

A Decade Footprint of the Global Change Research Data Publishing & Repository, World Data System

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Abstract: The global change research data publishing and repository has experienced for more than 20 years in China. After more than a decade of preparation work from 2002 to 2013, it was formally launched in 2014. Over the past decade, the infrastructure for global change research data publishing and repository was constructed through two journals plus publishing platform, as well as the data and information application hubs. Based on the data publishing and services, the Geographical Indications Environment and Sustainability (GIES), the decade program for 2021–2030 and the World Geographic Data Encyclopedia were launched. Besides, a new method for the research data assessment, joint data application sub-center and AI calculating sub-center were initialized. It was awarded the WSIS Prize (*e-Science*, Champion, 2018, 2021), and technical supporting partner of the FAO OCOP program.

Keywords: global change; data publishing; infrastructure; fill in gap; diving force; a decade

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Global change research is a comprehensive subject which is related to geography, natural resources, ecosystems, environment, cities and villages, natural and human elements, global, regional and local scales, as well as different time period. For such an interdisciplinary, comprehensive, and dynamic discipline, reliable application, cross application, and repeated application of data have become the most important characteristics of disciplinary development. Ten years ago, in order to solve the “bottleneck” problem of data sharing in the development of the discipline, the author created the Global Change Research Data Publishing & Repository. This article briefly lists the footsteps on the road of data publishing and sharing over the past decade.

1 Preparation (2002–2013)

In 2002, the author proposed the concept of sharing scientific data on Open Data for a Prosperous Country^[1]. In 2004, the author proposed the action guide of Data Integration,

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Sharing, Improvement, and Enhancement, which was recorded in Medium and Long-term Science and Technology Development Plan, 2006–2015 of the National State Council as the national strategy of the scientific e-platform construction^[2]. In October 2013, the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences (IGSNRR-CAS) successfully register in DOI system for DOI: 10.3974^[3], the preparation for the infrastructural development of the Global Change Research Data Publishing & Repository was ready.

2 Building the Data Publishing Infrastructure Through Two Peer-reviewed Journals Plus E-platform (2014–2020)

June 2014, the Global Change Research Data Publishing & Repository (GCdataPR for short) online including datasets, data papers and metadata¹, 20 peer reviewed datasets were online published and compatible 20 data papers in both Chinese and English were published in the *Acta Geographica Sinica*^[4].

August 2014, the CODATA task group team on research data sharing of developing countries lead by Liu, Chuang, Paul F. Uhler and Gu, Xingfa hosted an International Workshop of Open Data for Science and Sustainability in Developing Countries, the Data Sharing Principles in Developing Countries (The Nairobi Data Sharing Principles for short) was released at the workshop^[5].

December 2015, the Editorial Boards of *Acta Geographica Sinica* and GCdataPR jointly announced recommendations that the articles published in the *Acta Geographica Sinica* were welcomed to be publish the related datasets at the GCdataPR.

March 2016, Lead by He, Shujin and Liu, Chuang, 35 Journal officers joined the datasets publishing together with scientific articles.

October 2016, GCdataPR was approved to be the Regular Member of World Data System, International Science Council.

March 2017, the *Journal of Global Change Data & Discovery* was formally launched in both Chinese and English registering CN 10-1493/P and ISSN 2096-3645, which was credited as A New Milestone of China Scientific Data Sharing (Xu, Guanhua, former Minister of Ministration of Science and Technology of China, 2017)^[6,7], and creative action by Zhou, Dejin, Director General of Department of Scientific Communication, Chinese Academy of Sciences and supported by the Communication Fund of the CAS for two years (2017–2018).

September 2017, the Guidelines of GCdataPR was released, which includes 14 chapters and 75 articles related to the term, policy, procedure and regulations about the global change research data publishing, repository and sharing^[8].

March 2018, the “Scientific Data Management Policy” was released by the State Council of the People’s Republic of China^[9], the article 22 of the policy indicates that the competent authorities and legal entities should actively promote the publication and dissemination of scientific data, and support researchers in organizing and publishing scientific data with clear, accurate, complete, and shared value.

March 2018, the GCdataPR was awarded the WSIS Prize (*e-Science* Champion, 2018)^[10].

July 2018, the GCdataPR was awarded the Innovative Project at the 8th Digital Publisher Expo of China^[11].

August 2018, Proposed by Liu, Chuang, the Big Data Working Committee of Geographical Society of China was established in Xi’an^[12], Professor Liao, Xiaohan was selected as Director and Professors Zhu, Yunqiang, Chen, Lijun were selected as the Deputy Director, Liu, Chuang as Secretary General, all of them are the board members of the

¹ GCdataPR. <http://www.geodoi.ac.cn>.

GCdataPR.

August 2019, the GCdataPR was recognized to be one of the datasets repositories of AGU (American Geophysical Union)^[13].

February 2020, for against COVID-19, the GCdataPR cooperated with CCIT (Consultative Committee on Information Technology) of the United Nations and CCLH (Committee on Life Sciences and Human Health) to construct the Data and Information Hub on COVID-19. Professor Gong, Ke, President of WFEO and Chair of CCIT led the project.

June 2020, the peer reviewed *Digital Journal of Global Change Data Repository* was launched registering CN 11-9377/P, ISSN 2096-868X, which is the first digital journal in the world focused on publishing peer reviewed digital datasets^[14].

May 2021, the Data and Information Hub on COVID-19 at the GCdataPR was awarded the WSIS Prize (*e-Science*, Champion, 2021)^[15].

3 Data Driving Innovation for SDGs (2021–2024)

September 2021, the Geographical Indications Environment and Sustainability (GIES) 2021–2030 Program was launched at the CIFTIS (China International Fair for Trade in Services)^[16–19], it indicated that the data driving innovative action in geographical indications came to the practices and could benefit society enhancing implementation SDGs.

October 2021, China Association for Science and Technology (CAST) approved to establish the Innovation China GIES Technology Service Team, Liu, Yanhua, Former Vice Minister of Ministry of Science and Technology of China, is the Chair of Steering Committee, Wang, Zhenbo is the Chair of Planning Group, Liao, Xiaohan is the Chair of Expert Group and Liu, Chuang is the Chief Principle Investigator and Chair of Working Group.

January 2022, the first GIES New Year Fair was held. 10 GIES cases together with their GIES products from 8 provinces of China were demonstrated at the festival, including from Ningxia^[20,21], Yunnan^[22,23], Jilin^[24–31], Jiangsu^[32,33], Shaanxi^[34,35], Guangdong^[36,37], Shandong^[38,39], Shanxi^[40,41].

January 2022, the GIES team cooperated with Panshi of Jilin Province of China launched the first Winter Fishing Festival, Professor Ge, Quansheng, Editor-in-Chief and Director General of IGSNRR-CAS provided the Chinese calligraphy inscriptions.

May 2022, Liu, Chuang delivered a speech on Integrating geographical indication intellectual property with information and communication technology to enhance local sustainable development at the High-Level Policy Forum of the WSIS Closing Ceremony of the United Nations.

July 2022, GIES cases joined the First EU-China Geographical Indications Expo in Luzhou, Sichuan Province of China.

December 2022, Liu, Chuang and Philippe De Maeyer jointed the first Around Table of EU-China Geographical Indications Agreement in Brussels, Belgium, and proposed to set up S&T group between EU and China.

July 2023, FAO OCOP Initiative in Asia and Pacific Region was launched in Dakar, Bangladesh. Liu, Chuang was appointed to be the Vice Chair of FAO OCOP Organizing Group in Asia and Pacific Region.

August 2023, International Conference on Green Development was held in Huzhou, China. IGSNRR-CAS and FAO jointly organizing a workshop on GIES supporting OCOP at the conference. The case study and the capacity building were held in Fengxian County, Jiangsu Province and Beijing separately, experts and OCOP officers from Bhutan, Nepal, Bangladesh, Papua New Guinea, Thailand, Australia, Germany jointed the action.

October 2023, the Committee on Data of International Science Council (ISC) approved to establish GIES Task Group, Liu, Chuang, Kadambot H. M. Siddique and Philippe De

Maeyer appointed to be the co-chair of the task. Three of them are GCdataPR Editorial Board members^[42].

February 2024, Liu, Chuang delivered a speech on GIES methodology and technology supporting FAO OCOP at the 37th FAO Summit in Asia and Pacific Region.

February 2024, FAO and IGSNRR-CAS jointly signed the Memorandum of Understanding on GIES cooperation at the 37th FAO Summit in Asia and Pacific Region in Colombo, Sri Lanka. Professor Wang, Shengling, Deputy Director General of IGSNRR-CAS and Dr. Jong-Jin Kim, Assistant Director General of FAO on behalf of each sides signed the MOU^[43,44].

May 2024, the IGSNRR-CAS team visited Denmark, Belgium and Department of Agriculture of EU in Brussels, a common interesting on GIES cooperation was made^[45].

May 2024, the FAO OCOP Bhutan “Quinoa” project started. Liu, Chuang and Song, Xianfang were invited to made the GIES application technology transfer and capacity building in Trashigang Dzongkhag.

July 2024, the Geographical Indications Center of IGSNRR-CAS was established, which is the first GI center in the geography of the world. Song, Xianfang was appointed as director, Wang, Zhenbo was Deputy Director and Liu, Chuang was the Chief Scientist of the center^[46,47].

September 2024, the GCdataPR won the Prize of Geographical Data Collection and Sharing led by Zhu, Yunqiang and Shi, Ruixiang and Prize of Bid Data Driving GIES led by Liu, Chuang and Song, Xianfang, by Geographical Society of China.

September 2024, FAO and IGSNRR-CAS jointly hosted International Capacity Building Workshop on GIES supporting OCOP Implementation in Beijing, Shiyan City of Hubei Province, Panshi City of Jilin Province, Changzhi City of Shanxi Province. More than 30 experts and FAO OCOP national representatives from more than 20 countries attended the event.

October 2024, GIES coffee case of Panama was started. Liu, Chuang and Song, Xianfang were invited to made the GIES application technology transfer and capacity building in Panama.

December 2024, GIES progress was demonstrated at the 19th IGF (Internet Governance Forum) in Riyadh, Kingdom of Saudi Arabia, As Panel, Liu, Chuang delivered a speech on GIES as new ICT technology enhancing SDGs.

4 Launch the Encyclopedia of the Geographical Data of the World

After 9 years preparation (since 2015)^[48], Liu, Chuang announced that the Encyclopedia of Geographical Data of the World was formally launched by the GCdataPR at the Conference of Geography of the World which was held in Shanghai, China. More than 500 items of the geographical data of the world already published by the GCdataPR.

5 Explore an Innovative Evaluation Method for Datasets Publishing and Repository

June 2018, Liu, Chuang proposed an innovative evaluation method for datasets publishing and repository, which was called the Data Impact Score (DIS)^[49–53], the DIS for datasets, authors, author’s affiliation, founding projects, etc., were calculated according to the new method.

6 A Professional Team in Research Data Publishing and Repository was Established

The GCdataPR editorial team was developed from 2 professional scientists to 7+N including dataset editors, data paper editors, metadata network editors, e-science information platform editors, and application guidelines consultants. Now, the GCdataPR has become one of the data publishing training bason, data application communication bason and new technology practices for education. Liu, Chuang, member of the team, was awarded the 2020 Professional and Scholarly Excellence (PROSE) Finalist Award, PROSE Subject Category Winner Award for Environmental Sciences. Shi, Ruixiang and Ma, Junhua were credited as the Outstanding Editor, Li, Guoqing, Associate Chief Editor of GCdataPR, was honored the GEO Individual Excellence Award 2021^[54].

7 Foundations for Data Publishing and Repository for the Next Decade

More than 1,300 datasets were published by GCdataPR. There were four 100% performances, they are: (1) all of datasets published by GCdataPR were full and open to all both in Chinese and in English; (2) all of these datasets published by GCdataPR were peer reviewed and quality controlled; (3) all of these datasets published by GCdataPR were long-term archived, preserved and protected; (4) all feedback from more than 140,000 IP users, 30 million visitors from more than 100 countries were positive. More than 20 workshops, capacity building events and 43 big data communications in universities and villages^[55] were held during the last decade. Published research data cooperated with more than 60 academic journals^[56]. 22 GIES cases from 12 provinces of China, 4 innovative culture festivals and CAS GIES New Year Fair^[57] were advertised. Two coordinating data application and calculation centers were established in Fengxian County of Jiangsu Province and Zhangzi County of Shanxi Province of China.

Commemoration

I deeply miss Dr. Wang, Zhengxing, the outstanding GCdataPR reviewer, who passed away at a young age. I remember him for his indelible contributions to the data publishing and repository and for his pioneering work in compiling entries for the Encyclopedia of Geographical Data of the World!

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