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Following the objectives and work plans in our proposal, the **Spatial Data Lab** (SDL) project, which is an extension to the **China Data Lab** project, has made some good progress during 2021, including integrating and publishing new datasets, developing case studies, organizing training workshops, and building global collaborations.

1. Integrated New Datasets

New spatiotemporal datasets are collected and integrated into the SDL platform, such as Weibo datasets. The project team continues in updating COVID-19 datasets on Harvard Dataverse monthly. As of December 31, 2021, global users from 150 countries have downloaded the COVID-19 datasets on Harvard Dataverse more than 800,000 times. The team also developed multiple tools based on workflows, facilitating users to access external datasets on Harvard Dataverse, GitHub, the China Geo-Explorer database, and the human mobility data platform developed by the University of South Carolina. More information is available in the [Datasets introductions and user guide](#).

2. Workflow-Based Case Studies

The project team built 18 workflows for peer-reviewed case studies to help collaborating researchers easily and quickly conduct analysis, develop methodologies, and deliver education relevant to COVID-19, culture and society, human mobility, and urban and rural development. More information is available on the [Paper Replication List](#).

3. Research Grants Support

The COVID-19 data collection and platform development helped grant applications and provided direct support for the following project:

- [“Building a Spatiotemporal Platform for Rapid Response to COVID-19”](#), funded by NSF Covid-19 rapid response grant

4. International cooperation

The team cooperated with [Knime](#) to develop and research the application of Knime workflow platform and web portal for spatial data analysis.



5. Research Capacity

The Spatial Data Lab/China Data Lab team has been collaborating with global scholars from different institutions, including scholars and students from Harvard University, George Mason University, University of Washington, University of South Carolina, Tulane University, the University of Queensland, Colorado State University, Ball State University, Georgia State University, TAMU, CUNY, Tsinghua University, Wuhan University, and many others, on COVID-19 data collection, analysis, and publications. Those teams (mobility, modeling, innovation, and visualization) have published more than 10 peer-reviewed papers. More information is available on the following websites.

- Publications: <https://projects.iq.harvard.edu/chinadatalab/publications-0>
- Presentations: <https://projects.iq.harvard.edu/chinadatalab/presentations-0>

6. Meetings and Webinars

The SDL project is an initiative in the NSF I/UCRC Spatiotemporal Innovation Center. This Center held its 16th semi-annual Industrial Advisory Board meetings in November of 2021. The SDL team presented the project's progress and received high scores and positive feedback from the Industry Advisory Board members.

Besides, the Spatial Data Lab team jointly hosted a monthly training webinar series on "Workflow-based Spatiotemporal Data and Analysis", starting from September 2020 to August 2021. In each webinar, four to five workflows were introduced, and each was implemented to replicate, reproduce, or expand a methodology from a publication that analyzed spatiotemporal data. The team also hosted two webinars on "Workbook for Quantitative Methods and Socioeconomic Applications in GIS" and "Workbench for Spatial Data Science" in October 2021. There were more than 500 registrations and close to 200 attendees. The team jointly hosted the "International Symposium on Spatial Econometrics and Spatiotemporal Innovation". Speakers were 15 outstanding scholars from 3 countries, 2 of them are members of the U.S. National Academy of Sciences. There were more than 200 attendees. More information is available on the following websites.

- The 16th IAB meeting abstracts: https://www.stcenter.net/?page_id=128#GMU-17-04
- Recorded videos of the webinars : https://dataverse.harvard.edu/dataverse/cdl_training
- Recorded video of International Symposium on Spatial Econometrics and Spatiotemporal Innovation: https://drive.google.com/drive/u/0/folders/1WZdw-1aqaz0Rbd_ALzs8TVUy7T_TotTw

7. Global Impact

The Spatial Data Lab platform supported global researchers to work on COVID-19 studies and nearly 120 scholars have applied and used the platform. They are from the University of



Oxford, University of Maryland, University of Illinois at Chicago, University of Queensland, et al. The datasets on the Harvard Dataverse have been downloaded over 856,000 times from more than 150 countries. The developed case studies allow users to replicate, reproduce and expand the research easily. More than 200 people attended the International Symposium on Spatial Econometrics and Spatiotemporal Innovation, and many well-known scholars including members of the U.S. National Academy of Sciences presented in the symposium. Moreover, the co-sponsored training webinars attracted thousands of participants from countries around the globe.

8. Plans for the next phase

- Expand data collections for China study and spatial study.
- Enhance the Spatial Data Lab platform for global collaborations on China studies and spatial studies.
- Continue the development of workflow-based case studies for reproducible, replicable and expandable research on spatial data science.
- Organize training workshops on spatial data science.

9. Appendix

[1] China Data Lab project website: <https://projects.iq.harvard.edu/chinadatalab/home>

[2] China Data Lab project annual reports:

https://projects.iq.harvard.edu/chinadatalab/project-reports?admin_panel=1

[3] Spatial Data Lab Platform at Harvard University:

<http://chinadatalab.org/>

[4] COVID-19 data achieving on Harvard Dataverse:

<https://dataverse.harvard.edu/dataverse/2019ncov>

[5] CDL webinar achieving on Harvard Dataverse:

https://dataverse.harvard.edu/dataverse/cdl_training

[6] Spatial Data Lab platform datasets introductions and user guide:

<https://docs.google.com/document/d/1MV0C7ro8n7bFum7q6DYISD0YkKkV1vBMIEMuCi-ievmk>

[7] Publications: <https://projects.iq.harvard.edu/chinadatalab/publications-0>

[8] Presentations: <https://projects.iq.harvard.edu/chinadatalab/presentations-0>

[9] The 16th IAB meeting reports:

<https://drive.google.com/drive/folders/1Wqj5ilViBU9QQpaPSq9SqRFNFvWGxAnx>

[10] China Data Lab Webinars: <https://projects.iq.harvard.edu/chinadatalab/conferences>