

## Feature report on China: a bibliometric analysis of China-related articles

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**Abstract** China's rise in science has been widely acknowledged. Yet we know little empirically about academic research focusing on China. Utilizing a uniquely constructed large-scale dataset, this paper explores China-related publications through bibliometric analysis. Our data suggests that not only interest in China but also knowledge about China has developed rapidly over the years. Despite an increasingly diverse profile of participants, the substantial rise of research focusing on China is largely limited to affluent regions and some geographically proximate neighbors of China. The research discloses that overseas Chinese facilitate academic research focusing on China. The research foci of China-related studies have gradually shifted from social science to natural science and, in more recent years, to Chinese environmental issues, public health and economy.

**Keywords** China-related research · Bibliometric analysis · Research profile

### Introduction

The past decades have witnessed a rapid rise of China in economic development. With a GDP averaging about a 10 percent annual growth rate since 2000, China overtook Japan as the second largest economy in 2010. China is also the most important international trade partner of many countries. According to *Economywatch*, China became the largest exporting/importing partner for more than 30 countries in 2011 (Economywatch 2013). Being the second largest trading nation after the U.S., China is increasingly acting as a crucial player in the global economy (Worldbank 2013; BBC 2011).

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As a major driver of global growth, China, together with other Asian countries, is changing the landscape of knowledge production. China is now ranked as the highest producing country for scientific research publications since 2012 (Tang et al. 2014; Kostoff 2012). It has established and strengthened scientific collaborations with over 150 countries and has signed S&T cooperation agreements with more than 90 countries (Zhou and Glanzel 2010; Zhou and Leydesdorff 2006).

China's spectacular economic growth and emergence in science have undoubtedly generated worldwide interest in China, as evidenced by the snowballing of foreign direct investment (FDI) in China and intensified international trade relations (Gaulier et al. 2007; Whalley and Xin 2010). The mushrooming of Sinology and Confucius Institutes, as well as Chinese study abroad programs, demonstrates growing global interest in China. Yet, little is known empirically about the academic research focusing on China. Who is interested in China? What aspects are they interested in? What roles do overseas Chinese play in generating interest in China? To the best of our knowledge, no studies have explored these issues. To fill this research gap to some extent, this paper, utilizing a uniquely constructed large-scale dataset, attempts to answer the above questions via bibliometric analysis of China-related publications (CRPs).

The remainder of this paper is organized as follows: In the next section we describe the customized dataset for analysis. Then we combine bibliometric analysis and visualization techniques to depict the patterns and dynamics of China-related research during the past few decades. These patterns are analyzed in four categories: (1) general trends; (2) the role of Chinese Diaspora; (3) key participants at both country and institutional levels; and (4) research foci. We conclude with key findings and specify limitations of this study.

## Methods

### Data source

Thomson Reuters' Web of Science (WoS) is the chosen data source for this study. This database covers more than 12,000 research journals, including open access journals, and over 150,000 conference proceedings spanning 250 disciplines (Thomson Reuters 2013). As one of the most representative and authoritative citation databases, WoS has been selected by a great number of previous studies for large-scale research evaluations in a variety of research fields (Cronin and Overfelt 1994; Porter et al. 2008; Liu et al. 2013).

The focus of this study is China-related publications (CRPs). We used keyword methods to identify qualifying CRPs.<sup>1</sup> All three publication datasets in WoS were included: SCI-E, SSCI, and A&HCI. Taking both high recall and precision into consideration, and after several rounds of trial and error, we identified CRPs by adopting the country name of China, the names of 33 Chinese provinces, and their variations as search queries in the database's title field. The search queries are listed in Appendix (Table 5).

The publication records, with full bibliographic information, were downloaded on November 17, 2013, in plain text format. They were then imported into VantagePoint, a text-mining software, for cleaning and standardization through a series of thesauri and

<sup>1</sup> Considering the difference of science and technology systems between Mainland China and Taiwan, in this paper, we confine our analysis to Mainland China and two Special Administrative Regions: Hong Kong and Macau.

manual checks.<sup>2</sup> Following common practice, only document types of research articles were considered (Hu et al. 2012; Zhou et al. 2009). Since CRPs are rather sporadic prior to 1965, with an average of less than six articles per year, we chose to start with the year of 1966. To keep analysis consistent, we also excluded publications without affiliations.<sup>3</sup>

## Analyses

### *Is China attracting increasing attention?*

Following the thorough cleaning strategy suggested by Tang and Shapira (2011), we finalized 144,586 China-related publications during the period 1966–2013 for analysis.<sup>4</sup> To benchmark the global knowledge about China, we calculated the proportions of CRPs in all WoS-indexed journal articles and compared them against the proportions of their U.S. counterparts (see Table 5).<sup>5</sup> As shown in Fig. 1 Panel C, differing from the substantial growth of China-related research, the global share of U.S.-focused papers has not changed so dramatically, ranging between 1.2 and 1.7 percent over the last five decades.

To further understand the influences driving such growth, we split all CRPs into the following three exclusive groups:

1. Chinese institution only publications (CIOPs): publications authored by researchers in Chinese institutions only.
2. China-foreign collaborated publications (CFCPs): publications that were co-authored by researchers from both Chinese and foreign institutions.
3. Foreign institution only publications (FIOPs): publications written by foreign institutions only.

Our data shows that about 48 % of CRPs were written by China-based researchers, 23 % were joint publications with foreign institutions, while the remaining 29 % were solely from scholars outside China. Figure 1 Panel A demonstrates the annual trends of CRPs during the last 48 years. In 1966 there were only 89 CRPs published. That number jumped to 15,488 in 2012 with an annual growth rate of 11.6 %. All groups of CRPs have grown rapidly during our examined period. The moving trends of CIOPs and CFCPs are in exponential patterns, but FIOPs advance in a linear way.

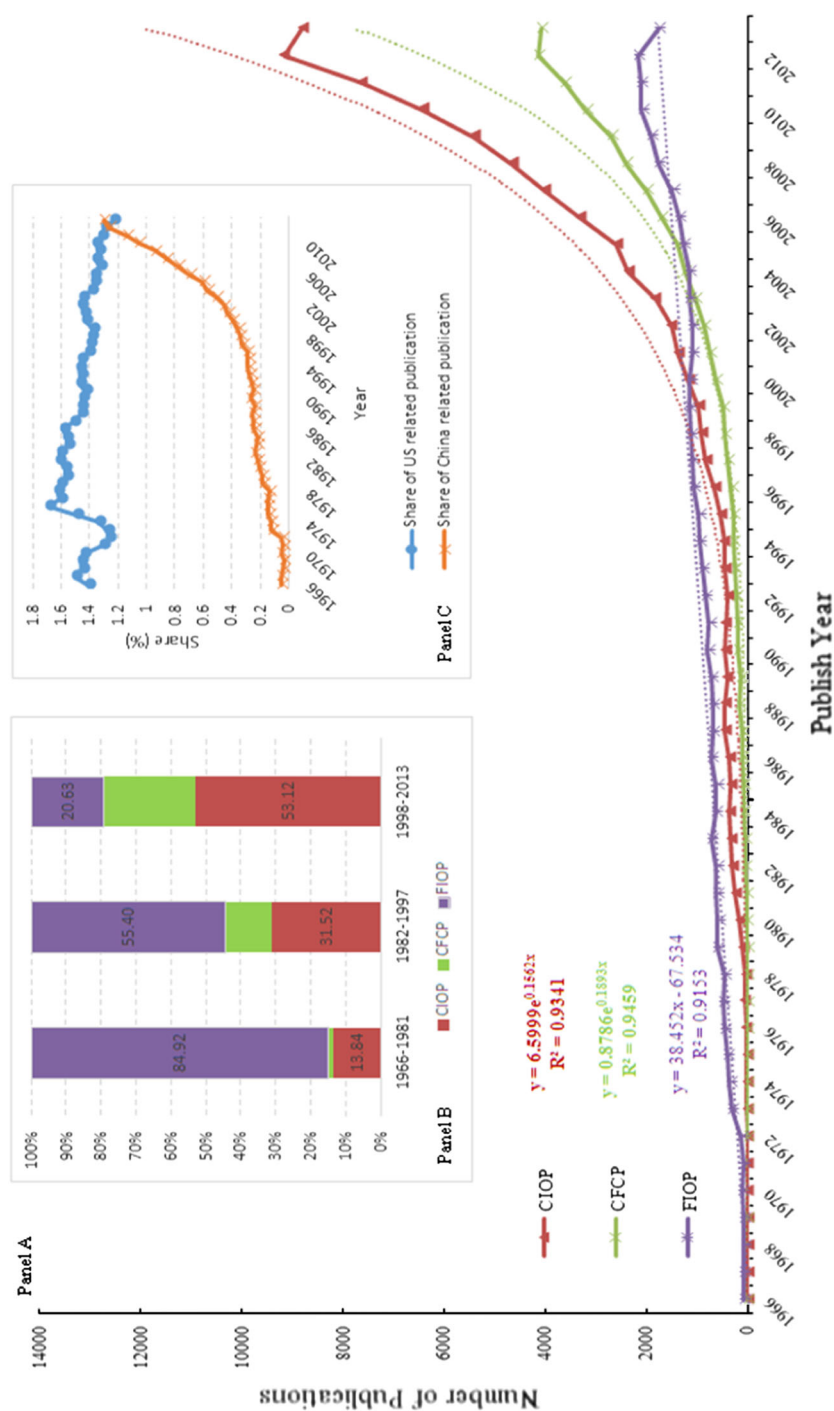
Although the total amount of China-related publications is driven by domestic research activities, the number of CIOPs has been consistently lower than that of FIOPs till the year 2000. This may suggest that, prior to 2000, China-based scholars were quite invisible in this research field. Starting in 2000, the watershed year, the proportions of CIOPs became higher than those of FIOPs, which underscores the growing influence of Chinese researchers on China-focused research. The relative importance of each group can be better

<sup>2</sup> This process included steps such as removing duplicated records based on ISI unique identifiers, merging affiliations in England, Scotland, and North Ireland into the United Kingdom, and splitting references to the University of California into different campuses of the University of California system based on the affiliation address.

<sup>3</sup> The publications indexed in the A&HCI database begin in 1975. In the period 1966–2013, approximately 6.6 % of our downloaded sources have missing data on affiliations and thus are not included in our analysis.

<sup>4</sup> We downloaded all the data in mid-November of 2013 before the Web of Science had indexed all the 2013 publications. Thus, we see a spike of CRPs in that year.

<sup>5</sup> The yearly publications of WoS and U.S.-focused data are available upon request. We assumed the same proportion of missing data for U.S.-focused publications in the affiliation field and adjusted our figures accordingly.



**Fig. 1** Trends of China-related research (1966–2013)

grasped in Fig. 1 Panel B. In sharp contrast to shrinking proportions of FIOPs, mounting shares of China-related studies are being conducted by China-based institutions and their international collaborators.

### Do overseas Chinese matter?

In 2012, the number of overseas Chinese amounted to approximately 50 million (Zhuang 2012). This number includes overseas students. China is the world's largest source of overseas students. From 1978 to 2011, 2.2 million Chinese students went abroad for further study (Wang 2012). Although their roles in facilitating China's research quantity and visibility have been widely documented (Wang et al. 2014; Jin et al. 2007a, b; Tang 2013), it remains to be seen whether or not and to what extent overseas Chinese are instrumental in the knowledge production focusing on China. It should be noted that our method for searching and retrieving data by article title is likely to capture a disproportionate amount of social science research. It is not intuitive for foreign researchers to do China-related research, especially in some social science and humanities disciplines.

In other investigations, surnames have been used to identify ethnicity in particular countries (Webster 2004; Kissin and Bradley 2013; Kerr 2008; Quan et al. 2006). In this paper, we used two dimensions, author affiliation and author surname, as proxy indicators of overseas Chinese. Building upon prior studies, we expanded the Chinese surname list and created a thesaurus of 1,448 Chinese family names.<sup>6</sup> As demonstrated in Fig. 2, similar to the trends of FIOPs, the FIOPs with a Chinese surnamed author also obtained a high growth rate, especially in the last 20 years. The ratio of Chinese-ethnicity involvement in FIOPs rose from less than 15 % in 1966 to over 60 % in 2013. This indicates that more and more researchers tend to work with Chinese descendants to investigate China-related questions, regardless of where the researchers are located. The large number of overseas Chinese who work or study in foreign institutions facilitates this kind of research.

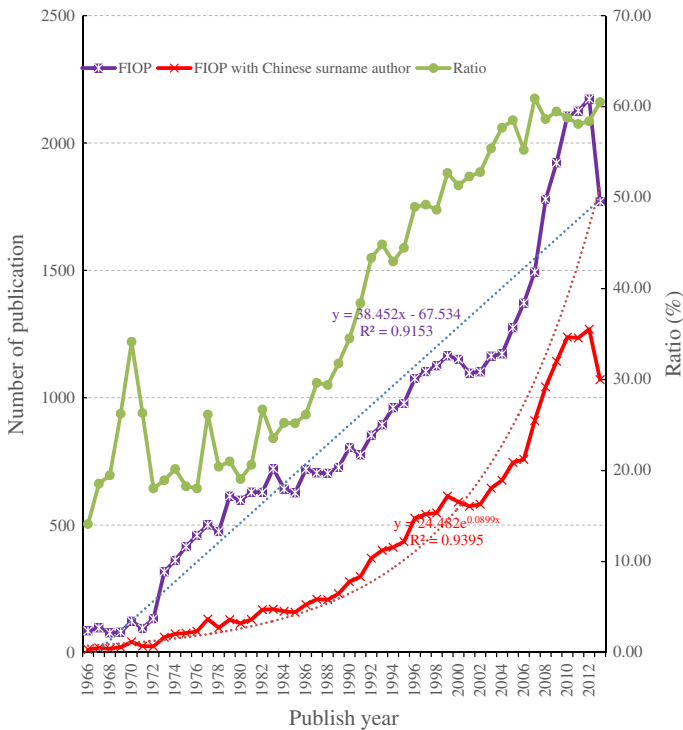
### Who is interested in China?

#### *Country level: status quo*

The level of interest in and knowledge about China varies substantially by country. We use reported author affiliations of CRPs to identify which countries are interested in and possess knowledge about China. We found that 155 countries are involved in China related studies. The U.S. leads with 33,629 publications, followed by the U.K. (7,921) and Japan (6,308). The top 20 foreign countries (regions) produced 72,268 publications, accounting for 50 % of all CRPs and 96.2 % of all publications involving foreign institutions (see Table 1). This indicates that China-related publications mainly concentrate in a few key countries. A further examination shows that all the top 20 countries (regions) are also China's important trade partners (NBSC 2012).

Figure 3 illustrates some features of the top 20 countries producing China-focused research. The X-axis (Ratio 1) is the number of CFCPs divided by the total number of CRPs, and the Y-axis (Ratio 2) shows the proportion of FIOPs with Chinese surnames against the total number of FIOPs. The bubbles, each representing one country, have sizes proportional to the quantity of associated CRPs. The origin of the coordinate axes is set at (44, 26), the averages of all countries' Ratio 1 and Ratio 2.

<sup>6</sup> The full list of Chinese surnames is available upon request.



**Fig. 2** FIOF vs FIOF with Chinese surnames

As reflected by its bubble size, the U.S. leads in CFCPs and FIOFs with Chinese family names. The U.S., Australia, Canada, and New Zealand have high values in both Ratio 1 and Ratio 2, indicating that these four countries not only collaborate with Chinese institutions but also work with overseas Chinese in CRPs. Being the main immigration countries for Chinese, these four countries have large populations of Chinese, thus facilitating the collaboration (OCAC 2011). Countries in Western Europe, such as Germany, France, and Belgium, demonstrate an opposite pattern. Their positions indicate that they prefer to collaborate with Chinese institutions rather than overseas Chinese. This may be due to the relatively low amount of Chinese diasporas in these countries compared to the U.S. or Canada.

Unsurprisingly, both Taiwan and Singapore have lower values in Ratio 1 but higher values in Ratio 2, suggesting their preference for working independently rather than with Mainland China. One explanation for this could be that many people living in Taiwan and Singapore are actually Chinese or Chinese descendants. Such a background would allow them to independently conduct research on China without language and culture barriers.

Russia and India, two important neighbors of China, show a unique pattern of China-focused research. Compared with other top 20 countries, they do not tend to collaborate with overseas Chinese, possibly because not many Chinese reside in these two countries. Nor do these countries tend to collaborate with China-based scholars, in spite of their reasonably large volume of research on China.

**Table 1** Top foreign countries (regions) of China-related publications

Country	Total	CFCP	Ratio1(%)	FIOP with CSA	Ratio 2(%)	Ranking <sup>a</sup>
USA	33,629	15,024	44.7	8,756	47.1	1
UK	7,921	3,872	48.9	1,490	36.8	17
Japan	6,308	3,028	48.0	945	28.8	2
Australia	5,560	3,194	57.4	1,231	52.0	7
Taiwan	5,268	804	15.3	4,360	97.7	6
Canada	4,864	2,423	49.8	1,206	49.4	20
Germany	3,818	2,115	55.4	330	19.4	5
France	2,328	1,153	49.5	202	17.2	18
Singapore	1,949	526	27.0	1,267	89.0	15
Netherlands	1,617	918	56.8	204	29.2	12
South Korea	1,409	455	32.3	867	90.9	4
Sweden	965	566	58.7	109	27.3	39
Switzerland	917	535	58.3	100	26.2	28
Russia	858	321	37.4	35	6.5	10
Italy	832	344	41.3	53	10.9	19
Belgium	676	378	55.9	64	21.5	29
New Zealand	565	289	51.2	154	55.8	53
Norway	487	304	62.4	55	30.1	56
Denmark	461	252	54.7	62	29.7	50
India	457	156	34.1	30	10.0	11
Top 20	72,268	32,064	44.4	19,067	47.4	

Ratio1 = CFCP/Total\*100, Ratio2 = FIOP with CSA/FIOP\*100

<sup>a</sup> The global ranking was calculated by authors based on 2011 imports and exports figures from China statistical yearbook 2012

*CFCP* China-foreign co-authored publication

*FIOP* Foreign institution only publication

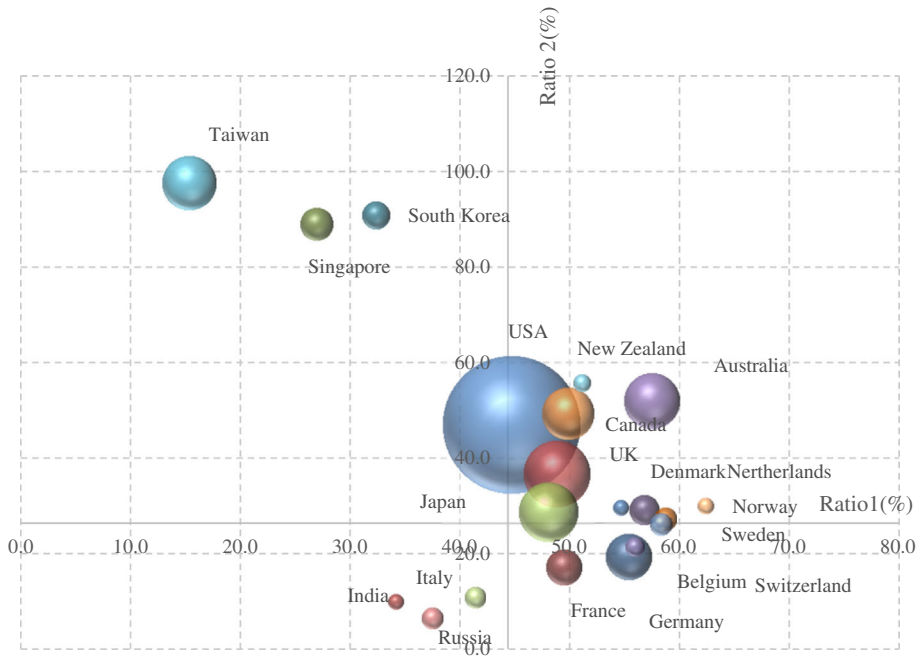
*FIOP with CSA* FIOP with Chinese surname author

### Country level: time dynamics

Further probing the dynamics of China-related research, we split the study period into three 16-year phases: 1966–1981, 1982–1997 and 1998–2013. Both the number of countries and publications rose quickly in these three periods from 55 countries and 5,962 publications in the first phase to 89 countries and 23,324 publications in the second period, and then to 151 countries and 115,300 publications in the last phase.

The rapid expansion of involved countries and publications indicates that an increasingly diverse profile of countries is becoming interested in and possessing knowledge about China. Table 2 lists the number of CRPs in the top 20 countries according to the three phases listed above.

As shown above, during the second 16-year period almost all the top 20 countries at least doubled their publications, with the exception Hungary, whose publications rose from 19 during the first phase to 20 in the second phase. Similarly, from the second phase to the third phase, all the key players' publications at least doubled, with the exception of publications in Israel. The U.S. dominated China-related research in the first period with 2,826



**Fig. 3** Bubble chart of top 20 CRPs countries

publications, two times more than that of China, ranked second place. With around a tenfold increase, China surpassed the U.S. with 10,403 publications and a share of 44.6 % in phase two. During this phase we can also see the quick drop in the share of Russia and India.

The GIS software MapInfo 11.0 was used to visualize the global China-focus map in the above three sequential periods. From Fig. 4, we can find that China-related publications primarily concentrate in developed areas such as North America, Western Europe, and the Asia–Pacific region (which includes Asia and Australia). The U.S. plays a key role in China-related research, but its relative importance has decreased as China rises in its own share of CRPs. The declining positions of Russia and India are evidenced by the faded color shades. South Korea, which was invisible in the previous two periods, emerged in the third phase.

### *Institution level*

Next we probed the research question of who, at the institution level, is interested in China. By institutional affiliation, National University of Singapore leads the production of CRPs with 1,330 papers. This is followed by National Taiwan University, Harvard University, Stanford University, and University of California, Los Angeles, with 1,296, 1,236, 879, and 823 papers respectively.

The top 20 most prolific foreign institutions in three sequential phases are identified in Table 3. The top 20 institutions in each of the three periods are all located around China or in some major immigration countries. In the first phase 70 % of the top 20 are actually located within the U.S., echoing previous finds that the U.S. dominates China-related research. With the rise of other institutions in Singapore, Japan, and Canada, the



**Table 2** Most prolific countries in China related research

Period	1966–1981			1982–1997			1998–2013		
Rank	Country	#	(%)	Country	#	(%)	Country	#	(%)
1	USA	2,826	47.4	China	10,403	44.6	China	91,519	79.4
2	China	899	15.1	USA	7,822	33.5	USA	22,981	19.9
3	UK	457	7.7	UK	1,513	6.5	UK	5,951	5.2
4	Canada	332	5.6	Japan	1,499	6.4	Australia	4,654	4.0
5	Japan	224	3.8	Canada	1,049	4.5	Japan	4,585	4.0
6	Germany	219	3.7	Taiwan	1,032	4.4	Taiwan	4,019	3.5
7	Taiwan	217	3.6	Germany	711	3.0	Canada	3,483	3.0
8	Australia	213	3.6	Australia	693	3.0	Germany	2,888	2.5
9	France	145	2.4	France	619	2.7	Singapore	1,619	1.4
10	Russia	109	1.8	Singapore	270	1.2	France	1,564	1.4
11	Netherlands	66	1.1	Netherlands	252	1.1	South Korea	1,354	1.2
12	Singapore	60	1.0	Russia	219	0.9	Netherlands	1,299	1.1
13	Italy	54	0.9	Sweden	187	0.8	Sweden	747	0.6
14	Switzerland	41	0.7	Italy	173	0.7	Switzerland	718	0.6
15	India	38	0.6	Switzerland	158	0.7	Italy	605	0.5
16	Israel	32	0.5	Israel	97	0.4	Belgium	555	0.5
17	Sweden	31	0.5	Belgium	97	0.4	Russia	530	0.5
18	New Zealand	31	0.5	India	84	0.4	New Zealand	465	0.4
19	Belgium	24	0.4	Finland	79	0.3	Norway	430	0.4
20	Hungary	19	0.3	New Zealand	69	0.3	Denmark	377	0.3

dominance of U.S. institutions declines over time. In the first period, 14 of the top 20 institutions are from the U.S. This drops to 12 in the second period and then to 9 in the third period. This indicates that a more diverse profile of participants is interested in and possesses knowledge about China

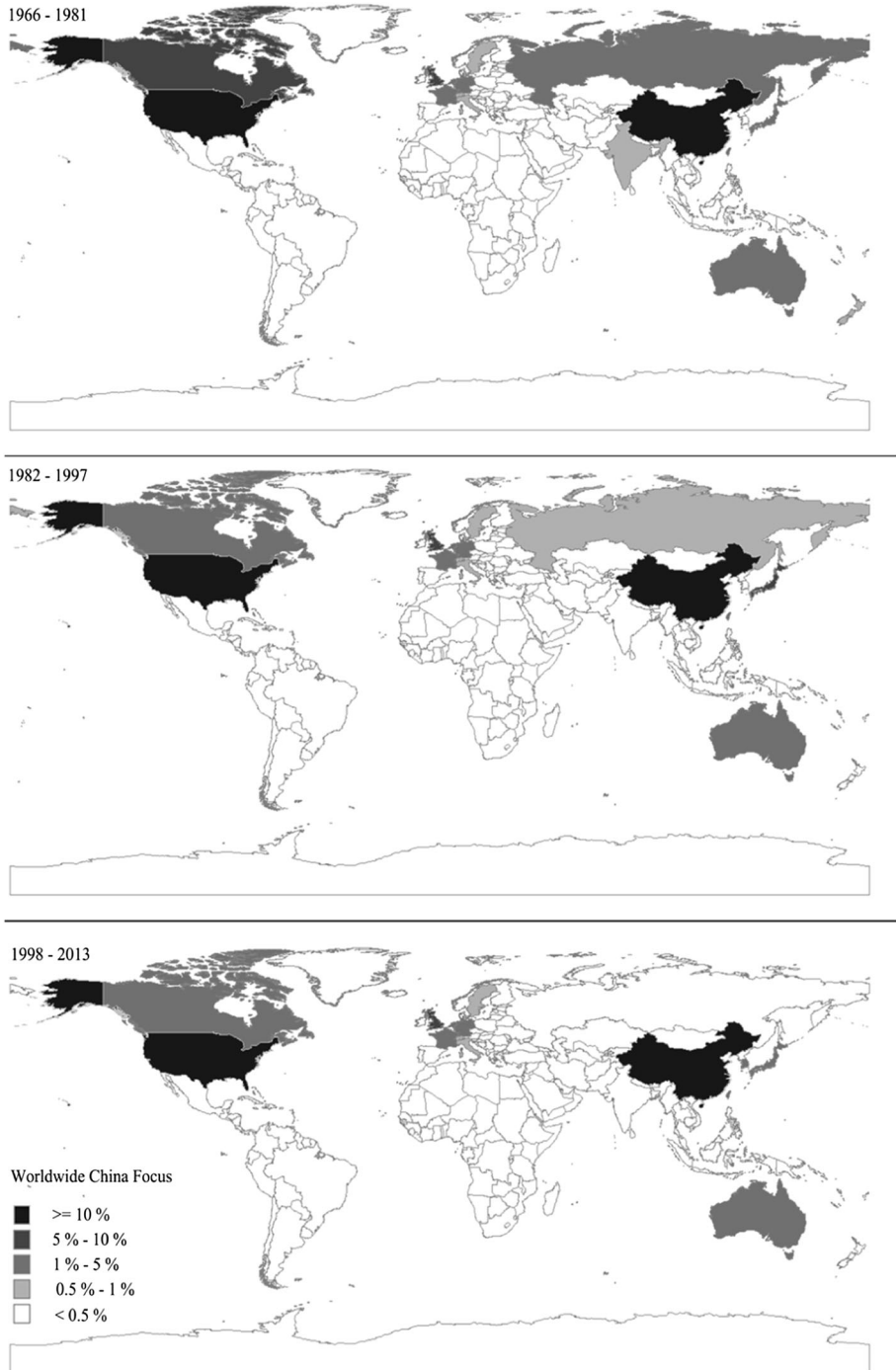
What aspects are they interested in?

### Research foci

We use the Web of Science (WoS) categories to identify the main research domains of China-related research. The data shows that China-related studies are distributed across all scholarly fields, i.e. the 251 WoS categories included in our examined period. Table 4 shows the distribution of CRPs in the top five WoS categories in three phases.

As shown in the first 16-year phase, researchers have great interest in the social perspective of China. The Area Studies category leads with 728 publications, followed by International Relations (511), Political Science (473), Biochemistry & Molecular Biology (411), and Genetics & Heredity (368). Consistent with earlier findings, in phase 1 very few China-based scholars have their China-related research published in WoS-indexed journals. FIOPs are the main driver in all the top five WoS categories.

In the second phase, Area Studies still leads all the categories with 1,459 publications, however, Biochemistry & Molecular Biology, Genetics & Heredity, and Geosciences,



**Fig. 4** Global distribution of CRPs

**Table 3** Top 20 Institutions of CRPs: three phases

Rank	1966–1981			1982–1997			1998–2013		
	Institution	Country	Number	Institution	Country	Number	Institution	Country	Number
1	Harvard Univ	USA	113	Harvard Univ	USA	255	Natl Univ Singapore	Singapore	1068
2	Univ Toronto	Canada	95	Natl Taiwan Univ	Taiwan	253	Natl Taiwan Univ	Taiwan	982
3	UC Berkeley	USA	91	Stanford Univ	USA	212	Harvard Univ	USA	868
4	Univ Michigan Ann Arbor	USA	74	Natl Univ Singapore	Singapore	209	Stanford Univ	USA	596
5	Stanford Univ	USA	71	UC Berkeley	USA	185	UC Los Angeles	USA	576
6	Australian Natl Univ	Australia	70	NCI	USA	181	Univ Tokyo	Japan	500
7	UC Los Angeles	USA	68	UC Los Angeles	USA	179	Acad Sinica	Taiwan	468
8	Inst Int Relat	Taiwan	65	Univ Michigan Ann Arbor	USA	169	UC Berkeley	USA	437
9	Natl Taiwan Univ	Taiwan	61	Columbia Univ	USA	148	Univ So Calif	USA	436
10	Columbia Univ	USA	59	Univ Toronto	Canada	146	Univ British Columbia	Canada	414
11	Natl Univ Singapore	Singapore	53	Russian Acad Sci	Russia	140	Natl Yang Ming Univ	Taiwan	405
12	Univ Hawaii Manoa	USA	51	Australian Natl Univ	Australia	139	Univ Oxford	UK	395
13	Yale Univ	USA	50	Cornell Univ	USA	139	Univ Melbourne	Australia	386
14	Upjohn Co	USA	50	Inst Int Relat	Taiwan	137	Johns Hopkins Univ	USA	383
15	Univ Wisconsin Madison	USA	48	Univ So Calif	USA	135	Univ Sydney	Australia	379
16	Acad Sci USSR	Russia	46	Univ Tokyo	Japan	132	Univ Toronto	Canada	371
17	Univ Colorado Denver	USA	44	Univ Washington	USA	121	UC Davis	USA	364
18	Penn State Univ Pk	USA	43	UC San Francisco	USA	112	Columbia Univ	USA	358
19	UC San Diego	USA	40	Univ British Columbia	Canada	109	Univ Queensland	Australia	356
20	Univ Washington	USA	40	MIT	USA	104	Univ Washington	USA	343

**Table 4** Top research foci of CRPs: three phases

Phase	WoS category	Total	CIOP	CFCP	FIOP
1966–1981	Area studies	728	28	2	698
	International Relations	511	11	1	499
	Political Science	473	8	0	465
	Biochemistry and Molecular Biology	411	4	0	407
	Genetics and Heredity	368	4	1	363
1982–1997	Area Studies	1,459	151	48	1,260
	Biochemistry and Molecular Biology	1,269	83	48	1,138
	Genetics and Heredity	1,034	64	55	915
	Geosciences, Multidisciplinary	1,009	546	262	201
	International Relations	1,000	108	22	870
1998–2013	Environmental Sciences	11,267	7,200	3,326	741
	Geosciences, Multidisciplinary	9,041	5,313	3,071	657
	Public, Environmental and Occupational Health	4,035	1,641	1,697	697
	Plant Sciences	4,008	2,434	1,149	425
	Economics	3,932	912	1,034	1,986

Multidisciplinary tail closely behind. International Relations drops from second place in the first phase to fifth in the second period. The high rankings of natural science categories in this phase suggest that a rising number of natural scientists are focusing their attention on China. FIOPs still lead in four of the five top WoS categories. Only in Geosciences, Multidisciplinary do CRPs based in Chinese research surpass FIOPs.

Unlike the first and second periods, the top 5 categories in the third phase change dramatically. Environmental Sciences now leads with 11,267 publications, followed by Geosciences, Multidisciplinary, Public, Environmental & Occupational Health, and Plant Sciences with 9,041, 4,035 and 4,008 publications. Additionally, CIOPs overtake FIOPs, scoring higher in four of the five WoS categories. Economics jumps up to fifth place with 3,932, suggesting that worldwide attention is starting to focus on Chinese economy.

## Conclusion and discussion

This study investigates key players in China-related research from a bibliometric perspective. Our analyses manifest that China has attracted increasing attention from the world in the past 48 years. The large number of overseas Chinese has facilitated worldwide research focusing on China. Despite an increasingly diverse profile of participants, the substantial rise of research focusing on China is largely limited to affluent regions and some geographically proximate neighbors of China.

Unsurprisingly, the U.S. shows the highest degree of interest in and knowledge about China in all three 16-year phases. The increasing attention from South Korea in recent years may indicate an intensifying collaboration network between China and South Korea. The research also shows that CRPs are not confined to area studies only, but are also found in a broad variety of other academic fields. However, the main interest points have shifted gradually from social science to natural science, and, more recently, the rise of China economy has become a worldwide hot topic.

This research has some limitations. The chosen database, WoS, favors English-language journals (Lin and Zhang 2007; Tang and Shapira 2011). In our data, only 4 % of China-related publications were written in a language other than English. This may underestimate the research activities in non-English countries, such as Japan, Russia, Germany and China. Additionally, the surname-based method used to identify Chinese ethnicity may overestimate the participation of Chinese ethnicity due to the sharing of some surnames between Chinese and other ethnicities. Moreover, our search queries are biased toward social and humanities research. They may also omit some relevant publications. For instance, a China-focused research with only a city name listed will not be identified. In the future, it would be worthy to examine the existence of differences in research content and quality among different groups of CRPs. While this study focuses on China-related research, it would also be interesting to make a comparison against research relating to other countries, such as the U.S.

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## Appendix

See Table 5.

**Table 5** Search strategies

	China-focus research	US-focus research
Searching set	<p>#1 TI = (China not “Republic of China” not Taiwan) OR (“Peoples Republic of China” OR Chinese)</p> <p>#2 TI = (Beijing OR Tianjin OR Hebei OR Shanxi OR Inner Mongolia OR Neimenggu OR Liaoning OR Jilin OR Heilongjiang OR Shanghai OR Jiangsu OR Zhejiang OR Anhui OR Fujian OR Jiangxi OR Shandong OR Henan OR Hubei OR Hunan OR Guangdong OR Guangxi OR Hainan OR Chongqing OR Sichuan OR Guizhou OR Yunnan OR Tibet OR Xizang OR Shaanxi OR Gansu OR Qinghai OR Ningxia OR Xinjiang)</p> <p>#3 TI = (“Hong Kong” OR HongKong OR Macau OR Macao)</p> <p>Total = (#1 OR #2 OR #3)</p>	<p>#1 TI = (“USA” OR “US” OR “U.S.” OR “United States” OR ((“American” OR “America”) NOT (“Latin America*” OR “South* America*”))))</p> <p>#2 TI = (Alabama OR Alaska OR Arizona OR Arkansas OR California OR Colorado OR Connecticut OR Delaware OR Florida OR Hawaii OR Idaho OR Illinois OR Indiana OR Iowa OR Kansas OR Kentucky OR Louisiana OR Maine OR Maryland OR Massachusetts OR Michigan OR Minnesota OR Mississippi OR Missouri OR Montana OR Nebraska OR Nevada OR “New Hampshire” OR “New Jersey” OR “New Mexico” OR “New York” OR “North Carolina” OR “North Dakota” OR Ohio OR Oklahoma OR Oregon OR Pennsylvania OR “Rhode Island” OR “South Carolina” OR “South Dakota” OR Tennessee OR Texas OR Utah OR Vermont OR Virginia OR Washington OR “West Virginia” OR Wisconsin OR Wyoming)</p> <p>#3 TI = “Georgia” NOT CU = (“Rep of Georgia” OR “Russia”)</p> <p>Total = (#1 OR #2 OR #3)</p>

We are aware that as online WoS search Boolean is not *case-sensitive*, searching “US” in the title will catch records with “us”. Intuitively this number of returned hits with “us” is neglectable

## References

- BBC (2011). China overtakes Japan as world's second-biggest economy. <http://www.bbc.co.uk/news/business-12427321>. Accessed 15 Dec 2013.
- Cronin, B., & Overfelt, K. (1994). Citation-based auditing of academic performance. *Journal of the American Society for Information Science*, 45(2), 61–72.
- Economywatch (2013). China trade, imports and exports. [http://www.economywatch.com/world\\_economy/china/export-import.html](http://www.economywatch.com/world_economy/china/export-import.html). Accessed 15 Dec 2013.
- Gaulier, G., Lemoine, F., & Ünal-Kesenci, D. (2007). China's emergence and the reorganisation of trade flows in Asia. *China Economic Review*, 18(3), 209–243.
- Hu, G. Y., Carley, S., & Tang, L. (2012). Visualizing nanotechnology research in Canada: Evidence from publication activities, 1990–2009. *Journal of Technology Transfer*, 37(4), 550–562.
- Jin, B., Rousseau, R., Suttmeier, R. P., & Cao, C. (2007a). The role of ethnic ties in international collaboration: The overseas Chinese phenomenon. D. Torres-Salinas & H.F. Moed (Eds.), *Proceedings of ISSI 2007, CINDOC*, Madrid, (pp. 427–436).
- Jin, B., Suttmeier, R. P., Wang, Z., Cao, C., Wang, D., & Zhou, Q. (2007b). Sino-U.S. Science Collaboration: An analysis in bibliometrics. *Journal of Shanxi University (Natural Sciences Education)*, 30(2), 295–302. (in Chinese).
- Kerr, W. R. (2008). Ethnic scientific communities and international technology diffusion. *The Review of Economics and Statistics*, 90(3), 518–537.
- Kissin, I., & Bradley, E. (2013). A surname-based patent-related indicator: the contribution of Jewish inventors to US patents. *Scientometrics*, 97(2), 357–368.
- Kostoff, R. (2012). China/USA nanotechnology research output comparison-2011 update. *Technological Forecasting and Social Change*, 79(5), 986–990.
- Lin, M. W., & Zhang, J. J. (2007). Language trends in nanoscience and technology: The case of Chinese-language publications. *Scientometrics*, 70(3), 555–564.
- Liu, W., Gu, M., Hu, G., Li, C., Liao, H., Tang, L. (2013). Profile of developments in biomass-based bioenergy research: a 20-year perspective. *Scientometrics*, 99(2), 507–521.
- NBSC (2012). China statistical yearbook 2012. <http://www.stats.gov.cn/tjsj/ndsj/2012/indexeh.htm>. Accessed 17 Dec 2013.
- OCAC (2011). Overseas Chinese population. <http://www.ocac.gov.tw/public/public.asp?selno=9429&no=9429&level=C>. Accessed 17 Dec 2013.
- Porter, A. L., Youtie, J., Shapira, P., & Schoeneck, D. J. (2008). Refining search terms for nanotechnology. *Journal of Nanoparticle Research*, 10(5), 715–728.
- Quan, H., Wang, F., Schopflocher, D., Norris, C., Galbraith, P. D., Faris, P., et al. (2006). Development and validation of a surname list to define Chinese ethnicity. *Medical Care*, 44(4), 328–333.
- Tang, L. (2013). Does “birds of a feather flock together” matter: Evidence from a longitudinal study on the US-China scientific collaboration. *Journal of Informetrics*, 7(2), 330–344.
- Tang, L., & Hu, G. Y. (2013). Tracing the footprint of knowledge spillover: Evidence from U.S.-China collaboration in nanotechnology. *Journal of the American Society for Information Science and Technology*, 64(9), 1791–1801.
- Tang, L., & Shapira, P. (2011). Regional development and interregional collaboration in the growth of nanotechnology research in China. *Scientometrics*, 86(2), 299–315.
- Tang, L., Shapira, P., & Youtie, J. (2014). Is there a clubbing effect underlying Chinese research citation increases? *Journal of the American Society for Information Science and Technology*, forthcoming.
- Thomson Reuters (2013). Web of knowledge: A versatile workflow solution that fulfills the varying needs of your research community. [http://wokinfo.com/media/pdf/SSR1103443WoK5-2\\_web3.pdf](http://wokinfo.com/media/pdf/SSR1103443WoK5-2_web3.pdf). Accessed 16 Dec 2013.
- Wang, H. Y. (2012). *Annual Report of Overseas Chinese: 2012*. Beijing: Social Sciences Academic Press.
- Wang, Q., Tang, L., & Li, H. (2014). Return migration of the highly-skilled in higher education institutions: A Chinese University Case. *Population, Space and Place*, forthcoming.
- Webster, B. M. (2004). Bibliometric analysis of presence and impact of ethnic minority researchers on science in the UK. *Research Evaluation*, 13(1), 69–76.
- Whalley, J., & Xin, X. (2010). China's FDI and non-FDI economies and the sustainability of future high Chinese growth. *China Economic Review*, 21(1), 123–135.
- Worldbank (2013). China overview. <http://www.worldbank.org/en/country/china/overview>. Accessed 15 Dec 2013.
- Zhou, P., & Glanzel, W. (2010). In-depth analysis on China's international cooperation in science. *Scientometrics*, 82(3), 597–612.

- Zhou, P., & Leydesdorff, L. (2006). The emergence of China as a leading nation in science. *Research Policy*, 35(1), 83–104.
- Zhou, P., Thijs, B., & Glanzel, W. (2009). Is China also becoming a giant in social sciences? *Scientometrics*, 79(3), 593–621.
- Zhuang, G.T. (2012). The status quo and development of overseas Chinese. (in Chinese).