

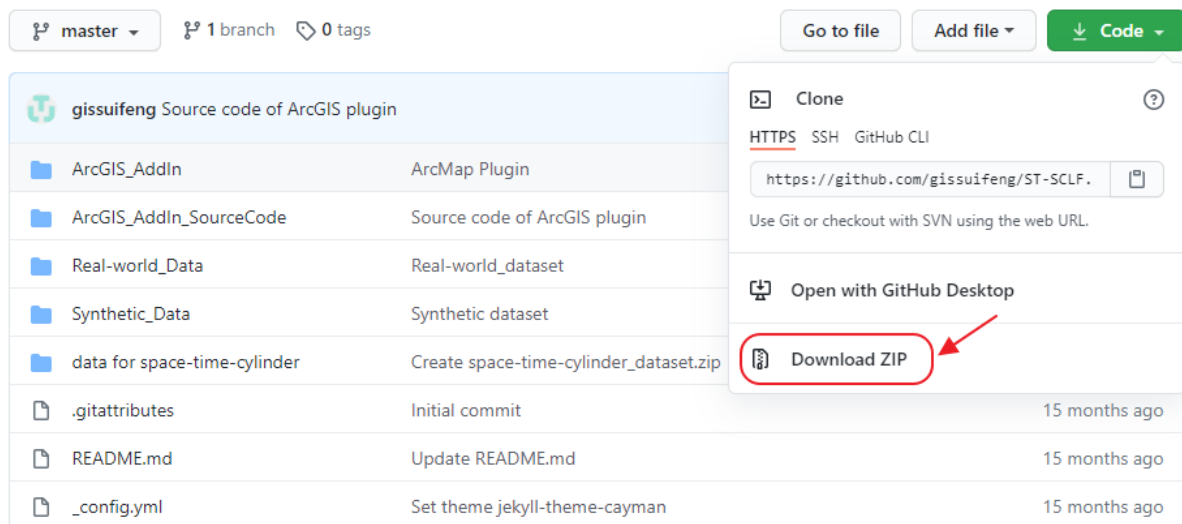
User Guider Book

of Spatiotemporal SCLFlow analysis

1. ArcMap Add-in installation

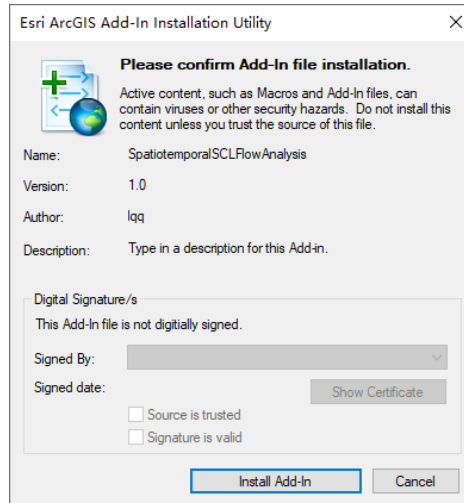
(1) First, you can download ArcMap Add-In on GitHub, and you can find Add-In from the link of <https://github.com/gissuifeng/ST-SCLF.git>. This GitHub repository contains ArcMap Add-In and its source code, synthetic dataset and real-world dataset can also be provided.

(2) You can download all of files from this GitHub repository by “Download Zip” menu button. Because large size of real-world dataset, So you may spend more time to download the zip package.

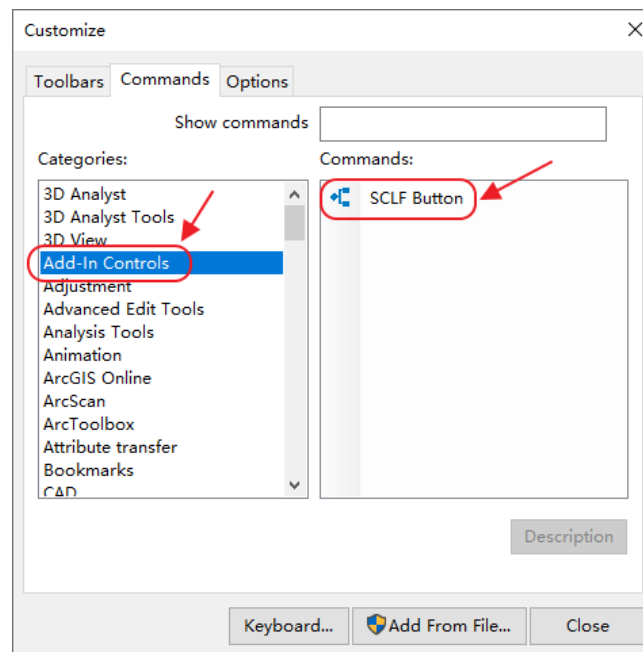


(3) After the files package is downloaded, you need to unzip the file named “ST-SCLF-master.zip”. Then you can find ArcMap plugin from the folder named “ArcGIS_AddIn”. This AddIn file has been tested successfully on the ArcGIS versions of 10.4, 10.5 and 10.6. This means you install it at least on ArcGIS 10.4 and later version.

(4) The installation is very simple, you only need to double click the plugin named “SpaceTimeSCLFlowAnalysis.esriAddIn”, and a confirm window will show, and click “Install AddIn” to finished the installation task. It is worth reminding that you need to close ArcMap before installing the plug-in.



(5) After finished the plugin installation, Start the ArcMap in your computer. Then open the “Customize” window and click the “Command” tab page. You can find “Add-In Controls” item in Categories list box. Finally, drag the button to any toolbar.



(6) Click “SCLF Button” on the toolbar which you have added just now, it is mean plugin can run successfully if a tool style window show.



Spatio-temporal sel-co-location Flow Pattern Analysis

Input Flow Table:

Flow Origin Field: Flow Origin Time (Optional):

Flow Destination Field: Flow Destination Time (Optional):

Flow Attribute Value:

Input Origin Features:

UID Origin Field:

Input Destination Features:

UID Destination Field:

SCLF Pattern Rate Threshold: SCLFlow Time distance (Optional):

SCLFlow Pattern Output Path:

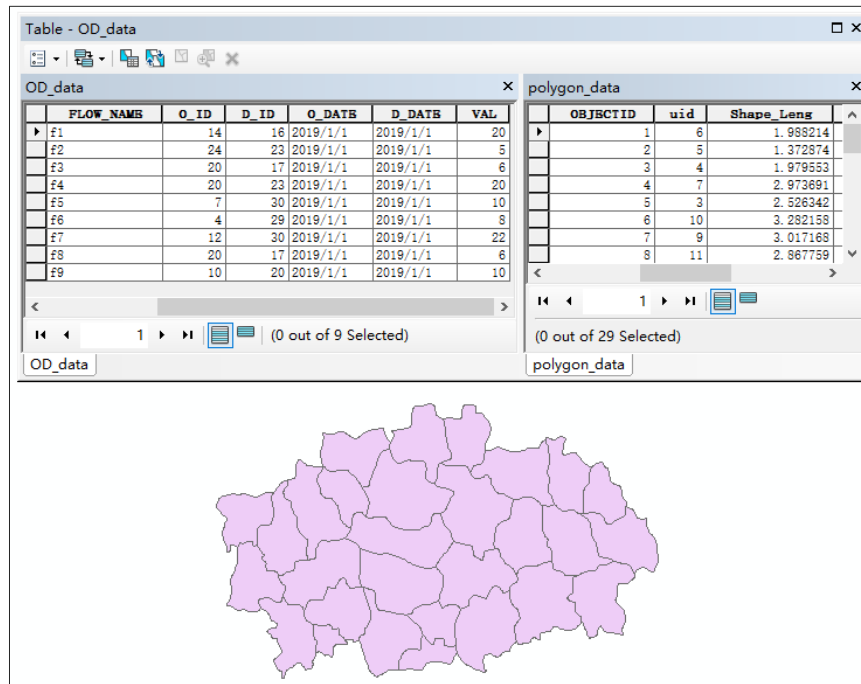
SCLFlow Pattern Output Name:

OK Cancel

2 Spatiotemporal SCLFlow analysis based on synthetic dataset

(1) Synthetic dataset can be found in “ST-SCLF-master.zip” and the files folder is named “Synthetic_Data”. Unzip “Synthetic_Data.zip” and you will find “polygon_data.shp” and “OD_data.csv”. Open the shapefile and dbf table to ArcMap. “polygon_data.shp” contains all areal unit, the uid field column as a foreign key in “OD_data.csv” for identifying origin area and destination area of each flow unit. The O_ID and D_ID in table “OD_data.csv” respectively identify the polygon ID of origin and the polygon ID of destination. O_DATE and D_DATE correspond to the departure time of Origin and the arrival time of Destination, respectively. The field VAL is the flow value.

Note: You first need to convert csv table to a geodatabase table.



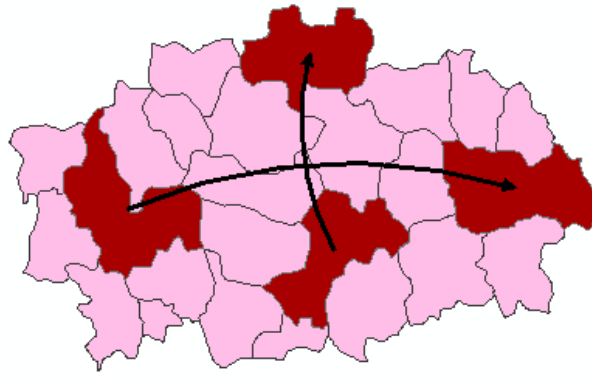
(2) Click “SCLF Button” and open the ST-SCL Flow analysis dialog, and config all parameters necessary as follow:

The screenshot shows the "Spatio-temporal sel-co-location Flow Pattern Analysis" dialog box. The parameters are configured as follows:

- Input Flow Table:** OD_data
- Flow Origin Field:** O_ID
- Flow Origin Time (Optional):** O_DATE
- Flow Destination Field:** D_ID
- Flow Destination Time (Optional):** D_DATE
- Flow Attribute Value:** VAL
- Input Origin Featruess:** polygon_data
- UID Origin Field:** uid
- Input Destination Featruess:** polygon_data
- UID Destination Field:** uid
- SCLF Pattern Rate Threshold:** 0.6
- SCLFlow Time distance (Optional):** 30 minute
- SCLFlow Pattern Output Path:** C:\Users\geoman\Downloads\Compressed\ST-SCLF-master\Synthetic_Data\Syn
- SCLFlow Pattern Output Name:** OD_data_SCLF

Buttons for "OK" and "Cancel" are at the bottom right.

(3) After finished all parameters configurations, click “OK” button execute the model. If the model executed successfully, both Origin-Destination pair polygon layer and Origin-Destination pair line layer are generated as follow, two flow patterns is detected out.



(4) Changed the rate threshold and time distance, the analysis results will be different.

(5) It is worth noting that this model can also ignore the time field, and only for mining spatial self-colocation flow patterns.

3 Spatiotemporal SCLFlow analysis based on real-world dataset

(1) Synthetic dataset can be find in “ST-SCLF-master.zip and the files folder is named “Real-world_Data”. Unzip “Real-world_Data.zip” and you will find “Cities_Polygon.shp”, “flow_data_all_2018.csv” and “flow_data_sub_2018.csv” data set. “Cities_Polygon.shp” all cities area in China, and “flow_data_all_2018.csv” contains all OD record use in paper. Because the amount of data in “flow_data_all_2018.csv” is very large and it will spend a lot of time for executing model, if you are only for testing the model, we strongly recommend that the sub-data set “flow_data_sub_2018.csv” of “flow_data_all_2018.csv” is used as the input of the model.



(2) First, you need to Convert “flow_data_sub_2018.csv” to a geodatabase table in Geodatabase. Then open ST-CLF Flow analysis dialog and config all necessary parameters as shown below:

Note: It is worth noting that Origin datetime is same as destination datetime in this real-world dataset. This because

we emphasized in the paper that for each OD flow, the location column field and time field of Origin and Destination should be included. But there are two situations for the time field. For the OD flow data in the city, such as people flow, traffic flow, etc., the Origin time and Destination time of each flow unit are different, and the Destination time will lag behind. In this case, if the problem is defined as the ST-SCLF pattern in 24 hours a day, the time difference between Origin and Destination is meaningful. When using days as the time interval and defining the problem to mine the ST-SCLF pattern in a week or a month or even a year, the time difference between Origin and Destination will be ignored, and the date in days is used as Time information of the flow unit. This is just a manifestation of the flexibility of the method proposed in this paper. The synthetic data set supplemented in resubmitted manuscript belongs to the former case, while the real-world data set belongs to the latter case.

Spatio-temporal sel-co-location Flow Pattern Analysis

Input Flow Table
flow_data_sub_2018_GDBTable

Flow Origin Field
o_city_id

Flow Origin Time (Optional)
o_date

Flow Destination Field
d_city_id

Flow Destination Time (Optional)
d_date

Flow Attribute Value
flow_value

Input Origin Features
Cities_Polygon

UID Origin Field
oid

Input Destination Features
Cities_Polygon

UID Destination Field
oid

SCLF Pattern Rate Threshold
0.8

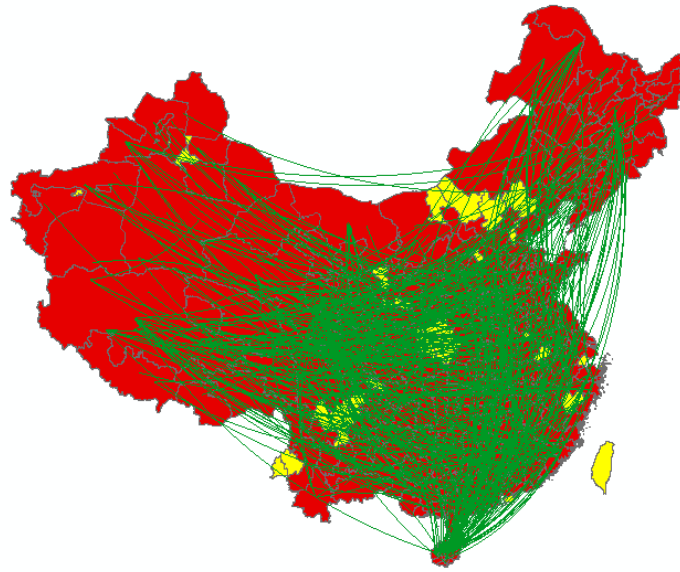
SCLFlow Time distance (Optional)
3 days

SCLFlow Pattern Output Path
F:\GIS_Study\Paper\before2020\paper\同位流模式\张海平英文\时空同位流模

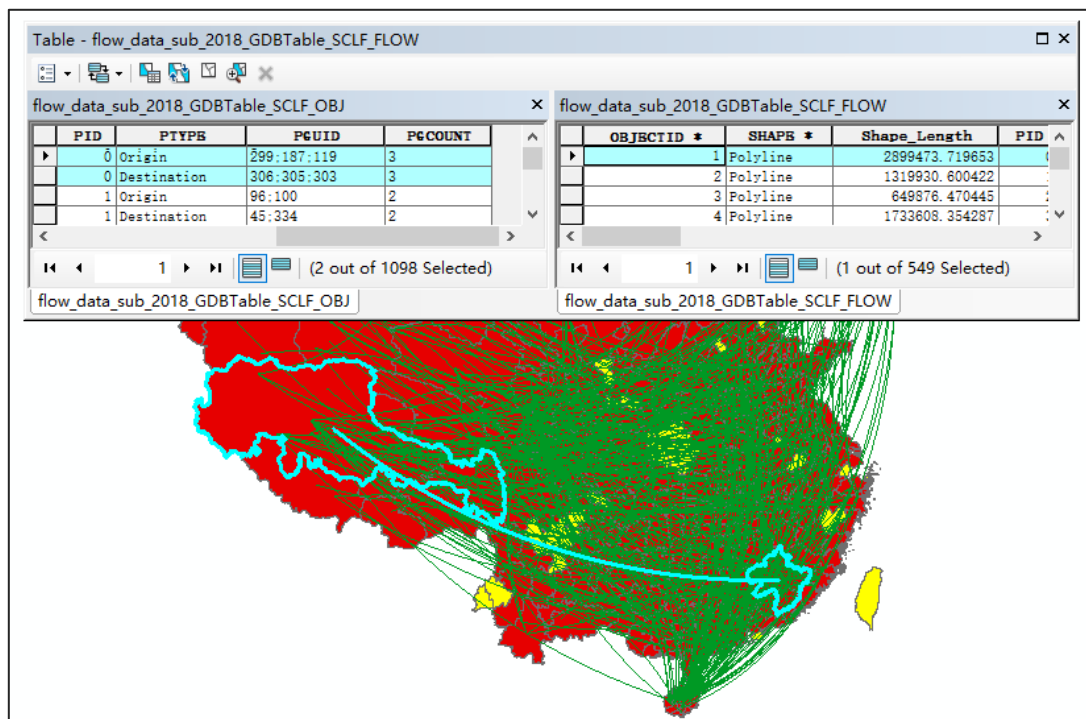
SCLFlow Pattern Output Name
flow_data_sub_2018_GDBTable_SCLF

OK Cancel

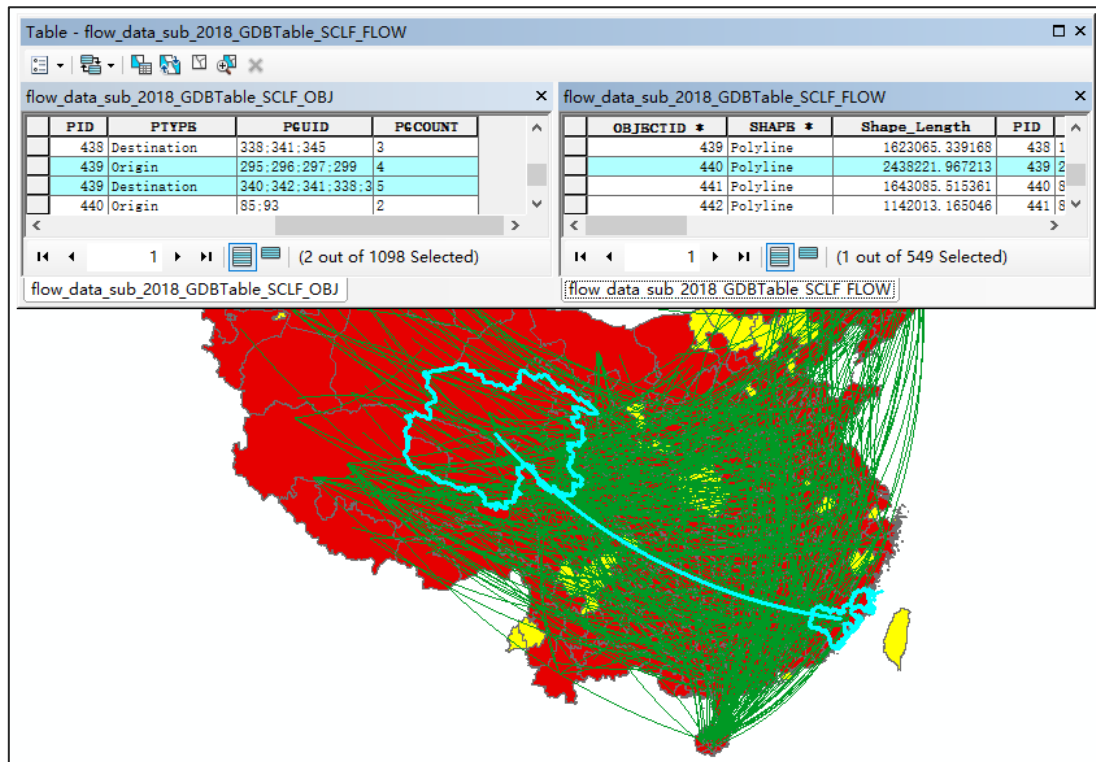
(3) After finished all parameters configurations, click “OK” button execute the model. If the model executed successfully, both Origin-Destination pair polygon layer and Origin-Destination pair line layer are generated as follow, many flow patterns is detected out.



(4) There are so many flow patterns, So you need to filter flow patterns you are more interested. You can filter flow pattern based on polygon count of origin or destination ,you also can filter flow pattern based on m-value, a-value et al. There are two examples flow patterns with PID = 0 and PID = 439. User can also change the rate threshold and time distance according the analysis needs.



ST-SCF pattern (PID=0)



ST-SCF pattern (PID=439)