



Measuring the Interdisciplinary Impact of Using Geospatial Data with Remote Sensing Data

Robert R. Downs¹, Robert S. Chen², Joachim Schumacher³

¹ rdowns@ciesin.columbia.edu

² bchen@ciesin.columbia.edu

³ jschumac@ciesin.columbia.edu

NASA Socioeconomic Data and Applications Center (SEDAC)
Center for International Earth Science Information Network (CIRESIN)
The Earth Institute, Columbia University

AGU 2017 Fall Meeting

Session: PA11C: Methods for Assessing the Impact and Value of Earth Observations and
Geospatial Data for Decision Making; Monday, 11 December 2017, 08:00 - 10:00 a.m.

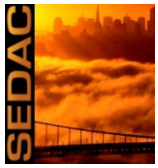
Paper: PA11C-09; 09:36 - 09:48 a.m.

New Orleans Ernest N. Morial Convention Center, 255-257





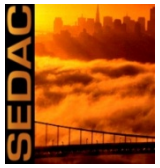
Value in Interdisciplinary Use (or Reuse) of Data



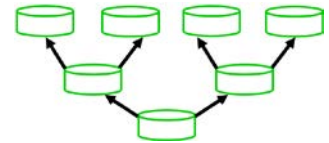
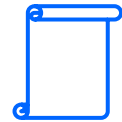
- Data gathered for one purpose may have value for other purposes in ways not understood by original data collectors
- Combination of data from multiple disciplines may yield potential insights and knowledge valuable for both disciplinary and interdisciplinary research
- Well integrated interdisciplinary databases and value-added data products derived from interdisciplinary research may enable new applications both in research and practice
- Enabling of studies of issues that fall between or cut across disciplinary boundaries
- Facilitation of problem-focused research that addresses real-world needs and challenges
- Overcome limitations of a single discipline
- Utilization of perspectives, method, tools, and data from multiple disciplines and analytic frameworks, overcoming limitations of a single discipline



Enabling Interdisciplinary Use of SEDAC Data

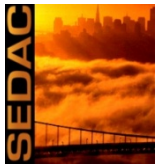


- Disseminating publicly available open data and open maps
 - Clearly stating rights for using data free of charges
- Producing data documentation to enable diverse usage
 - Across disciplines and levels of expertise
- Enabling discovery by many disciplines
 - Distributing metadata to multiple catalogs and harvesters
 - Making data products and services accessible through multiple clients
- Promoting the use of data products within various communities
 - Demonstrations, descriptions, explanations
 - Collection of data citations and development of searchable Citations database





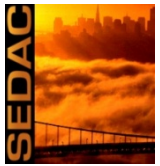
Finding Citations of SEDAC & Remote Sensing Data



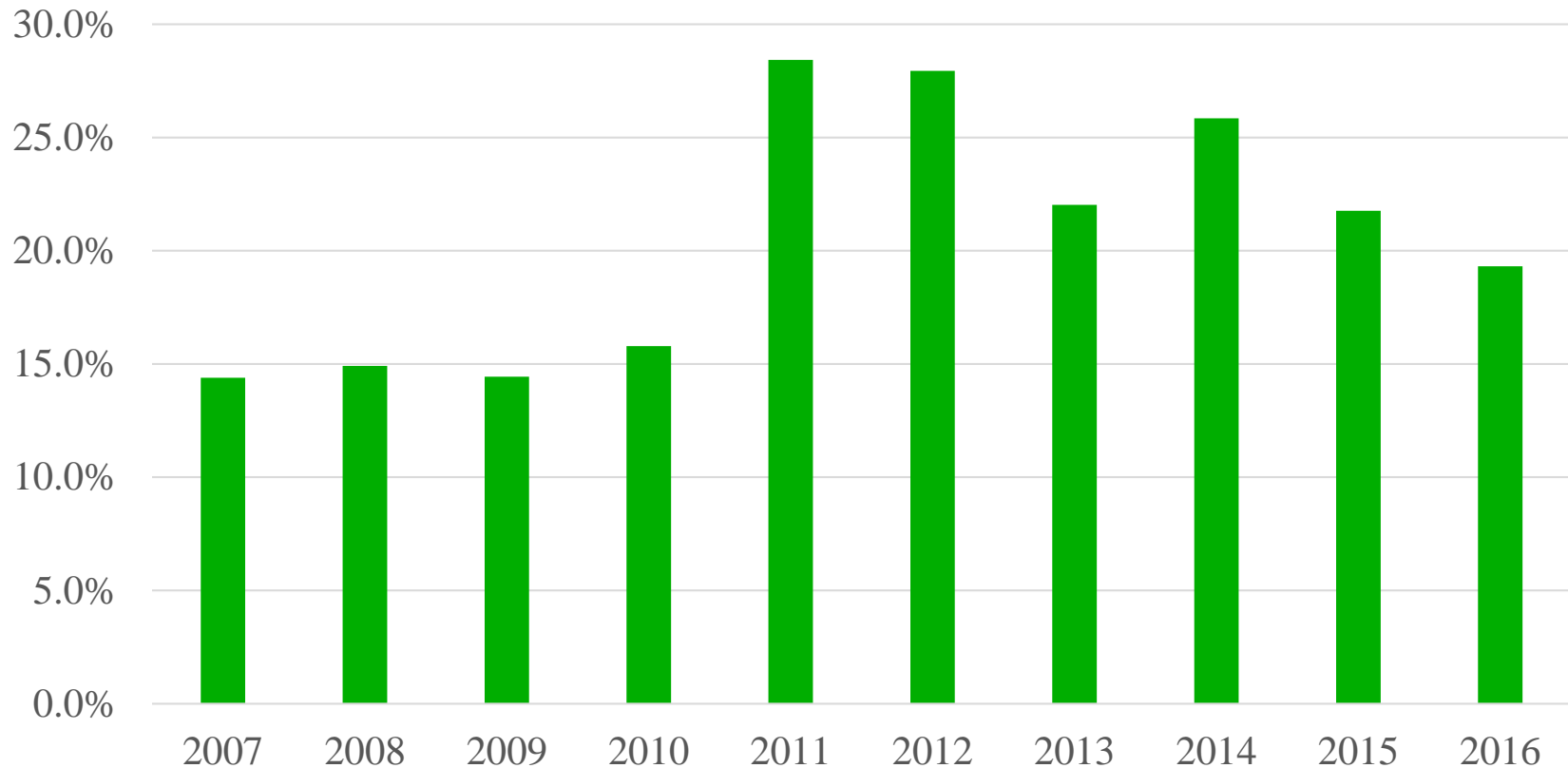
- Received citation alerts for search terms, SEDAC or CIESIN
 - Publishers and bibliometric databases (Scopus)
 - Google Scholar alerts received for SEDAC DOIs
 - Notifications received from some authors
- Identified articles citing both SEDAC data & RS data
 - Obtained articles from 2007 to 2016 and verified SEDAC data citation
 - Searched each article for remote sensing terms and instrument names (conducted routinely by the same person on a weekly basis), e.g., "remote sensing", "satellite".
- Verified use of RS data and SEDAC data within each article
 - In some articles, it is obvious that no satellite imagery was used.
 - Articles that appear to be using remote sensing data are examined closely if search terms produce no results.
 - Articles that mention an instrument or general satellite imagery without any data use reported are not coded as also citing remote sensing data



Percent of SEDAC Data Cited with Remote Sensing Data



Journal Citations of SEDAC Data with Remote Sensing Data as a Percentage of Total SEDAC Data Citations

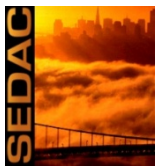


Identified 2,445 journal articles citing SEDAC data from 2007-2016.

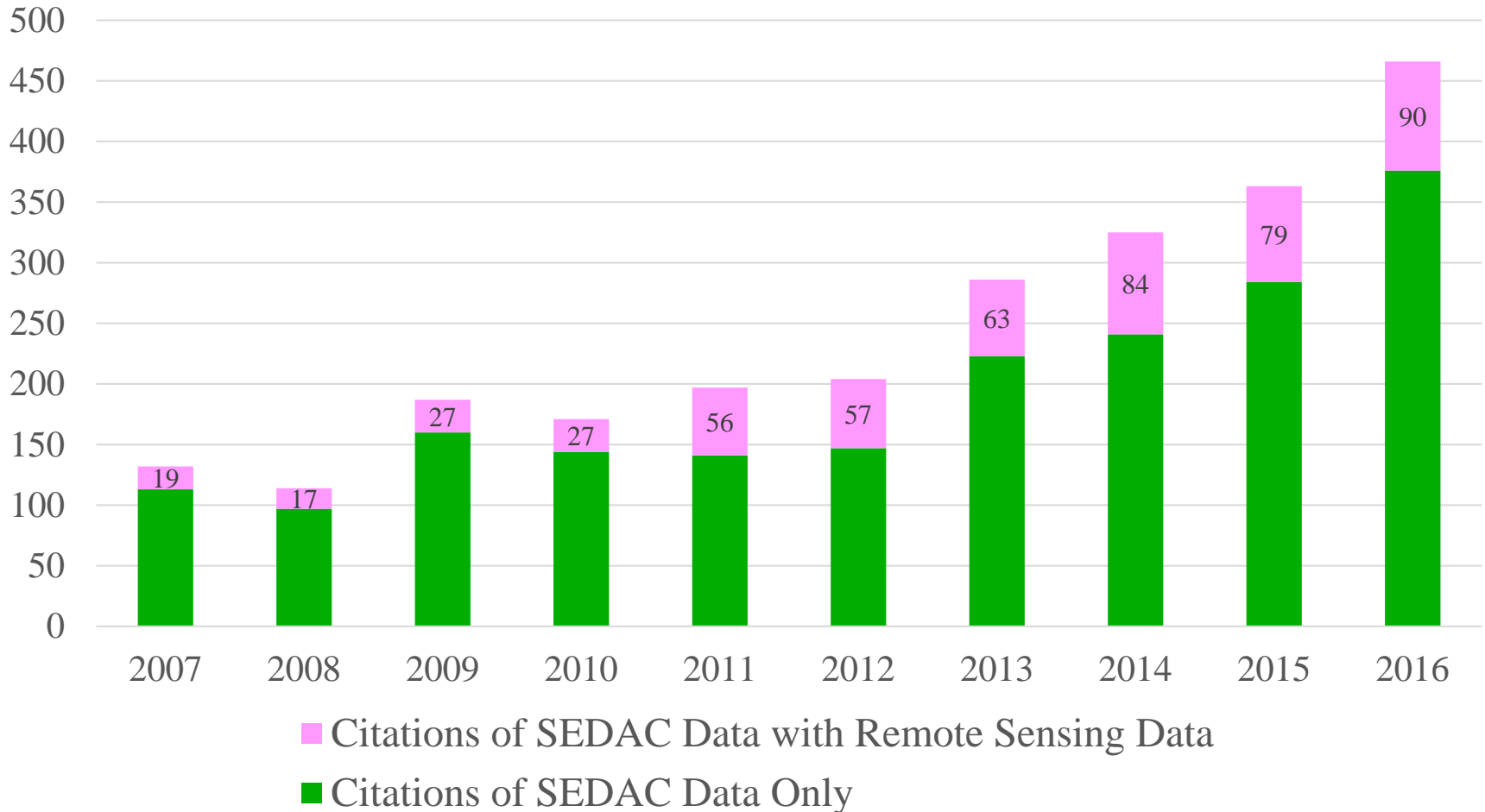
Found 519 (21.2%) of the journal articles also cited remote sensing data.



SEDAC Citations with and without RS Data 2007-16

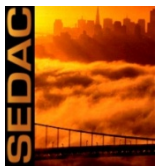


Journal Citations of Only SEDAC Data and of SEDAC Data with Remote Sensing Data





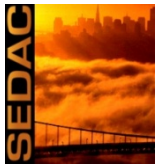
Journals containing 7 or more Articles Co-Citing SEDAC Data and Remote Sensing Data, 2007-2016



Journal Title	Co-Citing Articles
PLoS ONE	27
Remote Sensing of Environment	25
Atmospheric Chemistry and Physics	13
Journal of Geophysical Research	13
Remote Sensing	13
Environmental Research Letters	11
International Journal of Remote Sensing	11
Environmental Science & Technology	10
Malaria Journal	8
Applied Geography	7
Biological Conservation	7
Geospatial Health	7
Global Ecology and Biogeography	7
Proceedings of the National Academy of Sciences of the United States	7



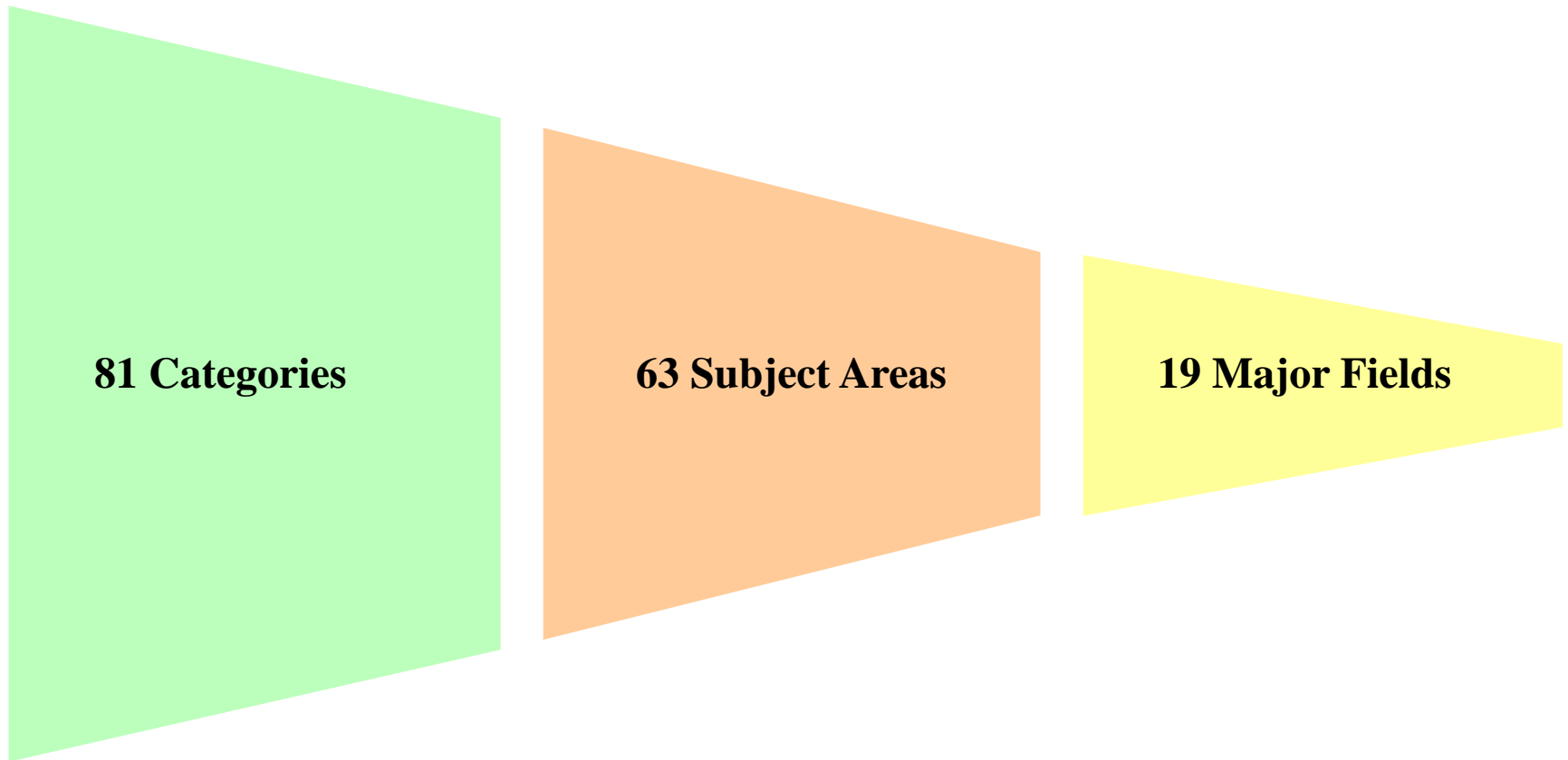
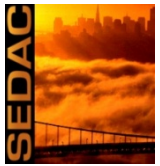
Methodology for Assessing Extent of Interdisciplinary Use in the Scientific Literature



- **Classifications to identify disciplines of each citing journal**
 - Obtained Web of Science® (WoS) Category assignments for journals
 - Obtained Web of Knowledge® Subject Classification of WoS Categories (WoK5.3) and Equivalent General Categories and Subject Areas
 - Obtained ScienceWatch® Field Definitions of Major Fields
- **Identified multidisciplinary use of Co-cited data**
 - Identified WoS Categories assigned to journals citing SEDAC data, and used Scopus®, journal titles, and publisher sites when Categories were not assigned
 - Paired assigned WoS Categories to Equivalent General Categories and Subjects
 - Identified Major Fields corresponding to assigned WoS Categories and Subjects
 - Normalized journals with WoS Categories, (WoK5.3) and Equivalent General Categories and Subject areas, and Field Definitions of Major Fields
 - Identified Categories, Subjects, and Major Fields of journals citing SEDAC data

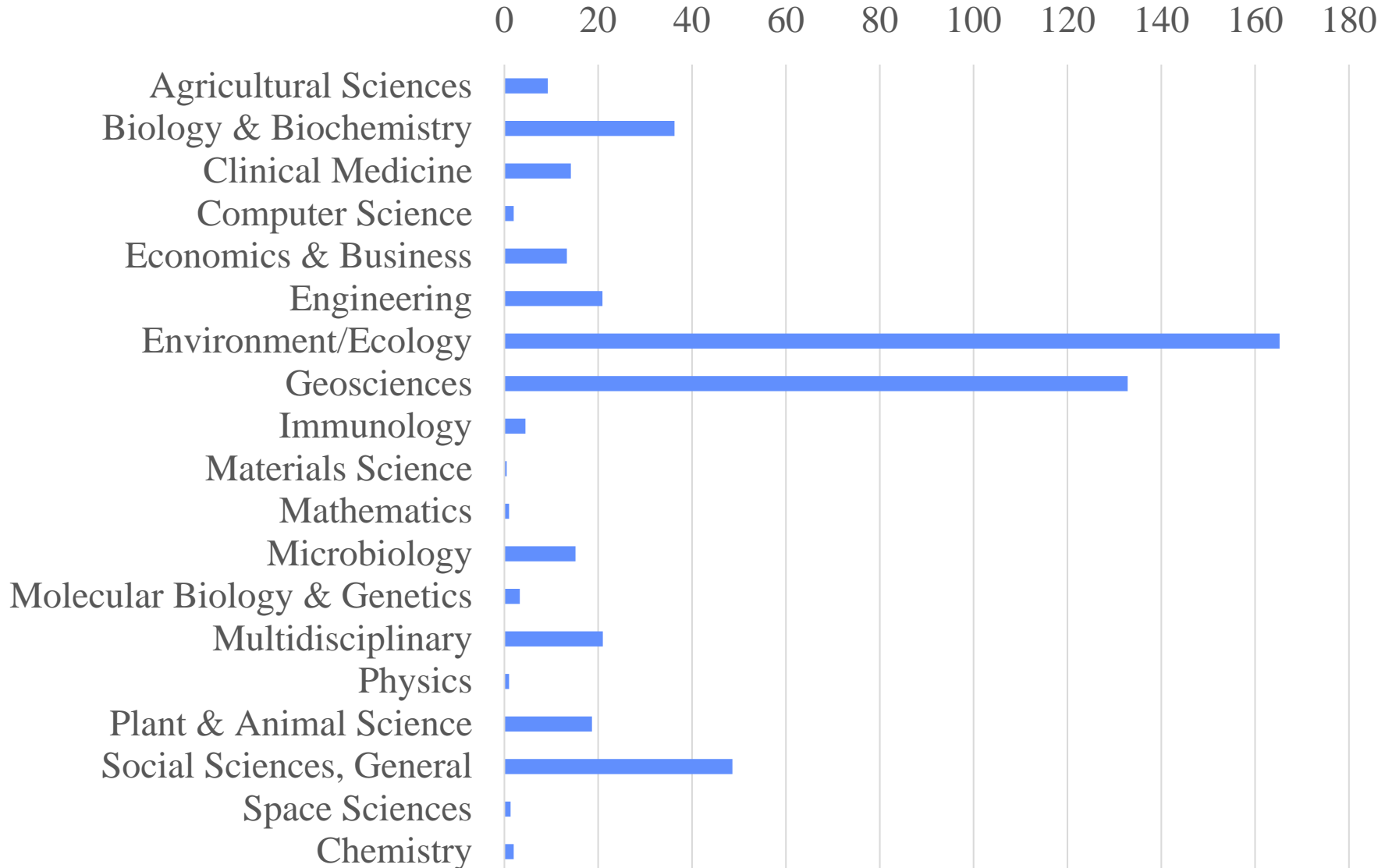
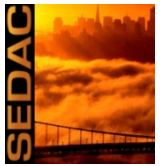


519 Articles Co-Cited SEDAC Data with Remote Sensing Data in 227 Journals, 2007-2016



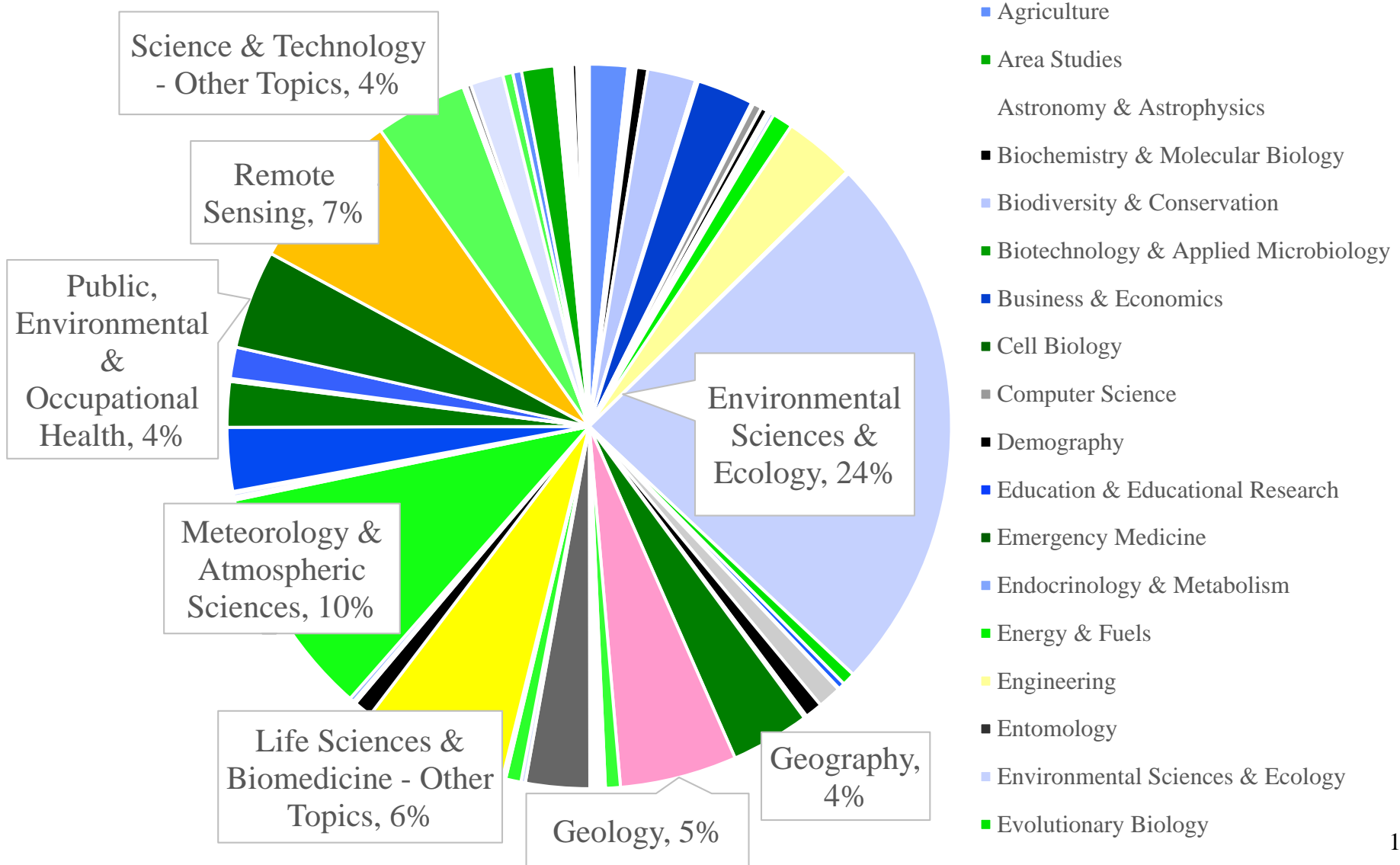
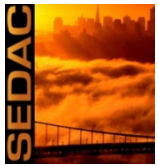


19 Major Fields of Journals with Articles Co-Citing SEDAC Data with Remote Sensing Data, 2007-2016



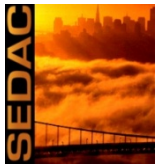


63 Subject Areas of Journals with Articles Co-Citing SEDAC Data with Remote Sensing Data, 2007-2016





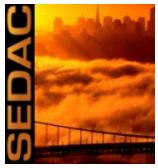
Observations



- Percentage of joint citation papers is increasing gradually
- Number of joint citation papers has increased more quickly than the total number of SEDAC data citations from 2007-16
- Higher joint usage in natural science journals compared with social science journals (not correcting for total number of articles published)
- Multidisciplinary journals (e.g., PLoS ONE, PNAS) also publish papers that cite both types of data
- Some health journals also have numerous papers, mainly in area of mapping disease prevalence and vectors
- The use of DOIs in SEDAC citations has been increasing steadily since SEDAC began assigning DOIs to data in April 2014



Further Work



- What type and degree of integration is reflected by joint citations?
- Are there patterns in joint citations and integration over time?
- If so, do they have an impact on results?
- Are there prevailing approaches within or across disciplines for using SEDAC data with remote sensing data?
- Which SEDAC data and remote sensing data are used together frequently?

Taxonomy of Data Citation

Cited but not used

Used as background or context

-- Used in figure only

Used in study design

-- Hypothesis/theory development

-- Sample selection

-- Other

Used in trend or spatial analysis

Used in statistical model

-- Statistically significant?

-- Total number of variables

Used in simulation model

-- Key component or variable

-- Minor variable or parameter

-- Baseline or boundary condition

Used for validation purposes

Used in research translation

-- Making results relevant to policy

-- Enabling use in applications

-- Cited in conclusion/discussion