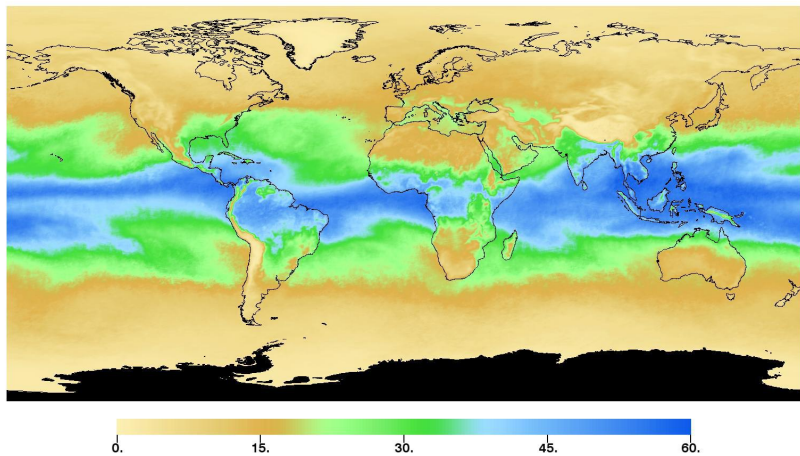


Impact of NASA EOS instrument data on the scientific literature: 10 years of published research results from Terra, Aqua, and Aura

AIRS TOTAL PRECIPITABLE WATER VAPOR (mm), May 2009



Gene R. Major

NASA Goddard Library

NASA Sounder Team Meeting, November 13, 2012

Scientific Data Set Citation

- Lack of standardization for data set citation in peer-review literature
- Data set citation is limited to footnotes or within text of article, if allowed at all
- Some movement towards data citation standardization:
 - PANGAEA: German Research Foundation and German National Library of Science and Technology (TIB)
 - Data Observation Network for Earth (DataOne)
 - Unique identifiers for Earth science data (Duerr, et al., 2011)
 - Both AGU and AMS have convened committees on exploring scientific data citation in journals

Scientific Data Set Citation

- Even if all journals allowed scientific data citation now, retrospective analysis of past use of specific data sets would not be possible

Citation of EOS Data Sets

- Instrument keywords in the literature as indicators of EOS data set usage and a proxy for data citation

Wong, Sun, Eric J. Fetzer, Brian H. Kahn, Baijun Tian, Bjorn H. Lambrigtsen, Hengchun Ye, 2011: Closing the Global Water Vapor Budget with AIRS Water Vapor, MERRA Reanalysis, TRMM and GPCP Precipitation, and GSSTF Surface Evaporation. *J. Climate*, **24**, 6307–6321.
doi: <http://dx.doi.org/10.1175/2011JCLI4154.1>

 **Closing the Global Water Vapor Budget with AIRS Water Vapor, MERRA Reanalysis, TRMM and GPCP Precipitation, and GSSTF Surface Evaporation**

Sun Wong, Eric J. Fetzer, Brian H. Kahn, Baijun Tian, and Bjorn H. Lambrigtsen

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California

Hengchun Ye

Department of Geography and Urban Analysis, California State University, Los Angeles, California

Results From Web of Science

WEB OF KNOWLEDGESM

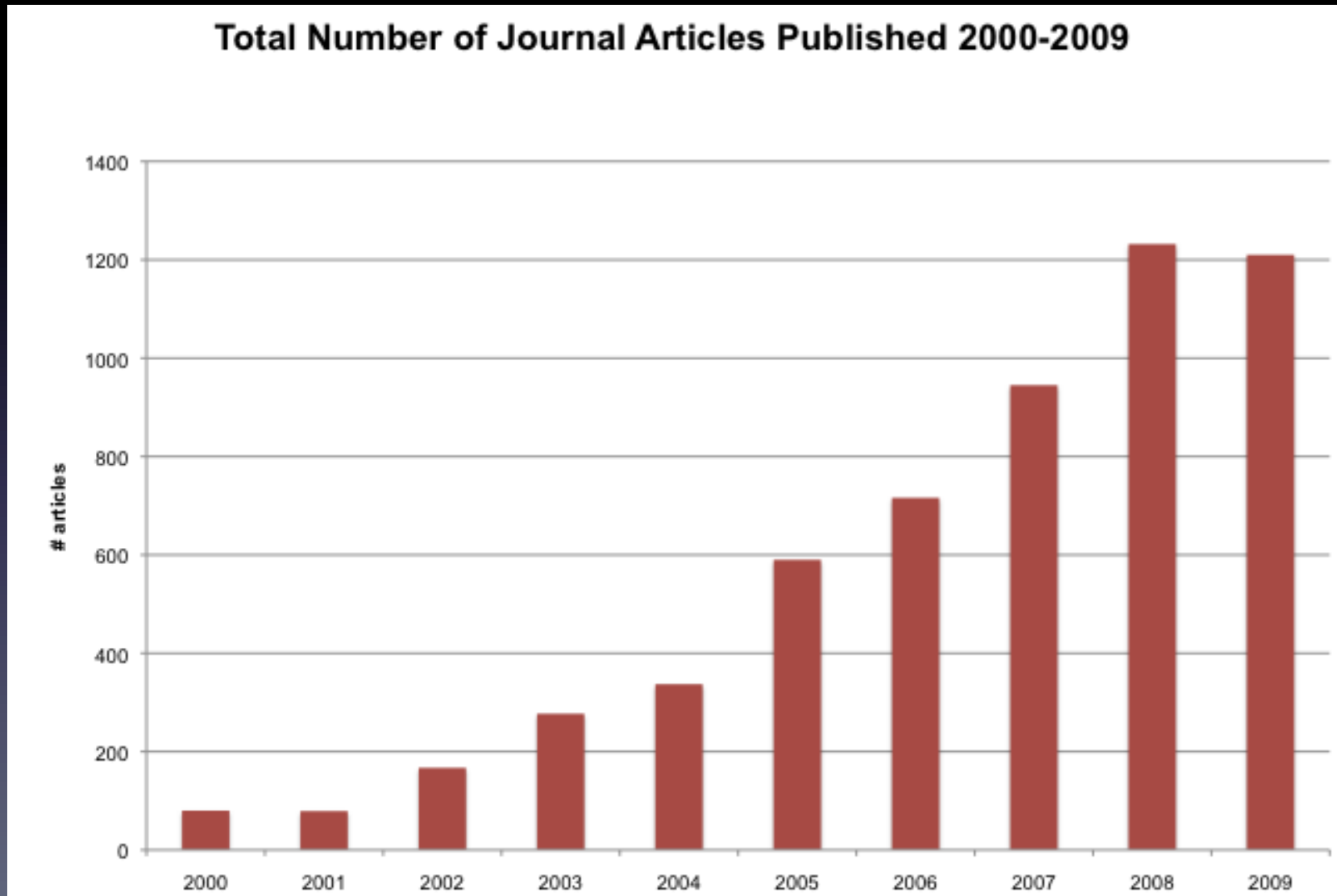
DISCOVERY STARTS HERE



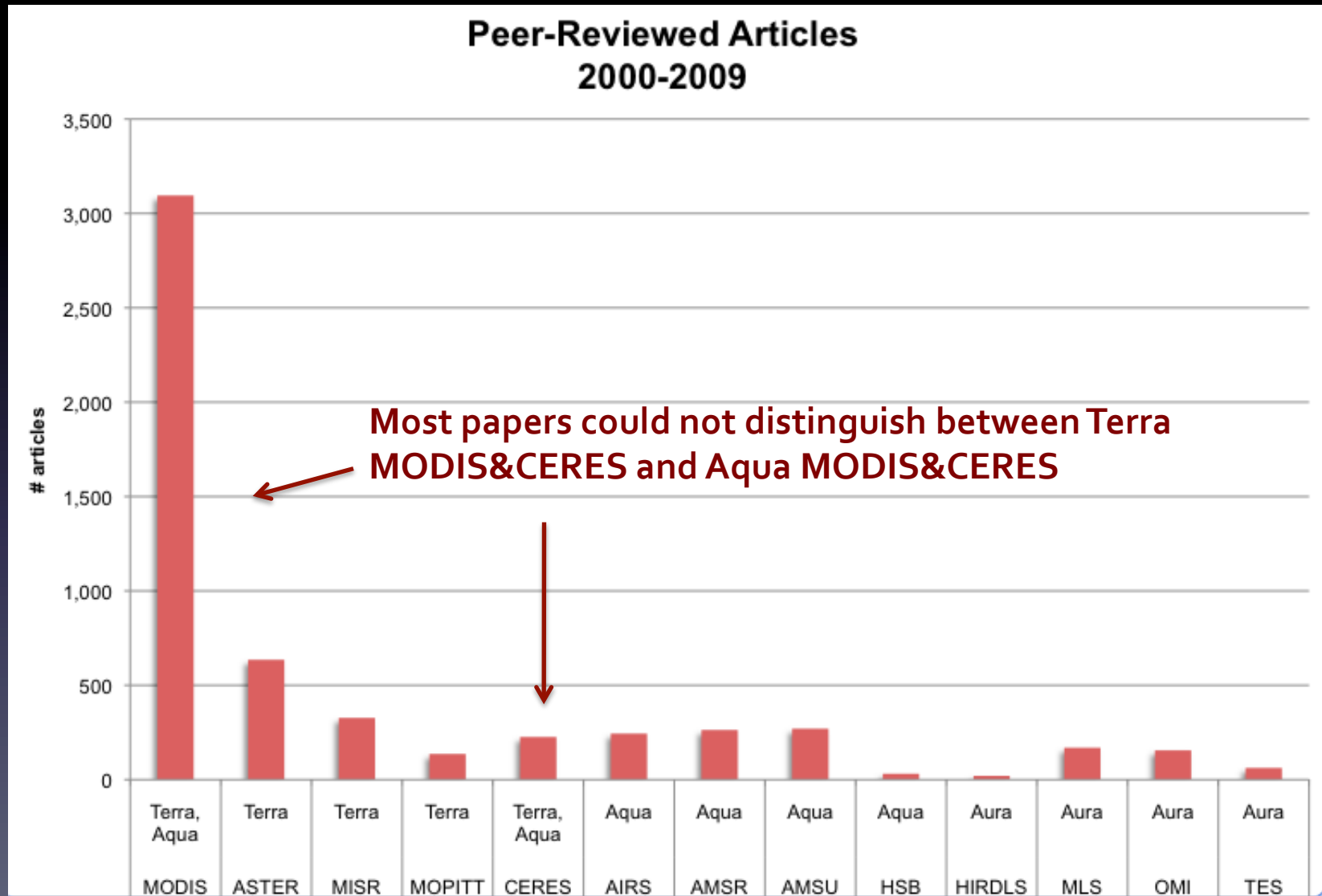
THOMSON REUTERS

- *Web of Science* journal citations
 - Did not use conference proceedings or books
- 5,633 papers published in the 10-year period 2000-2009 using EOS instrument data
- Over 400 different journals
- Over 55% of the papers used MODIS data

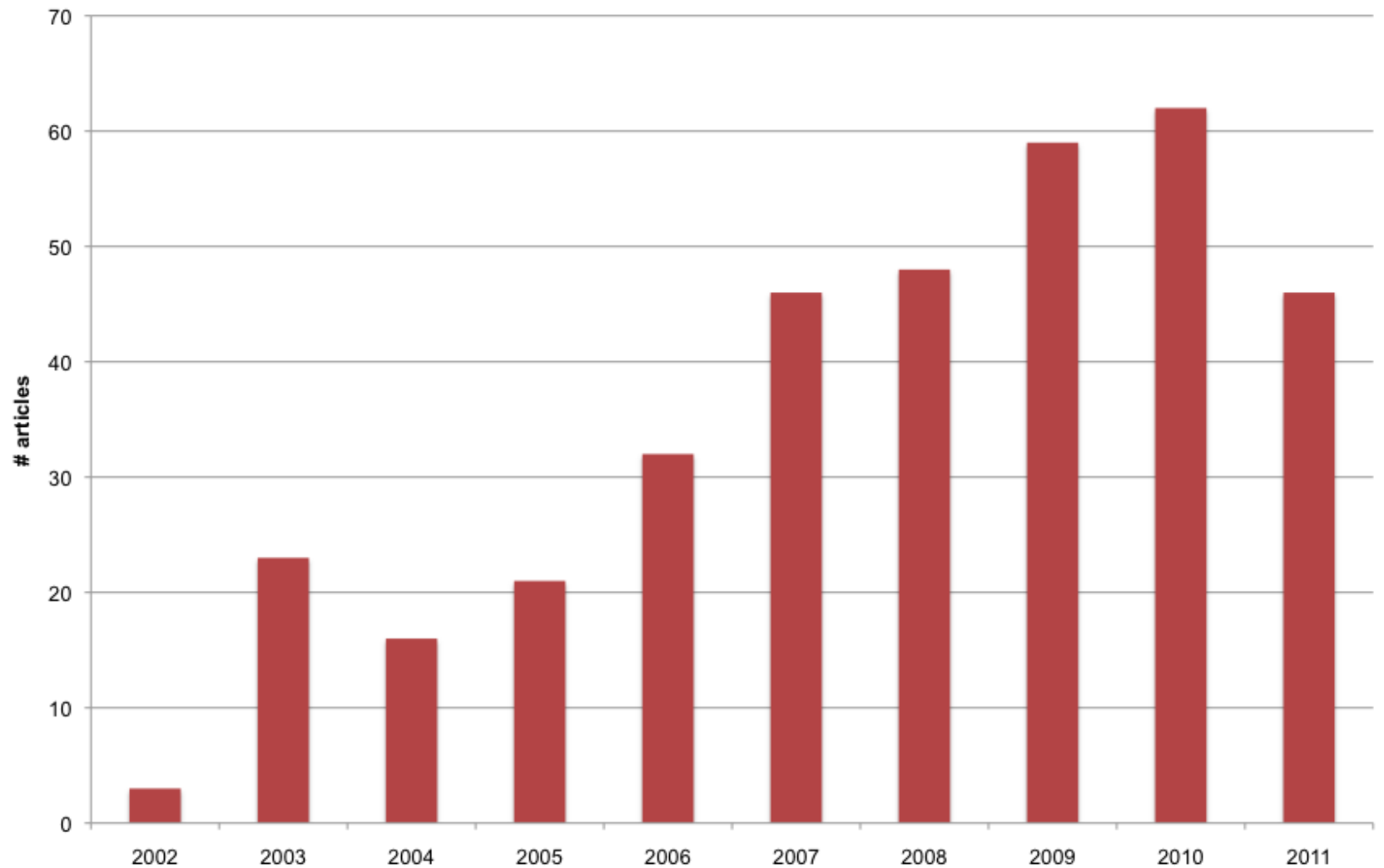
Journal Articles Citing EOS Data from WoS



Journal Articles Citing EOS Data from WoS by Instrument



AIRS Published Articles 2002-2011



Data Extraction Method

Web of Science Additional Resources

Search Author Search Cited Reference Search Advanced Search Search History

Web of Science®

Search

AIERS Atmospheric Infrared Sounder
Example: oil spill* mediterranean

in Topic

AND

O'Brian C* OR OBrian C*
Example: O'Brian C* OR OBrian C*
Need help finding papers by an author? Use Author Search.

in Author

AND

Cancer* OR Journal of Cancer Research and Clinical Oncology
Example: Cancer* OR Journal of Cancer Research and Clinical Oncology

in Publication Name

Add Another Field >>

Search Clear Searches must be in English

1. Search *Web of Science* for each instrument
Some instrument names are unique; others (ASTER) required additional qualifiers

2. Download WoS records

Output Records

Step 1:

☒ Selected Records on page
☐ All records on page
☐ Records to

Step 2:

☐ Authors, Title, Source
☐ plus Abstract
☒ Full Record
☐ plus Cited References

Step 3: [How do I export to bibliographic management?]

Save to: **ENDNOTE® WEB** **ENDNOTE®**

Save to Tab-delimited (Mac)

Save

+ (0)

PT AU BA BE GP AF BF CA TI SO SE LA DT CT CY CL
SP HO DE ID AB C1 RP EM RI FU FX CR NR TC Z9
PU PI PA SN BN J9 J1 PD PY VL IS PN SU SI MA
BP EP AR DI D2 PG P2 WC SC GA UT

J Noh, YJ; Liu, GS; Jones, AS; Haar, THV Noh, Yoo-Jeong; Liu, Guosheng; Jones, Andrew S.;
Haar, Thomas H. Vonder. Toward snowfall retrieval over land by combining satellite and in situ measurements
JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES English Article
MICROWAVE SOUNDING UNIT; ICE; MODEL; PRECIPITATION; CLOUDS; ALGORITHM; REFLECTIVITY; SENSITIVITY; EMISSIVITY;
RADIOMETER Although snowfall is an important component of global precipitation in extratropical regions, satellite
snowfall estimate is still in an early developmental stage, and existing satellite remote sensing techniques do not yet
provide reliable estimates of snowfall over higher latitudes. Toward the goal of developing a global snowfall algorithm, in
this study, a Bayesian technique has been tested for snowfall retrieval over land using high-frequency microwave satellite
data. In this algorithm, observational data from satellite- and surface-based radars and in situ aircraft measurements are
used to build the a priori database consisting of snowfall profiles and corresponding brightness temperatures. The retrieval
algorithm is applied to the Advanced Microwave Sounding Unit-B data for snowfall cases that occurred over the Great Lakes
region, and the results are compared with the surface radar data and daily snowfall data collected from National Weather
Service stations. Although the algorithm is still at an ad hoc stage, the results show that the satellite retrievals compare
well with surface measurements in the early winter season, when there is no accumulated snow on ground. However, for the late
winter season, when snow constantly covers the ground, the snowfall retrievals become very noisy and show overestimation.
Therefore, it is concluded that developing methods to efficiently remove surface snow cover contamination will be the major
task in the future to improve the accuracy of satellite snowfall retrieval over land. [Noh, Yoo-Jeong; Jones, Andrew S.;

3. Import records into spreadsheets

1	J	Tao, L; Fu, XH; Wang, B	The Moisture Structure of ISO in Western North Pacific Revealed by AIRS	ACTA METEOROLOGICA SINICA	2009
2	J	Gao, WH; Zhao, FS; Gai, CS	Validation of the atmospheric infrared sounder retrieval products over china and their application in numerical model	ACTA METEOROLOGICA SINICA	2007
3	J	Tao, L; Fu, XH; Lu, WS	Moisture structure of the quasi-biweekly mode revealed by AIRS in western Pacific	ADVANCES IN ATMOSPHERIC SCIENCES	2009

Data Extraction Method

One workbook for each instrument;
Multiple spreadsheets for each year

Journal titles sorted by year for each instrument

1	AIRS	2009
2	ACTA METEOROLOGICA SINICA	1
3	ADVANCES IN ATMOSPHERIC SCIENCES	1
4	ADVANCES IN SPACE RESEARCH	2
5	APPLIED OPTICS	1
6	ASTROPHYSICAL JOURNAL	1
7	ATMOSPHERIC CHEMISTRY AND PHYSICS	6
8	AUSTRALIAN METEOROLOGICAL AND OCEANOGRAPHIC JOURNAL	1
9	GEOPHYSICAL RESEARCH LETTERS	7
10	IEEE GEOSCIENCE AND REMOTE SENSING LETTERS	1
	IEEE JOURNAL OF SELECTED TOPICS IN APPLIED EARTH OBSERVATIONS AND REMOTE SENSING	1
11		
12	IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING	2
13	JOURNAL OF APPLIED METEOROLOGY AND CLIMATOLOGY	3
14	JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY	4

Each record was checked for
accuracy and consistency

Especially noted journals that do not
normally publish papers on remote sensing
data. For example:

Journal: *JOURNAL OF MEDICAL
ENTOMOLOGY*

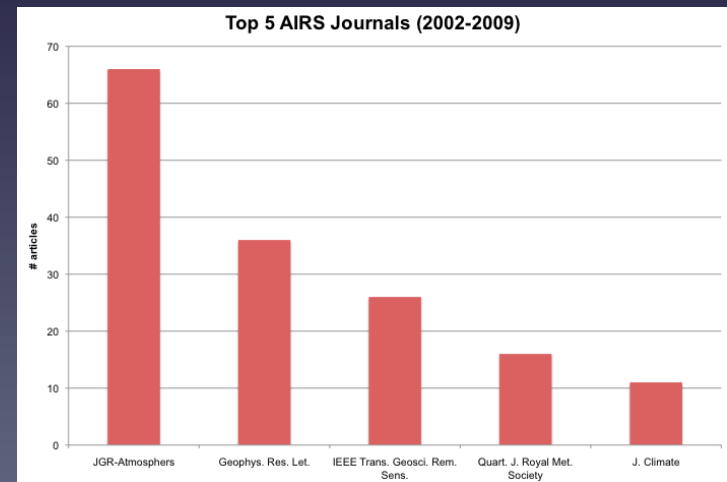
Title: *Infestation of rural houses by Triatoma
infestans (Hemiptera: Reduviidae) in southern
area of Gran Chaco in Argentina*

**MODIS imagery was used to examine areas
before and after insecticide application to
determine its effectiveness.**

EOS Landscape in the Scientific Literature

- Approximately 70% of all articles were published in 20 journals.
- Top 5:
 - *Journal of Geophysical Research – Atmospheres* (849 articles, JIF=3.475)
 - *Remote Sensing of Environment* (732 articles, JIF=4.757)
 - *IEEE Transactions on Geoscience and Remote Sensing* (446 articles, JIF=2.705)
 - *International Journal of Remote Sensing* (441 article, JIF=1.621)
 - *Geophysical Research Letters* (431 articles, JIF=3.341)

All of these journals have Journal Impact Factors (JIF) above the median JIF for journals in these subject areas: *Meteorology and Atmospheric Science, Oceanography, and Remote Sensing*



Diversity of Applications of EOS Data

- EOS data was also reported in journals outside the mainstream, indicative of the wide applications of EOS:
 - *Harmful Algae*
 - *Archaeologic Prospection*
 - *Quaternary Science Reviews*
 - *Infection Genetics and Evolution*
 - *Journal of Vector Ecology*
 - *Australian Journal of Grape and Wine Research*

International Use of EOS Data

- EOS-related articles also published in international journals:
 - *Chinese Science Bulletin*
 - *Rivista Italiana Di Telerilevamento*
 - *Russian Meteorology and Hydrology*
 - *Journal of the Korean Meteorological Society*
 - *Izvestiya Atmospheric and Oceanic Physics*

Impact of EOS Data (from WoS)

	Times Cited	Avg. Citations per Item	h-index	Avg Citation per year	Highly Cited
MODIS	41,977	9.25	71	3498.08	55.3
ASTER	3663	9.11	28	302.25	23.4
MISR	3154	11.95	30	262.83	15
MOPITT	2716	15.7	27	226.33	17.33
CERES	2054	14.67	22	171.17	29.5
AIRS	3529	8.87	28	294.08	32.22
AMSR	2897	5.63	26	241.42	25.78
AMSU	4371	10.38	31	364.25	32.22
HSB	1082	25.76	14	120.22	32.22
HIRDLS	320	5.82	10	26.67	15.5
MLS	3381	13.21	29	281.75	29
OMI	2035	10.88	23	185	28.33
TES	1241	13.2	20	103.42	11.55
	72,420				

- Over 72,000 “times cited”
- High h-index (28 AIRS papers have 28 citations or more)
- High average citation (AIRS had 294 average citations per year (2002-2009))
- The most highly cited AIRS paper had 32.22 citations per year

Impact of EOS Data

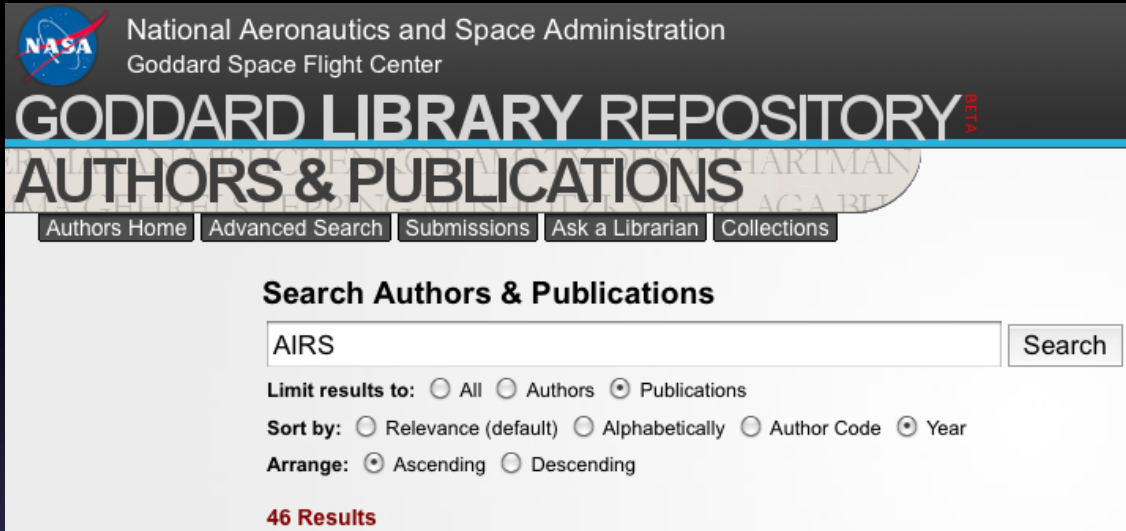
Which was:

Title: AIRS/AMSU/HSB on the aqua mission: Design, science objectives, data products, and processing systems

Author(s): Aumann, HH; Chahine, MT; Gautier, C; et al.

Source: IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING Volume: 41 Issue: 2 Pages: 253-264 DOI: 10.1109/TGRS.2002.808356 Published: FEB 2003

Another analysis tool: The Goddard Library Repository



NASA National Aeronautics and Space Administration
Goddard Space Flight Center

GODDARD LIBRARY REPOSITORY BETA

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Arrange: ☒ Ascending ☐ Descending

46 Results

Goddard Library Repository
Is a tool for searching for
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Goddard Authors. For 2009,
11% of the papers were
authored/co-authored by
Goddard.

[http://gsfcir.gsfc.nasa.gov/
authors](http://gsfcir.gsfc.nasa.gov/authors)

[Improving forecast skill by assimilation of quality-controlled AIRS temperature retrievals under partially cloudy conditions](#)

Record Type: Journal Articles

Publication: [GEOPHYSICAL RESEARCH LETTERS](#)

Author(s): Reale, O.; Susskind, J.; Rosenberg, R.; Brin, E.; Liu, E.; Riishojgaard, L. P.; Terry, J.; Jusem, J. C.

Publication Date: 2008 APR 25

Keyword(s): [Geosciences, Multidisciplinary](#)

[Observation sensitivity calculations using the adjoint of the Gridpoint Statistical Interpolation \(GSI\) analysis system](#)

Record Type: Journal Articles

Publication: [MONTHLY WEATHER REVIEW](#)

Author(s): Zhu, Yanqiu; Gelaro, Ronald

Publication Date: 2008 JAN

Keyword(s): [Meteorology & Atmospheric Sciences](#), [RECURSIVE FILTERS](#), [NUMERICAL ASPECTS](#), [COVARIANCES](#), [AIRS](#)

Conclusions and Next Steps

- Although specific data sets are not usually cited, EOS data cited in the literature ultimately came from the NASA DAACs or affiliated data centers.
- Journals that published papers using EOS data are diverse: MODIS, especially, is cited in non-traditional Earth science journals. Many papers are from international journals.
- EOS papers tend to be published in journals with high Journal Impact Factors and are highly cited.
- Next Steps
 - Extend WoS analysis through 2011 and 2012.
 - Re-analysis of 2009 results
 - Incorporate results from Goddard Library Repository authors collection
 - Further explore WoS citation tools

Questions?

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 - NASA Goddard Library
 - Eugene.R.Major@nasa.gov
 - <http://www.istl.org/11-fall/article1.html>
 - <http://gsfcir.gsfc.nasa.gov/authors>