*First Asia-Pacific Solar Physics Meeting*
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# Conference summary: Asia-Pacific region in the world and in astronomy

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**Abstract.** I will discuss how the Asia-Pacific region is represented in the world by using some statistical data which are population, GDP, IAU membership, and *Solar Physics* authorship. Although the Asia-Pacific region is under-represented in solar physics and astronomy in general, the situation is improving with the economical rise of China and India.

*Keywords* : Sun: general – history and philosophy of astronomy – publications, bibliography

## 1. Introduction

There are AAS SPD and AGU meetings in the US, and European Solar Physics and EGU meetings in Europe. The Asia-Pacific region has AOGS, but solar physics in the framework of AOGS has more weight in space weather and solar-interplanetary physics. The Asia-Pacific Regional Meeting of IAU can in principle be a host for solar physics meeting in our region, but the activity has so far remained rather low. The idea of initiating the first Asia-Pacific Solar Physics Meeting is to establish an equivalent of AAS SPD and European Solar Physics meetings.

Scientific research proceeds both with cooperation and competition. There is no doubt that Europe, the Americas, Africa, and Asia-Pacific region should cooperate to advance knowledge in science. However, it is an unfortunate situation that scientific researches done in Africa, South America, and Asia-Pacific region are under-represented in Europe and North America. This is partly because scientists in the former regions are not easily able to attend the conferences in the latter regions and present their research results. The obstacles are not only in the distance to travel, but in funding, language, and visa problems. The aim of Asia-Pacific Solar Physics Meeting

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is not only in increasing mutual acquaintance and cooperation among the scientists in the region, but to raise the power of Asia-Pacific solar physics community to let the other world recognize properly the solar physics research undertaken in our region.

In the following I will briefly touch on statistical data that show contributions from the Asia-Pacific region in various aspects.

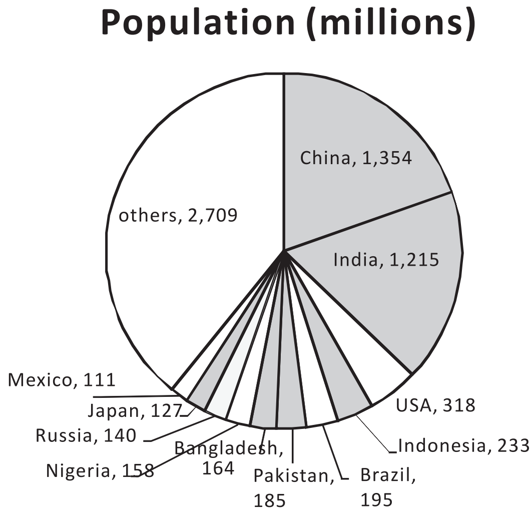


**Figure 1.** Population of the world (data from 'World Population Prospects: The 2010 Revision', http://esa.un.org/unpd/wpp/index.htm). Nations/regions with population exceeding one hundred million are shown. The Asia-Pacific regions are indicated with gray.

## 2. Population and economy

Fig. 1 shows the pie chart of population of nations (greater than hundred millions, as of 2010). China and India, combined, constitute more than one-third of world's population. More than 60% of world's population is in Asia. Fig. 2 shows the pie chart of GDP. In 2010 China surpassed Japan and has become the second largest economy in the world, Japan becoming the third. Asia contributes to about 29% of world's GDP. Significant growth in GDP is found in China, India, Singapore, and Taiwan in the Asia-Pacific region.

## 3. IAU Members

Fig. 3 shows the nation-wise distribution of IAU members (more than 100, as of 2010). As one can see, the number of IAU members is not proportional to population, and a large fraction of members are from the US and European countries. Fig. 3 may be

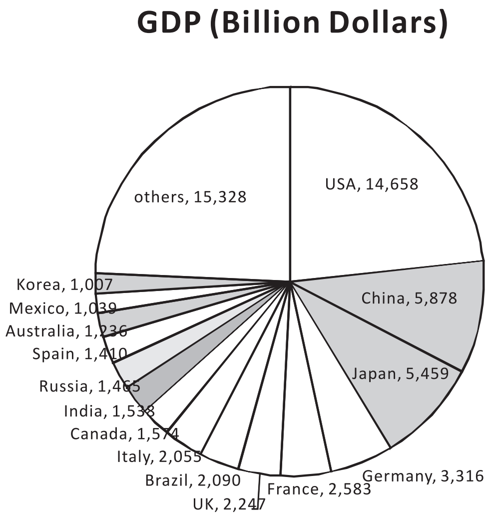


**Figure 2.** GDP (gross domestic products) of the world (data from 'IMF World Economic Outlook Database April 2011', http://www.imf.org/external/pubs/ft/weo/2011/01/weodata/index.aspx2010). Nations/regions with GDP exceeding one thousand billion US Dollars are shown. The Asia-Pacific regions are indicated with gray.

regarded as representing the sizes of astronomical communities in terms of nations and regions. If the number of IAU members is under-representing the actual number of (active) astronomers in some nations/regions, which may be the case, then the situation has to be improved by recruiting new members from those nations/regions.

**Table 1.** Top 10 Supercomputers (http://www.top500.org/)

| Rank | Site | Country | Computer | Year | Vendor | Tflops |
|---|---|---|---|---|---|---|
| 1 | RIKEN | Japan | K-Computer | 2011 | Fujitsu | 8162 |
| 2 | Natl. Supercomp. Ctr., Tianjin | China | Tianhe-1A | 2010 | NUDT | 2566 |
| 3 | Oak Ridge Natl. Lab. | USA | Jaguar | 2009 | Cray | 1759 |
| 4 | Natl. Supercomp. Ctr., Shenzhen | China | Nebulae | 2010 | Dawning | 1271 |
| 5 | Tokyo Tech. | Japan | Tsubame 2.0 | 2010 | NEC/HP | 1192 |
| 6 | Los Alamos | USA | Cielo | 2011 | Cray | 1110 |
| 7 | NASA Ames | USA | Pleiades | 2011 | SGI | 1088 |
| 8 | Lawrence Livermore | USA | Hopper | 2010 | Cray | 1054 |
| 9 | CEA | France | Tera-100 | 2010 | Cray | 1050 |
| 10 | Los Alamos | USA | Roadrunner | 2009 | IBM | 1042 |

## 4. Supercomputers

Numerical simulations are powerful tool in solar physics, and of course in scientific research in general. Astrophysics is considered to be one of the important topics

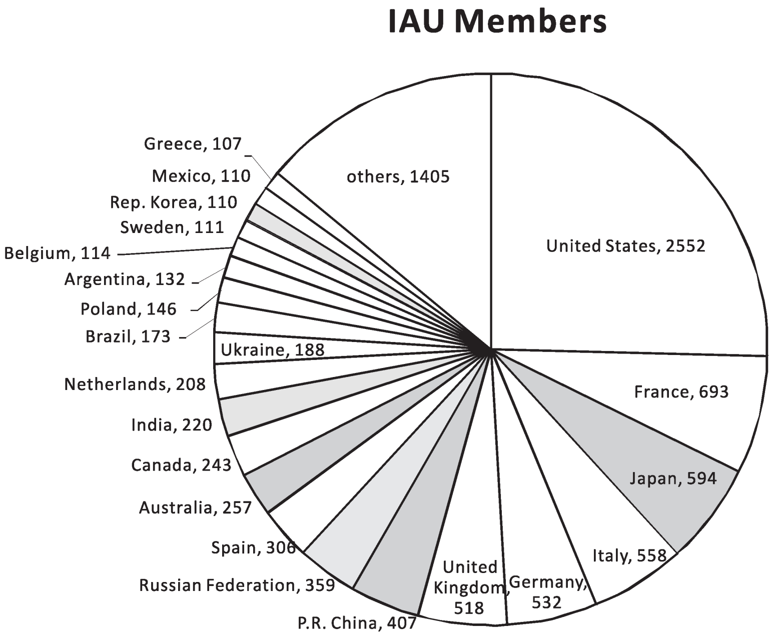


**Figure 3.** Distribution of IAU members (data from http://www.iau.org/administration/membership/individual/distribution/). Nations/regions with members exceeding 100 are shown. The Asia-Pacific regions are indicated with gray.

to be pursued by supercomputers, among other fields like plasma physics and fusion research, material science, atmospheric science and climate studies, biochemistry, and so on. Table 1 shows the top ten supercomputers as of 2011 July. Half of them are from Asia, and the K-Computer of RIKEN has become number one in 2011. K (kei) is the name of number unit for $10^{16}$ in Japan, and meant to be a 10 petaflops computer. Astrophysics and elementary particle physics is one of five strategic research targets of the K-Computer.

## 5. Journal impact factors

The impact factor is a measure of how many times on average the papers appearing in a journal are cited. The impact factor of a journal for the year 2010 is calculated by citations in that year to the papers published in 2008 and 2009 divided by the number of papers published in 2008 and 2009 in the journal. The impact factors are compiled by Thomson Reuters and published yearly as Journal Citation Reports.

Fig. 4 shows the six-year trend of impact factors of major astronomy journals. Review journals (*Annual Reviews of Astronomy and Astrophysics*, *Space Science Reviews*, etc.) tend to have higher impact factors, but they are not included in this graph.

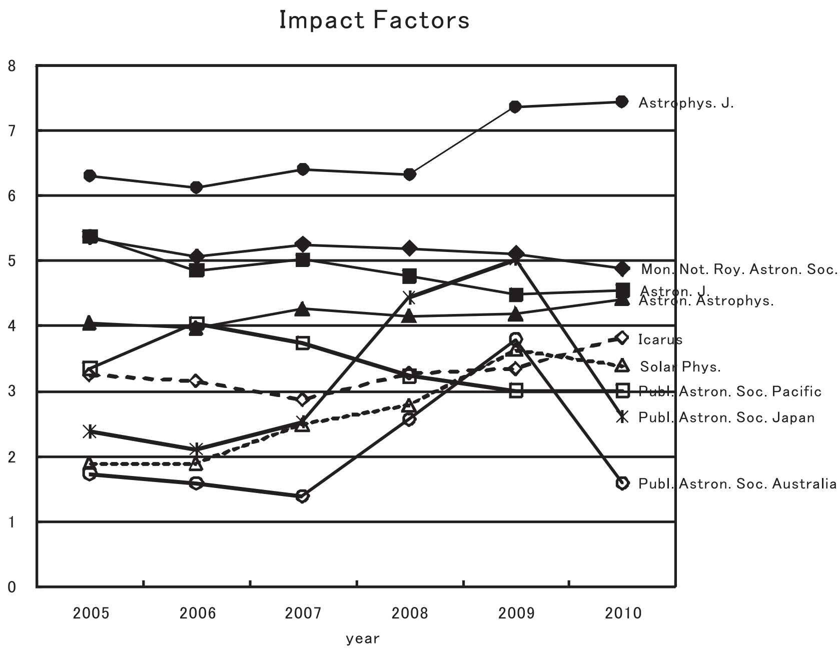


**Figure 4.** Impact factors of major astronomical journals (Journal Citation Reports, Thomson Reuters).

*The Astrophysical Journal* maintains the impact factor of 6–8, followed by *Monthly Notices of the Royal Astronomical Society* (≃ 5), *The Astronomical Journal* (4–5), and *Astronomy and Astrophysics* (≃ 4).

*Solar Physics* shows an impact factor of about 3. *Icarus*, a journal on the solar system, shows a slightly higher impact factor.

In the Asia-Pacific region, *Publications of the Astronomical Society of Japan* has shown on an average an impact factor of around 2–3, but performed better in 2008-2009 by the success of Hinode and Suzaku satellites. *Publications of the Astronomical Society of Australia* shows an impact factor of around 2. *Publications of the Astronomical Society of the Pacific* is based on California and is not included in the Asia-Pacific region. *Research in Astronomy and Astrophysics*, a new journal launched in 2009 by astronomers in China, India and other Asia-Pacific countries, was created by transforming *Chinese Journal of Astronomy and Astrophysics* into an international journal with an editorial board consisting of astrophysicists from different Asia-Pacific countries. Its impact factor for 2012 is estimated to be in the range of 1.1–1.2 based on the citation records so far (generally the impact factor is low when a new journal is initiated, because of lower popularity of the name of the journal), but will crank up in the future.

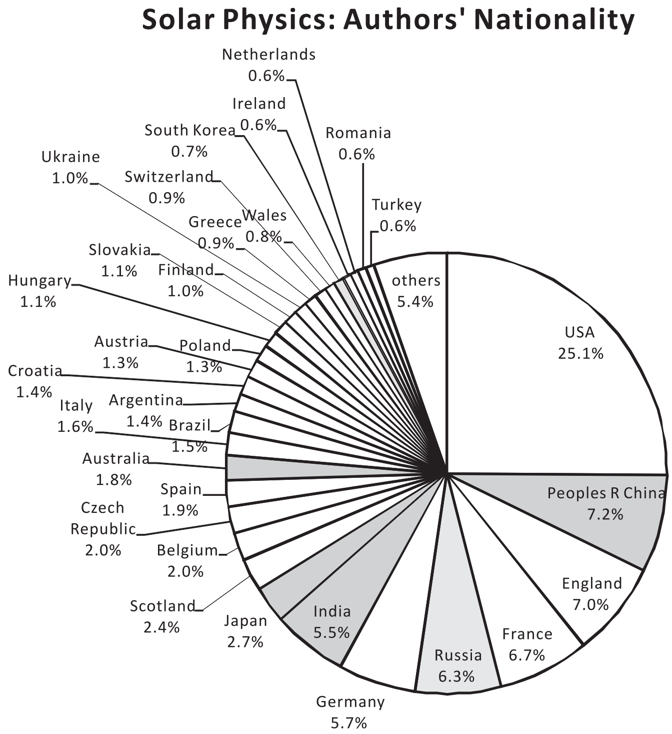


**Figure 5.** Distribution of lead authors of *Solar Physics* journal in terms of their nationality (data by courtesy of Springer Verlag). The Asia-Pacific regions are indicated with gray.

## 6. Nation-wise distribution of authors in *Solar Physics* journal

Fig. 5 shows how the lead authors of papers in *Solar Physics* are distributed in different nations. About 1/4 each of total papers come from Asia and North America, and 45% from Europe. As one of the three managing editors of *Solar Physics*, I noticed a significant increase in papers contributed from China, India, and Russia in recent five years. Submission from Korea and Japan might be more encouraged.

The ten highest-cited papers in the period of 2004–2009 are (the numbers in brackets indicate citations):

1. Kosugi et al., “The Hinode (Solar-B) Mission: An Overview”, 2007 [350]

2. Tsuneta et al., "The Solar Optical Telescope for the Hinode Mission: An Overview", 2008 [223]
3. Culhane et al., "The EUV Imaging Spectrometer for Hinode", 2007 [176]
4. Golub et al., "The X-ray Telescope (XRT) for the Hinode Mission", 2007 [144]
5. Klimchuk, "On Solving the Coronal Heating Problem", 2006 [141]
6. Verwichte et al., "Characteristics of Transverse Oscillations in a Coronal Loop Arcade", 2004 [97]
7. Schrijver et al., "Nonlinear Force-Free Modeling of Coronal Magnetic Fields I.: A Quantitative Comparison of Methods", 2006 [83]
8. Suematsu et al., "The Solar Optical Telescope of Solar-B (Hinode): The Optical Telescope Assembly", 2008 [82]
9. Ichimoto et al., "Polarization Calibration of the Solar Optical Telescope onboard Hinode", 2008 [77]
10. Wiegelmann, "Optimization Code with Weighting Function for the Reconstruction of Coronal Magnetic Fields", 2004 [73]

The contributions from the Hinode mission are very prominent.

**Table 2.** Summary of statistics in percentage.

| | Asia-Pacific | North America | South America | Europe | Africa |
|---|---|---|---|---|---|
| Population | 61 | 8 | 6 | 10 | 15 |
| GDP | 29 | 28 | 8 | 32 | 3 |
| IAU members | 23 | 29 | 4 | 42 | 2 |
| *Solar Physics* papers | 26 | 26 | 3 | 44 | 0.5 |

## 7. Concluding remarks

Table 2 shows the summary of statistics presented above. IAU members and *Solar Physics* authors are nearly equal in distribution and it means that solar physics shares a fixed fraction (probably roughly 10%) among all astronomy regardless of regions in the world. On the other hand, the Asia-Pacific region and Africa are the largest in population, while their contributions to GDP are lower. It is clear that under-developed economy in Africa and most of the Asia-Pacific regions is the main reason for their under-representation in science. The situation, however, is changing by the economical rise of China and India. Efforts of stimulating science activities and spreading research results to the world outside the Asia-Pacific region, like our Asia-Pacific Solar Physics Meeting, will assist, with relatively low costs, a movement toward proper representation of our region in the world.