



Scientometric study of Doctoral theses of Physical Research Laboratory

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Summary

- Introduction
- About PRL
- About PRL Library
- Scope & Methodology of the study
- Data Collection
- Data Analysis
- Findings

The background of the slide features a repeating pattern of stylized, light blue leaves. Each leaf is composed of several pointed lobes radiating from a central vein, creating a delicate, lace-like appearance. The leaves are rendered in a light blue color that blends with the overall light blue gradient of the slide.

■ *Introduction*

Research

“Systematic investigation into and study of materials, sources, etc in order to establish facts and reach new conclusions”

Measuring Research

Objectives :

- Identification of frontier areas of research
- Direction of scientific research
- Allocation of funds

Tools :

- Publication output
- Citation data

Study of Publications is Bibliometrics

Bibliometrics

- Pritchard defines it as :
- “ The branch of information theory that attempts to analyze quantitatively the properties and behavior of recorded knowledge”
- BSI defined it as :
- “The study of the use of documents and patterns of publication in which mathematical and statistical methods have been applied”

Major contributors

- **Derek J De Solla Price**
 - Little Science, Big Science (1963)
 - Networks of scientific papers (1965)
- **Eugene Garfield**
 - Essays of an information scientist
 - Scientometrics (1978)

Scientometrics

- The science of measuring and analyzing science. In practice, scientometrics is often done using bibliometrics i.e. measurement of (scientific) publications

Citations : A Scientometric tool

- Citations - references appended to articles in scholarly journals
- Important scientific tradition
- Giving credit to related work
- Showing one's awareness of related research
- Providing background reading material
- Supply information for comparison

Citation Analysis

- Statistical analysis of the citations appearing at the end of each document
- Indicate the visibility and use of certain documents for the purpose of study

Doctoral Thesis

- A **dissertation or thesis** is a document submitted in support of candidature for a degree or professional qualification presenting the author's research and findings

The background of the slide features a repeating pattern of stylized, light blue leaves with prominent veins, set against a light grey gradient background. The leaves are arranged in a way that they appear to be overlapping and filling the space.

■ About PRL

The Physical Research Laboratory was established to fulfill the vision of Dr. Vikram A. Sarabhai:

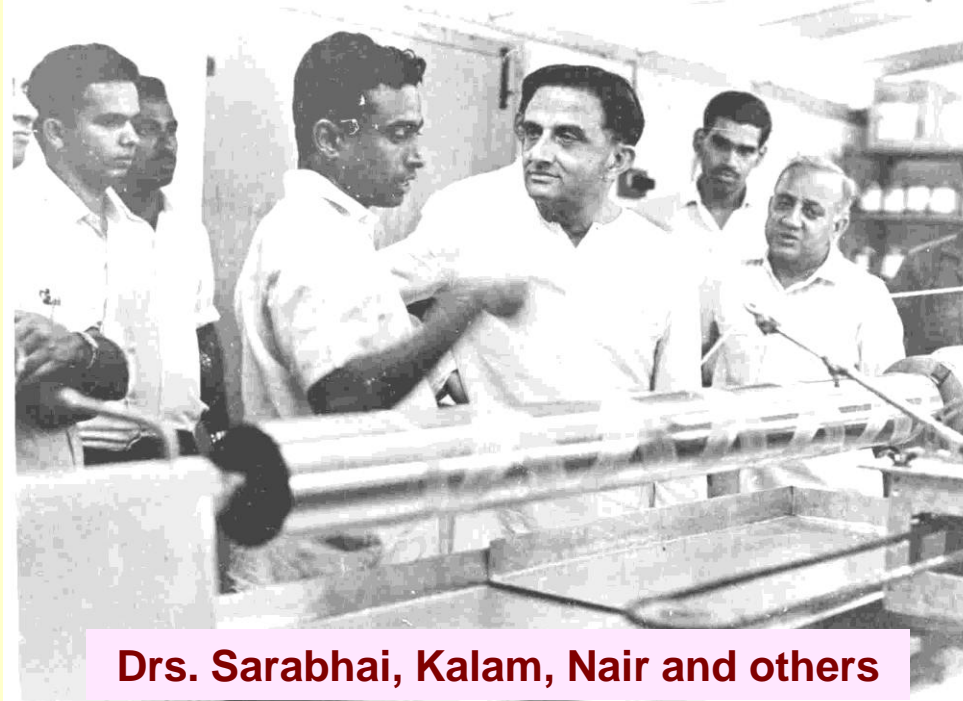


“Countries have to provide facilities for its nationals to do front rank research within the resources that are available. It is equally necessary having produced the men who can do research, to organise task oriented projects for the nation’s practical problems.”

The first step to set up PRL was taken in 1947 when Dr. Sarabhai established a laboratory for Cosmic Ray Studies in his home “RETREAT”



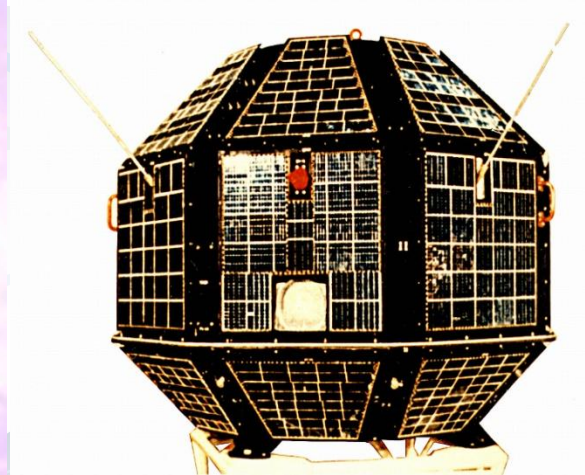
Scientists from PRL initiated Space Science Research by contributing significantly to the scientific and technical developments. Thus PRL became the “cradle” of Indian Space Research Program.



Drs. Sarabhai, Kalam, Nair and others



Rocket Launch from Thumba

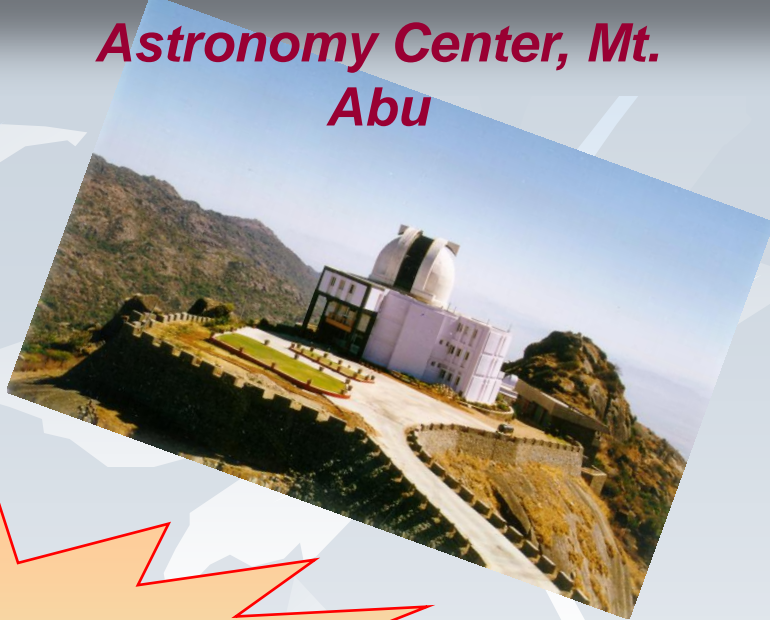


Aryabhata Satellite Balloon Launch from Hyderabad

Main Campus, Ahmedabad



Astronomy Center, Mt. Abu



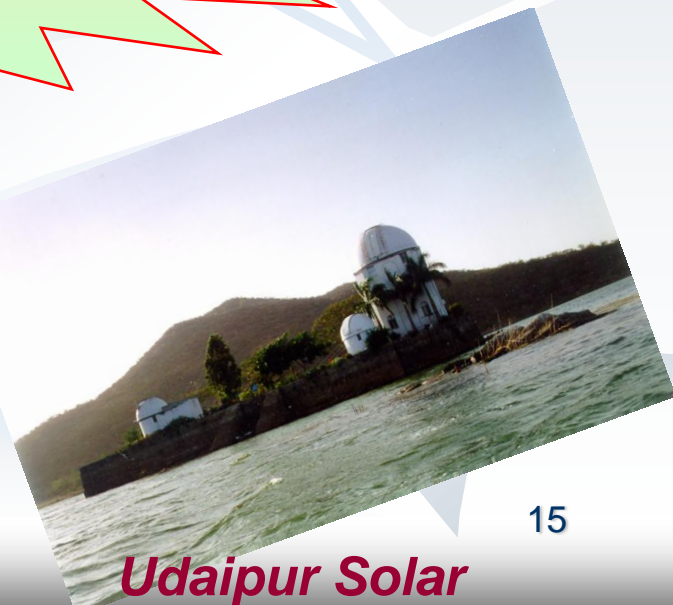
Currently PRL research is carried out at four Campuses:



15 Feb 2010

Thaltej Campus,

LISA VI



15

Udaipur Solar

Evolution of Research Activities

→ **1950s & 60s:**

Aeronomy and Cosmic rays

→ **1970s:**

Planetary and Geosciences

Infra-Red Astronomy

Plasma Physics- This programme led to the formation of Institute for Plasma Research (IPR) which became a separate entity in 1986

Evolution of Research Activities

- **1980s :** *Solar Physics : Udaipur Solar Observatory becomes part of PRL (1981)*
The 1.2 m Telescope was commissioned at Mt. Abu (1986)
- **1990s :** *High Energy Physics Group*
- **Since 2000:**
Submillimeter Astronomy
Planetary Exploration (PLANEX) Programme

Profile of Scientific Activities

Basic Sciences

Infrared & Radio Astronomy, Solar Physics
Atomic & Mol. Physics
High Energy Physics
Astroparticle Physics & Cosmology
Nuclear Physics
Computational Physics

Space & Atmospheric Sciences

Upper Atmospheric Studies
Middle Atmospheric Studies
Laboratory Astrophysics
Planetary Atmospheres
Infrared & Radio Astronomy
Sub - mm Astronomy
Solar Physics

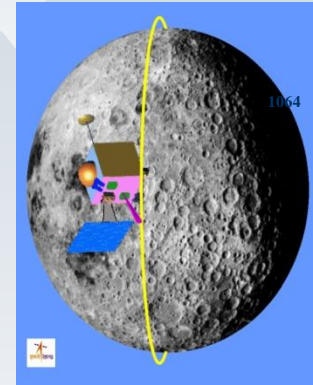
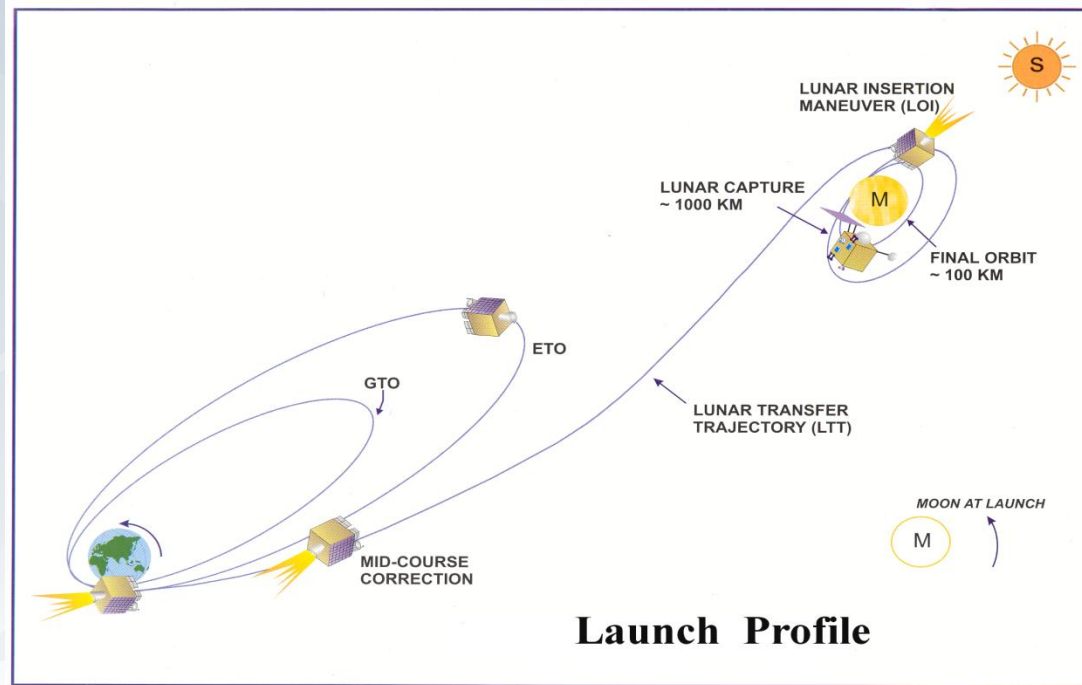
Planetary & Geo Sciences

Evolution of Solar System
Planets, Moon & Meteorites
Isotope Geology & Geochemistry
Palaeoclimate :
Short & Long Time Scales
Hydrology
Evolution of Indian Lithosphere

INDIA'S MISSION TO MOON

CHANDRAYANA - I

P
S
L
V



Scientific objective of Moon Mission is to understand the origin and evolutionary history of moon:

- 3D topographic atlas of the Moon
- High resolution mineralogical and chemical mapping of polar regions
- Distribution of ^{222}Rn , ^{210}Pb , other radioactive elements and some Rare Earths



- About PRL Library



Physical Research Laboratory, Ahmedabad

LIBRARY AND INFORMATION SERVICES

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PRL has always maintained an up-to-date library. The library which started from just a single room in 1948, is now spread over four campuses - the PRL main campus, the Thaltej Campus, the Udaipur Solar Observatory and the Mt. Abu Infrared Observatory. The library endeavors to facilitate the students and scientists in their research pursuits. There are

Library Collection

- **19,000 scientific & general books**
- **1946 Hindi books**
- **1000 videos/CDs/DVDs**
- **32,000 bound volumes**
- **158 journals (145 available online)**
- **Reports, Maps, Reprints**

Online Archives/Resources

- **Annual Reviews**
- **IOP Archive Online**
- **Lecture Notes in Physics**
- **Physical Reviews Online Archive (PROLA)**
- **ScienceDirect**
- **SPIE Digital Library**

Library Management

- **3 Campus Libraries**
- **4 Professional staff**
- **1 Semi Professional staff**
- **5 Library Trainees (Including USO)**
- **1 Office Trainee**

Library Milestones

- ❖ **ScienceDirect (2001)**
- ❖ **FORSA Consortium (2002)**
- ❖ **Digital Library (2003)**
- ❖ **E-books (2005)**
- ❖ **CD-server (2006)**
- ❖ **RFID Security System (2007)**
- ❖ **Institutional Repository (2008)**
- ❖ **SPIE Digital Library (2009)**

Present study -Methodology

- Period of the study : 5 years (2001-2005)
- Sample : 33 bibliographies

Objectives

- 1. Citing pattern from print towards electronic resources
- 2. Types of Resources used :
books, journal articles, proceedings,
monographs, reports, doctoral theses, etc.

Data Collection

- Reference data was collected for each thesis comprising of title of the journal, other type of resources like books, reports, proceedings, monographs and the year of publication
- The journal names were then tagged for 'Subscribed title' or 'Non-subscribed title'.

Data Collection

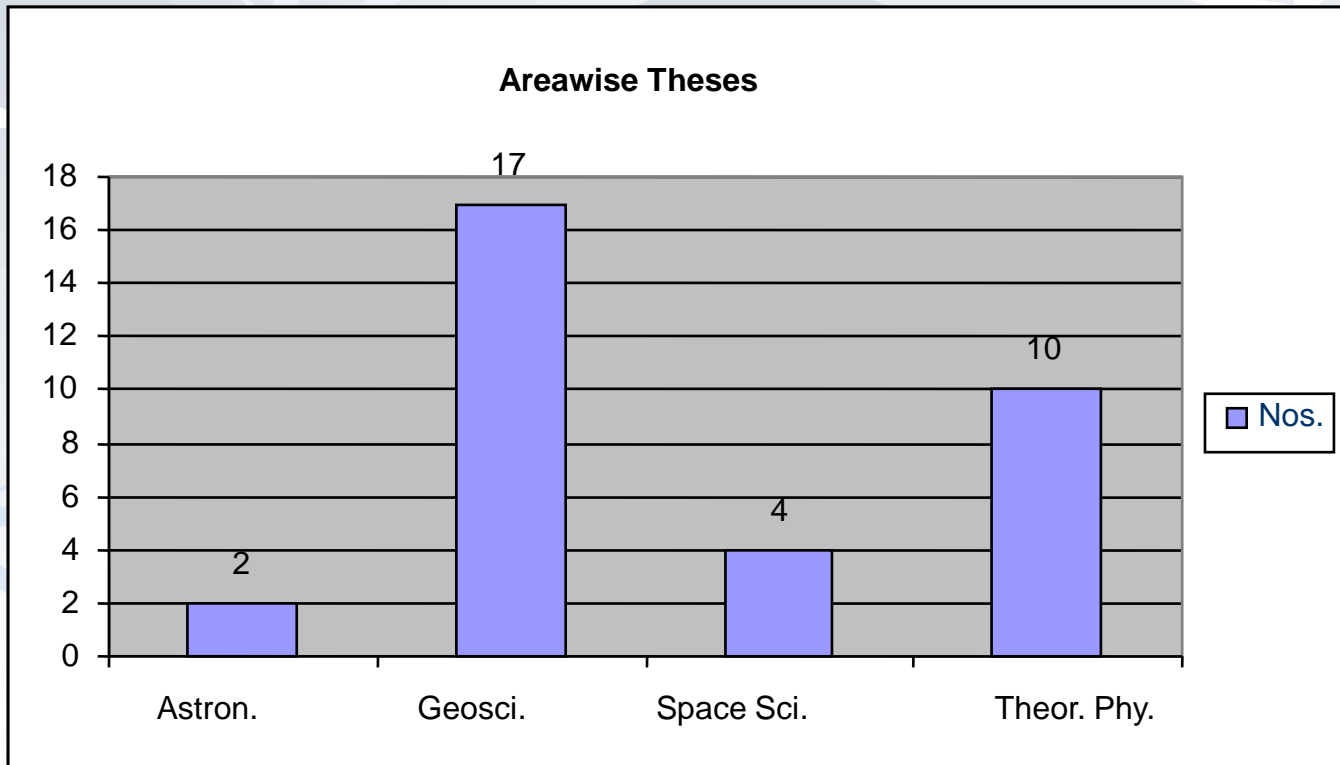
- Sample was also classified into
 - ✓ Print resources
 - ✓ Electronic resources
- Starting of online subscription
- Care was taken to consider the backfile access given by the publisher at the time of online subscription

Data Analysis

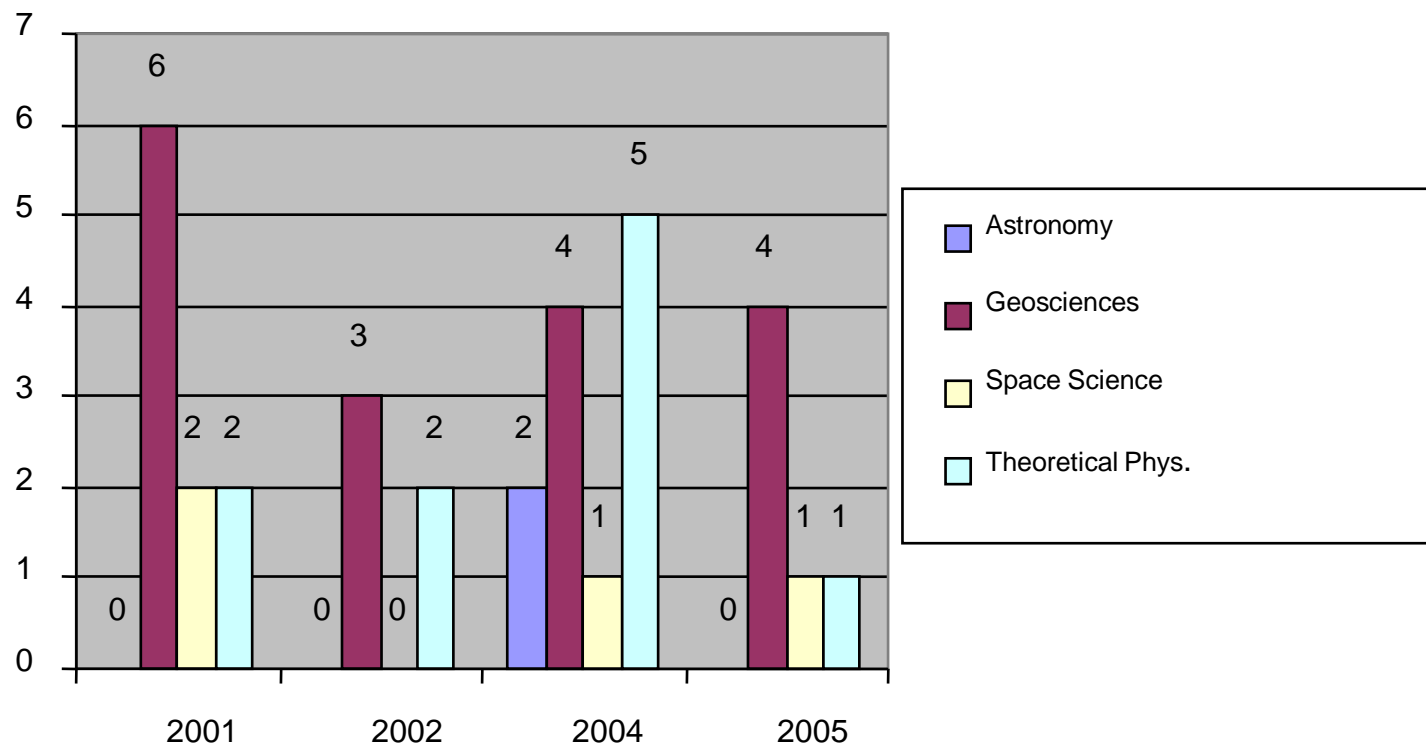
- Yearwise distribution of 33 Bibliographies is :
 - 2001 – 10
 - 2002 - 5
 - 2004 – 12
 - 2005 - 6

Data Analysis

- Subjectwise (Divisionwise) distribution of these 33 theses is :
 - Astronomy & Solar Physics – 2
 - Geoscience & Planetary Science – 17
 - Space & Atmospheric Science – 4
 - Theoretical & High Energy Physics - 10



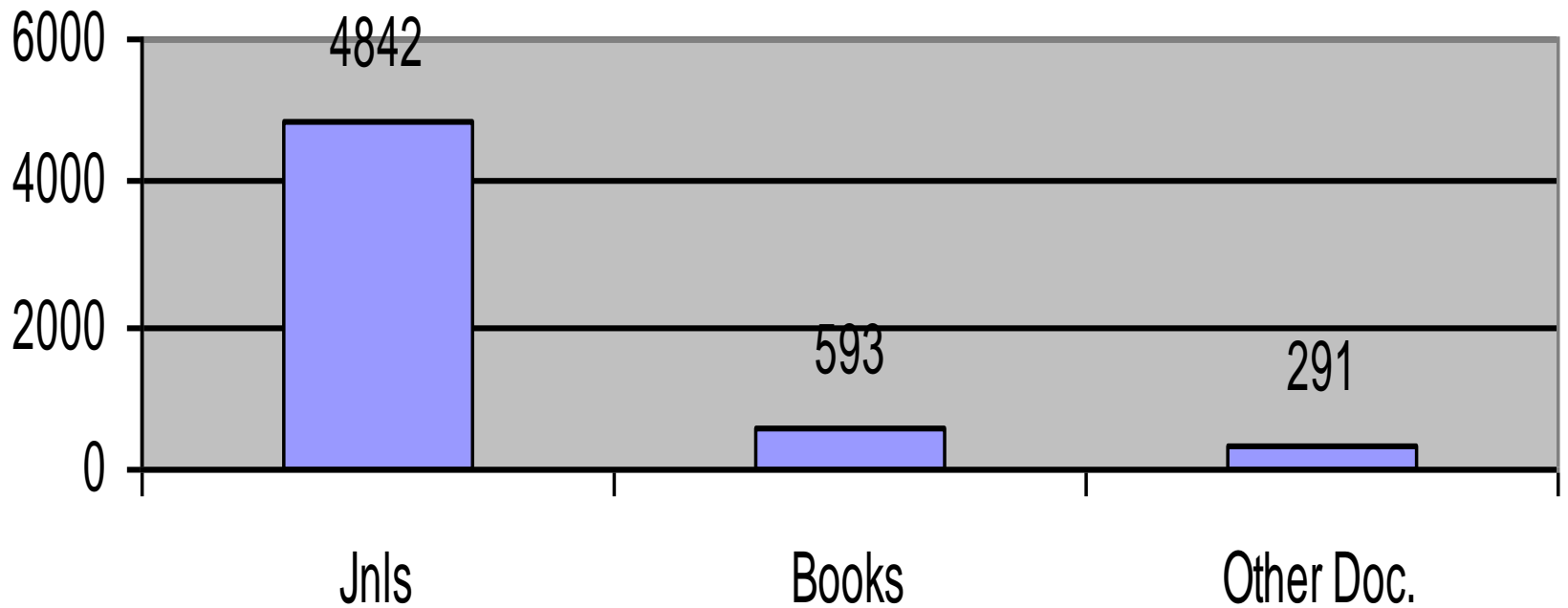
Yearwise Areawise No. of Theses



Types of Resources used

- Journals - 4842 (84.56%)
 - Books - 593 (10.35%)
 - Other Doc. - 291 (5.08%)
-
- Total – 5726 References

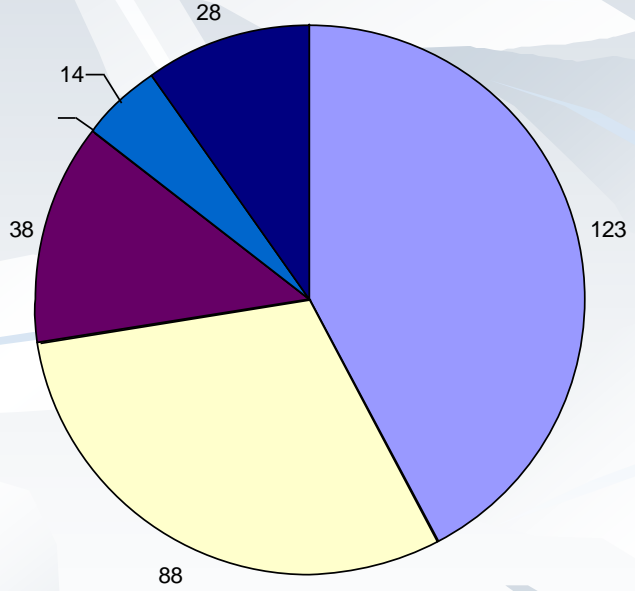
Type of Resources used



Other Resources used

- Reports - 123
 - Proceedings - 88
 - Theses - 38
 - Monographs - 14
 - Eprints - 28
-
- Total No. of 'Other Documents' - 291

Other Resources Used



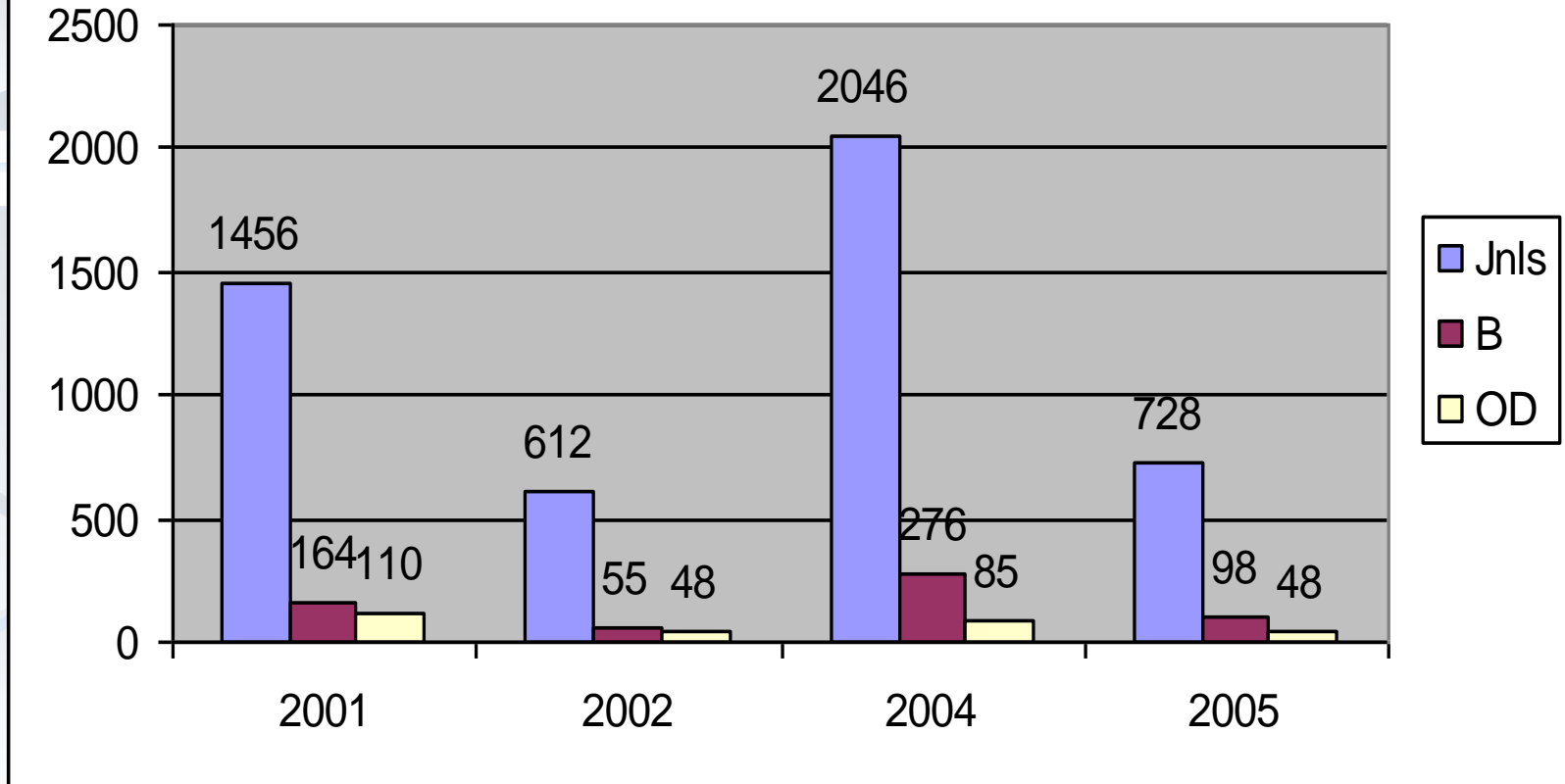
- Reports
- Proceedings
- Theses
- Monographs
- Eprints

Types of Documents used

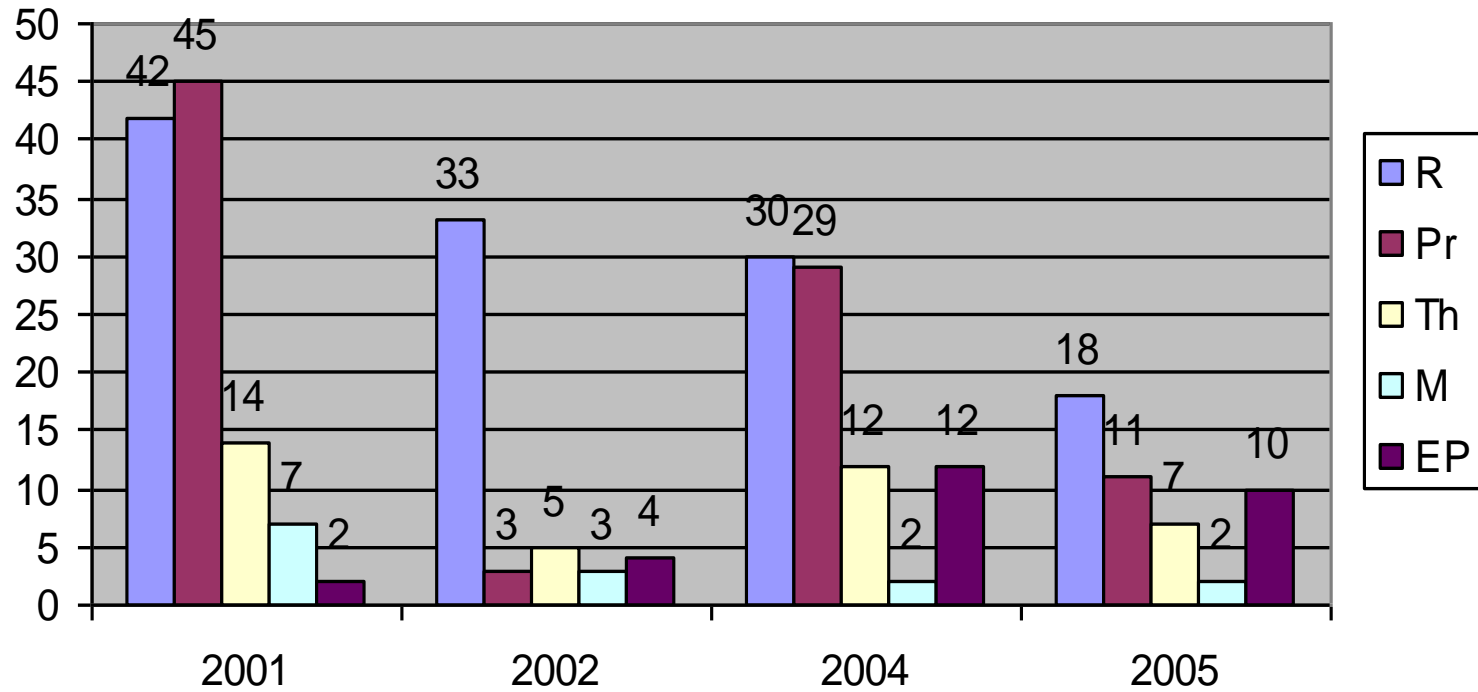
- Yearwise

	2001	2002	2004	2005
Theses	10	5	12	6
Journals	1456	612	2046	728
Books	164	55	276	98
Other Documents	110	52	85	48

Types of Documents



Other Documents

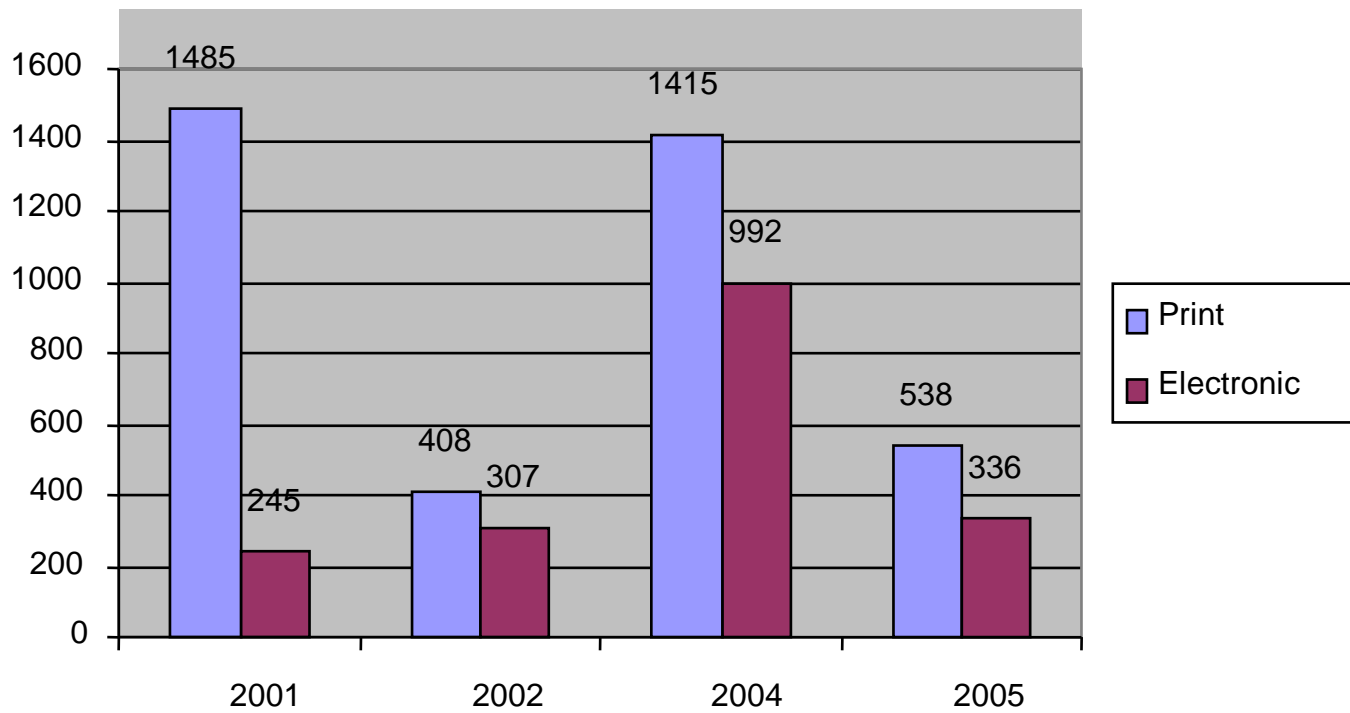


Print versus Electronic

- Yearwise

	2001	2002	2004	2005
Print	1485	408	1415	538
Electronic	245	307	992	336

Print Vs Electronic

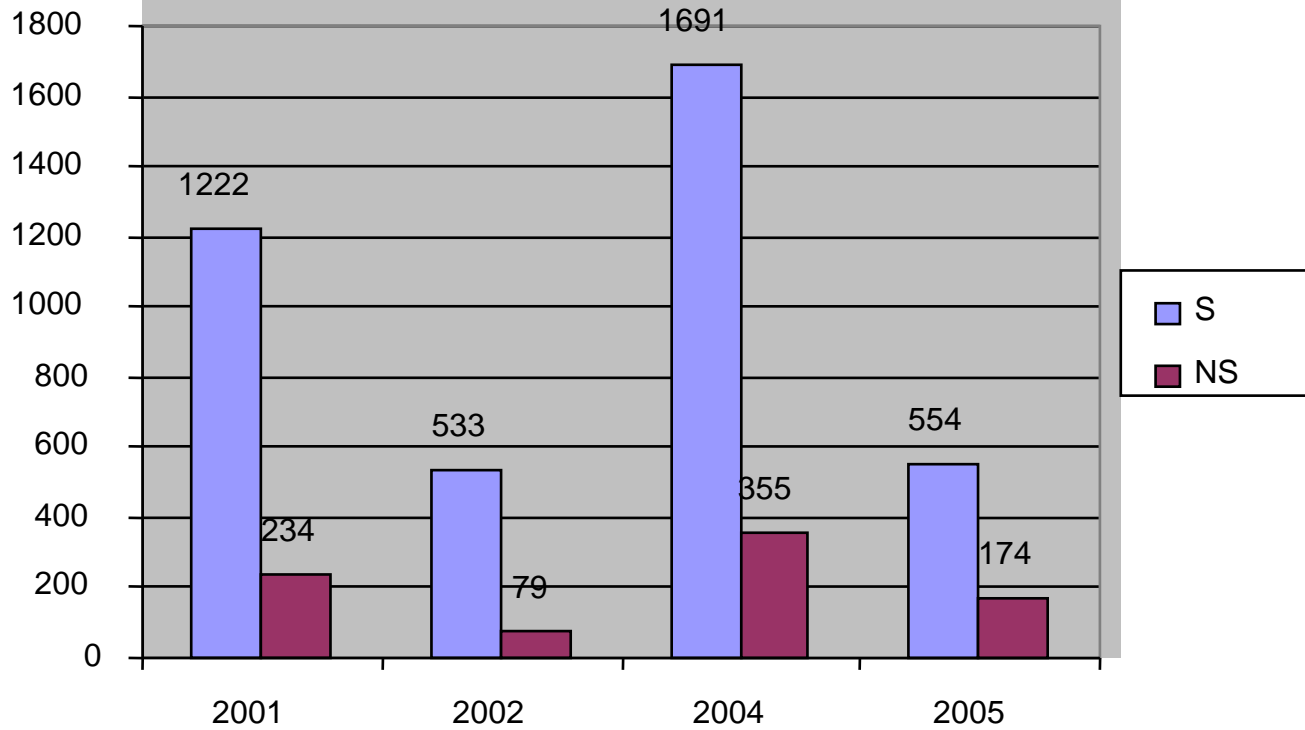


Subscribed versus Non-subscribed

- Yearwise

	2001	2002	2004	2005
Subscribed Jnls	1222	533	1691	554
Non-subscribed Jnls	234	79	355	174

Subscribed Vs Non-subscribed

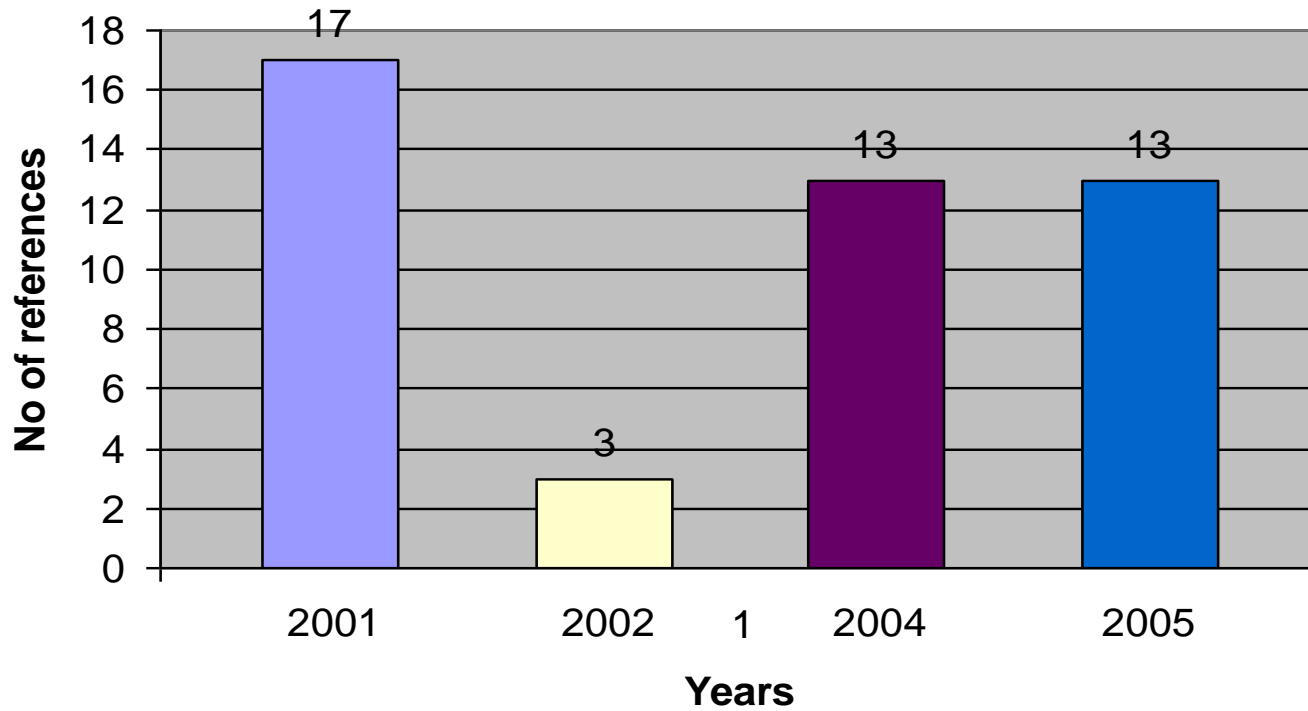


Open Access Resources

- Yearwise

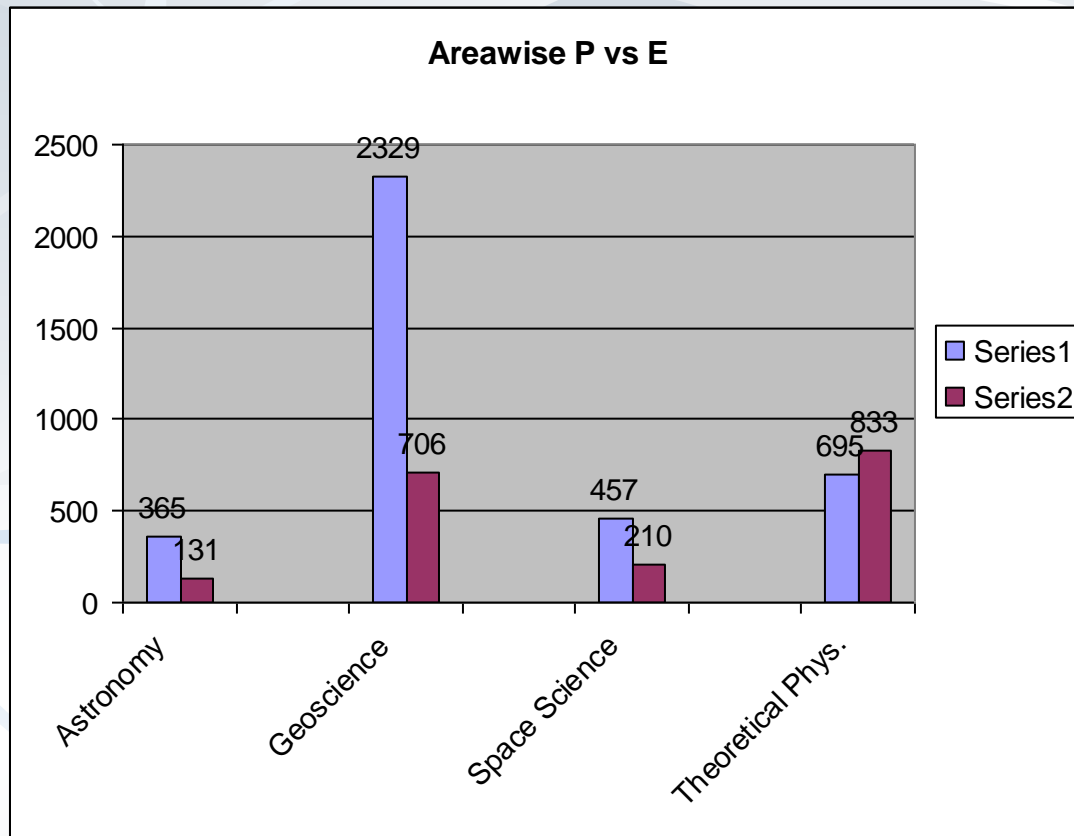
	2001	2002	2004	2005
Open Access Documents	17	4	13	13

OA resources used

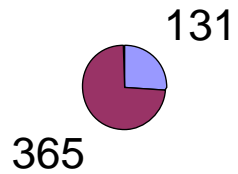


Areawise E vs P

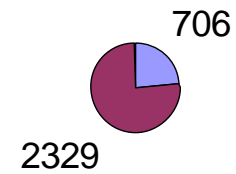
■ Area	Electronic	Print
■ Astronomy	131	365
■ Geosciences	706	2329
■ Space Sci.	210	457
■ Theoretical Phys.	833	695



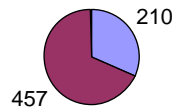
Astronomy (P vs E)



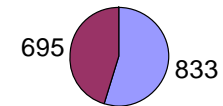
Geosciences (P vs E)



Space Science (P vs E)



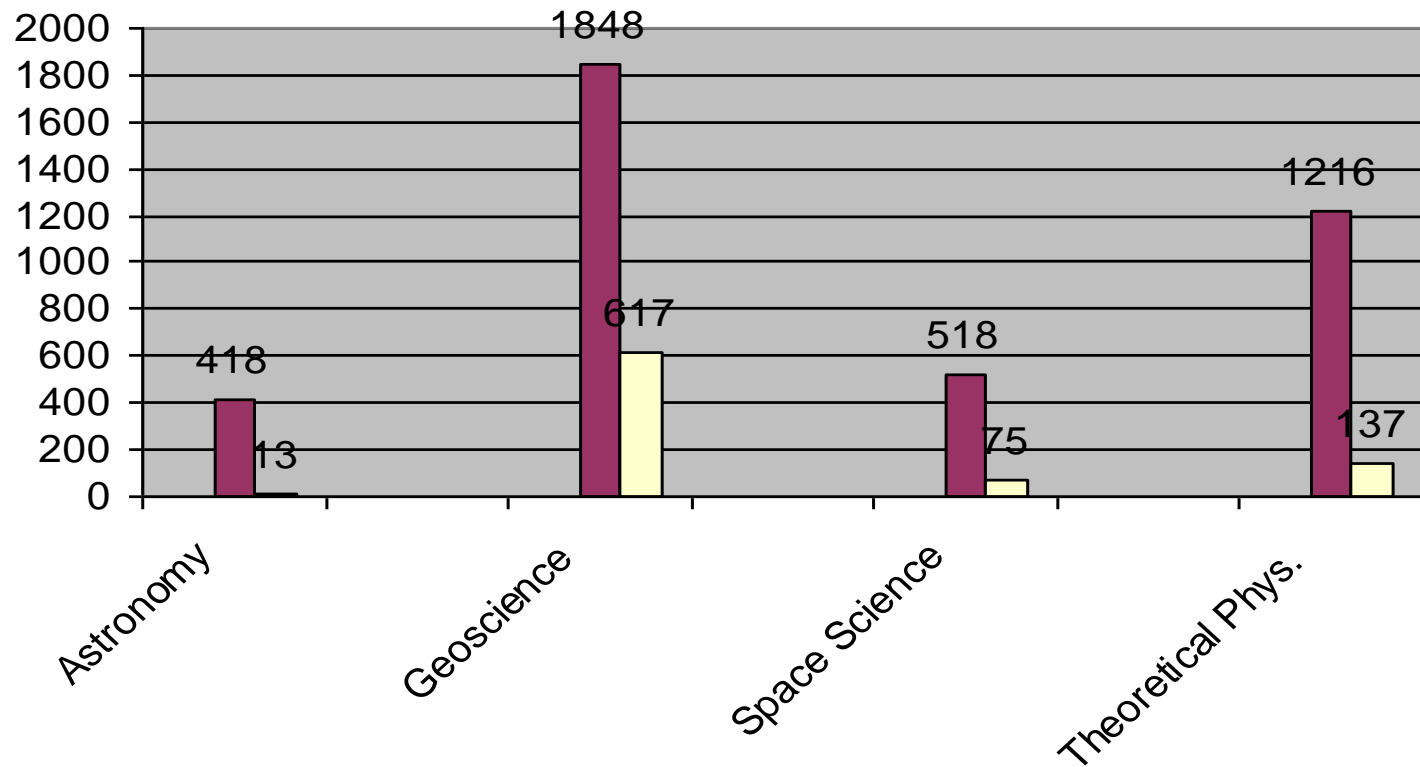
Theoretical Phys.(P vs E)



Areawise usage of subscribed & nonsubscribed journals

Astronomy		418	13
Geoscience		1848	617
Space Science		518	75
Theoretical Phys.		1216	137

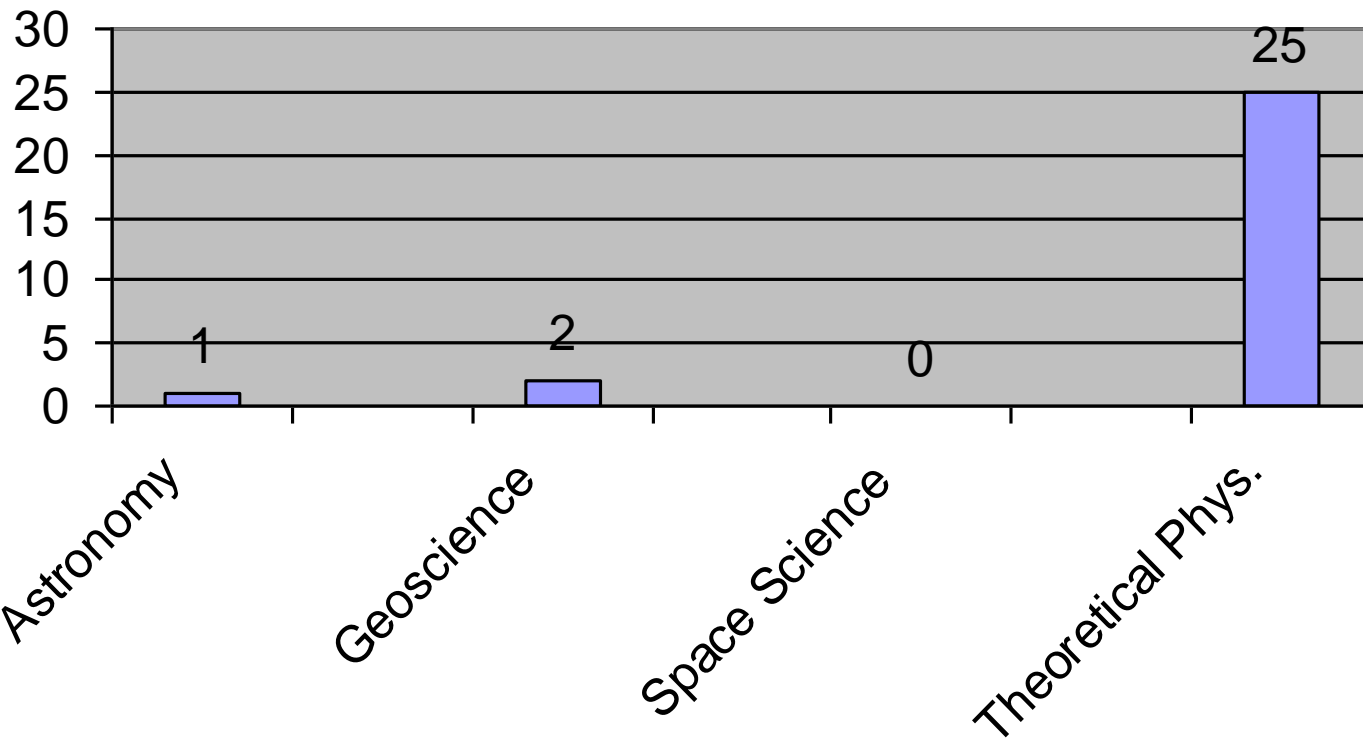
Areawise subscribed vs non-subscribed journals used



Use of E-Prints Archives

- Astronomy – 1
- Geosciences – 2
- Space Science – 0
- Theoretical Physics – 25

E-Prints archive usage

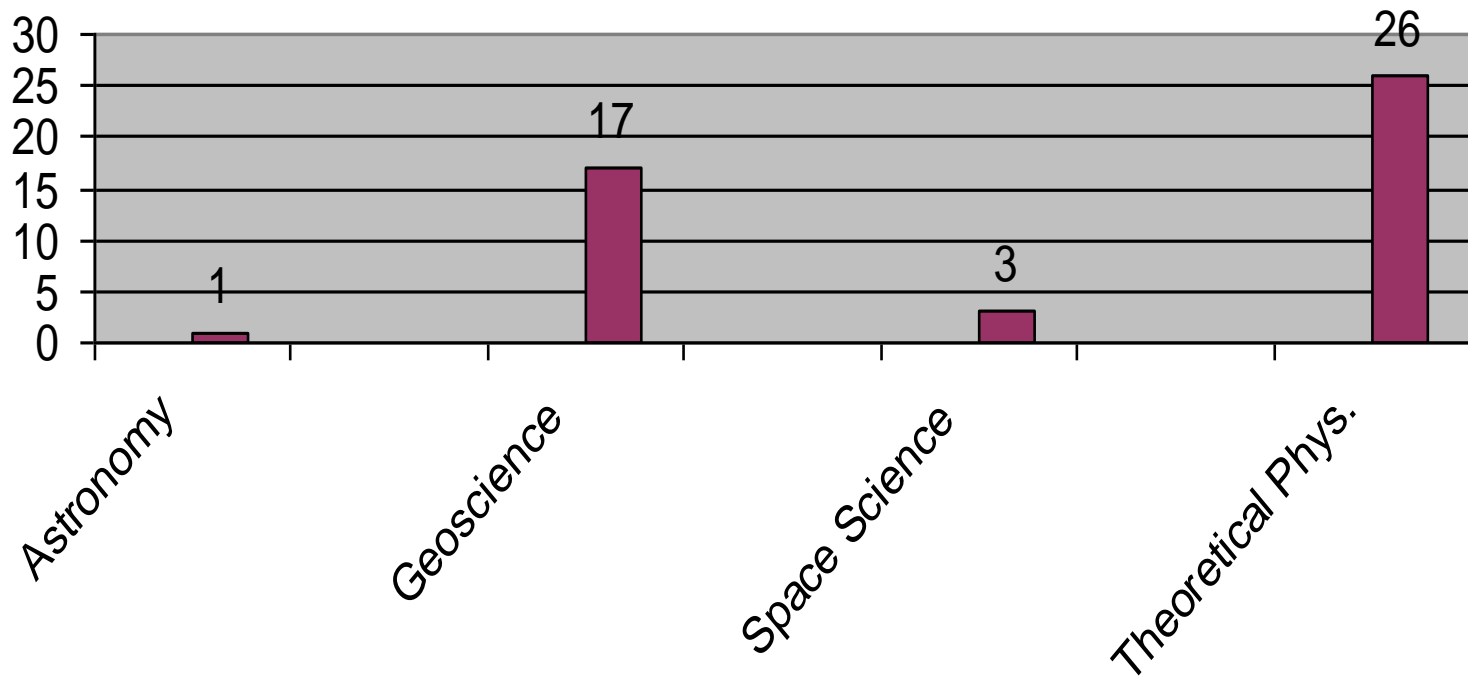


No of OA resources used

- Astronomy – 1
- Geosciences – 17
- Space Science – 3
- Theoretical Physics – 26

- Total OA resources : 47

No. of OA resources used

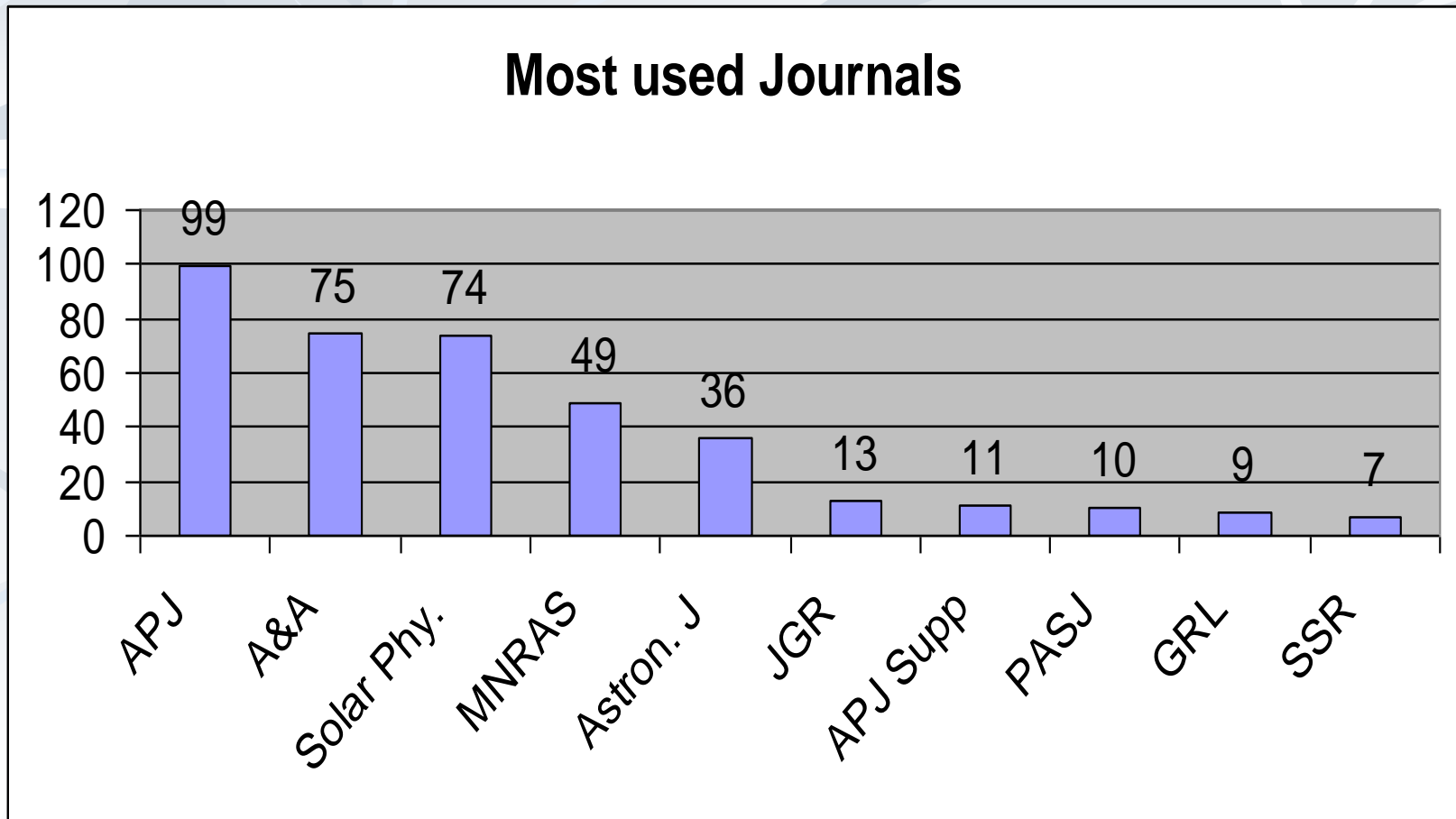


Most used Journals

- Astronomy &
- Solar Physics

APJ	99
A&A	75
Solar Phy.	74
MNRAS	49
Astron. J	36
JGR	13
APJ Supp	11
PASJ	10
GRL	9
SSR	7

Most used Jnls in Astronomy

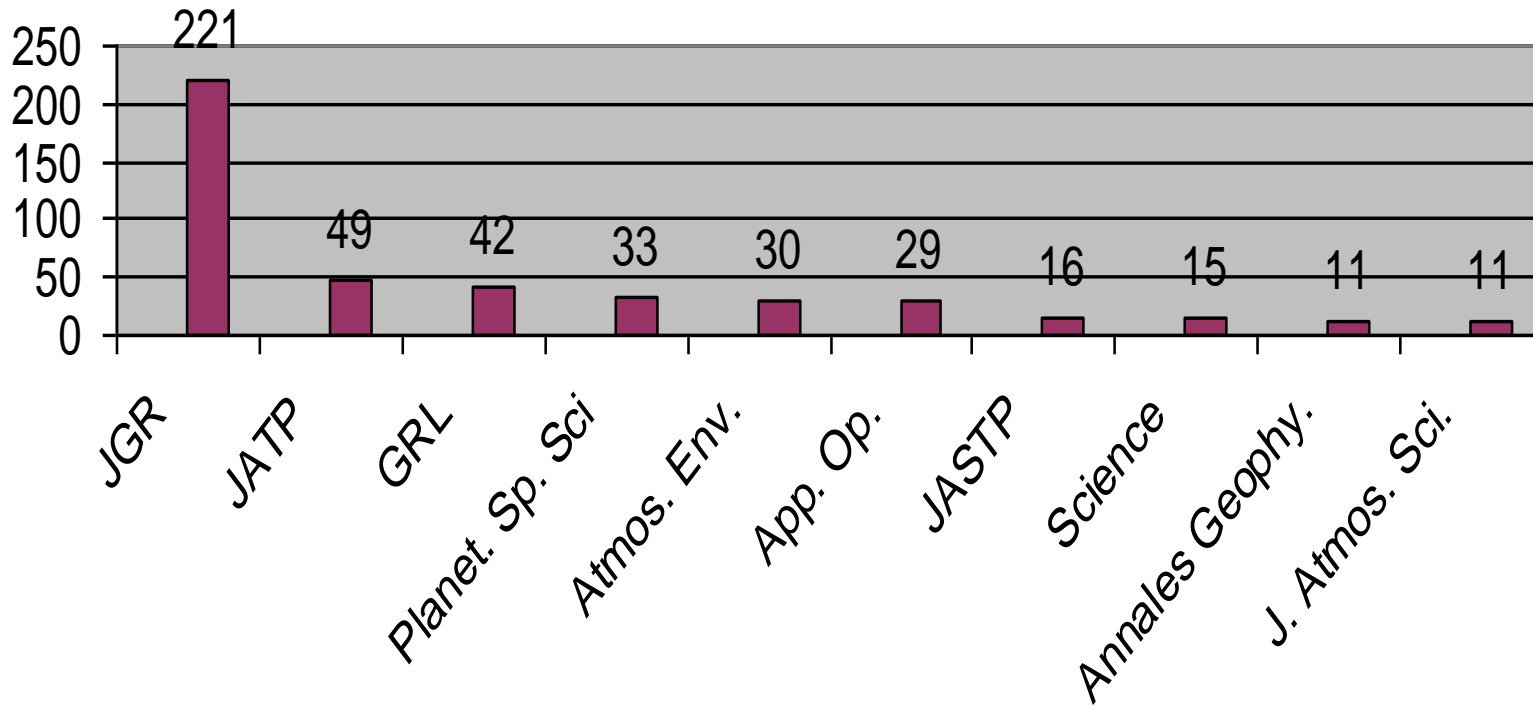


Most used Journals

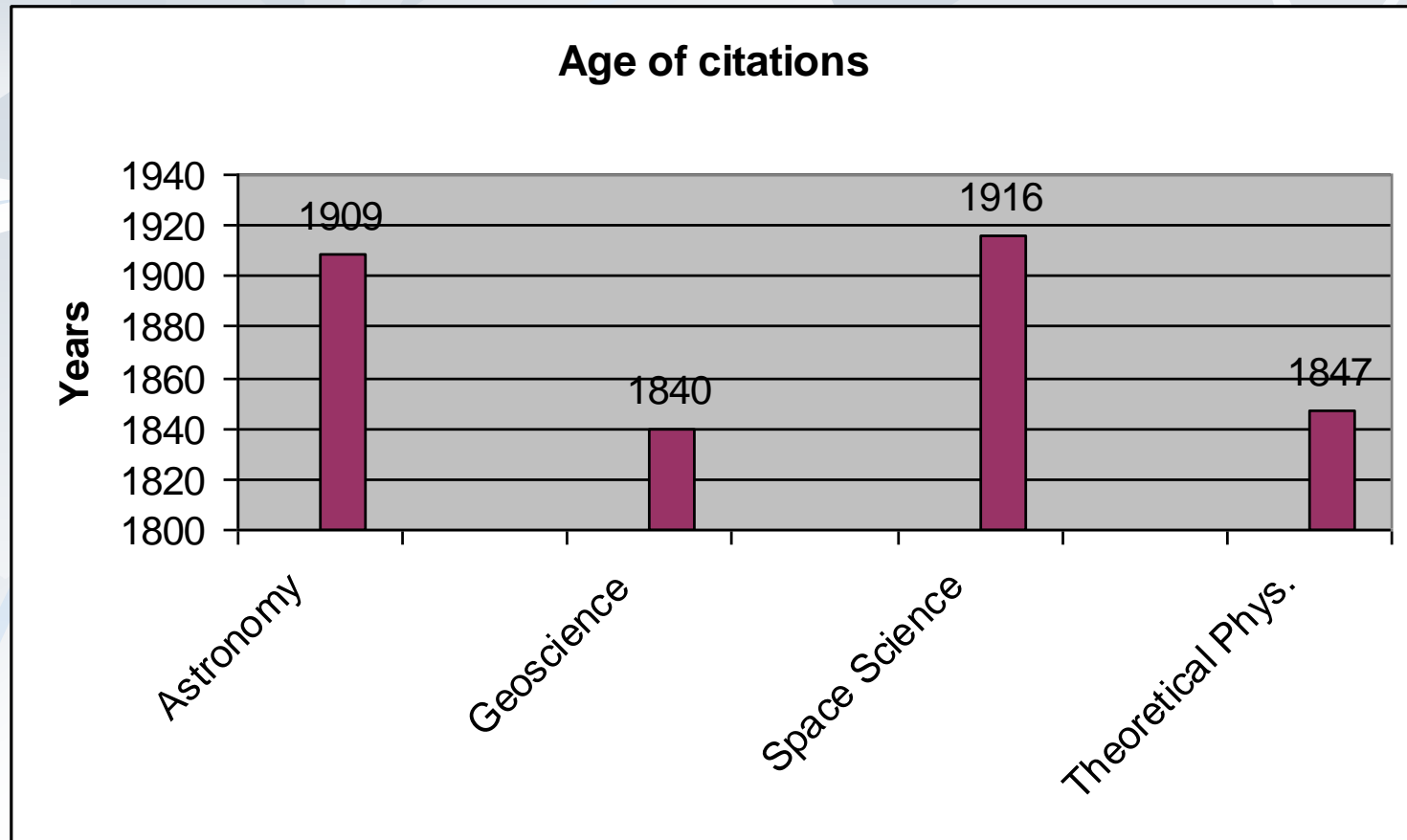
- Space &
- Atmos.
- Sciences

Journal of Geophysical Research		221
Journal of Atmospheric and Terrestrial Physics		49
Geophysical Research Letters		42
Planetary and Space Science		33
Atmospheric Environment		30
<u>Applied Optics</u>		29
J. of Atmos. and Solar-Terrestrial Phys.		16
Science		15
Annales Geophysicae		11
Journal of the Atmospheric Science		11

Most used Journals in Space & Atmos. Sciences



Age of citations



Findings

- Journal articles comprise of about 85% of the total resources, followed by Books (10%) and Other Documents (5%)
- In 'Other documents' category, most used are the Reports followed by Proceedings
- The preference for electronic resources from 2001 through 2005 confirms the findings of earlier studies

The background of the slide features a stylized, light blue and white graphic of several overlapping leaves or branches, creating a textured, organic pattern.

■ Findings

Findings

- Amongst the different areas, Theoretical Physics shows remarkable preference for electronic resources
- Most preferred journals in Astronomy
 - *Astrophysical Journal
 - *Astronomy & Astrophysics
- Most preferred journals in Space & Atmospheric Sciences
 - Journal of Geophysical Research
 - Journal of Atmospheric & Terrestrial Physics

Findings

- No Indian journal appears in 10 most preferred journals in Astronomy as well as in Space & Atmospheric Sciences
- OA citation surprisingly low in Astronomy and Space Science
- Oldest citation (1840) from Geoscience division has been a surprise too !



■ **Thank you !**