

CHARACTERIZING THE BIBLIOGRAPHIC PRODUCTION OF FRENCH ASTROPHYSICS IN 2011

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Abstract. We have used the SAO/NASA ADS information system to collect a complete database of refereed publications from French Astronomy (i.e. with at least one of the authors with affiliation in a French institution). We find about 2150 publications for the year 2011 and we present some statistics to characterize the scientific production of this community. We also find a rapid increase in the number of authors per paper in the recent years.

Keywords: bibliometry

1 Introduction

In this paper we use the SAO/NASA ADS information system in order to extract and characterize a complete data collection of refereed publications issued from French Astrophysics for the year 2011.

2 Selection criteria

We have used the following selection criteria:

- Refereed articles: We have used the filter for “refereed articles” as available from the SAO/NASA ADS interface, with minor adjustments.
- Astrophysics domain: We have restricted the data collection to articles from the ADS ASTROPHYSICS database, which roughly corresponds to the Astronomy-Astrophysics (hereafter AA) domain of the French Institut National des Sciences de l’Univers (INSU).
- Affiliation in a French institution: an article is retained in the list if and only if one of the authors provides an affiliation with a French institution (i.e. with an address in France). Publications from French astronomers in international organizations such as ESO have not been retained, while productions of foreign colleagues temporarily associated to a French institution are included.

3 Query modes

In order to be very complete we have used two complementary approaches, and merged their results.

One is the *Affiliation search* mode of ADS —which is presented in the ADS system as having a “limited usefulness” due to inconsistency of this specific field in the databases. In the present context, it proved to be quite efficient, as least for recent years.

The other query mode is the classical *search by author names*: for that, lists of permanent staff have been extracted from the CNRS directory of laboratories and research units. About thirty research units or “UMR” are relevant to the AA domain. These units are generally located in Observatories (with the notable exception of AIM-SAp —a department of the French nuclear research center CEA) and they actually constitute the core of French professional astrophysics.

By using this double query approach we are rather confident that we are more than 95% complete, missing only a few papers not known to ADS, and some articles which are not signed by a permanent staff and for which the affiliation is absent or incomplete.

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4 Result: a bibliographic list of 2150 articles for the year 2011

We have compiled through the method described above a data collection of 2150 refereed articles constituting the bibliography of French Astrophysics for the year 2011. This database is managed as a *private library* within the ADS system, and is available from the author on request.

This collection is about 14% of the overall production of astrophysics that we estimate to be about 15,000 papers per year.

Of course, because of very frequent wide international co-authorship, this does not mean that French contribution counts for 14% of the total world production in the Astrophysics domain (a more correct estimation is 6%, see below).

If we restrict ourselves to the twelve principal astronomy and astrophysics journals, French production concerns 1550 articles out of a total of 10,000 papers.

4.1 In which journals do French authors publish ?

Figure 1 provides the distribution of published articles by journals: 32% are published in the European journal *Astronomy & Astrophysics* (A&A) —this is 33% of the articles published in 2011 in this journal— and 18% in the *Astrophysical Journal*.

75% of the 2150 articles are published in a journal or review focused on the astrophysics domain, while 25% appear in physics, geophysics or astroparticle journals or reviews (although we have retained from these journals only articles dealing with astrophysical topics).

5 Characterizing the production of French research units

As a reference, we first give in Fig. 1 the list of French research units sorted according to their number of permanent research staff. Only research units for which the main scientific domain is AA are listed in this Figure.

5.1 From which research units are issued the scientific publications ?

The research mode we have used for this study allowed us to precisely locate the research units in which the French authors of astrophysical publications are affiliated, among the main thirty research units of current professional French astrophysics. Note that a paper may be attributed to several research units, according to the affiliations of the different authors.

Figure 2 provides the histogram of the distribution of refereed articles issued from the main astrophysics research labs for the year 2011. Note that the total number of entries is larger than the number of articles because of the multiple authorship.

For research units dealing with several domains (e.g. astrophysics and geophysics, or astrophysics and astroparticles), this does not reflect the total number of publications of the unit, because only astrophysics publications are counted here.

About 250 articles (i.e. 12%) from our data collection are not assigned to any of the French astrophysics labs : this is mainly due to co-authorships from French colleagues from other disciplines (geophysics, chemistry, instrumentation, etc.) contributing to an astrophysical study, together with astrophysicists from other countries.

5.2 Histograms related to the first (or main) author of the paper

We have looked for those articles whose first author is affiliated in a French institution. In the following, an article is therefore attributed to a single institution. In the specific case of “Collaborations” (e.g. Planck Collaboration, HESS collaboration, etc.) we have used, whenever possible, the *corresponding author* as the main author.

Among the 2150 articles of our data collection, 42% (900 articles) have a first author in a French institution, among which 80% in one of the thirty astrophysics laboratory.

This implies that 6% of the world publication in astrophysics (900 over 15000 articles) has a first author in a French institution.

The changes in ranking from Fig. 2 to Fig. 3 tend to favor those scientific teams that carry a leadership role in collaborative projects.

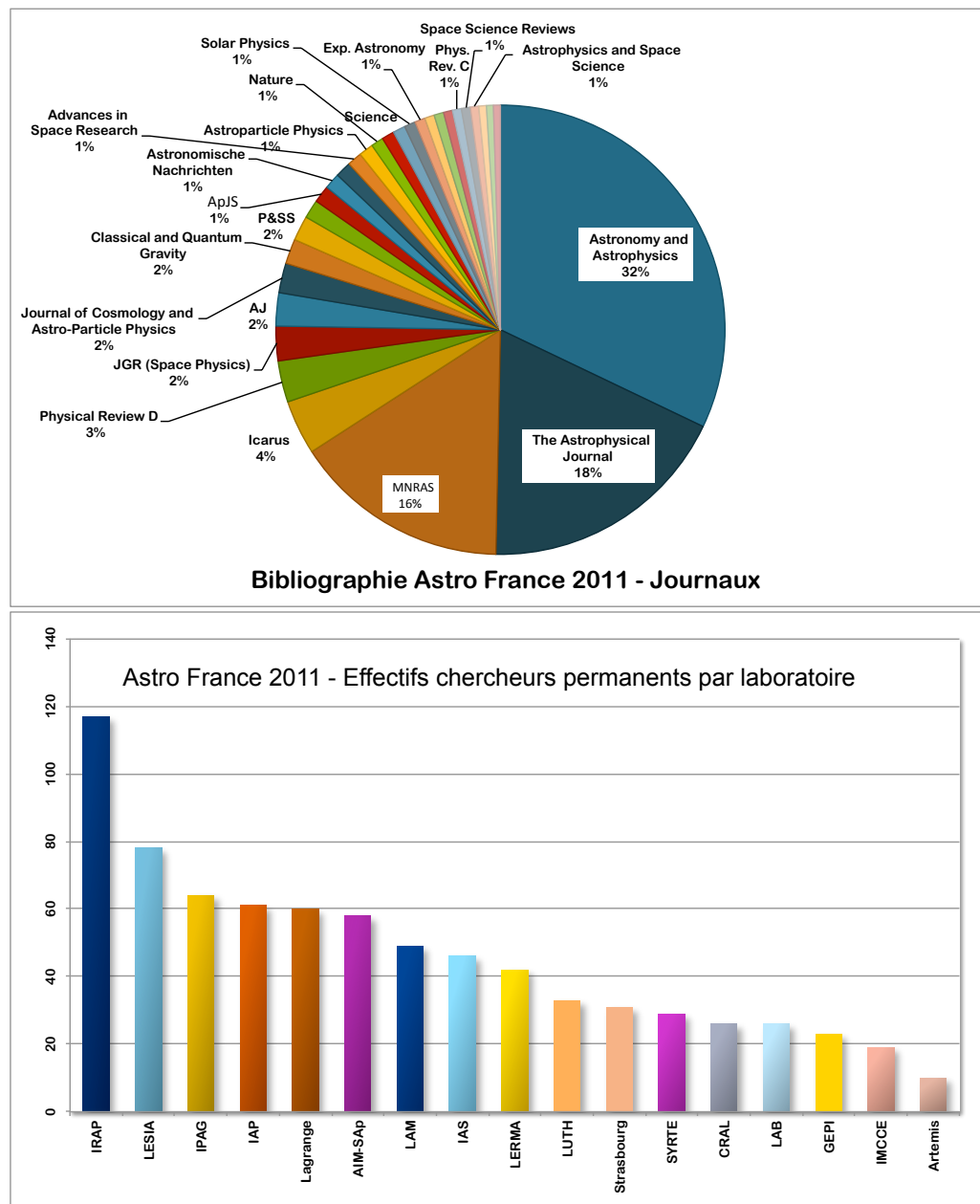


Fig. 1. Top : Bibliography Astro France 2011 : Distribution of Journals and reviews in which the articles are published. **Bottom:** French Astrophysics: number of permanent scientific staff in selected research units.

6 A striking characteristic: the number of co-authors per paper is increasing rapidly

Figure 4 illustrates the number of authors per paper. In 2011 (histogram on the right) 50% of the papers have more than 6 authors, 12% have more than 30 authors. Average is 21.

This is a recent trend, consistent with the international evolution of our science (Trimble 2009). The histograms in Fig. 4 illustrate the evolution in 5 years (2006-2011) — a period in which the number of publications of French astrophysics increased by 20%.

The fraction of single-author papers has declined from about 6% to less than 3% in five years, while the fraction of papers with more than 30 authors increased from 7% to 12%.

The median number of authors increased from 5 to 7 and the average number of authors from 11 to 21. This constitutes an important factor for explaining the yearly progression of bibliographic production of our

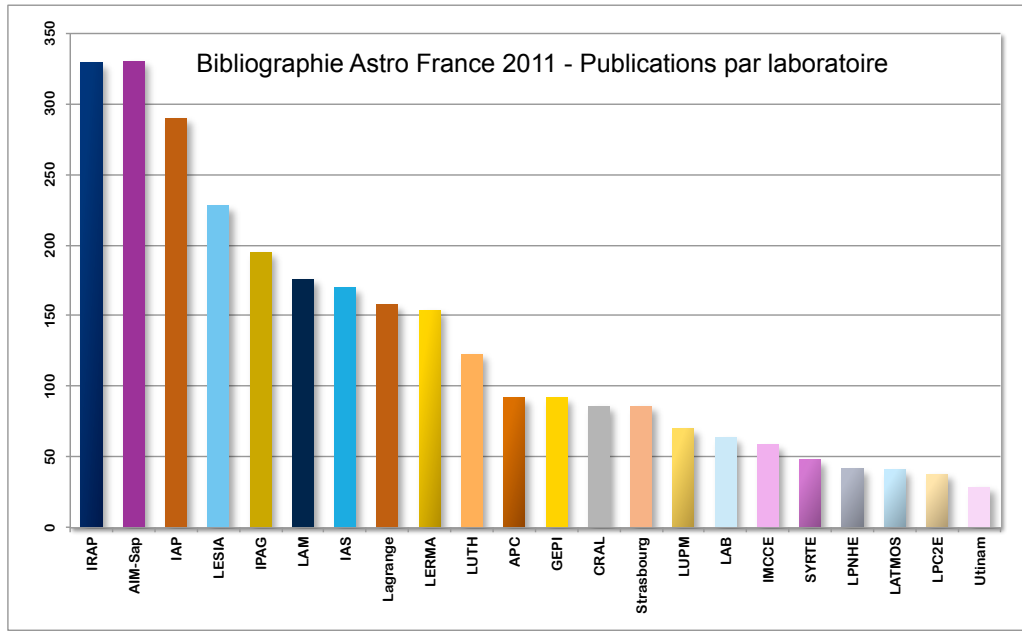


Fig. 2. Astro France 2011: research units sorted by their number of refereed publications.

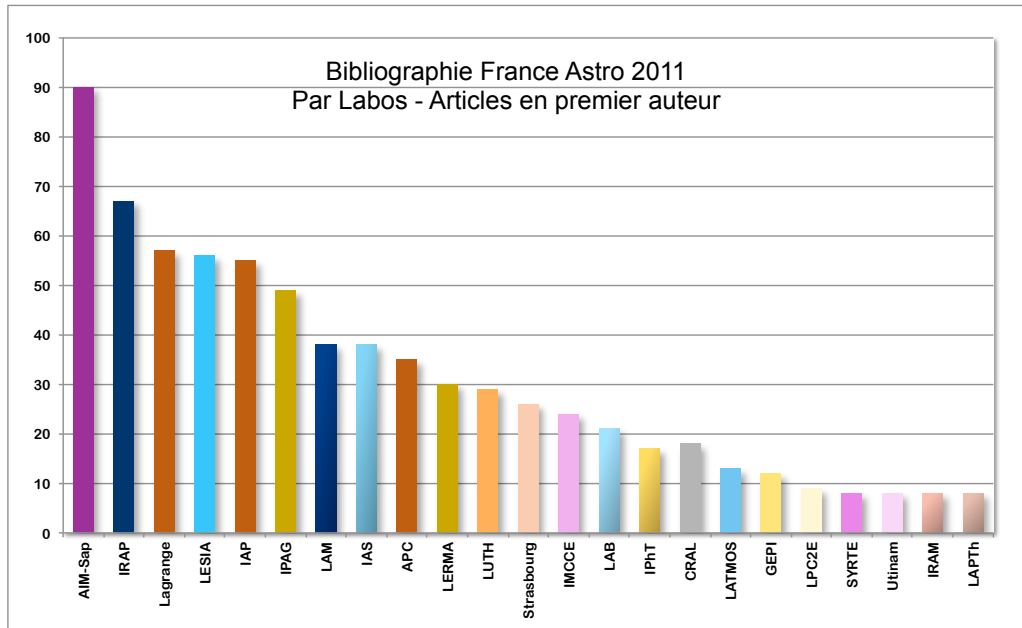


Fig. 3. Astro France 2011: research units sorted by their number of refereed publications in first author.

institutions: this reflects an increased weight of large international collaborative projects.

7 Conclusion

This paper is a first of a series to characterize the current production of French Astrophysics, and analyze the trends. The first trend shown here is a rapid increase of the number of co-authors, reflecting the growing implication in large international collaborative projects.

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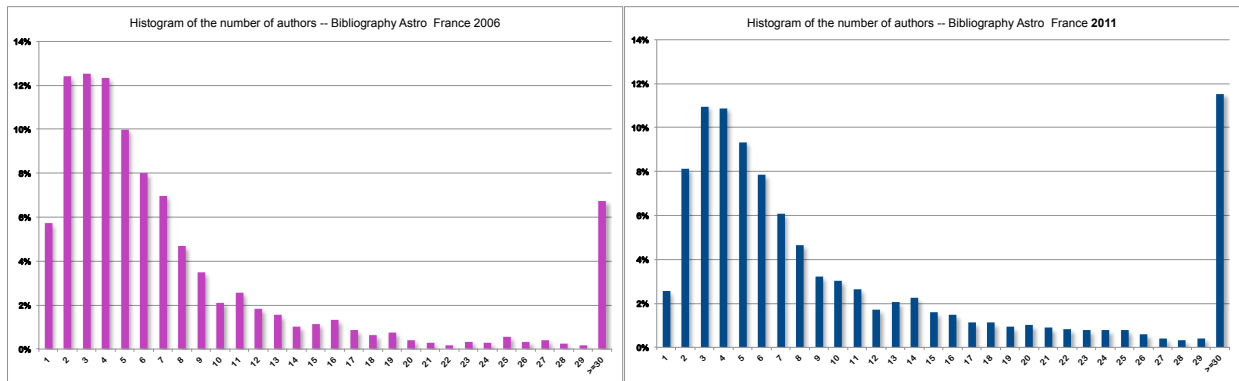


Fig. 4. Astro France 2006 (left) and 2011 (right): histograms of the number of authors per article.

This research has made use of SAO/NASA's *Astrophysics Data System*.

References

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