

# A Survey of Astronomical Research Identifying Countries in “Astronomy Development”

Valério Ribeiro<sup>1</sup>, Pedro Russo<sup>2</sup> and Alejandro Cárdenas-Avedaño<sup>3</sup>

## Introduction

Evaluating the development of any science in a country is a challenging task and numerous potential metrics have been put forward as a means to assess this development. In this project, we use the number of publications of research papers as an indicator of professional development in the field of astronomy. Indeed such work has been attempted in the past. For example, Hearnshaw (2007) surveyed the astronomical output of 63 IAU member countries as well as several non-member countries over a timespan from 1976 to 2005. Hearnshaw (2007) found a three-fold increase in the number of published papers per year over the 30 year interval. It was also suggested that the number of publications correlates with the gross national income of the country.

## Methodology

We used the author affiliation field, within the ADS Mighty Search page ([http://adsabs.harvard.edu/mighty\\_search.html](http://adsabs.harvard.edu/mighty_search.html)), to count astronomical publications, both refereed and non-refereed papers (although the latter is much more difficult to quantify due to the fact that in the majority of the cases the affiliation are not given in the ADS Abstract), by country during the periods of 1950 up to, and including, 2011. 146 countries were chosen based on their Gross National Income being less than 14,365 USD, the average for 2010. The search returned the number of papers for a given country in a given year. We then selected papers based on, our biased view, what we consider “mainstream” astronomy journals. These were, *Astronomical Journal* (including Supplements), *Astronomy and Astrophysics*, *Astrophysical Journal* (including Letters and Supplements), *Monthly Notices of the Royal Astronomical Society*, *New Astronomy* (including Reviews) and *Physical Reviews*.

## Conclusions and Discussions

What is evident from the figures is that we may separate the different countries into some general descriptions. For example, most of the countries in Europe have a good history of publishing both in astronomy and other sciences while in Africa it is difficult to say anything quantitatively. In terms of the least developed countries more investment in general sciences and culture of publishing should be done. We believe that the most successful country in developing astronomy will be that which already has a culture of publishing. To put this in context to the Office of Astronomy for Development, we believe that for a country to be successful in developing astronomy, within the lifetime of the office, the country should have a good well established publishing (not necessarily in Astronomy) record or invest in bringing outside expertise which can play a leading role in implementing courses at the university and/or instrumentation. One immediate example is that of Burkina Faso, where the University of Ouagadougou partnered with the University of Montreal in 2006 to develop an astronomy degree and an observatory (Carignan et al. 2011).

## Future Work

We will now compare our data with the findings from Naicker & Govender (2009), where it was used data from the Global Astronomy Survey ([www.developingastronomy.org/index.php/survey](http://www.developingastronomy.org/index.php/survey)), conducted as part the Developing Astronomy Globally Cornerstone project of the International Year of Astronomy 2009. This served to identify a country’s strengths and weaknesses, which would then be used as a basis to develop improvement plans, and a baseline with which to measure change.

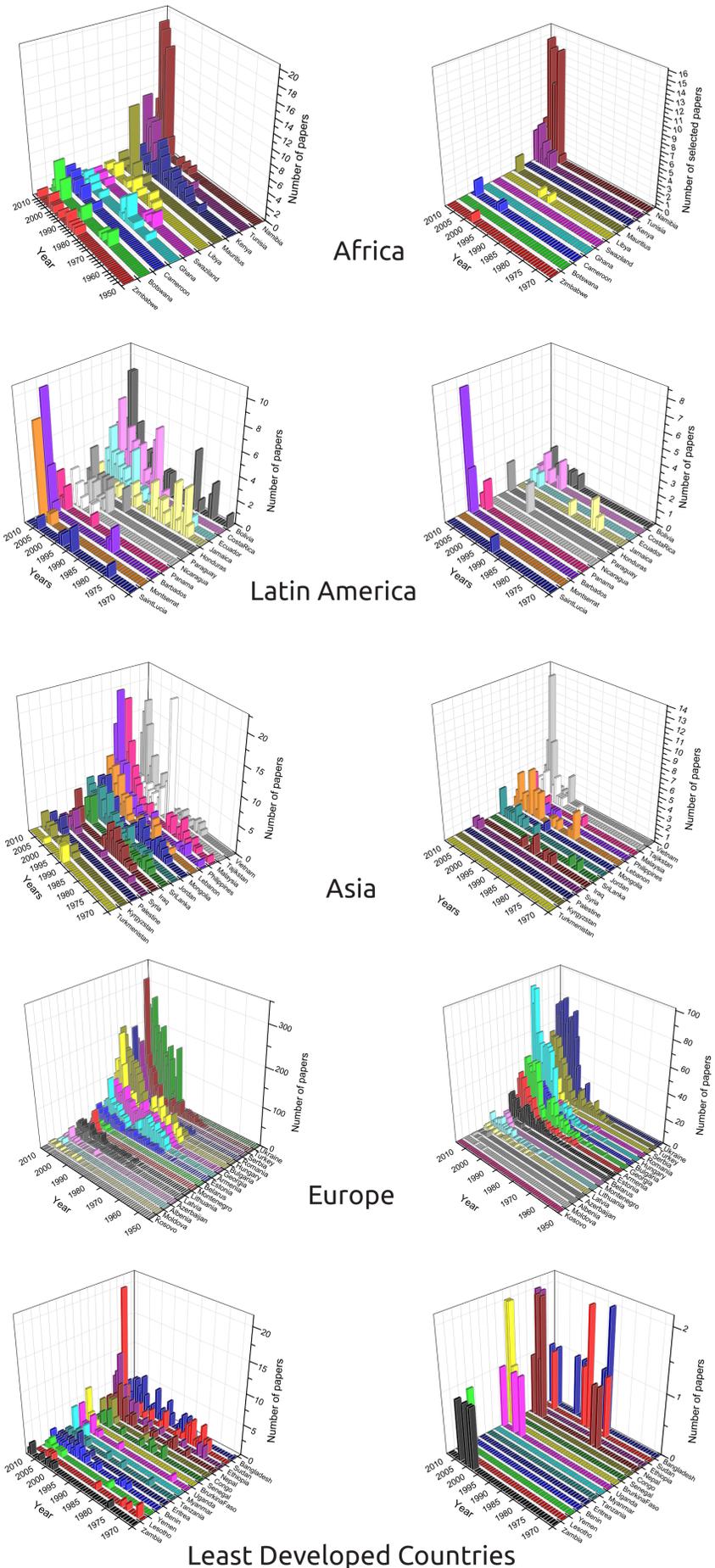
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Number of papers. *Left*: all published journals. *Right*: publications for the journals mentioned in the text.

<sup>1</sup> University of Cape Town, South African SKA Fellow, South-Africa, E-mail: [vribeiro@ast.uct.ac.za](mailto:vribeiro@ast.uct.ac.za)

<sup>2</sup> Leiden Observatory, EU-Universe Awareness, the Netherlands

<sup>3</sup> Universidad Nacional de Colombia, Colombia

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