China and the Global Patent Landscape in Environmental Remote Sensing

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Introduction

Researchers from different countries used patent statistics to trace technological change in chemicals, to analyze biotechnology patenting, to research optoelectronics companies, to analyze international nanotechnology development, etc.

Environmental remote sensing has been widely researched and applied by many countries and in the *National Long- and Medium-term Program of Sci-Tech Development Planning* (2006-2020), China launched and funded many related major programs. Nevertheless, we do not find patent statistics about environmental remote sensing.

This paper gives an overview of the global patent landscape in environmental remote sensing from 1990 to 2008 (searching date: Nov. 25, 2008) and compares China patent outputs with other countries. Because of the outstanding innovation capability of Unites States quantitatively and qualitatively, analysis of its patent outputs are especially discussed. In the last part of this paper, suggestions on the development of China's environmental remote sensing innovations are also given.

Analytical methods

The analyses were performed by using web-based Derwent World Patents Index, combined with Microsoft Excel, Thomson Data Analyzer and Aureka, so as to produce visualizations of the results. We consulted research experts in order to identify subject keywords and Derwent Class Codes, and then with data scrubbing, we clarified 477 patents as analyzing objects.

In order to comprehensively disclose environmental remote sensing patent outputs, over ten kinds of quantitative and qualitative analytical methods are adopted, mainly including patent output statistics, patent country comparison, patent technology correlation analysis, patent family comparison, patent assignees ranking, technology life cycle research, cluster analysis, patent map description, invalid patent analysis, citing patents and cited patents analysis, etc.

Analyzing Results

From 1990 to 2008, there are 477 environmental remote sensing patents with an average annual growth rate of nearly 20% and 13 countries and areas involve in these patents. Quantitatively, Unites States patent number is the highest, accounting 40% of the total, and China patent number, ranking the second, is approximately half that of Unites States patents. Japan, Germany, Canada, Great British patents are all much less than China patents. Nevertheless, these countries have much close technological relations with United States, and China patents are technologically separate.

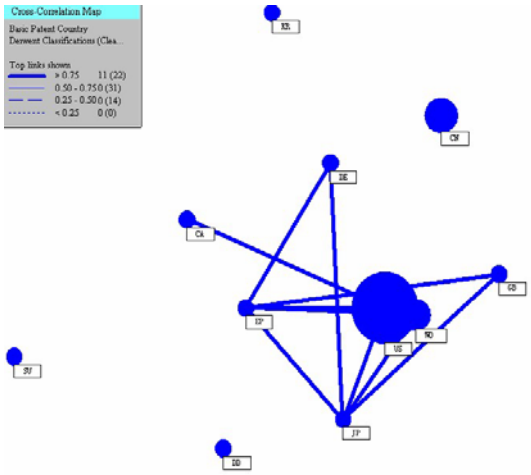

Figure 1. Patent Tech. Correlations between Countries (by Thomson Data Analyzer)

Patent assignees from different countries prefer to have Unites States patent members, and Europe, Australia, Japan, Germany, and Canada patent members are also highly considered. Contrarily, China patent members are quite limited, less than 10 percent of Unites States patents.

At present, global environmental remote sensing innovations is at the developing phrase, because the number of patent outputs and inventors have both doubled every two to three years approximately after 2002 and climbing space may still exist.

Comparison about country's annual patent outputs indicates that through China patenting entered into this innovation field quite later than United States, Japanese and Europe, China patent outputs have increased remarkably and stably since 2005 and gradually caught up with United States.

To a certain degree, patents with more cited number have higher patent quality. So Unites States patents

are superior to other countries' patents, because approximately 83% of all 2421 cited patents are Unites States patents, and the second ranking belongs to JP patents, but it is less than 10 percent of Unites States patents.

About 98% of 477 patents distribute in 22 Derwent manual codes. Compared with Unites States patent outputs, China should widen technology innovation scope in such field as W04-Audio/Video Recording and Systems, W05-Alarms, Signaling, Telemetry and Tele-control, etc.

It is worth mentioning that in the top core assignee ranking, three Chinese organizations including Shanghai University are listed with Japanese, American and German organizations, such as California University and NEC cooperation.

Because of the outstanding innovation capability of Unites States, statistics of its patent outputs are especially analyzed. We find that Unites States patent outputs mainly focus on such aspects as spectrometer, hyper-spectrum, sensor, image and camera, etc. and about 90 patents will become invalid from 2009 to 2027, among them, US5483387A titled "High pass optical filter" and applied by Honeywell Inc. is one of the highest cited patents, and this invention can be used for remote sensing of chemical agents, satellite surveys of agricultural resources, meteorological conditions, or environmental quality, etc.

Conclusion

We should attach importance to patent growth not only in quantity but in quality; pay close attention to the exploration and utilization of invalid patents, and widen China's innovation scope in such fields as Audio/Video Recording and Systems, etc.. In order to optimize China's sci-tech research portfolio and produce more applicable and front-line patent outputs, extensive international cooperation with advanced countries and organizations is also necessary. Again, we should consider how to transfer academic achievements into productive forces to earn social returns more efficiently and more smoothly.

Figure 2. US Patent Tech. Changing Trends (before and after 2001 year)(by Aureka)

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References

Lacasa ID, Grupp H, Schmoch U. Tracing Technological Change over Long Periods In Germany in Chemicals Using Patent Statistics. *SCIENTOMETRICS*. 2003, 57 (2):175-195.

Banerjee P, Gupta BM, Garg KC. Patent Statistics as Indicators of Competition An Analysis Of Patenting In Biotechnology. *SCIENTOMETRICS*. 2000, 47 (1):95-116.

Christian Sternitzke, Adam Bartkowski, Heike Schwanbeck, Reinhard Schramm. Patent and literature statistics – The case of optoelectronics. *World Patent Information*. 2007, 29(4):327-338.

Zan Huang, Hsinchun Chen etc. International Nanotechnology Development in 2003: Country, Institution, and Technology Field Analysis Based on USPTO Patent Database. *Journal of Nanoparticle Research*, 2004, (6):325-354.

Fang Shu, Zhang Xian, Xiao Guohua. Research on Patent Information Analysis Methods and Application. *Library, Information and Knowledge*. 2007, 118:64-69.