IRIS CITATION PROJECT

January 2014 – December 2014

Introduction

The aim of this year's project was to compile the database of IRIS citation's references for the year 2014. Due to unavoidable staffing changes the citations database research was delayed, and as a consequence the results presented in this report differ somewhat from previous reports. An incomplete report was submitted in August, 2015. This completed report for 2014 should supersede the previous citation report.

In order to maintain continuity while searching journals and procuring citations the processes and procedures used in previous years were followed as closely as possible. These procedures are outlined below.

The search for these citations was performed from July-October 2015.

The searching of earth science journals for references with IRIS citations for 2014

The eleven most prominent earth science journals were given priority while searching. These journals are - ***Bulletin of Seismological Society of America (BSSA), Journal of Geophysical Research (JGR), Geophysical Journal International (GJI), Seismological Research Letters (SRL), Geophysical Research Letters (GRL), Earth and Planetary Science Letters (EPSL), Physics of the Earth and Planetary Interior (PEPI), Tectonophysics, Nature, Science*** and ***Geology.***

The journals were searched for the following key words: *IRIS, Incorporated Research Institution for Seismology, PASSCAL, DMC, DMS, Data Management Center, GSN, Global Seismographic Network, GDSN, USArray, EarthScope* and *PBO, Plate Boundary Observatory, Transportable Array (TA), Magnetotellurics and Flexible Array, OBSIP*, *Ocean Bottom Seismograph Instrument Pool* and *GLISN, Greenland Ice Sheet Monitoring Network*.

This year the additional search term "www.iris.edu" was added. This search term located an additional ~25 documents and helps to filter results.

The searches were carried out electronically with different search engines for journals as follows:

- *Journal of Geophysical Research*, *Geophysical Research Letters*, and *Geophysical Journal International* were searched through Wiley search engine.

- For SSA publications (*Bulletin of Seismological Society of America, Seismological Research Letters*) the GSW engine was used.

- For Elsevier publications, *Earth and Planetary Science Letters*, *Physics of the Earth and Planetary Interiors*, and *Tectonophysics*, the ScienceDirect engine was used.

- The other journals, *Nature* and *Science* have their own search engines on their respective web pages and *Geology* has the search engine of Geological Society of America.

Most of these search engines are capable of an all-text search, which often brings up unrelated documents as well as the intended IRIS research results. I make an initial scan through the results, deleting entries that are obviously unrelated to IRIS research activities. For the remaining documents I manually perform a "find" function for the key word on the abstract, primary text, figures, funding sources and/or acknowledgements. If the document is relevant I mark it and exported it into the database as a .ris file.

The distribution of findings are given in the following table:

Table 1: Total number of citations in the Top 11 journals

No.	Journal / Magazine	Number of references Jan. 2014 – Dec. 2014
1	Bulletin of the Seismological Society of America	47
2	Journal of Geophysical Research	76

3	Geophysical Journal International	74
4	Geophysical Research Letters	43
5	Earth and Planetary Science Letters	57
6	Seismological Research Letters	33
7	Physics of the Earth and Planetary Interiors	9
8	Tectonophysics	16
9	Science	9
10	Nature	4
11	Geology	4
Total		**372**

There was no increase in the total number of citations in 2014 compared to calendar year 2013; there were 372 citations in 2013 and 372 citations in 2014. This is not unusual – there was an increase of only one citation between 2010 and 2011, and an increase of only 4 citations between 2001 and 2002. In the past there are have also been decreases in the number of total citations. For instance, between 2000 and 2001 the citation number decreased by 22, and citations went down each year in 2004 and 2005.

This year there were more IRIS related publications in SRL, GJI and EPSL (17, 8 and 24 more references, respectively), but there were less IRIS related publications in Tectonophysics (28 less) and BSSA (15 less). Refer to Figure 1 below to see a direct comparison of the number of citations in each journal for the last 2 calendar years and Figure 2 to see the number of citations per year.

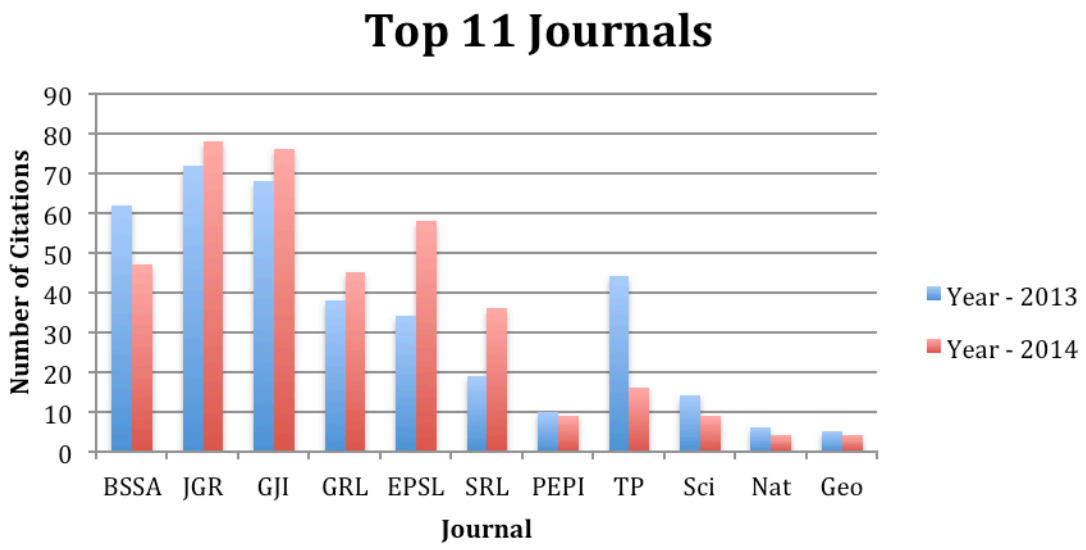

Figure 1. Number of publications in the top eleven journals in calendar years 2013 and 2014.

Since the inception of the IRIS citations database in 2000 the number of IRIS related citations has showed an overall upward trend (Figure 2). This increase can be expected to continue, particularly as USArray moves into Alaska and the OBSIP and GLISN projects gain momentum.

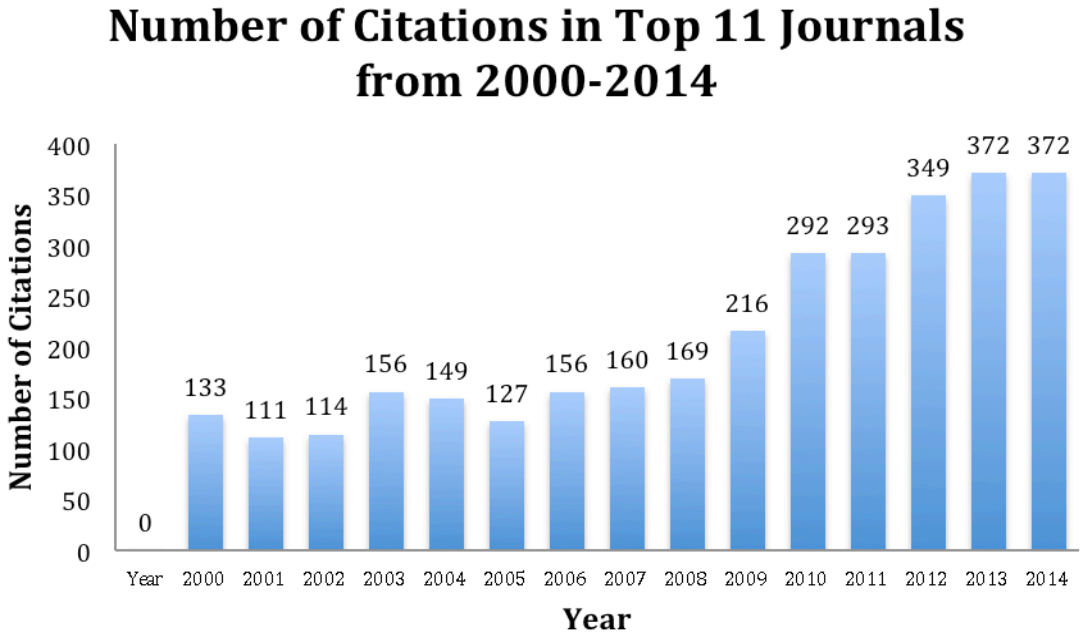

Figure 2. Total number of IRIS related citations in the eleven most prominent earth science journals since the inception of the database in 2000. Years 2000-2014 are shown. The number above each bar is the total number of citations for that year.

The number of search terms found per journal is presented in Table 2 (below). The number of key words found in the top journals increased between 2013 and 2014. All search terms except for OBSIP and GLISN increased; the number of OBSIP and GLISN references remained the same. To see a direct comparison between 2013 and 2014 see Table 3.

Table 2: Number of search terms by journal in 2014

Citation / Journal	IRIS or full name	PASS-CAL	GSN /GDSN	DMC DMS or full name	US-Array	Earth Scope	PBO	OBSIP	GLISN
BSSA	56	11	10	37	12	12	9	1	0
JGR	53	14	16	32	17	24	16	1	0
GRL	31	7	7	12	12	11	7	1	0
GJI	52	13	13	20	26	16	8	0	0
PEPI	6	1	3	4	4	1	0	0	0
SRL	32	5	10	14	23	18	4	0	0
TECTO	28	8	11	7	5	7	2	0	0
NATURE	0	8	1	1	5	4	2	0	0
EPSL	53	16	4	23	43	37	4	1	1
SCIEN	9	0	1	3	5	5	2	0	0
GEOL	4	3	2	1	2	2	0	0	0
All 11 journals	**324**	**86**	**78**	**154**	**154**	**137**	**54**	**4**	**1**

Table 3: Number of search terms in top 11 journals in calendar years 2013 and 2014

	IRIS or full name	PASS-CAL	GSN /GDSN	DMC DMS or full name	USArray	EarthScope	PBO	OBSIP	GLISN
2013	**254**	**55**	**57**	**112**	**55**	**87**	**41**	**4**	**1**

2014	**324**	**86**	**78**	**154**	**154**	**137**	**54**	**4**	**1**

In order to determine the importance of the IRIS structure or project used in the study represented by any paper, it was necessary to go through the content of each paper. I did this by searching each reference from the 11 most import journals for IRIS search terms and then reading the associated content to determine how the IRIS facility or data was utilized in the study. In keeping with previous reports, I considered the IRIS contribution to the study to be of high importance when only IRIS data or equipment were used for the research work; of medium importance when the IRIS data and/or equipment are employed together with other data or equipment from other agencies or organizations; and of low importance when IRIS structures are mentioned only occasionally (for example in references of the paper) or for the reason of archiving and disseminating the produced data through that research into the IRIS structures mentioned.

Table 4: Importance of IRIS facilities in references from Top 11 journals

Important Journal	Total	High	Moderate	Low
BSSA	47	19	22	6
JGR	76	40	29	7
GRL	43	19	16	8
JGI	74	32	25	17
PEPI	9	3	3	3
SRL	33	17	9	7
TECTONOPHYS.	16	0	5	11
NATURE	4	2	0	2
EPSL	57	32	8	17
SCIENCE	9	4	2	3
GEOLOGY	4	3	1	0
All 11 journals	**372**	**171**	**120**	**81**

The searching of references of IRIS citations in other 29 earth science journals

IRIS promotes continuous conducting of geophysical investigations of seismic sources and earth properties through its facilities and allows free and unrestricted access to its database, one of the largest in the world. This database is used by researchers around the world to explore the lithosphere, cryosphere, atmosphere, hydrosphere and deep earth in unprecedented ways. The types of scientific findings aided by IRIS facilities are extremely varied, and this is reflected in the number and type of journals that cite IRIS data, instruments and facilities. Given the importance of some of these journals, their impact factor and effectiveness citation index, 29 other journals from earth science publications are selected for expanding our searching for IRIS-related citations. These journals are: ***Canadian Journal of Earth Sciences, Geophysics, The Leading Edge, Reviews of Geophysics, Tectonics, Polar Science, Earth Surface, Journal of Glaciology, Marine Geophysical Research, Nature Geoscience, Lithosphere, Journal of Geodynamics, Geosphere, Earthquake Science, Journal of Volcanology and Seismology, Seismic Instruments, Natural Hazards and Earth System Sciences, Journal of Structural Geology, Natural Hazards, Geochemistry, Geophysics, Geosystems, Soil Dynamics and Earthquake Engineering, Russian Journal of Pacific Geology, Journal of Volcanology and Geothermal Research, Marine Geology, Geomorphology, Pure and Applied Geophysics, Chinese Journal of Geophysics, Journal of Seismology, EOS.***

The number of citations for each of these journals is presented in Table 4 below.

Table 5: Number of citations found in additional 29 journals

Canadian Journal of Earth Sciences	TOTAL
	1
Geophysics	1
The Leading Edge	0
Reviews of Geophysics	4

Tectonics	4
Polar Science	0
Earth Surface	0
Journal of Glaciology	0
Marine Geophysical Research	1
Nature Geoscience	2
Lithosphere	2
Journal of Geodynamics	4
Geosphere	3
Earthquake Science	2
Journal of Volcanology and Seismology	0
Seismic Instruments	0
Natural Hazards and Earth System Sciences	0
Journal of Structural Geology	5
Natural Hazards	4
Geochemistry, Geophysics, Geosystems	28
Soil Dynamics and Earthquake Engineering	0
Russian Journal of Pacific Geology	0
Journal of Volcanology and Geothermal Research	8
Marine Geology	2
Geomorphology	1
Pure and Applied Geophysics	12
Chinese Journal of Geophysics	0
Journal of Seismology	0
EOS	4
All 29 Journals	**88**

The total number of citations found in these journals in 2014 is less than what was found the previous year (Figure 3). In particular, there were no IRIS related citations in the journals related to glaciology and polar research.

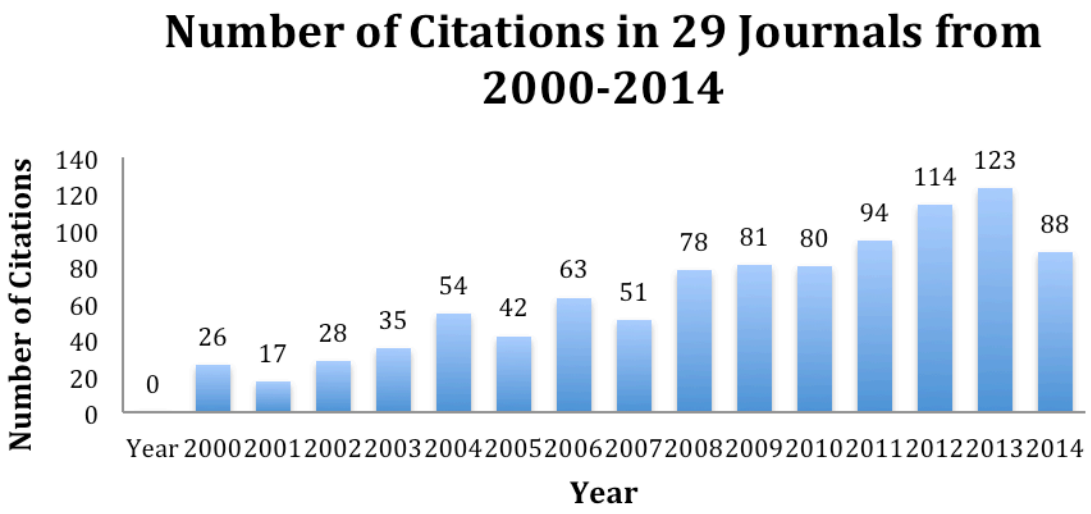

Figure 3. Graph showing the number of citations per year in the 29 additional journals.

Table 6: Key words found in 29 additional journals

Key Word / Journals	Total	IRIS	PASSCAL	GSN	DMC	USArray	EarthScope	PBO	OBSIP	GLISN
Canadian Journal of Earth Sciences	1	0	0	0	0	1	0	0	0	0
Geophysics	1	0	0	0	0	1	0	0	0	0
The Leading Edge	0	0	0	0	0	0	0	0	0	0
Review s of Geophysics	4	0	0	0	0	3	1	0	0	0
Tectonics	4	2	1	0	0	0	0	0	0	0
Polar Science	0	0	0	0	0	0	0	0	0	0
Earth Surface	0	0	0	0	0	0	0	0	0	0
Journal of Glaciology	0	0	0	0	0	0	0	0	0	0
Marine Geophysical Research	1	1	0	0	0	0	0	0	0	0
Nature Geoscience	2	0	0	1	0	1	0	0	0	0
Lithosphere	2	0	0	0	0	0	1	1	0	0
Journal of Geodynamics	4	5	0	1	3	0	0	0	0	0
Geosphere	3	1	0	1	1	2	2	0	0	0
Earthquake Science	2	2	1	1	2	1	1	0	0	0
Journal of Volcanology and Seismology	0	0	0	0	0	0	0	0	0	0

Seismic Instruments	0	0	0	0	0	0	0	0	0	0
Natural Hazards and Earth System Sciences	0	0	0	0	0	0	0	0	0	0
Journal of Structural Geology	5	0	0	0	0	0	4	1	0	0
Natural Hazards	4	4	0	1	1	0	0	0	0	0
Geochemistry, Geophysics, Geosystems	28	7	9	1	14	6	6	3	1	0
Soil Dynamics and Earthquake Engineering	0	0	0	0	0	0	0	0	0	0
Russian Journal of Pacific Geology	0	0	0	0	0	0	0	0	0	0
Journal of Volcanology and Geothermal Research	8	6	1	0	2	0	0	0	0	0
Marine Geology	2	1	0	0	0	0	0	0	0	0
Geomorphology	1	1	0	0	0	0	0	0	0	0
Pure and Applied Geophysics	12	12	1	4	6	7	4	3	0	0
Chinese Journal of Geophysics	0	0	0	0	0	0	0	0	0	0
Journal of Seismology	0	0	0	0	0	0	0	0	0	0
EOS	4	0	0	0	2	1	3	1	0	1
All 29 Journals	**88**	**44**	**13**	**10**	**31**	**23**	**22**	**9**	**1**	**1**

The searching of references of IRIS citations in other journals

As the application of IRIS facilities expands into new realms (OBSIP, GLISN and USArray Alaska) we can expect an increase in the number of citations in journals that were previously not relevant to IRIS related research. Additionally, unexpected and creative uses of the data and facilities are creating an exciting body of work outside of the traditional earth science journals. For example, using USArray to document atmospheric disturbances and using PBO to measure snow fall and plant growth have expanded the types of journals featuring content using IRIS data and facilities.

In order to explore the use of IRIS data and products in journals outside of the traditional earth science sphere, I performed a generalized search on the aforementioned search terms using Google Scholar and Web of Science. This search uncovered an additional 61 citations from 38 journals. These journals and the number of citations from

each journal are listed in Table 7. Particularly, the ***Journal of South American Earth Sciences, Journal of Asian Earth Sciences, Izvestiya, Physics of the Solid Earth, and Earth, Planets, and Space*** had a significant number of IRIS related citations.

Table 7. Additional journals and total number of IRIS related citations in each

Other Journals	TOTAL
Solid Earth Discussions	2
Journal of South American Earth Sciences	4
Computers & Geosciences	1
Encyclopedia of Earthquake Engineering	2
Surveys in Geophysics	2
Geotectonics	1
EURASIP Journal on Applied Signal Processing	1
The Journal of the Acoustical Society of America	1
Physical Review Letters	1
Geomagnetism and Aeronomy	1
Journal of Applied Physics	1
Journal of African Earth Sciences	1
Physics Today	1
Meteoritics and Planetary Science	1
Progress in Earth and Planetary Science	1
Scientific Reports	3
Journal of Asian Earth Sciences	5
Journal of Geodesy	1
International Journal of Biometeorology	1
Izvestiya, Physics of the Solid Earth	5
Ieee Journal of Selected Topics in Applied Earth Observations and Remote Sensing	1
Water Resources Research	1
Geological Society of America Special Papers	1
Geofísica Internacional	1
Earth, Planets, and Space	4
Journal of Applied Meteorology and Climatology	1
Advances in Geophysics	1
Annual Review of Earth and Planetary Sciences	1
Doklady Earth Sciences	2
Journal of Hydrology	1
Oceanography	1
The Cryosphere Discussions	1
Global and Planetary Change	1

Annual Review of Marine Science	1
Advances in Space Research	1
Geodesy and Geodynamics	1
Science China Earth Sciences	2
Radio Science	2
Geophysics	1
TOTAL	**61**

The searching of references of IRIS citations in AGU, GSA and EGU abstracts

I used the NASA ADS Service Abstracts for searching into AGU proceedings. There are 232 abstracts of AGU meetings with citations of IRIS or IRIS structures (Table 8) that are mentioned increased in 2014. This is similar to the number of citatons from 2013. There are 54 abstracts authored or co-authored by IRIS staff.

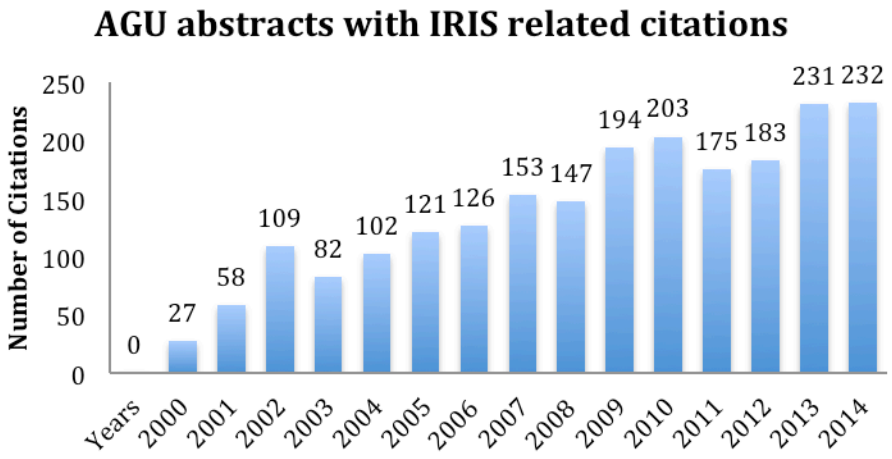

Figure 4. Number of AGU abstracts with IRIS related citations from 2000-2014.

Because the IRIS Global Seismic Network (GSN), Data Management Center (DMC) and data from USArray are widely incorporated in studies throughout the world, I also searched for IRIS related abstracts of research presented at the Geological Society of America (GSA) meeting and the European Geophysical Union (EGU) meeting. I used

Google Scholar to search for GSA and EGU abstracts that cite IRIS or IRIS structures. 27 GSA abstracts and 32 EGU abstracts cite one or more relevant search terms (Table 8).

Table 8. Number of 2014 abstracts containing IRIS related citations

Citation / Conference	IRIS or full name	PASS-CAL	GSN /GDSN	DMC DMS or full name	USArray	EarthScope	PBO	OBSIP	GLISN
AGU	66	17	4	12	71	90	28	2	6
GSA	5	0	0	1	2	21	10	0	0
EGU	6	3	0	0	10	10	7	0	4

Findings from 2014

The total number of IRIS related citations found in all journals in 2014 is 502. The total number of citations in abstracts is 291. Thus, the total number of IRIS related references in 2014 is 793.

There is a significant increase in IRIS-citation references in many of the traditional journals. We have an increase of 12% for ***Geophysical Journal International***, 18% for ***Geophysical Research Letters***, 71% for ***Earth and Planetary Science Letters,*** and 89% for ***Seismological Research Letters***. In the 29 additional journals, ***Geochemistry, Geophysics, Geosystems***, ***Pure and Applied Geophysics*** have 2 digit entries. Finally, 61 additional citations were discovered in 38 journals not previously documented in these reports.

The current file of the project for this year contains:

- a list of all papers and abstracts with IRIS related citations for 2014
- a list of papers with IRIS-related citations for 11 traditional journals
- a list of papers with IRIS-related citations for additional journals

- a list of papers with IRIS-related citations for AGU, GSA and EGU abstracts
- four libraries with all the entries in EndNote for 2014 citations (All citations, 11 top journals, Abstracts, all other journals)
- a report documenting the processes, procedures and findings for 2014 citation findings

Dr. Wendy Bohon, Oct. 12, 2015.