Editorial: Impact of special collections in JGR Space Physics

Michael W. Liemohn[1] and Paige R. Wooden[2]

[1]Department of Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI. https://orcid.org/0000-0002-7039-2631

[2]American Geophysical Union, Washington, DC. https://orcid.org/0000-0001-5104-8440

Corresponding author: Michael Liemohn (liemohn@umich.edu)

Submitted to the *Journal of Geophysical Research Space Physics*

Key Points:

- JGR Space Physics published 51 special collections from 2006 – 2018, totaling 981 papers out of 8831.
- Taken together, the citations to these papers, as well as other metrics, are essentially the same as the non-special-collection papers.
- Special collection papers omitting the measurement techniques sections reveals a notably better citation rate than other papers.

AGU Index Terms:

- 9815 Notices and announcements
- 2700 Magnetospheric physics
- 2400 Ionosphere
- 2100 Interplanetary physics
- 7500 Solar physics, astrophysics, and astronomy

Keywords:

Editorial, special collections, bibliometrics, citations, downloads

Abstract

Journals occasionally solicit manuscripts for special collections, in which all papers are focused on a particular topic within the journal's scope. For the *Journal of Geophysical Research: Space Physics*, there have been 51 special collections from 2005 through 2018, with a total of 981 papers out of the 8998 total papers in the journal over those years (11%). Taken together, the citations to these papers, as well as other metrics, are essentially the same as the non-special-collection papers. In late 2015 through early 2017, there was one grouping of special collections, Measurement Techniques in Solar and Space Physics (MTSSP) for particles, fields, optical, and ground-based instrumentation, with over 100 papers that were mostly Technical Reports: Methods papers (i.e., very few Research Article paper types). The MTSSP special collection papers have a significantly lower citation rate than the non-special-collection submissions published around the same time, but a higher download rate. Special collections papers omitting the MTSSP collections reveal a notably better citation rate and download rate than non-special-collection papers. In addition to higher citations, special collections also focus community attention on that particular research topic, providing a deadline for manuscript submissions and a single webpage at which many related papers are listed.

Plain Language Summary

Journals sometimes focus the attention of the research community by having a special collection, sometimes an entire special issue, devoted to a single topic. A reasonable question to ask is whether the extra effort of organizing, promoting, and maintaining the special collection is worthwhile. This paper examines paper impact in this journal, the *Journal of Geophysical Research Space Physics*, separating the special collection papers from the non-special-collection papers. The short answer is, on average, yes, at least based on the metric of citations. This comes with the caveat, though, of the exclusion of a particular set of special collections devoted to new measurement techniques, which had a significantly lower-than-average citation rate. However, the average download rate of these instrumentation papers exceeds that of regular papers, indicating that they are being read but perhaps not heavily referenced (yet). The conclusion is that special collections are worth the extra work.

1. Introduction

The *Journal of Geophysical Research Space Physics* (JGR-SP) regularly publishes papers that are part of a special collection (SC). SCs are proposed by members of the research community and are focused on a particular topic within the scope of the journal. While open to submissions from anyone, SC proposals include a listing of potential authors and tentative paper titles, which are often presentation titles from a recent small workshop or session at a larger conference. With electronic publishing, the articles in an SC are no longer gathered into a single issue but rather appear online as they are accepted. They are, however, listed together on a separate page within the journal website, allowing quick access for the research community to all papers in that collection.

There are three qualitative benefits to SCs. First, they provide a deadline for submitting manuscripts, which often serves as positive encouragement for researchers to finalize their study

and get it written into a submittable form. The influence of these deadlines is a sizable increase in submissions to the journal around special collection deadlines. While this could be a shift of submissions that would have come in later, some of this is also from researchers prioritizing manuscript preparation in their busy schedules. That is, the existence of an SC likely leads to increased scientific production.

Second, an SC focuses community attention on a particular topic. As the organizers publicize the SC to relevant researchers, they raise awareness of the topic not only among potential authors but also across the broader discipline-wide community. This publicity and exposure continues as the papers are accepted and eventually published. The SC topic, or individual papers within it, might also receive extra promotion through an Editor's Vox, Research Spotlight, Editors' Highlight, or social media post. Whether or not a particular space physicist is conducting research in that focused topic of the SC, the extra contact with this topic raises its familiarity within the community.

Third, the SC page on the journal website is a single-stop location for researchers to find papers on this topic. While search engines are good at locating scholarly articles on a particular topic, sometimes the search results are overwhelming or contain many papers of only marginal relevance. However, finding just one paper from an SC will lead to a link to the SC's page, providing easy access to many related papers.

The effectiveness and impact of SCs has not been quantitatively examined, however. This study assesses the impact of papers in SCs published in recent years in JGR-SP. Note that SCs are sometimes called by the old names, most notably the special issue, when a hardcopy issue of the journal was devoted to the papers in the special collection, and the more recent special section, when the papers were scattered among several issues. The newest name, special collection, includes new submissions like the special section but also could be a compilation of already-published papers, or even a mixture of the two. This latter practice is just beginning in AGU journals and one has not yet appeared in JGR-SP. In this paper, we will use the new term, special collection, and in fact we will use the shorthand SC, but all three names could be used interchangeably.

2. Methodology and Results

We examined impact metrics for all papers published in JGR-SP from the beginning of 2006 to the end of 2018 and submissions from 2005-2018. This time span includes the publication of papers from 51 SCs. The total number of published papers in our analysis is 8831, with 981 papers listed within an SC. Note, however, that for joint special collections, i.e., those SCs that include papers from more than one AGU journal, only the JGR-SP papers from the SC were included in this analysis.

Download data is retrieved from Wiley Journal Insights, a proprietary platform operated by Wiley and includes the number of times a paper is viewed in full text or downloaded in PDF formats on Wiley Online Library; it includes download activity of the past five years of all papers published in the journal. Citation data is retrieved from Dimensions Analytics platform, and includes citations by all content indexed in the Dimensions database (see Hook et al., 2018, section "2.3.2. Citations" for a detailed description of citation counts in Dimensions). Citing publications can include articles, chapters, preprints, or monographs. Download and citation data used in this analysis was retrieved 13 September 2019, and analyzed in Excel.

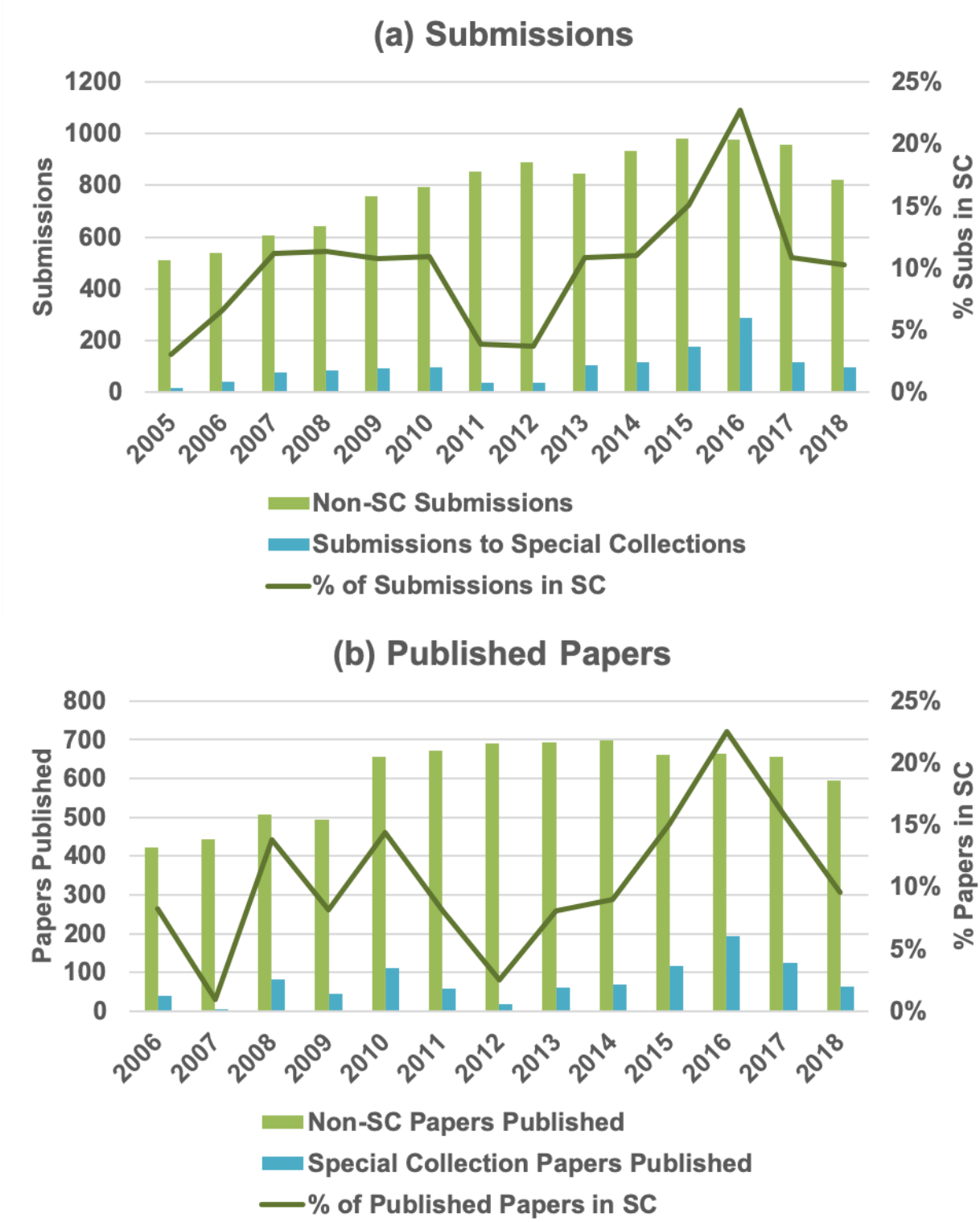


Figure 1. Submissions and published papers by year (panels a and b, respectively). Non-SC manuscripts are shown with the green column, the special collection manuscripts with the blue columns, and the black line shows the

118 percent of submissions and papers in special collections, using the right-hand
119 scale.

120

121 Figure 1 shows submissions to special collections in the time span from 2005 to 2018 and
122 the papers published from 2006 through 2018. The current editor in chief, the first author of this
123 study, made it a priority of his term to increase the number of special collections. The influence
124 of this emphasis on special sections is evident in the panels of Figure 1. The peak submission of
125 manuscripts to special collections occurred in 2016, a year in which 9 special collections were
126 open to submissions at least for some portion of the year.

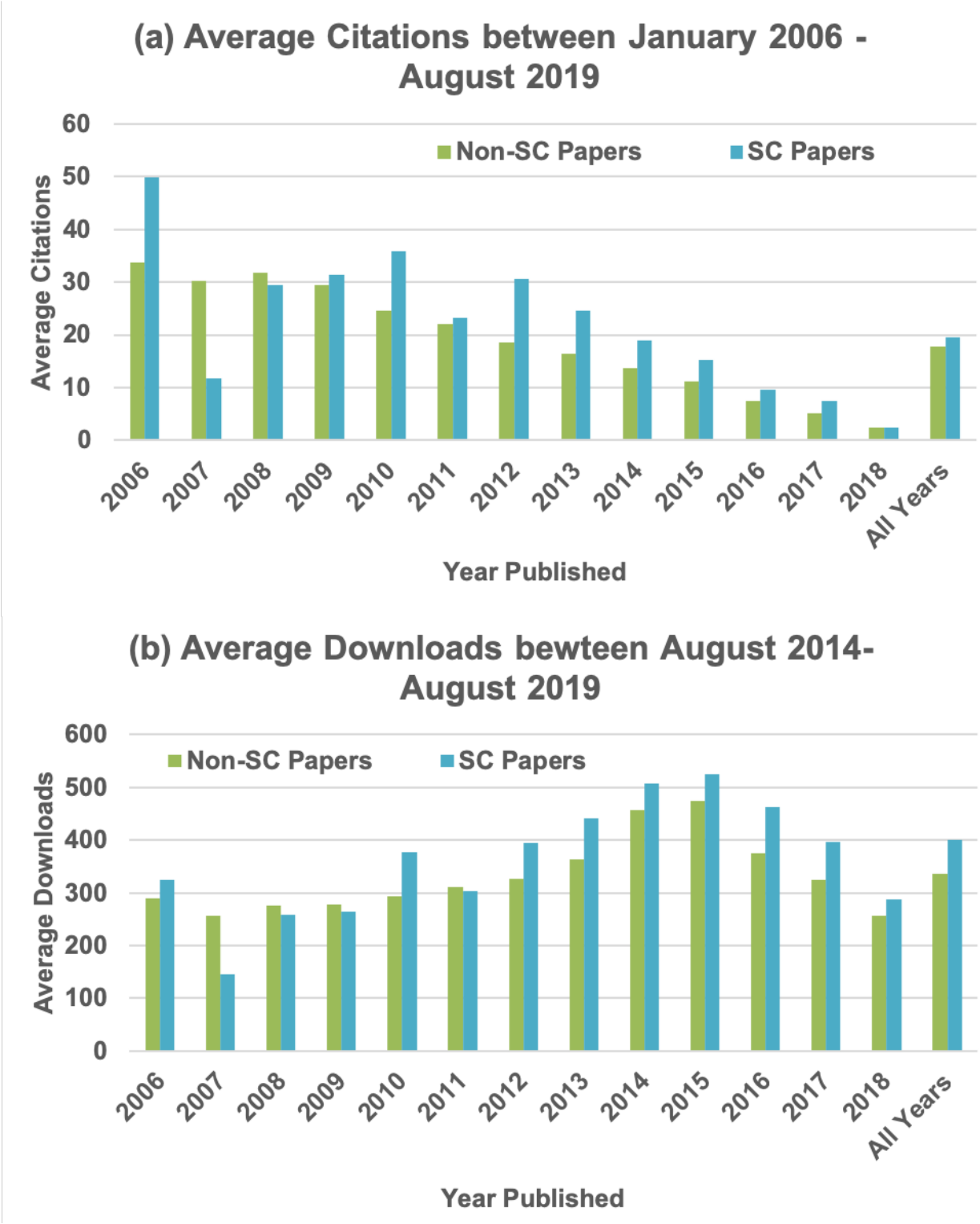
127 Figure 2 presents three measures of the impact of papers in special collections versus
128 non-SC papers published in the journal over the study epoch. The two metrics are average
129 citations per paper and average downloads per paper. The download information only exists for
130 the past 5 years, so Figure 2b focuses on this interval (August 2014 through August 2019). The
131 definition of a "download" is online access to the full text article and includes both full/enhanced
132 article (HTML) and PDF formats. As noted earlier, download data is only from the past five
133 years, so this download chart does not show the immediate popularity of articles published prior
134 to August 2014.

135 It can be seen in Figure 2 that, for nearly every year and for both metrics, the SC paper
136 value exceeds that of the non-SC paper value. This is also true for the "all years" columns, with
137 average citations per paper of 19.5 and 17.8, and average downloads per paper of 299 and 336,
138 for SC and non-SC articles, respectively.

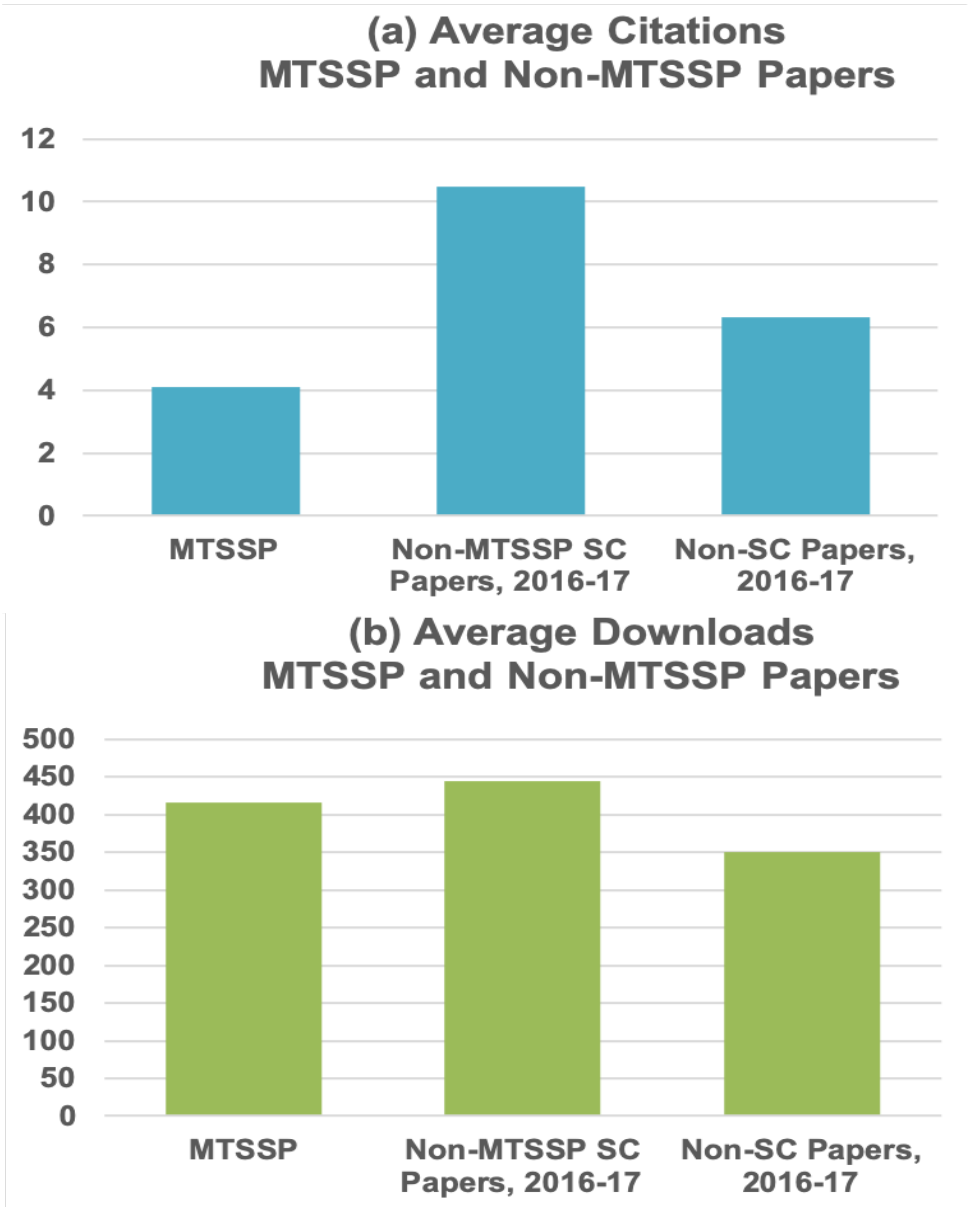
139 To assess whether the differences in average citations or downloads per paper are
140 statistically significant, Welch's *t* tests were conducted. Poisson counting statistics were used to
141 assign uncertainties to each value in Figure 2, based on the published paper numbers in Figure
142 1b, It was found that all pairs of values (SC versus non-SC metric for a given year) are highly
143 significant, with all *t* values greater than 10 and many greater than 100, much larger than the 2.6
144 *t* value needed for 99% confidence of difference. Even the difference in the "all years" columns
145 are highly statistically significant.

146 It should be noted that not all special collections are the same. In particular, JGR-SP
147 published a unique set of papers in 2016, with a few published in early 2017, as a follow-on to
148 the Measurement Techniques in Solar and Space Physics (MTSSP) conference held in March
149 2014. MTSSP was actually 4 distinct collections, one on particle measurements, another on field
150 sensors, a third on photon instrumentation, and a fourth on ground-based techniques. In all, 83
151 papers were published in the MTSSP collections. What makes these special collections different
152 is that most of the papers were not the typical Research Article paper type, instead many were of
153 the paper type Technical Reports: Methods. A Research Article needs to have a significant
154 original contribution to our understanding of the physics of the space environment, while a
155 Technical Reports: Methods paper should describe a significant advancement in how space
156 physics is conducted with a discussion of the ways that this method could be used for scientific
157 discovery. Furthermore, most of these Methods papers were not describing instrumentation that
158 was about to be flown, but rather many presented updated details of existing in-flight
159 instruments, laboratory-scale improvements toward future spaceflight hardware, or calibration
160 and testing of new instrument designs. Moreover, these Methods papers appeared in a year when
161 there were many other special collections that were dominated by Research Articles. The

MTSSP special collections, therefore, represent an interesting test case against two other groups: non-special-collection papers in the journal and science-focused papers in other special collections.



167 **Figure 2.** A comparison of impact metrics for papers in special collections (blue
168 columns) against the values for non-SC papers (green columns), per year and for
169 all years combined. Panel (a) shows average citations per paper (2006 – August
170 2019) and (b) presents average downloads per paper (August 2014 – August
171 2019). The average citations for papers published in the years 2006-2018.
172



173

174 **Figure 3.** Average citations and average downloads for three mutually-exclusive
175 categories of papers published in 2016 and 2017: the papers in the MTSSP
176 collections; the papers in all other special collections; and all non-special-
177 collection papers.

178

A comparison was constructed between the papers in the MTSSP special collections with two other distinct groups of papers from the same 2016 to 2017 interval: all papers in other special collections and all papers not in any special collection. The total number of papers in these three groups are 83, 234, and 1321, respectively. Figure 3 presents the outcome of this analysis, showing average citations and average downloads for these three mutually exclusive categories of papers.

It is seen in Figure 3 that the MTSSP papers have lower average citations and average downloads than other SC papers in those same years. Moreover, the MTSSP papers have a lower average citation rate than non-SC papers in the comparison group. As before, Poisson counting statistics were applied to yield fractional and absolute uncertainties for the three groups and Welch's t tests were conducted between all values in each panel of Figure 3. The differences in these values are statistically highly significant, with the Welch's *t* test values ranging between 5.2 and 96 (again, all greater than 2.6, the *t* value for 99% confidence in the difference). While it is the case that the MTSSP papers are not cited as much as other papers, this also means that the MTSSP special collections are, in a meaningful amount, being downloaded more than non-special-collection papers in the journal. That is, even with the lower citation rate at this young age, they could have a large impact on the field as the many readers of these papers eventually use them to develop new scientific instrumentation, and perhaps even cite them in years to come.

It should be noted that the non-MTSSP special collection papers are heavily influenced by a small handful of highly cited papers. These are particularly found in two collections published in 2016, "Big Storms of the Van Allen Probes Era" and "Major Results from MAVEN." We calculated the median for the "Big Storms of the Van Allen Probes Era" special collection and it is 17; this means that over 50% of papers in this set from 2016 already have double-digit citations. A median less than the mean indicates a right-sided tail to the distribution; the skew of the citation counts for this special collection is 1.4. To assess if this is an unusual feature specific to this special collection, the skew values were calculated for each of the 37 special collections. While a few special collection citation counts have a skew that is below zero, indicating a slightly left-sided tail, nearly all have a positive skew value and over half of special collection citation count distributions have a skew above unity, indicating a heavy right-sided tail.

A concern that is sometimes raised about special section papers is whether they receive the same editorial and reviewer scrutiny. One way to quantitatively evaluate this concern is to consider the proportionality of the final decisions for papers in special collections relative to the rest of the journal. Figure 4 shows these final decisions, with columns for the rates of acceptance for each year for SC and non-SC papers (withdrawn/deleted submissions excluded). It is seen that some years have the SC acceptance rate higher and other years the SC acceptance rate is lower. For the all-years column, the values are both 74% (to be very specific, they are 74.01 and 74.07 for SC and non-SC papers, respectively). This difference is negligible; there is no preference for accepting a manuscript submitted to a special collection compared to non-SC submissions.

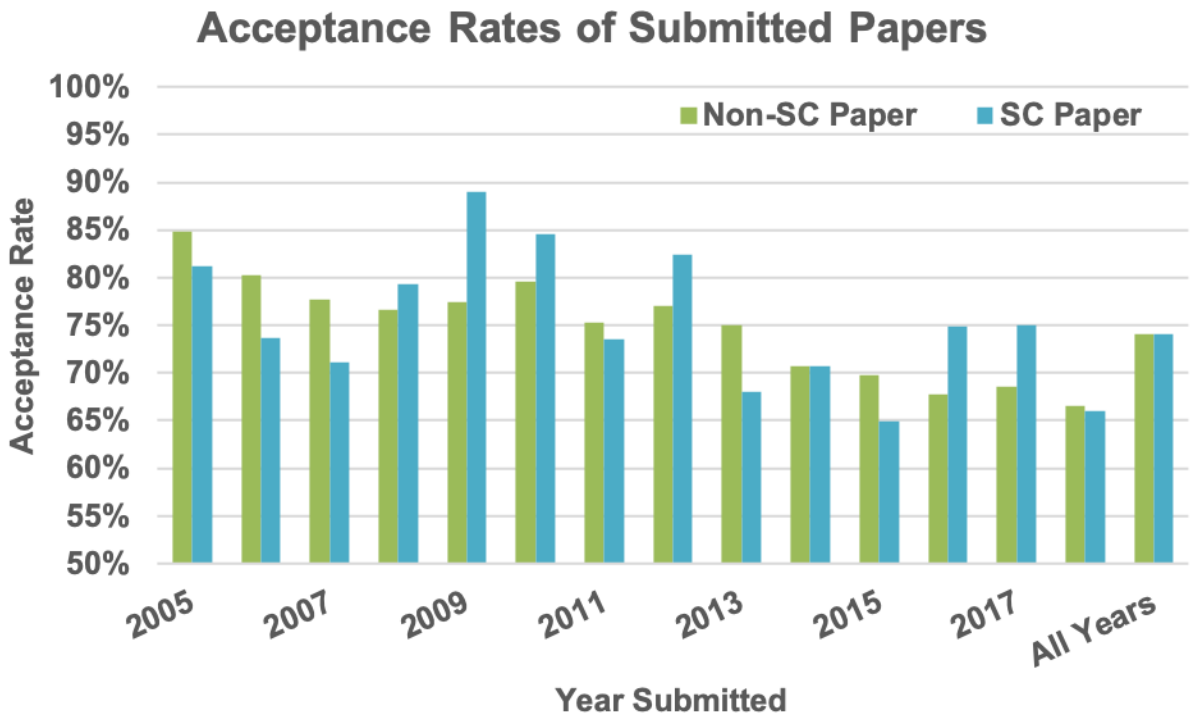


Figure 4. Final decision acceptance rates for papers, by year and for all years combined, in special collections (green columns) compared to non-SC papers (blue columns). Papers submitted then withdrawn before final decision are excluded.

3. Discussion and Conclusions

In summary, the impact metrics show that science-focused papers in special collections are more highly cited and downloaded than non-special-collection papers published in JGR-SP. The increased download rate is also true for methods-focused special collection papers, but their citation rate is below that of non-special-collection papers.

One lesson to be learned from this is that special collections have a positive influence on the field. The qualitative reasons for having special collections that were listed in the introduction of this study are justified by the numerical analysis of recent special collections in the journal. The number of manuscript submissions goes up; it is not just shifting of papers that would have been submitted later but a real increase in submissions as authors make the time in their schedules to complete their papers on these specific topics. Both downloads of and citations to these papers are higher than for other papers in JGR-SP, indicating, at least by these metrics, a higher impact from papers in special sections.

It is worth mentioning that the citation metrics presented here include citations to other papers in the same special collection. It has not been analyzed but it could be that special collection papers are citing each other and, if this is true, then more papers in a collection would result in more citations to SC papers. This would be especially true for Preface papers, which

used to be written as short descriptions of the findings from each paper in the collection, thus contributing one citation to every paper in the collection. AGU journal editors decided in 2013 to end this practice, so none of the recent special collections include this augmentation to their citations. In particular, the analysis shown in Figure 3 includes no special collections with this old type of Preface format. Also, citations to other papers in the same collection would predominantly be within the same year as the original publication, because most papers in any given SC are published within the same calendar year. That is, this type of citation would mostly contribute to the Immediacy Index (average citations in year A to papers published in year A) of JGR-SP but not likely contribute to the Journal Impact Factor (average citations in year A to papers published in years A-1 and A-2) unless a citing paper within the same SC is published in the year following the cited paper's publication.

The differences in downloads and citations are statistically significant but not particularly large. That is, these are statistics, and any individual paper might flourish or flounder either within or outside of a special collection. Plus, as noted by Moldwin and Liemohn (2018), there are other characteristics of papers that could lead to increased impact and citations.

We have two parting pieces of advice to the space physics research community. The first is this: when there is an open special collection in your specific research field, make it a priority in your work schedule to write a paper for it. This time commitment to write a paper that you otherwise might not have written comes at an opportunity cost, taking time away from other activities, but on average, such papers do well. The second piece of advice is, the next time that you are organizing a workshop or special session at a large conference, to seriously consider taking on the extra task of organizing a special collection for it. For JGR-SP, the organizers are not guest editors, responsible for finding reviewers and making decisions, but promoters of the special collection. The task of organizing a special collection is not as heavy a lift as you might think.

Acknowledgments and Data

This work was supported by the American Geophysical Union. This paper was written using citation data obtained on (13 September 2019), from Digital Science's Dimensions platform, available at https://app.dimensions.ai. Download and publication data was retrieved from Wiley Journal Insights on 13 September 2019. Submission data was retrieved from AGU's manuscript submission system. All of the data used in this analysis can be accessed via University of Michigan's Deep Blue repository, https://deepblue.lib.umich.edu/data/.

Submission note: a Deep Blue DOI will be minted upon acceptance of the paper. For submission, data files are zipped together and available as supporting information.

References

Digital Science. (2018-) Dimensions [Software] available from https://app.dimensions.ai. Accessed on (13 September 2019), under license agreement.

Hook, D.W., Porter, S.J., and Herzog, C. (2018), Dimensions: Building Context for Search and Evaluation, *Frontiers in Research Metrics and Analytics*. 23 August 2018, https://doi.org/10.3389/frma.2018.00023

Moldwin, M. B., and M. W. Liemohn (2018), High impact papers in space physics: Examination of gender, country and paper characteristics, *Journal of Geophysical Research Space Physics*, *123*, 2557–2565, doi: 10.1002/2018JA025291.