. In the case of multi-authorship, group them by firm or organization as shown in the title of these Guidelines.

2.2 ISPRS Affiliation (optional)

For those authors affiliated with a specific Commission and/or Working Group of ISPRS, a separate title may be entered. The title should be centered in bold type after one blank line below the author's affiliation, i.e. Commission #, Working Group #. The Commission number shall be Roman and the Working Group number should be the Commission Roman number, slash, WG Arabic number (see example above).

2.3 Key Words

Leave two lines blank, then type "**KEY WORDS:**" in bold capital letters, followed by 5-8 key words, according to the list appended to these Guidelines or as provided on the *ISPRS web* www.isprs.org/documents/orangebook/ISPRS_Keywords.aspx Normally only key words provided on this list will appear in the "Keywords Index" found at the end of each Volume.

2.4 Abstract

Leave two blank lines under the key words. Type "**ABSTRACT:**" flush left in bold Capitals followed by one blank line. Start now with a concise Abstract (100 - 250 words) which presents briefly the content and very importantly, the news and results of the paper in words understandable also to non-specialists.

3. MAIN BODY OF TEXT

Type text single-spaced, **with** one blank line between paragraphs and following headings. Start paragraphs flush with left margin.

3.1 Headings

Major headings are to be centered, in bold capitals without underlining, after two blank lines and followed by a one blank line.

Type subheadings flush with the left margin in bold upper case and lower case letters. Subheadings are on a separate line between two single blank lines.

Subsubheadings are to be typed in bold upper case and lower case letters after one blank line flush with the left margin of the page, with text following on the same line. Subsubheadings may be followed by a period or colon, they may also be the first word of the paragraph's sentence.

Use decimal numbering for headings and subheadings

3.2 Footnotes

Mark footnotes in the text with a number (1); use the same number for a second footnote of the paper and so on. Place

footnotes at the bottom of the page, separated from the text above it by a horizontal line.

3.3 Illustrations and Tables

3.3.1 Placement: Figures must be placed in the appropriate location in the document, as close as practicable to the reference of the figure in the text. While figures and tables are usually aligned horizontally on the page, large figures and tables some-

times need to be turned on their sides. If you must turn a figure or table sideways, please be sure that the top is always on the left-hand side of the page.

3.3.2 Captions: All captions should be typed in upper and lower case letters, centered directly beneath the illustration. Use single spacing if they use more than one line. All captions are to be numbered consecutively, e.g. Figure 1, Table 2, Figure 3.

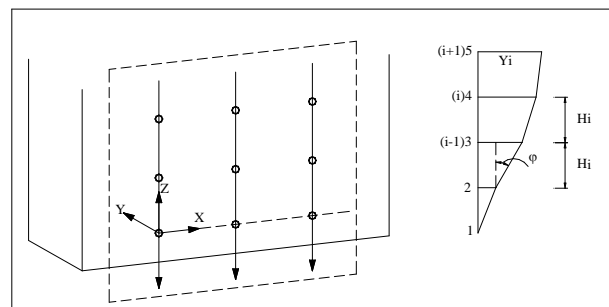


Figure 1. Figure placement and numbering

3.3.3 Copyright: If your article contains any copyrighted illustrations or imagery, please include a statement of copyright such as: © SPOT Image Copyright 20xx (fill in year), CNES. It is the author's responsibility to obtain any necessary copyright permission. After publication, your article is distributed under [the Creative Commons Attribution 3.0 Unported License](http://creativecommons.org/licenses/by/3.0/) and you retain the copyright.

3.4 Equations, Symbols and Units

3.4.1 Equations: Equations should be numbered consecutively throughout the paper. The equation number is enclosed in parentheses and placed flush right. Leave one blank lines before and after equations:

$$x = x_0 - c \frac{X - X_0}{Z - Z_0} ; y = y_0 - c \frac{Y - Y_0}{Z - Z_0} \quad (1)$$

where c = focal length
 x, y = image coordinates
 X_0, Y_0, Z_0 = coordinates of projection center
 X, Y, Z = object coordinates

3.4.2 Symbols and Units: Use the SI (Système Internationale) Units and Symbols. Unusual characters or symbols should be explained in a list of nomenclature.

3.5 References

References should be cited in the text, thus (Smith, 1987b), and listed in alphabetical order in the reference section. The following arrangements should be used:

3.5.1 References from Journals: Journals should be cited like (Smith, 1987a). Names of journals can be abbreviated according to the "International List of Periodical Title Word Abbreviations". In case of doubt, write names in full.

3.5.2 References from Books: Books should be cited like (Smith, 1989).

3.5.3 References from Other Literature: Other literature should be cited like (Smith, 1987) and (Smith, 2000).

3.5.4 References from websites: References from the internet should be cited like (Moons, 1997).

ACKNOWLEDGEMENTS (OPTIONAL)

Acknowledgements of support for the project/paper/author are welcome.

REFERENCES

Moons, T., 1997. Report on the Joint ISPRS Commission III/IV Workshop "3D Reconstruction and Modelling of Topographic Objects", Stuttgart, Germany <http://www.radig.informatik.tu-muenchen.de/ISPRS/WG-III4-IV2-Report.html> (28 Sep. 1999).

Smith, J., 1987a. Close range photogrammetry for analyzing distressed trees. *Photogrammetria*, 42(1), pp. 47-56.

Smith, J., 1987b. Economic printing of color orthophotos. Report KRL-01234, Kennedy Research Laboratories, Arlington, VA, USA.

Smith, J., 1989. *Space Data from Earth Sciences*. Elsevier, Amsterdam, pp. 321-332.

Smith, J., 2000. Remote sensing to predict volcano outbursts. In: *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Kyoto, Japan, Vol. XXVII, Part B1, pp. 456-469.

APPENDIX (OPTIONAL)

Any additional supporting data may be appended, provided the paper does not exceed the limits given above.

Revised April 2014