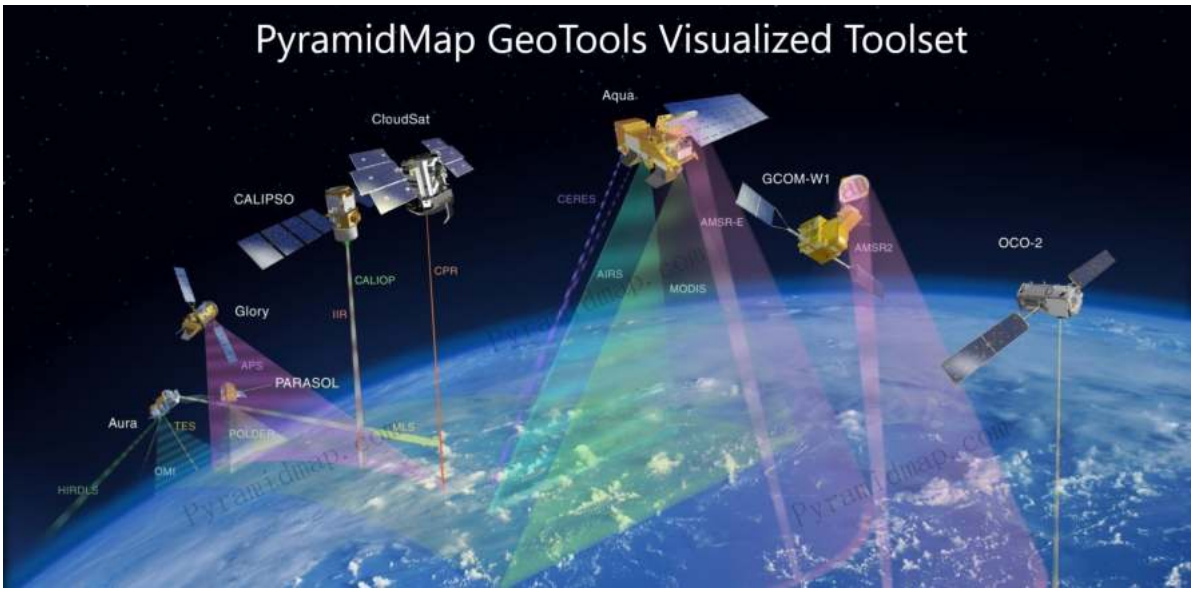


PyramidMap Geotools Visualized Toolset Instructions

1 Introduction

1.1: Function overview

As the world enters the information and digital era, the development of communication and Internet technology has completely changed the way people communicate and perceive the world. GIS (Geographic Information System) has developed from original paper map to holographic digital electronic map. GIS is synchronized with the software and hardware support of operating system, communication interconnection and mobile terminal, and has penetrated into all aspects of social production and people's life. From space launch, satellite remote sensing, express delivery and bus service, almost every link is shining with the glory of GIS. GIS can integrate spatial and dynamic information into holographic digital visual effects, and provide timely and accurate visual services for geographical research, geographical decision-making and residents' lives. The rich and colorful services of GIS come from its massive data support and powerful analysis and processing capabilities. However, the production, storage, analysis, processing and service provision of map data is an extremely professional, arduous and complex work, which has professional requirements for workflow and operators, and the technical cost is very high. Therefore, many enterprises with this demand but weak technology are discouraged. PyramidMap is a simple and practical GIS data processing workflow platform for small and medium-sized enterprises to solve this problem.

PyramidMap GeoTools visual map tool set is launched by PyramidMap (www.Pyramidmap. com). It is based on GeoTools component technology, which can be used as an independent map processing tool, as well as oriented to GeoServer and used as its client. It constitutes a simple and easy-to-use map service system covering mapping, editing and assignment, rendering, database storage, service release and management. It is simple and easy to use, covering mapping, editing and assignment, rendering, database storage, service publishing, and management. The purpose of PyramidMap is to transform the professional and even daunting GIS data processing into an approachable, easy to use, relaxed and pleasant workflow. On this basis, the original complex process of GeoServer and Geodatabase connection and map service publishing is transformed into a fully guided visualization process, reducing the user threshold and improving the efficiency of map operation, Thus, GIS users are given the ability to independently complete the whole process from map mapping to web map services. Its ultimate goal is to provide efficient data processing process for WebGIS applications. That is to say, PyramidMap tool provides you with the most basic data assurance processing process for WebGIS applications. It belongs to the core layer of map data processing and is also the most complex process. PyramidMap is fully qualified for this work. The process is shown in Figure 1-1.

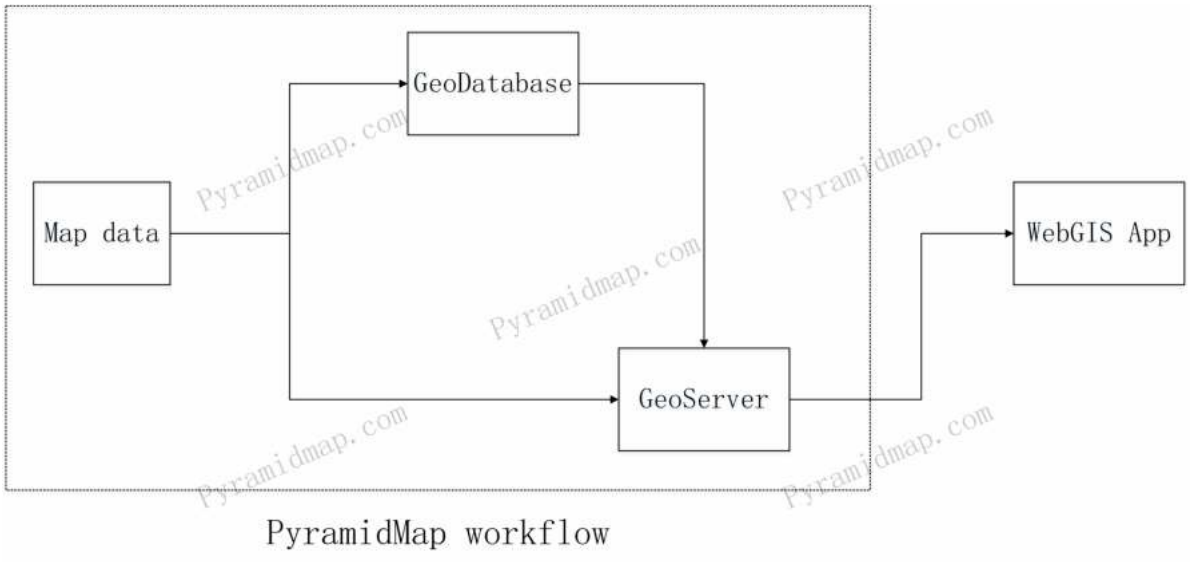


Figure 1-1: Diagram of PyramidMap Total Energy

PyramidMap is positioned at the key link of the whole WebGIS implementation process, and completes the processing and storage of key map data before the feasibility of WebGIS. Traditionally, it is highly dependent on the skills of professional GIS personnel. Now it can be easily completed by PyramidMap, which greatly reduces the access threshold for GIS users and improves the efficiency of map data processing.

1.2 Contact us

PyramidMap focuses on GIS application services and is committed to building a complete ecosystem of efficient GIS data processing, enterprise level geographic data storage, distributed map services, web and mobile map applications. It can help you achieve map data processing more easily and quickly, until the terminal displays the entire process of the application as a streamlined service. Welcome visiting to: http://www.pyramidmap.com obtaining beta software and technical information. For more technical support, please contact PyramidMap studio.

Email: service@pyramidmap.com

Tele: (086)0535-82957588

Mobile: (086)18660789051

WeChat: A18660789051

QQ: 29862351

2 Software deployment

2.1 Deployment mode

PyramidMap integrates all the dependencies required for operation internally. You only need to decompress the software to use it (Chinese path is not supported for the moment). Double click the PyramidMapViewer.exe executable to run it. The deployment mode is shown in Figure 2-1.

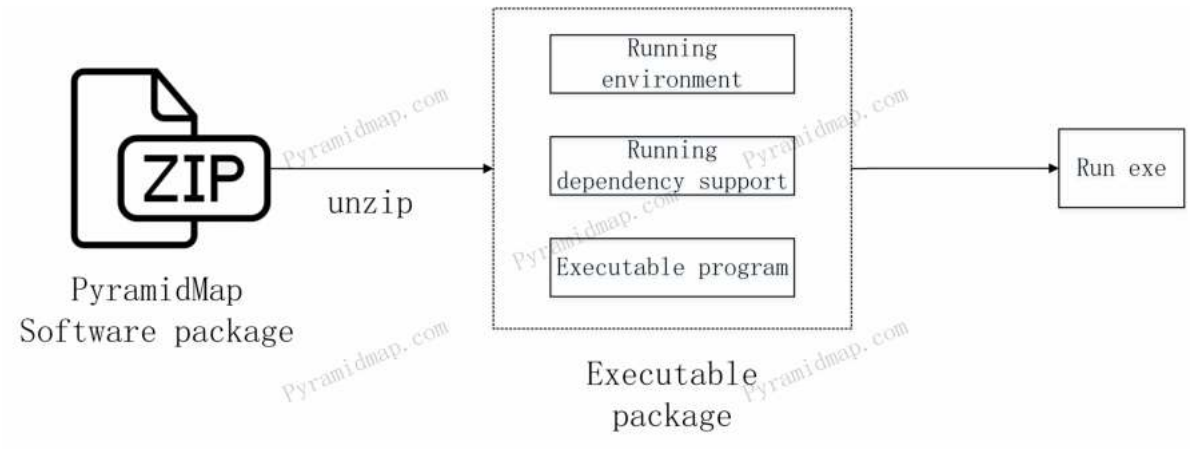


Figure 2-1: Schematic Diagram of PyramidMap Deployment Operation Mode

The PyramidMap GeoTools visualization toolset is only supported running in a Windows environment currently , with a minimum resolution requirement of 1920 * 1200.

2.2 Running mode

- Client/Server mode

PyramidMap can complete independent mapping, map editing, symbol definition rendering, Geodatabase geographic database connection, access, map data input and output, GeoServer map server space management, map service publishing, hosting and access and other full process processing. PyramidMap can independently complete all functions from mapping to editing, support multiple spatial geographic databases, including but not limited to Oracle, Postgre, MySQL, and complete the input, output, access and storage of map data. PyramidMap can be seamlessly connected with GeoServer map server, and can be used as a visualization client tool of GeoServer to complete workspace and data storage management of remote server, layer publishing, map symbol production and publishing, server layer and symbol data management, preview and other serialized operations on the client. To sum up, PyramidMap provides map users with a full process function from mapping to Web side use. PyramidMap supports deployment in Internet and intranet environments. It has all the dependencies required for integrated operation. It can be used after decompression without installation (Chinese path is not supported temporarily).The role and operation mode of PyramidMap in WebGIS network architecture are shown in Figure 2-2.

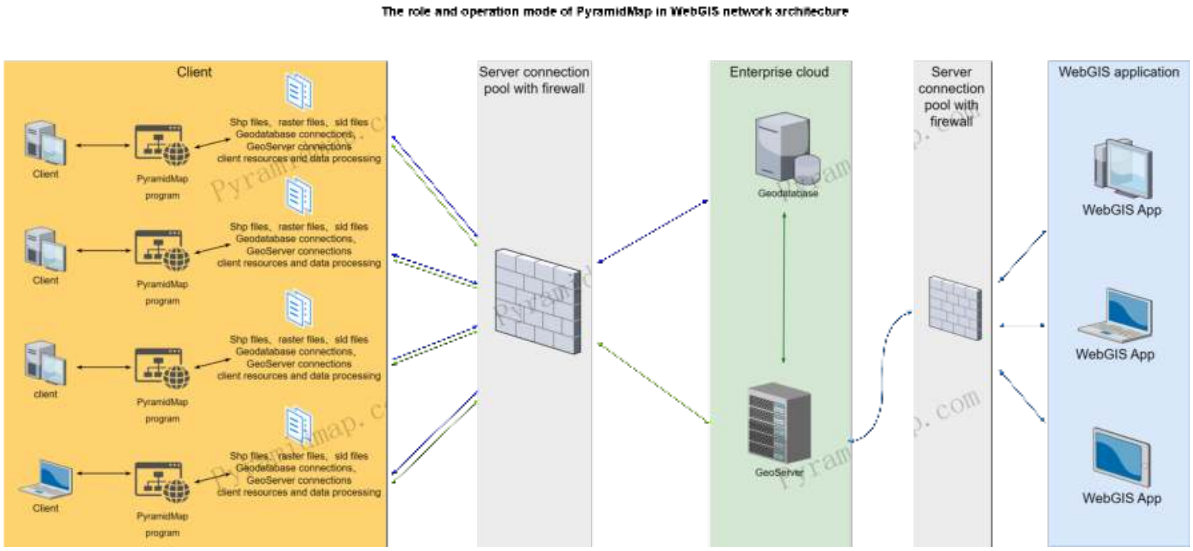


Figure 2-2: The role and operation mode of PyramidMap in WebGIS network architecture

2.3 Function list

Classify	Item	Function description
Map view	Map main view	Map preview and editing operations, support Shp file type, Geodatabase geographic database type, WMS, WFS, WCS, WMTS and other standardized map services from GeoServer, as well as various online map resources that follow standardized specifications, complete the complete process of map preview, editing, submission, and storage, and realize the symbolic management and rendering of maps.
	Layers displaying node control	The layers in the main view of the map will be classified and managed as nodes. It supports the display and right-click menu control on layer nodes through Checkbox, and the corresponding operations are implemented according to the layer type.

Classify	Item	Function description
	GeoDatabase layers node control	Database connection pool node. Double click the database node to dynamically load its internal layer. The layer node can be dragged to the main view or displayed by double clicking the mouse. Different levels of nodes have corresponding shortcut menus. The database node menu completes database connection testing, editing, layer list management, and deletion; The layer node menu supports layer export, conversion and deletion.
	GeoServer layers node control	GeoServer connection pool node. Double click the server node to dynamically load the server's internal workspace and layer nodes; Layer nodes can be dragged to the main view or displayed by double clicking. The nodes at different levels have corresponding shortcut menus. The GeoServer level node menu completes the map server connection test, editing the connection, obtaining the server synchronization data (the GeoServer server workspace, data storage and its database connection configuration), workspace management (the workspace parameters are localized and modified and synchronized to the server), refreshing nodes, and deleting; The workspace node menu completes the data storage management and layer import. In particular, in the data storage list, you can edit and modify the database connection and maintain the layer list for each item in the list, including the details of the layer and the maintenance of addition and deletion.
Map query		It supports SQL queries on layer data tables in the main map view and each independent map view, and the query results are highlighted on the map. Support Shp vector file, Geodatabase layer, GeoServer layer and other data types.
Features Selection		In the main map view and each independent map view, you can select map features, highlight and open the data table, edit, modify, save and submit attribute data. Support Shp vector file, Geodatabase layer, GeoServer layer and other data types.
Map editing	Cartography	In the main map view and each independent map view, according to the geometric type of the current layer, the mouse can be used to dot, draw lines, and save images. Support Shp vector file, Geodatabase layer, WFS map service in GeoServer and other data types.

Classify	Item	Function description
	Features assignment	In the main map view and each independent map view, you can modify and edit attribute data in the map feature form, and submit it for saving. Support Shp vector file, Geodatabase layer, WFS map service in GeoServer and other data types.
	Data conversion	Shp to Csv,Shp to Kml, Shp to GeoJson, Csv to Shp, Kml to Shp, GeoJson to Shp.
	Data processing	Vector and raster coordinate system conversion, raster NoData processing, raster tiles slice and mosaic merge.
Create Shp	Create original Shp	Realize the full process processing of the design, editing, drawing, data saving, importing into the database, and publishing to GeoServer of the original Shp format vector layer.
	Transfer external data to Shp	Realize the conversion of structured data such as Csv, Kml and GeoJson to Shp vector layer.
	Geodatabase export Shp	Support, but not limited to, the export of geographic database features such as Oracle, PostGIS (PostgreSQL+GIS function extension), MySQL, and SQLServer to Shp.
Figure 3-25：Geodatabase node popup menu	GeoServer export Shp	Support the export of vector layers in GeoServer as Shp.
Layer resource management	Vector layers resource management	The client vector layer is brought into the program resource management system by selecting files to achieve a unified resource management pool for the client vector layer.
	Raster layers resource management	The client grid image layer is included in the program resource management system by selecting files, so as to achieve a unified resource management pool for client grid images.
Import layers into Geodatabase		Import the Shp layer in the client's vector layer resource management pool to Oracle, PostGIS, MySQL, SQLServer and other geographic databases.
Layers published to GeoServer	Publish Shp vector file	Publish the Shp layer in the client's vector layer resource management pool to GeoServer, store it in the data cache directory specified by GeoServer in the form of a file, and output such standardized map services as wms/wfs/kml , and provide visual map services for WebGIS.

Classify	Item	Function description
	Publish raster file	Publish the image layers in the grid layer resource management pool of the client to GeoServer, store them in the data cache directory specified by GeoServer as files, output the standardized map services such as wms/wcs/wmts, and provide visual map services for WebGIS.
	Publish Geodatabase vector layer	Import the shp files in the shp resource pool into the geodatabase, each shp will be converted into a feature data table, and then all the feature tables will be data source for the GeoServer which integrates the built-in JDBC engine driver, such then realize the access and processing of the map data in geodatabase, and output the standardized map services such as wms/wfs/kml, and provide visual map services for WebGIS.
Symbol system management	Create sld symbol file	Create sld layer style definition files of different feature types of point、multiPoint、lineString、multiLineString、polygon、multiPolygom to define the rendering mode of the layer.
	Manage sld symbol files	The client sld symbols are incorporated into the program resource management system by selecting files to achieve a unified resource management pool for the client sld symbols.
	Get server sld symbols	Obtain the sld symbol files on the GeoServer, synchronize them to the local client, and incorporate them into the program resource management system to achieve a unified resource management pool for the client sld symbols.
	Edit sld symbol file	Edit the sld symbol file.
	Synchronize the sld files to the server	Submit the sld files in the client sld resource pool to GeoServer.
Geodatabase connection pool	New Geodatabase connection	PyramidMap supports direct connection access to DBMS databases with spatial spatial data storage capabilities to realize the storage and conversion of map data. It supports (but is not limited to) Oracle, PostGIS (PostgreSQL+GIS function extension), MySQL, SQLServer and other databases. After the connection parameters are configured and tested, the above database resource connection pool is created and maintained.

Classify	Item	Function description
	Maintain Geodatabase connection pool	PyramidMap manages the resource allocation of the geodatabase in the way of connection pool, which is selected when the Shp layer is imported into the database and published. In the resource list, you can select operations such as modification, connection test, and layer import/export.
	Geodatabase layers management	Import the Shp files that have been included in the PyramidMap resource pool into the geodatabase; Export the feature layers in the geodatabase to Shp or Kml, GeoJson and other format files in the specified path.
	Geodatabase layers preview	Select the feature layer under the geodatabase in the database connection pool,for data query and layer preview.
GeoServer connection pool	New GeoServer connection	PyramidMap supports direct connection access with GeoServer map server, realizes multi type layer publishing function, and provides layer service interface for WebGIS. After the connection parameters are configured and tested successfully, create and maintain the GeoServer resource connection pool.
	Manage GeoServer connections	PyramidMap manages the resource configuration of the GeoServer in the way of connection pool. You can select modification, connection test, layer import and export and other related operations in the resource list.
	Manage workspace and data storage	PyramidMap can be used as a visual client of GeoServer to assist users in managing the workspace and data storage in a graphical interface. Usually, these operations require professional GIS personnel on the web console of GeoServer. The operations are complex and require high professional skills for operators. PyramidMap helps users realize this process through visual interface guidance, making this process very simple.
	Manage Server Layers	PyramidMap can be used as a visual client of GeoServer to assist users in uploading and publishing client layers, exporting and converting server layers in a graphical interface. Usually, these operations require professional GIS personnel on the web console of GeoServer. The operations are complex and require high professional skills for operators. PyramidMap helps users realize this process through visual interface guidance, making this process very simple.

Classify	Item	Function description
	GeoServer layers preview	PyramidMap can be used as the visualization client of GeoServer. It can display the layers in GeoServer in the map view of the main interface, and export and convert the layers accordingly, thus simplifying the difficulty of secondary development and application.
	Management GeoServer sld symbols	Sld (Styled layer description), the layer rendering style description file, and the map is drawn according to the description of sld, to realize the symbolization, color matching, transparency, text annotation and other rendering display of different types of elements of points, lines, and surfaces. PyramidMap can be used as the visualization client of GeoServer. It can help users to realize the localization creation and maintenance of sld files, keep synchronization with the server, and preset the server layer and the client layer during the release process. Usually, these operations require professional GIS personnel on the web console of GeoServer. The operations are complex and require high professional skills for operators. PyramidMap helps users realize this process through visual interface guidance, making this process very simple.

Table 2-1: PyramidMap functions list

2.4 Release

Functions	Release version			Application scenarios
	Basic	Standard	Professional	
Map view	●	●	●	Shp, Tiff, database and GeoServer layer, online base map display.
Map query	●	●	●	Shp, database and GeoServer vector layer data query and list.
Map features Selection	●	●	●	Select features on the map for editing and deleting.
Map drawing(point, line, polygon)	●	●	●	Create points, lines, and polygons on the map.
Map editing(graphics and attribute)	●	●	●	Edit and delete map element attribute data.
Map saving(file, database, GeoServer)			●	Submit saving the new, modified map features or delete them.
Map data conversion		●	●	Interconversion between Shp, Csv, Kml, GeoJson and other formats
Coordinate system conversion		●	●	Interconversion between all standardized coordinate system.
Vector and Raster spatial processing		●	●	Raster noData processing, raster tiles and mosaic together.
Design map symbols	●	●	●	Map symbols including shape, graphics, size, color and annotation.
Get GeoServer sld symbols	●	●	●	The client obtains the sld symbols on the GeoServer.
Client slds submitted to GeoServer			●	Synchronize the client's sld symbols to the GeoServer.
Client vector layers pool	●	●	●	The list of vector layer resources maintained by the client.
Client raster layers pool	●	●	●	The list of raster layer resources maintained by the client.
Vector layer imported to Geodatabase			●	Import the client's shp files into the Geodatabase.
Publish vector layers to GeoServer			●	Publish the client's shp files to GeoServer data directory.
Publish database layers to GeoServer			●	Import the shp to the Geodatabase, and then publish to the GeoServer.
Publish raster layers to GeoServer			●	Publish the client's raster files to GeoServer data directory.
Geodatabase layers exported		●	●	The layers in Geodatabase exported to Shp, Kml, GeoJson.
GeoServer layers exported		●	●	The layers in GeoServer exported to Shp, Kml, GeoJson.
GeoServer workspace and data storage			●	Managing GeoServer workspace and data storage in client.
Geodatabase connections pool	●	●	●	Create and maintain Geodatabase connections pool in client.
GeoServer connections pool	●	●	●	Create and maintain GeoServer connections pool in client.

Table 2-2: PyramidMap release functions list

3 Map view

The main map interface is divided into four functional areas, as shown in Figure 3-1. They are the main map view and the display container of all map data. They accept the loading and display of various map resource data from Shp files, image files, Geodatabase, GeoServer, online maps, etc; The online layer node on the left is the layer data source node that has been loaded into the main map view. It is classified according to the path layer, and has the corresponding level menu to complete the operation as instructed; On the upper right is the Geodatabase data source node, which is classified according to the data connection layer table, and has the corresponding level menu. The operation can be completed according to the instructions. The layer table can be dragged to the map view area or displayed by double clicking the mouse, and automatically added to the layer display node on the left; The lower right side is the GeoServer workspace and layer data source node, which are classified according to GeoServer connection - workspace - layer, and have the corresponding level menu. The operation is completed according to the instructions. The layer can be dragged to the map view area or displayed by double clicking the mouse, and automatically added to the layer display node on the left.

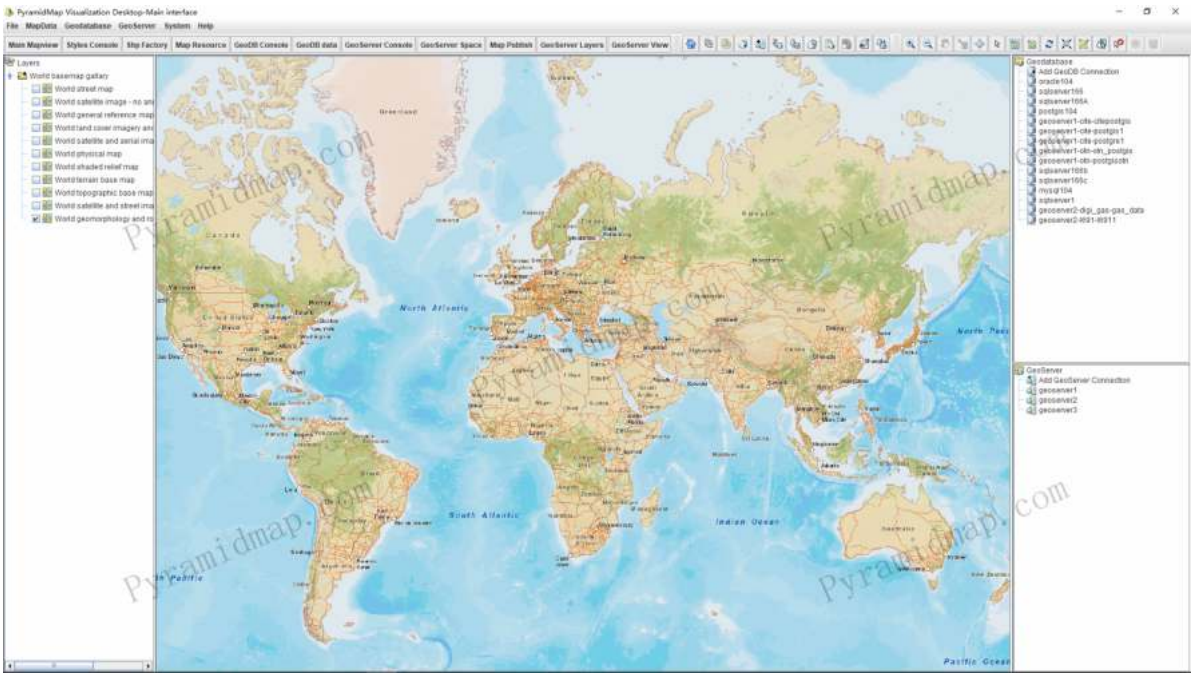


Figure 3-1: Main map viewer

3.1 Load basemap

The base map provides a reference map for the system and an environment for the content to be displayed in the map. When creating a new map, you can select an underlay to use. PyramidMap currently supports many base map resource based on Web Mercator coordinate system and others standard coordinate system. You can change the base map of the current map at any time: you can select the base map from the base map library. With the help of the base map, accurate spatial location calibration can be carried out, map data related to location can be processed, dot, line and picture can be plotted on the map, and accurate positioning and track query can be carried out. The main interface loads and switches the base map through the shortcut menu in the toolbar, as shown in Figure 3-2.

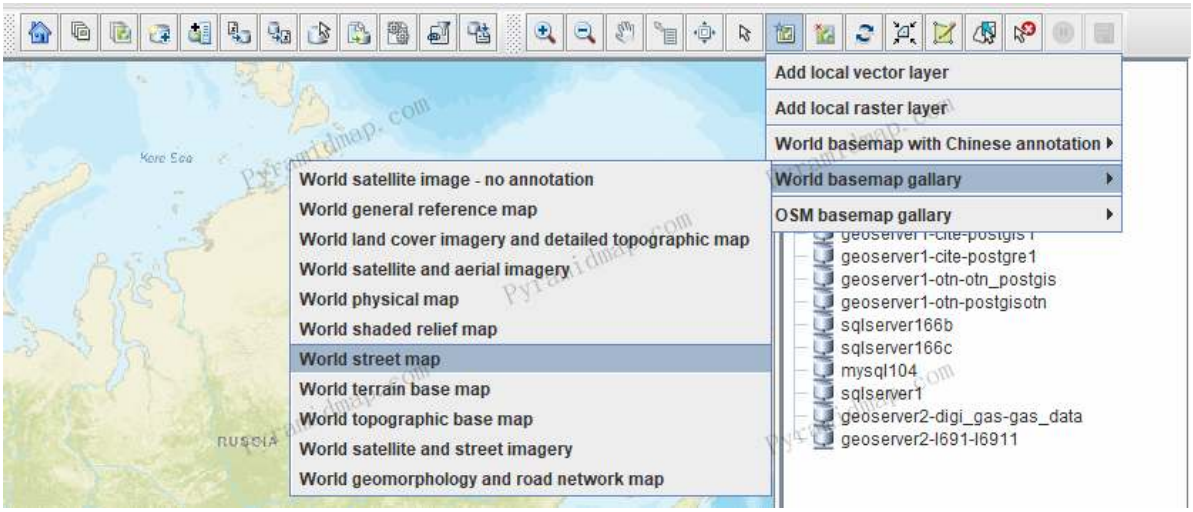


Figure 3-2: Main viewer base map menu

PyramidMap supports vector and raster type base map resources，This base map is designed to be used as a general reference map for informational purposes as well as for GIS professionals and other users to creating web maps and web mapping applications.

The world general reference map includes administrative boundaries, cities, protected areas, highways, roads, railways, water features, buildings and landmarks, overlaid on shaded relief and land cover imagery for added context. This reference map display effect is shown in Figure 3-3.

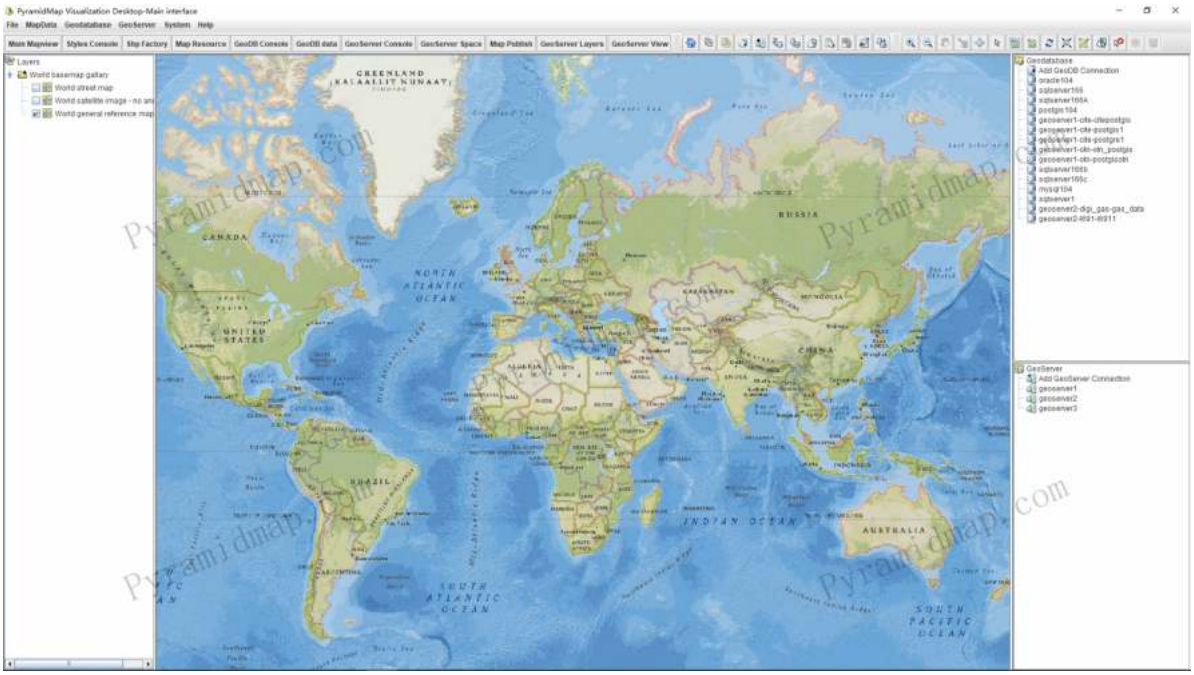


Figure 3-3：The world general reference map display effect

The local details somewhere for the world general reference map are shown in Figure 3-4.

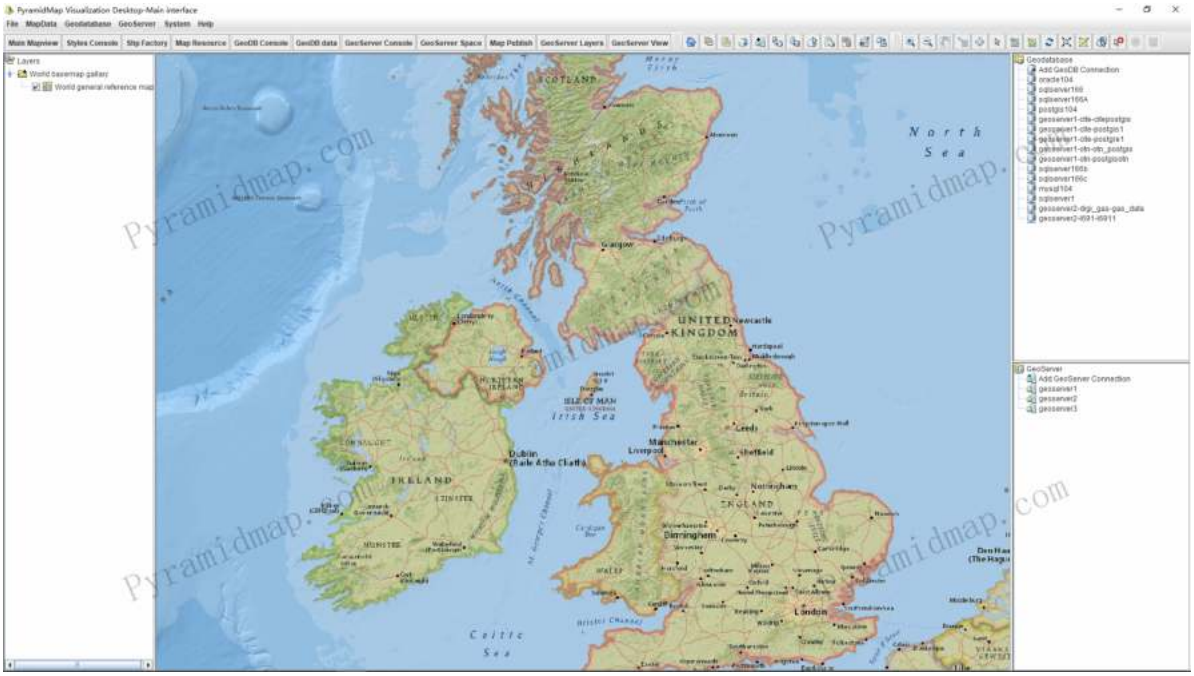


Figure 3-4：The world general reference map somewhere local details

The world land cover imagery and detailed topographic map presents land cover imagery and detailed topographic maps for the world. This map display effect is shown in Figure 3-5.

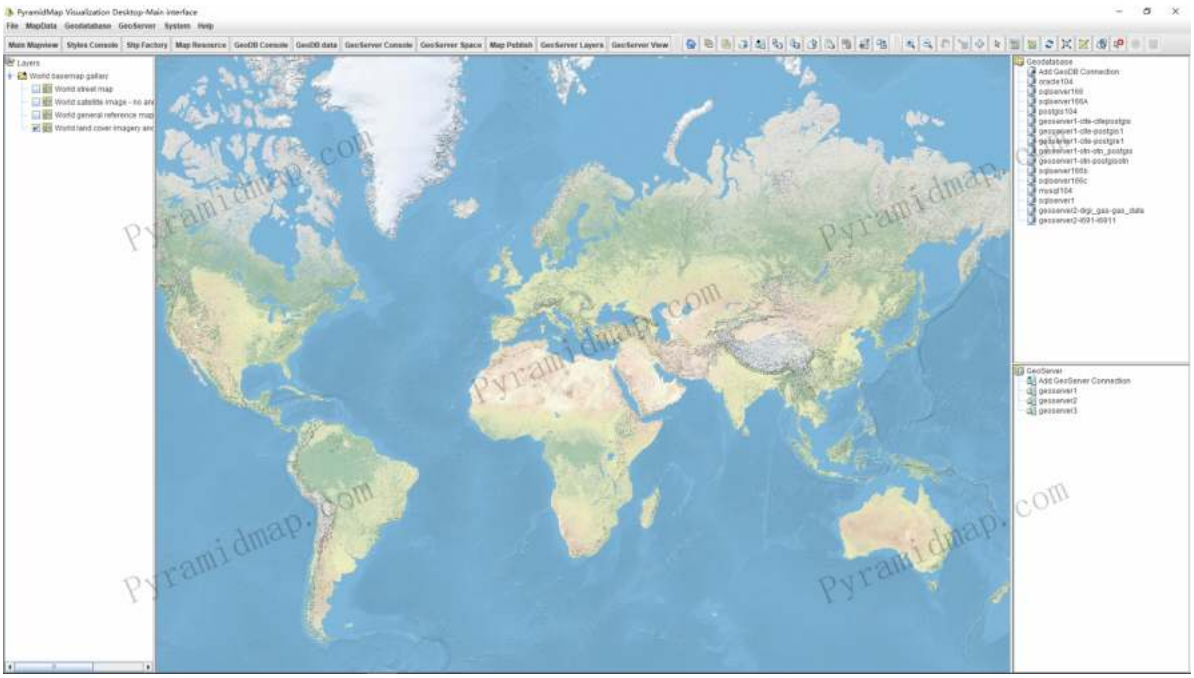


Figure 3-5：The world land cover imagery and detailed topographic map display effect

The local details somewhere for the world land cover imagery and detailed topographic map are shown in Figure 3-6.

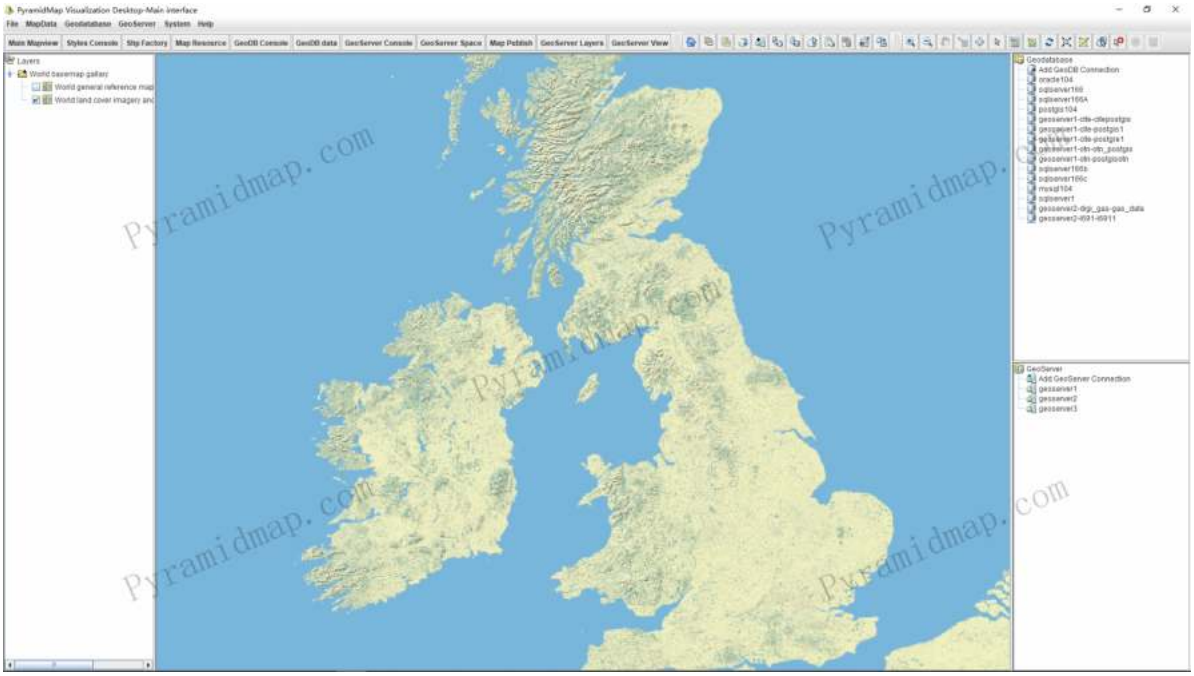


Figure 3-6：The world land cover imagery and detailed topographic map somewhere local details

The world satellite and aerial imagery map provides one meter or better satellite and aerial imagery in many parts of the world and lower resolution satellite imagery worldwide. The map includes 15m TerraColor imagery at small and mid-scales (~1:591M down to ~1:288k) for the world. The map features Maxar imagery at 0.3m resolution for select metropolitan areas around the world, 0.5m resolution across the United States and parts of Western Europe, and 1m resolution imagery across the rest of the world.The world satellite and aerial imagery map features high-resolution aerial photography contributed by the GIS User Community. This imagery ranges from 0.3m to 0.03m resolution (down to ~1:280 in select communities). The world satellite image display effect is shown in Figure 3-7.

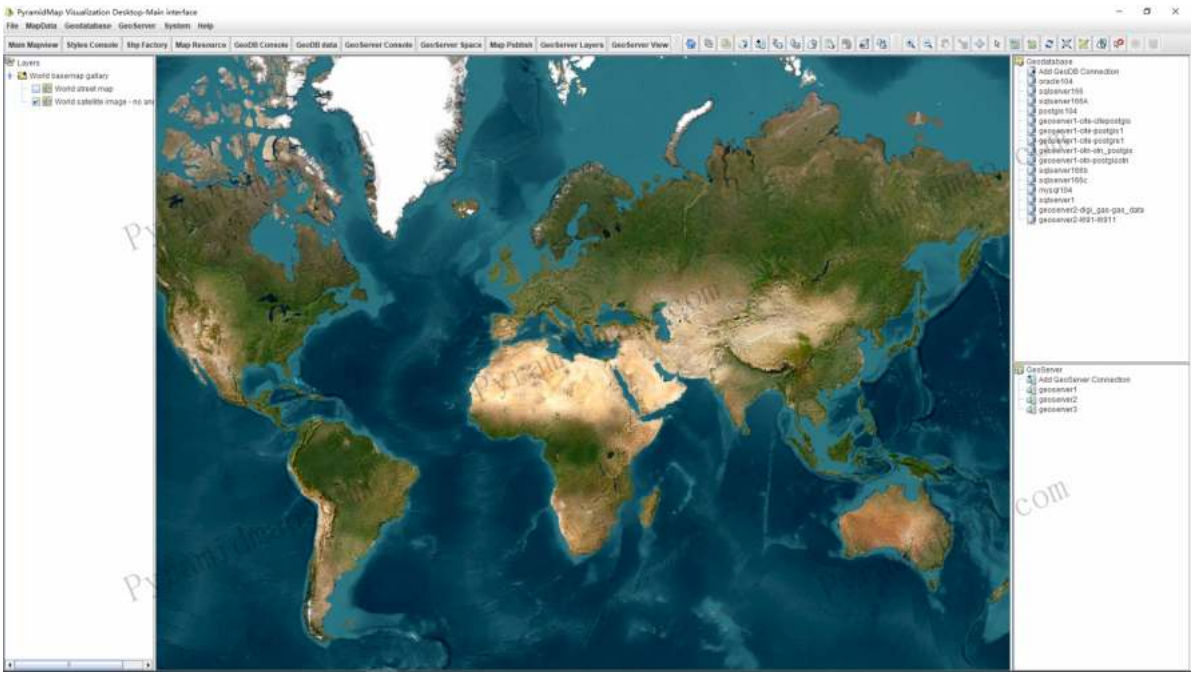


Figure 3-7：The world satellite image map display effect

The local details somewhere for the world satellite and aerial imagery map are shown in Figure 3-8.

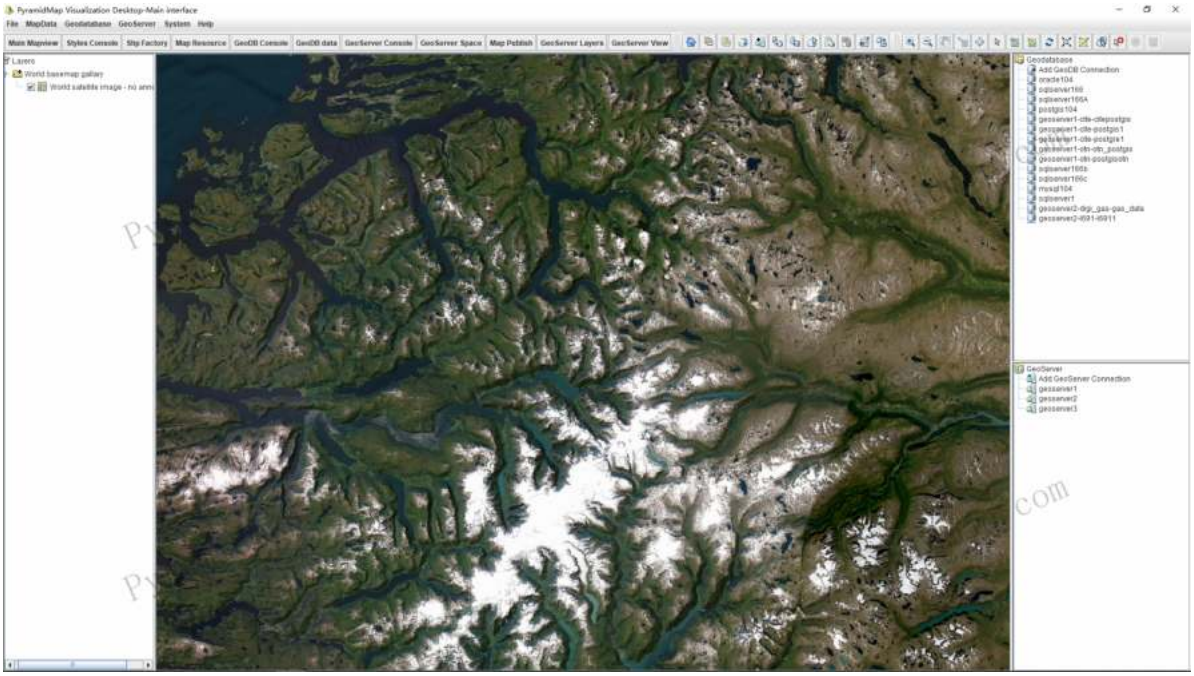


Figure 3-8：The world satellite image map somewhere local details

The world physical map presents the Natural Earth physical map at 1.24km per pixel for the world and 500m for the coterminous United States. This map display effect is shown in Figure 3-9.

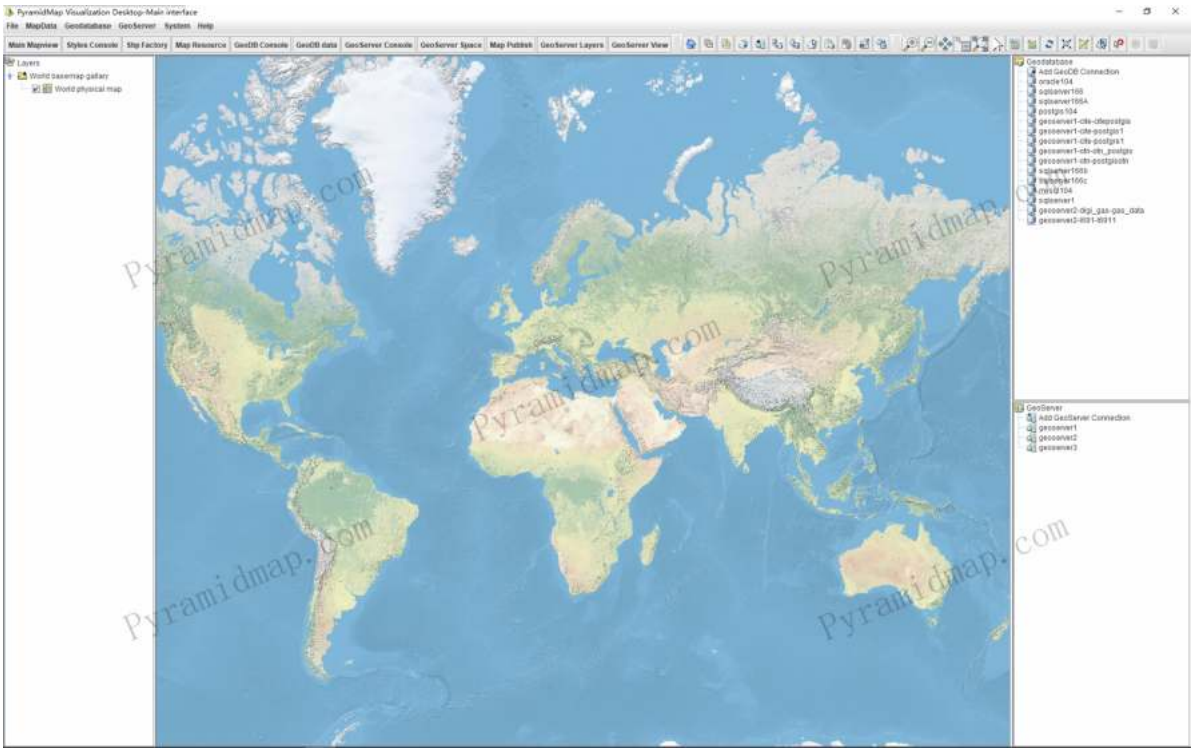


Figure 3-9：The world physical map display effect

The local details somewhere for the world physical map are shown in Figure 3-10.

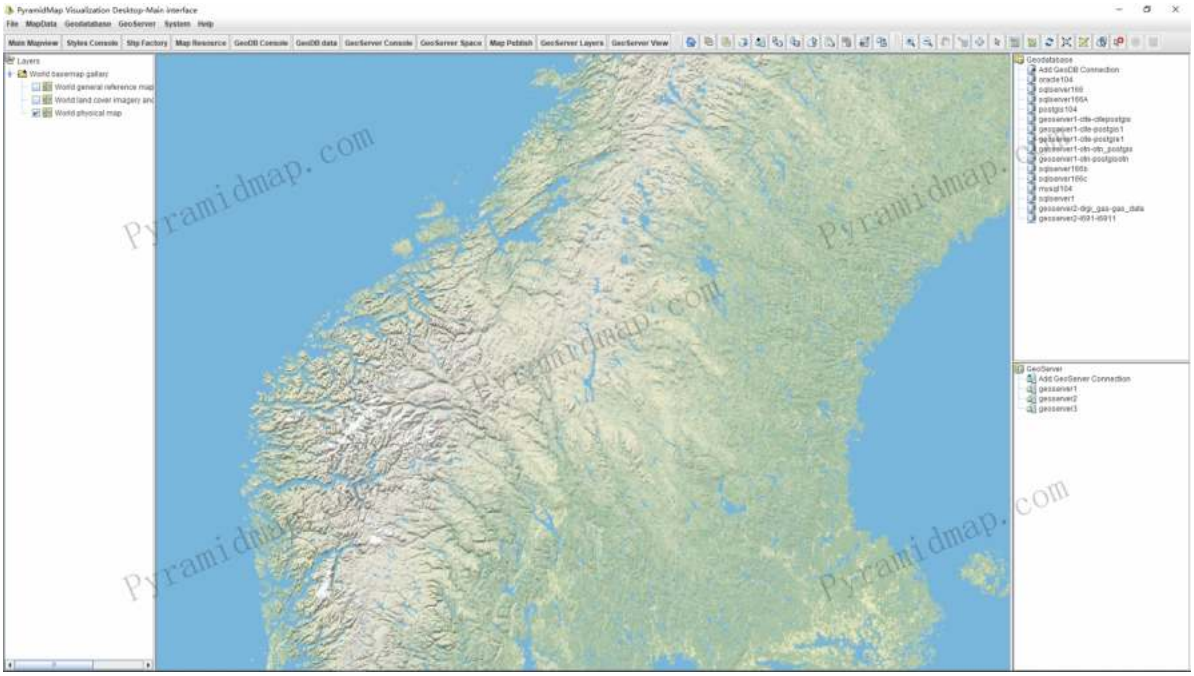


Figure 3-10：The world physical map somewhere local details

The world shaded relief map portrays surface elevation as shaded relief. This map is used as a basemap layer to add shaded relief to other GIS maps, such as the ArcGIS Online World Street Map. It is especially useful in maps that do not contain orthoimagery. The map resolution (cell size) is as follows: 30 Meters for the U.S. 90 Meters for all land areas between 60 degrees north and 56 degrees south latitude. 1 KM resolution above 60 degrees north and 56 degrees south. The shaded relief imagery was developed by Esri using GTOPO30, Shuttle Radar Topography Mission (SRTM), and National Elevation Data (NED) data from the USGS. The world shaded relief map display effect is shown in Figure 3-11.

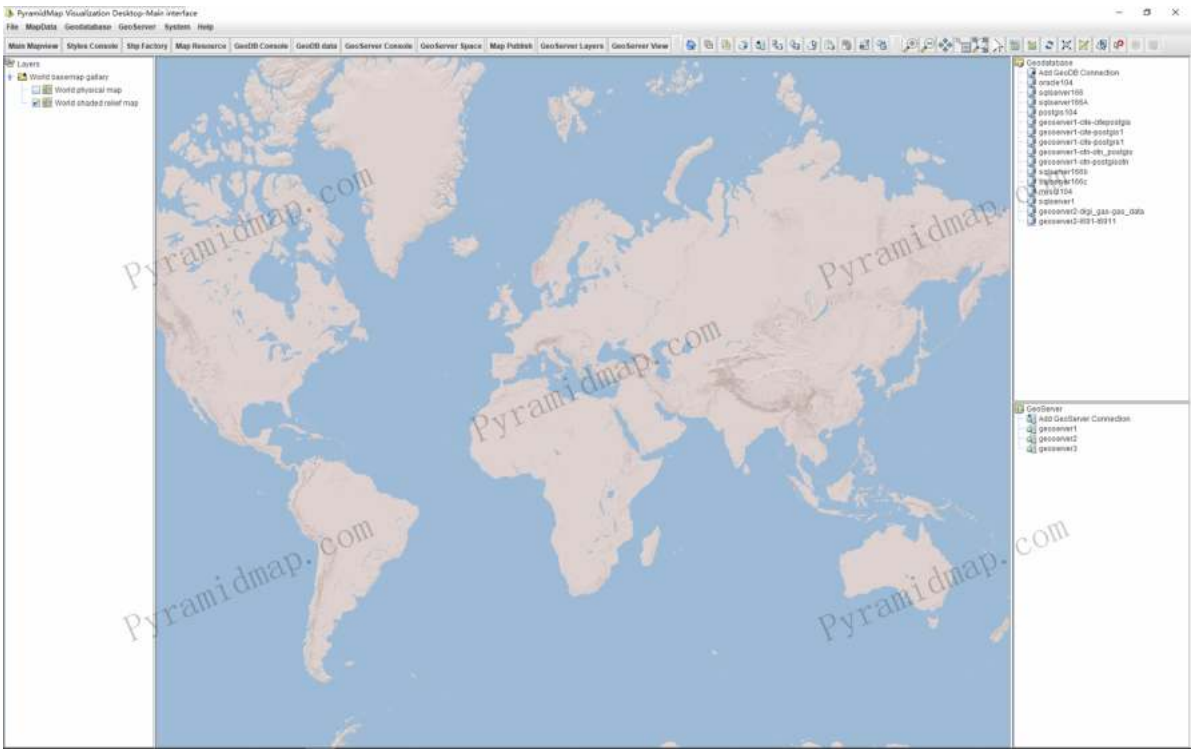


Figure 3-11：The world shaded relief map display effect

The local details somewhere for the world shaded relief map are shown in Figure 3-12.

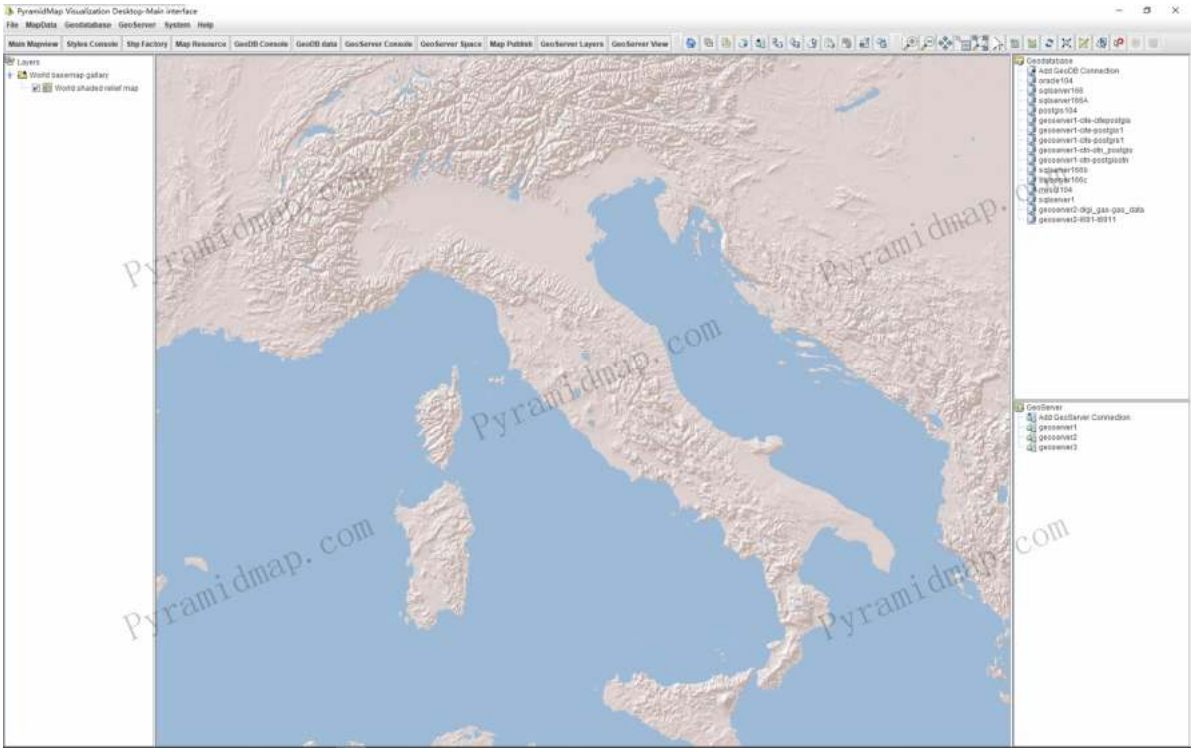


Figure 3-12：The world shaded relief map somewhere local details

The world street map presents highway-level data for the world. Street-level data includes the United States; much of Canada; Mexico; Europe; Japan; Australia and New Zealand; India; South America and Central America; Africa; and most of the Middle East. This comprehensive street map includes highways, major roads, minor roads, one-way arrow indicators, railways, water features, administrative boundaries, cities, parks, and landmarks, overlaid on shaded relief imagery for added context. Display effect is shown in Figure 3-13.

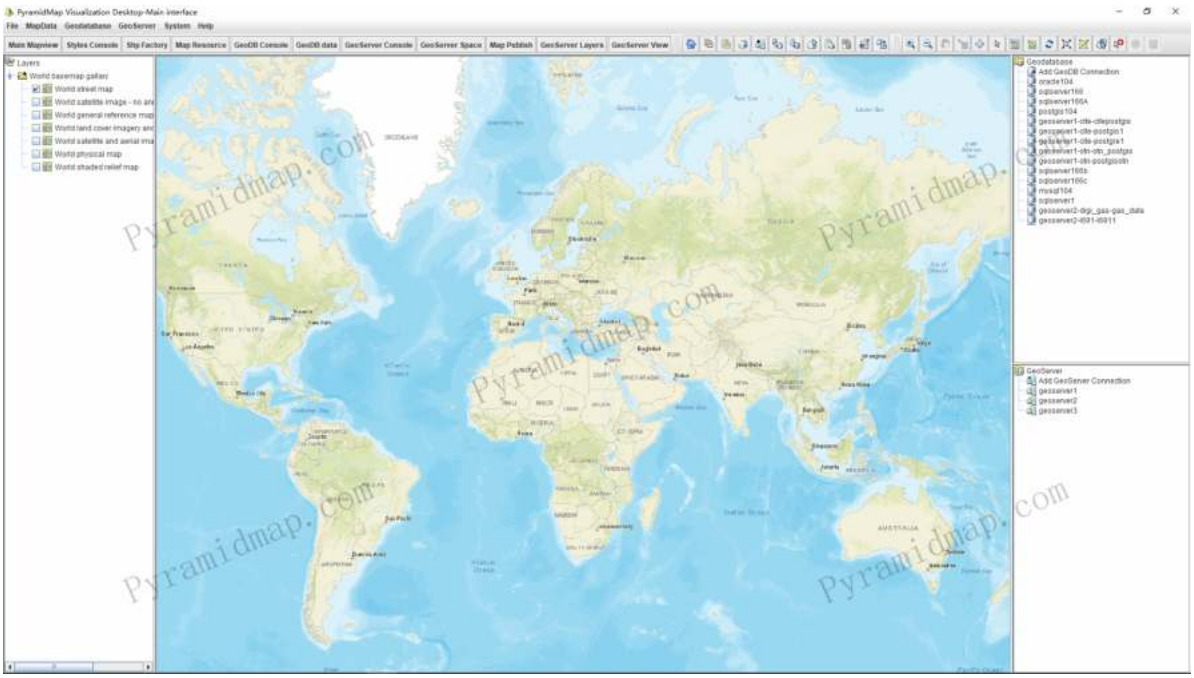


Figure 3-13：The world street map display effect

The local details somewhere for the world street map are shown in Figure 3-14.

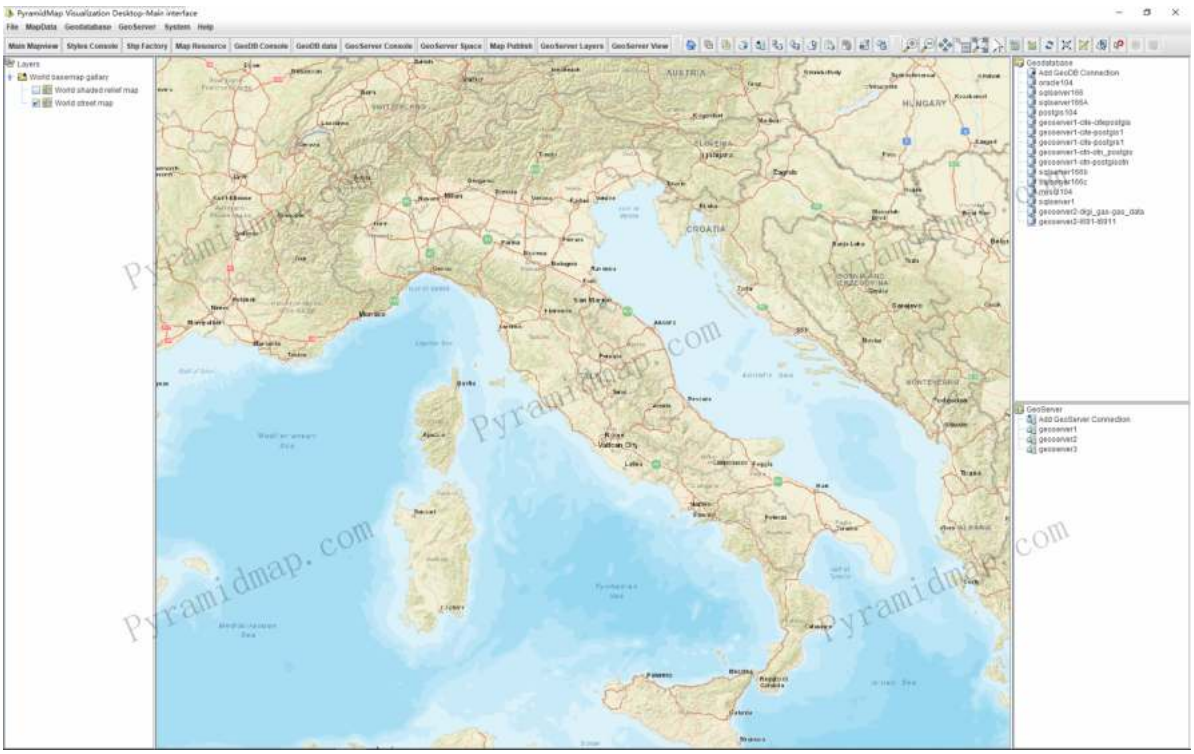


Figure 3-14：The world street map somewhere local details

The world terrain base map is designed to be used as a base map by GIS professionals to overlay other thematic layers such as demographics or land cover. The base map features shaded relief imagery, bathymetry, and coastal water features designed to provide a neutral background for other data layers. The base map currently provides coverage for the world down to a scale of ~1:1m.The world terrain base map display effect is shown in Figure 3-15.

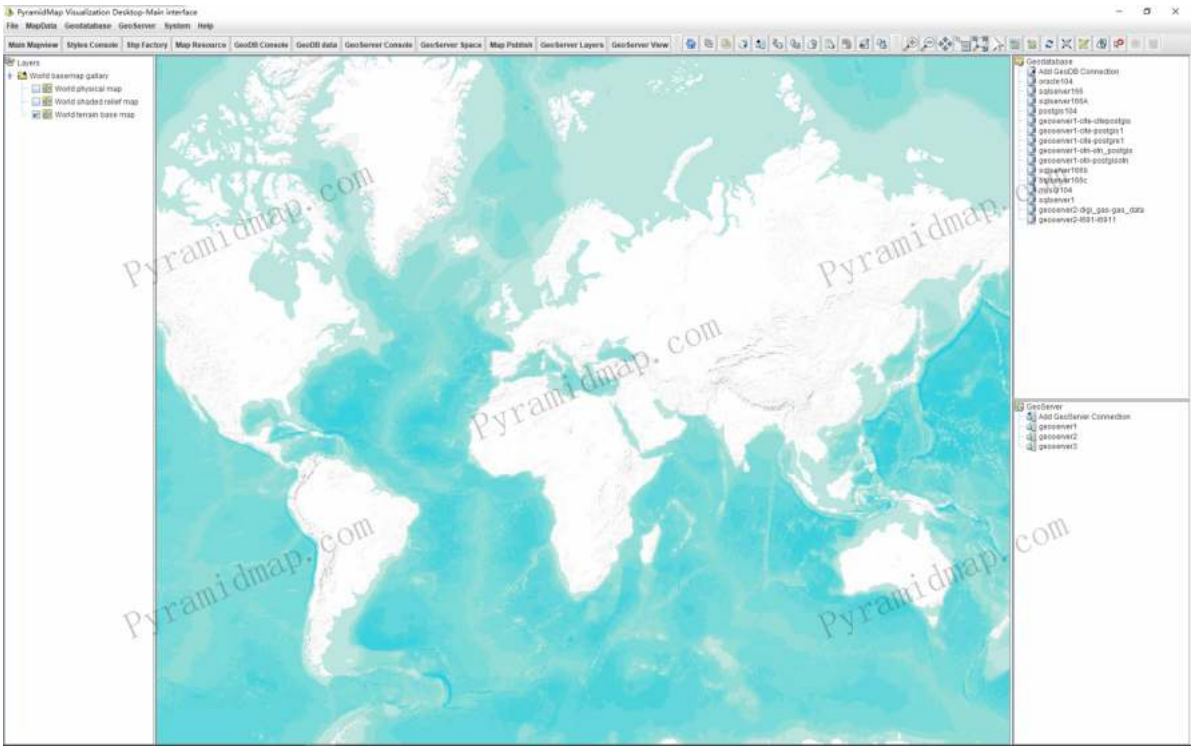


Figure 3-15：The world terrain base map display effect

The local details somewhere for the world terrain base map are shown in Figure 3-16.

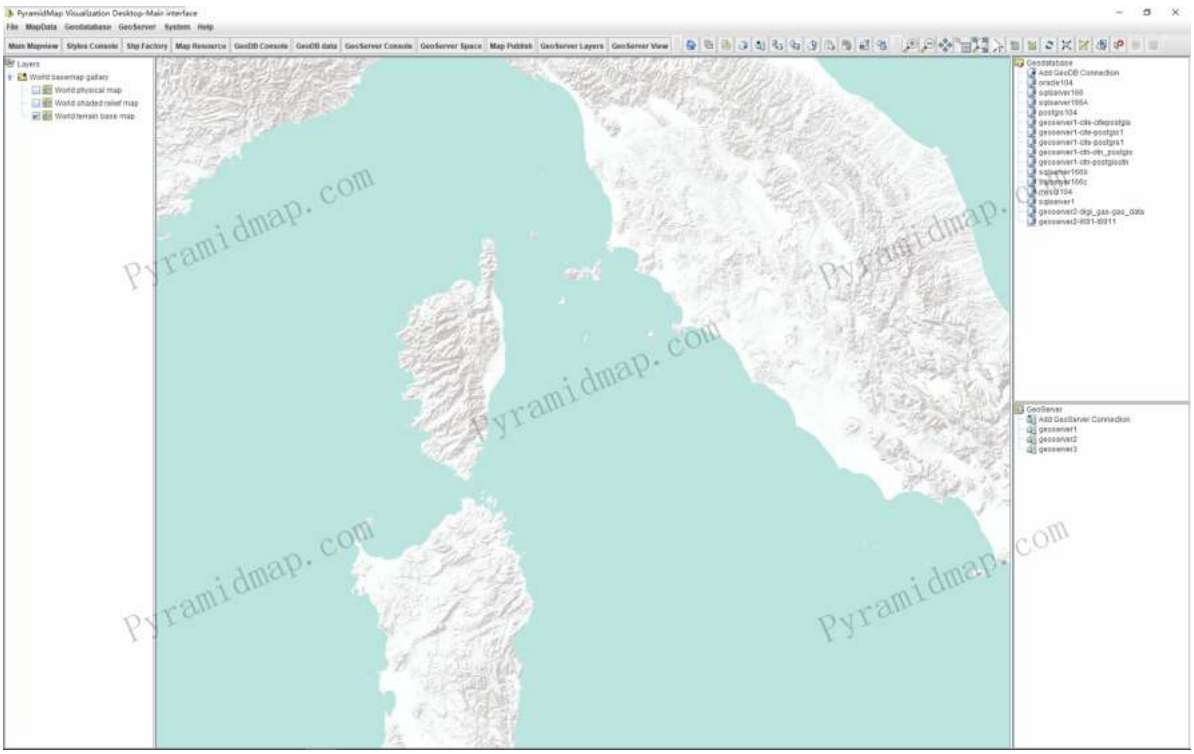


Figure 3-16：The world terrain base map somewhere local details

The world topographic base map is designed to be used as a basemap by GIS professionals and as a reference map by anyone. The map includes administrative boundaries, cities, water features, physiographic features, parks, landmarks, highways, roads, railways, and airports overlaid on land cover and shaded relief imagery for added context. The world topographic base map display effect is shown in Figure 3-17.

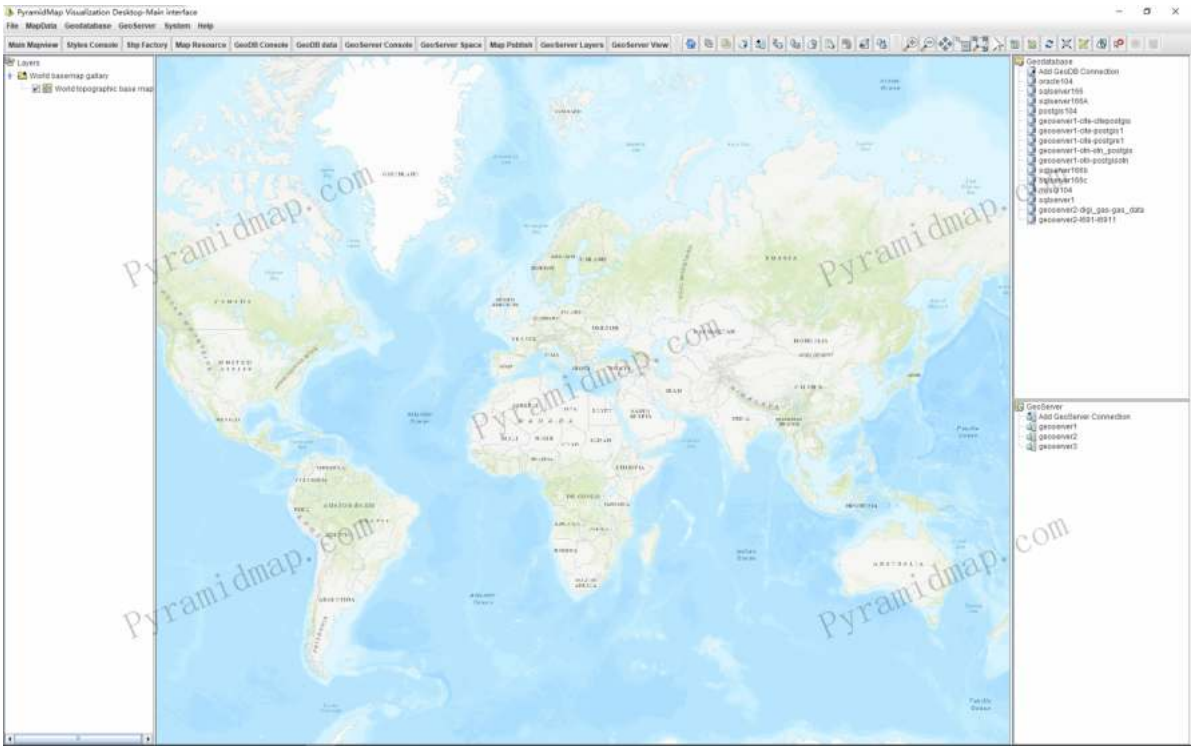


Figure 3-17：The world topographic base map display effect

The local details somewhere for the world topographic base map are shown in Figure 3-18.

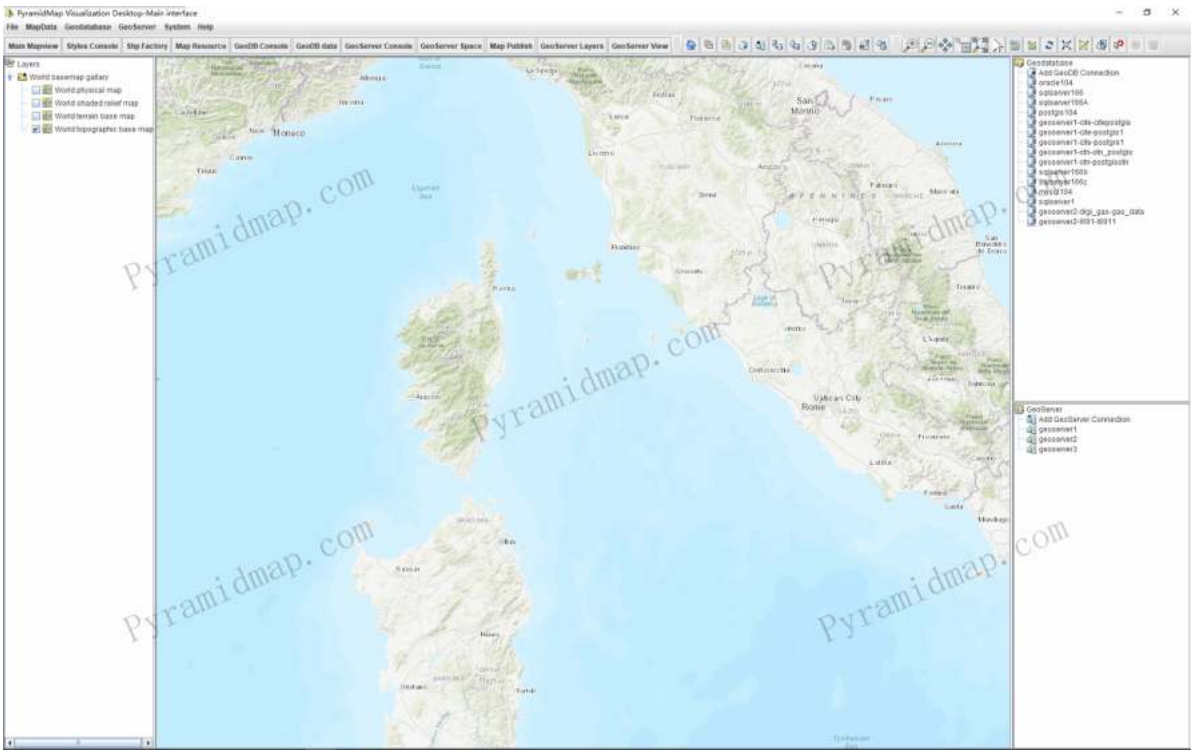


Figure 3-18：The world topographic base map somewhere local details

The world geomorphology and road network map presents highway-level data for the world. Street-level data includes the United States; much of Canada; Japan; Europe; Australia and New Zealand; India; South America and Central America; most of the Middle East; Egypt and Morocco; and parts of southern Africa including Botswana, Lesotho, Namibia, South Africa, and Swaziland. This comprehensive street map includes highways, major roads, minor roads, one-way arrow indicators, railways, water features, administrative boundaries, cities, parks, and landmarks, overlaid on shaded relief imagery for added context. This map display effect is shown in Figure 3-19.

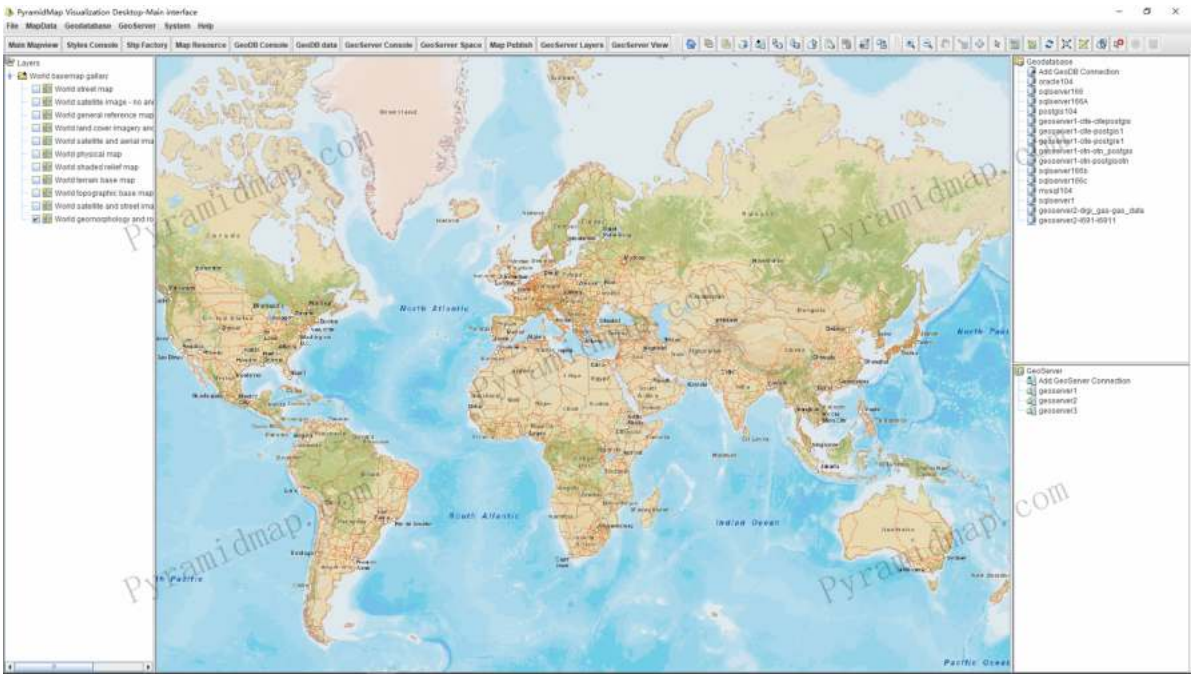


Figure 3-19：The world geomorphology and road network display effect

The local details somewhere for the world geomorphology and road network map are shown in Figure 3-20.

Figure 3-20：The world geomorphology and road network map somewhere local details

3.2 Load business layer

The map view supports the following map data: Shp file type, Geodatabase geographic database type, WMS, WFS, WCS, WMTS and other standardized map services from GeoServer, and various online map resources that follow standardized specifications. The layers added to the view are classified according to the data source path and displayed in the layer node on the left. The hierarchical operation is implemented through the right-click shortcut menu.

3.2.1 Load local Shp layer

Select "Load local vector layer" in the toolbar, as shown in Figure 3-21.

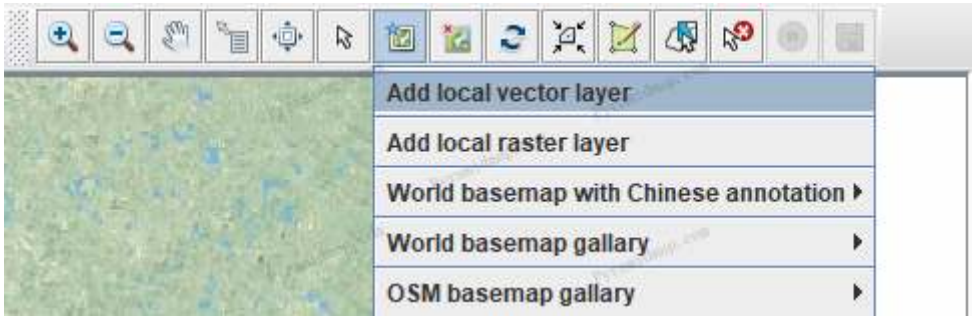


Figure 3-21：Load local vector layer

Loading the required layer through file broswer. After successful loading, it will be displayed in the map view, and the layers mount node on the left will be formed, as shown in Figure 3-22.

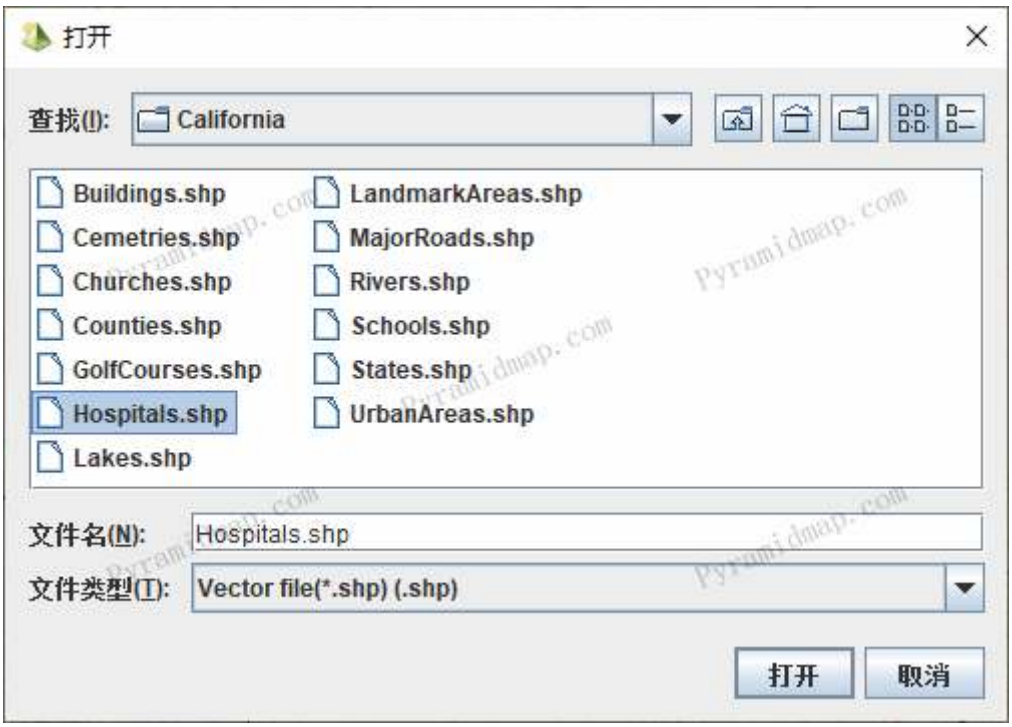


Figure 3-22：Load local shp file broswer

Then the shp selected display in the map viewer,as shown in Figure 3-23.

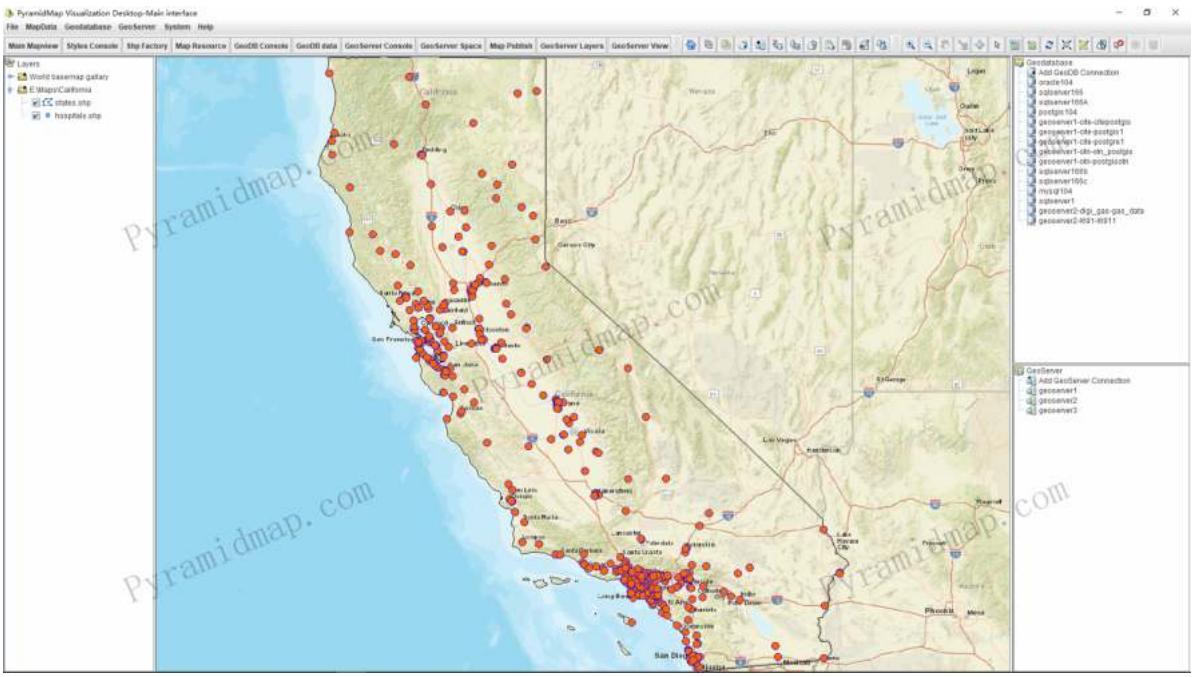


Figure 3-23：Load local shp file and display in the map viewer

At the same time, PyramidMap provides a more convenient operation, assuming the map initialization view is shown in Figure 3-24.

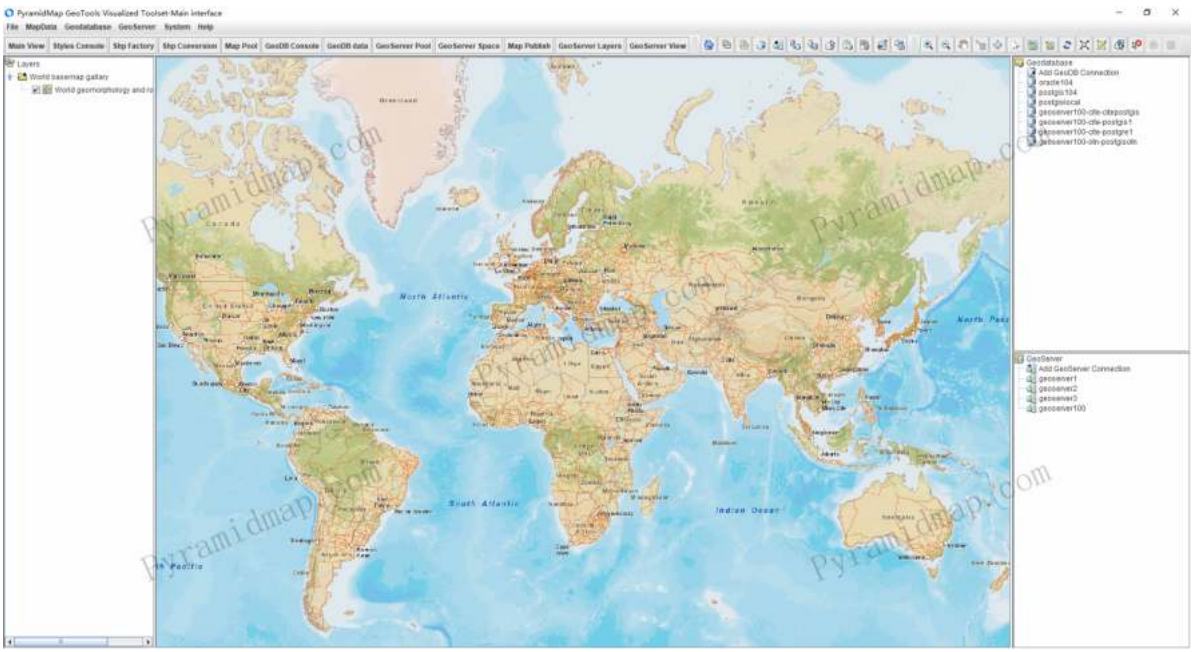


Figure 3-24：The map viewer initialization

You can drag and drop the shapefiles to the map view displaying directly, as shown in Figure 3-25.

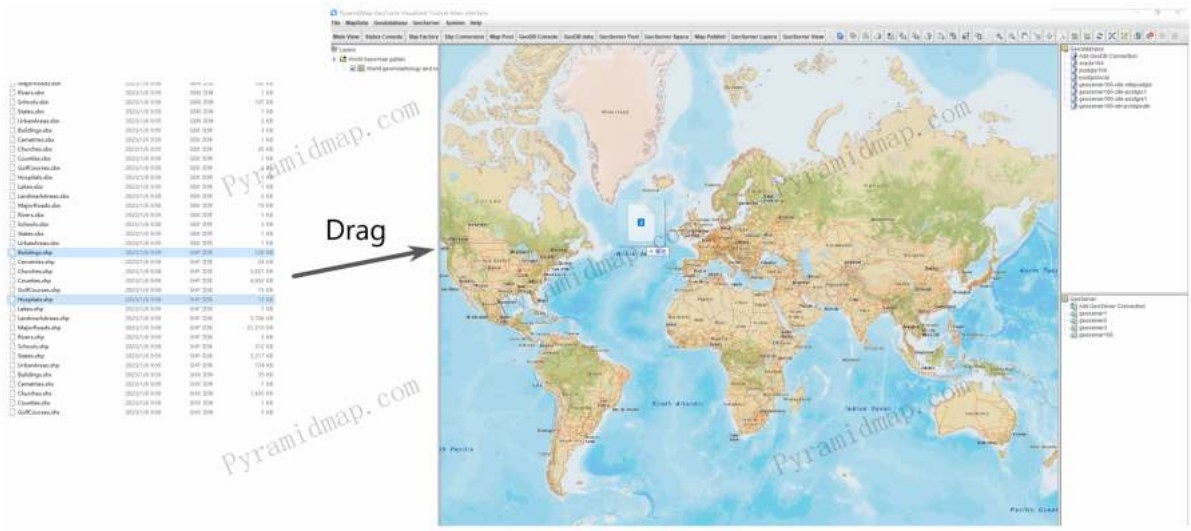


Figure 3-25：Drag and drop the shapefiles to the map view displaying directly

The display effect is shown in Figure 3-26.

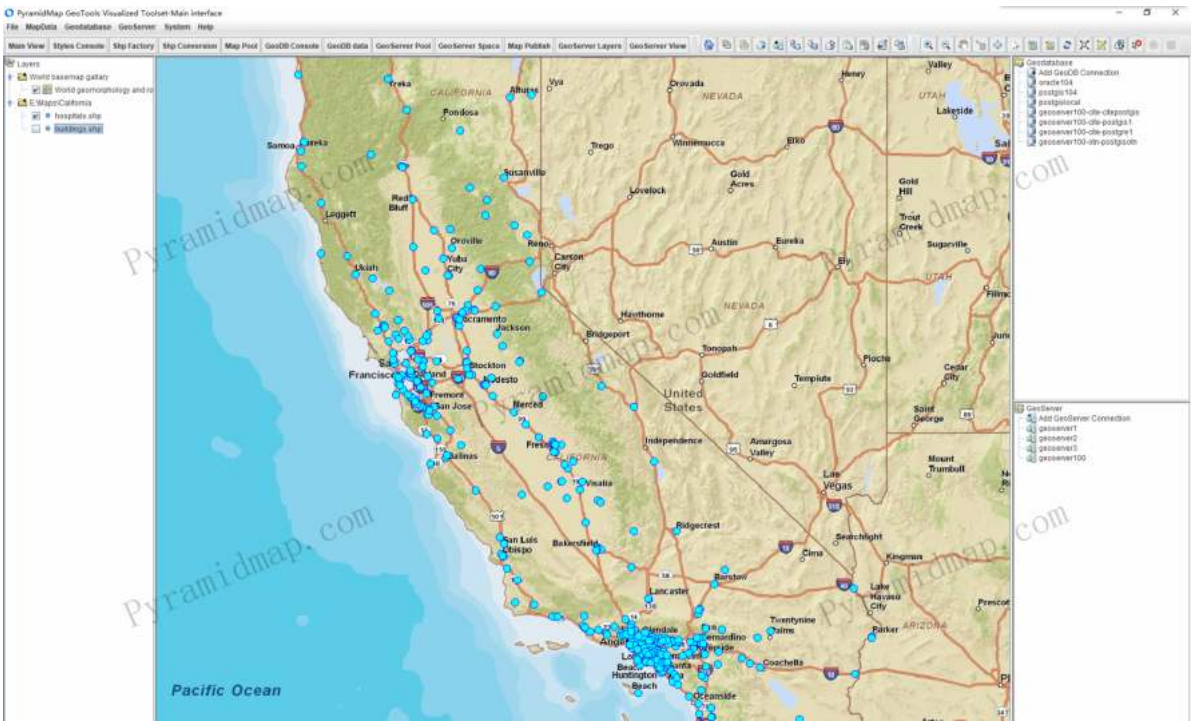


Figure 3-26：Drag and drop the shapefiles displaying

3.2.2 Load Geodatabase layer

In the node tree of the database connection pool on the main interface, double-click the database node to dynamically load its internal layer. Drag the layer node to the map view or double-click the mouse to display it. At the same time, the layer mount node on the left is formed, as shown in Figure 3-27.

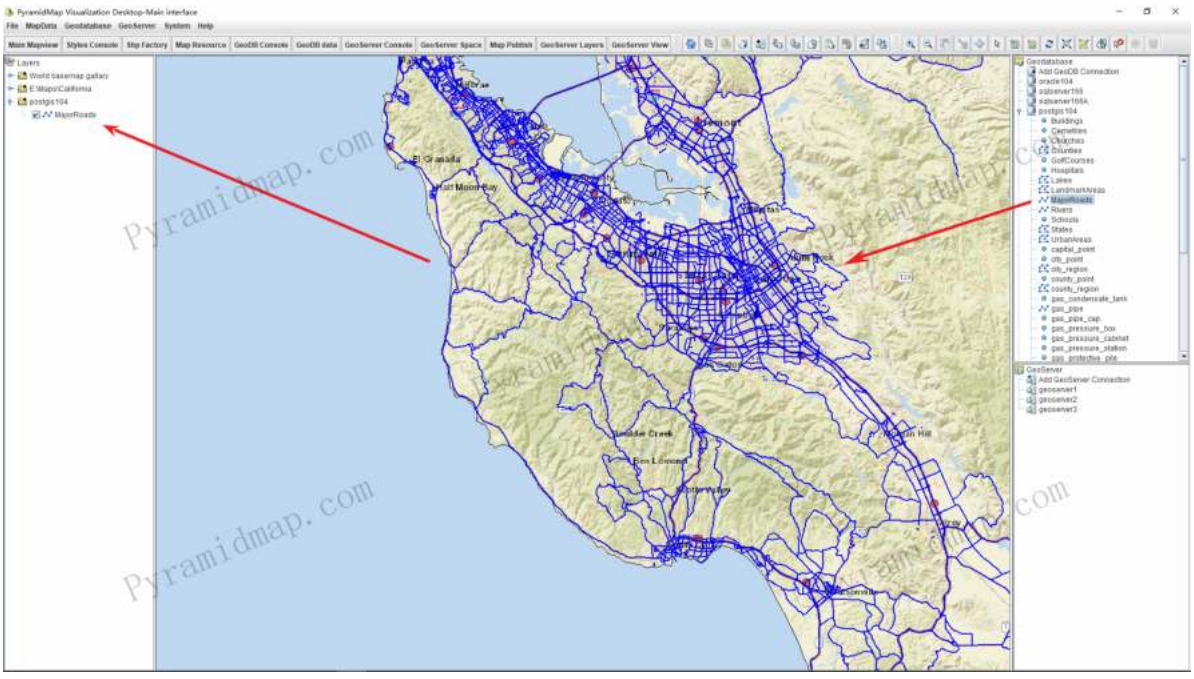


Figure 3-27：Loading and displaying vector layers in Geodatabase

3.2.3 Geodatabase node catalog and operation

On the upper right side of the main interface, there is a Geodatabase connection pool node, which provides a Geodatabase data source. Double click the database node to dynamically load its internal layers. The layer nodes can be dragged or double clicked to displaying in the map viewer. Different levels of nodes have corresponding shortcut menus. The database node menu

completes database connection test, editing, layer list management, and deletion operations, as shown in Figure 3-28.

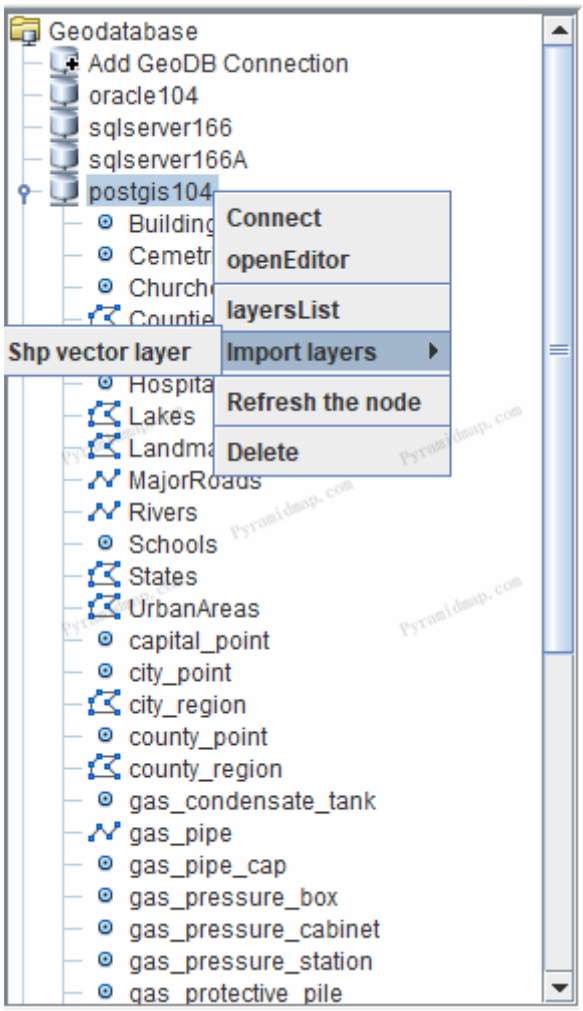


Figure 3-28：Geodatabase node popup menu

The layer node menu supports exporting database layers to Shp, Kml, Csv, GeoJson and other formats or being deleted, as shown in Figure 3-29.

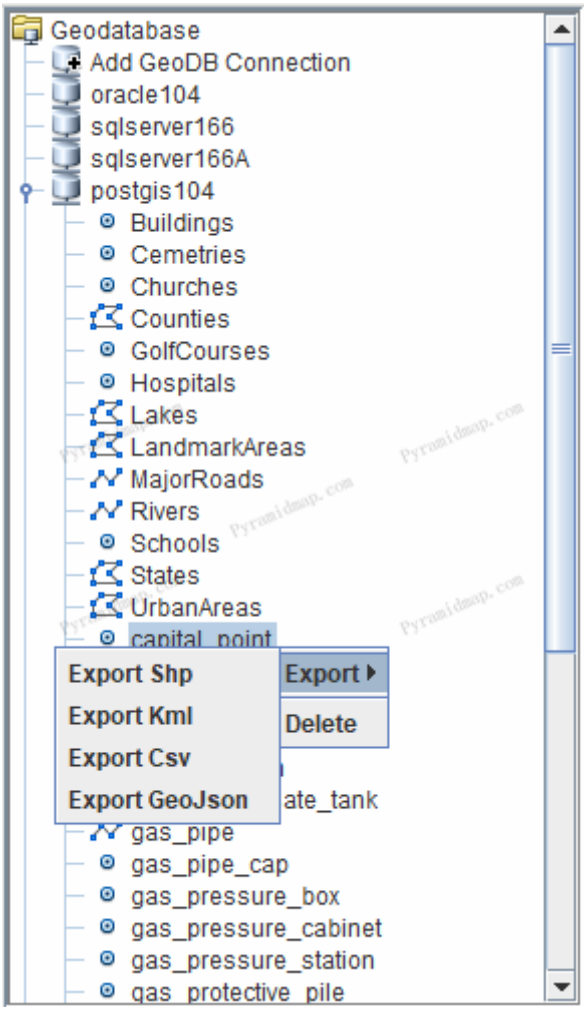


Figure 3-29：Geodatabase layer node popup menu

3.2.4 Load GeoServer layer

In the node tree of the GeoServer connection pool in the main interface, double-click the GeoServer node to dynamically load its internal workspace and its layers. The layer nodes can be dragged or double clicked to displaying in the map viewer, at the same time, the layer mount node on the left is formed, as shown in Figure 3-30.

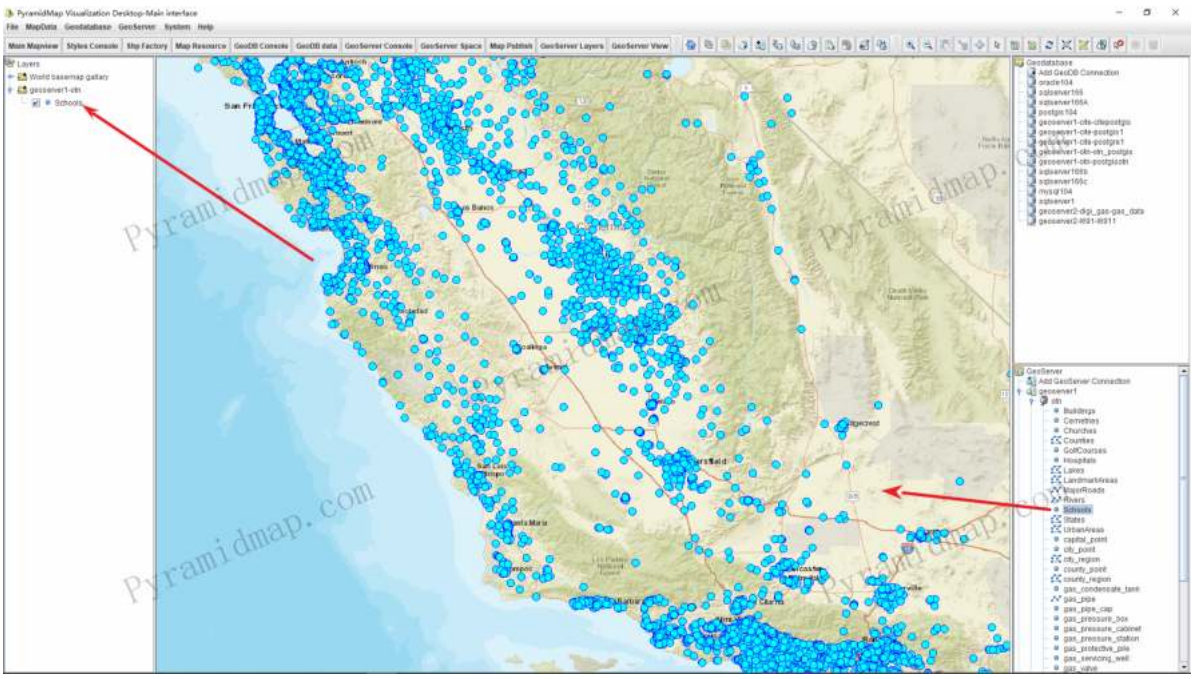


Figure 3-30：Loading and displaying vector layers in GeoServer

3.2.5 GeoServer node catalog and operation

On the lower right side of the main interface, the GeoServer connects to the pool node, providing the GeoServer data source. Double click the GeoServer node, then dynamic loading the internal workspace and layer nodes. Nodes at different levels have corresponding shortcut menus. The GeoServer node menu completes the server connection test, connection editing, obtaining server synchronization data (configuring the GeoServer workspace and data storage and its database connection), workspace management (localizing and modifying the workspace parameters and synchronizing them to the server), refreshing the layer list, connection deletion, and other operations, as shown in Figure 3-31.

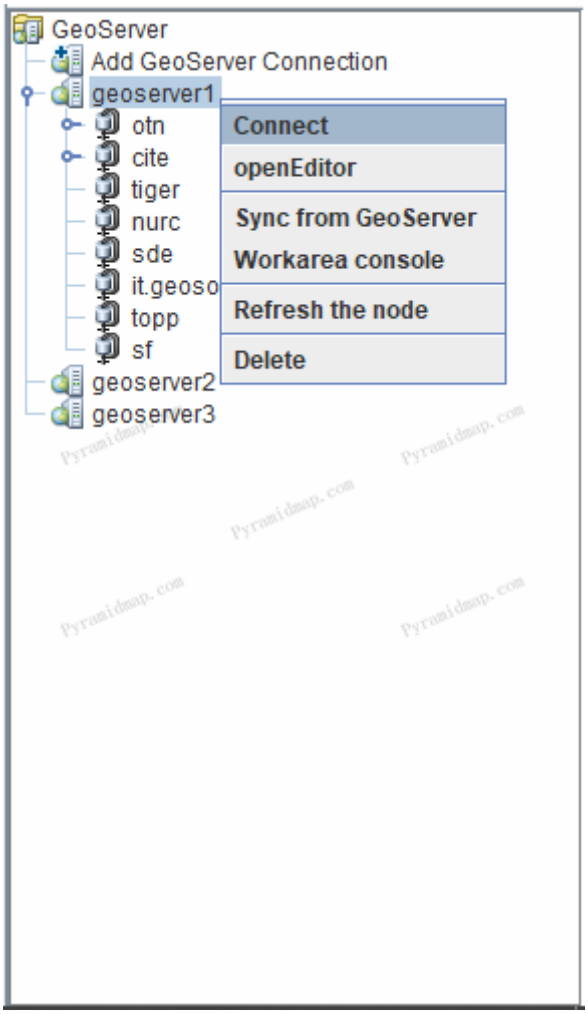


Figure 3-31： GeoServer node popup menu

Under the GeoServer node is the workspace node. The workspace node menu completes data storage management, layer node refresh, map import, workspace deletion and other operations, as shown in Figure 3-32.

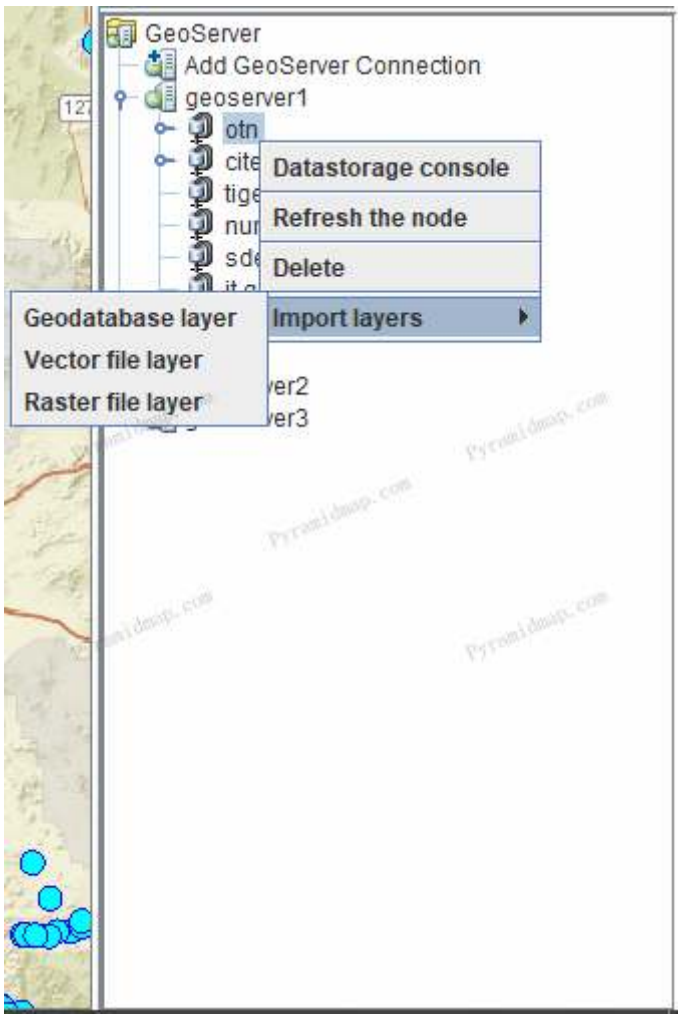


Figure 3-32：GeoServer workspace node popup menu

In particular, in the data storage list, you can edit and modify the database connection and maintain the layer list for each item in the list, including the details of the layer and the addition and deletion maintenance. The layer nodes can be dragged or double clicked to displaying in the map viewer and can be setted sld symbols, exported and deleted, as shown in Figure 3-33.

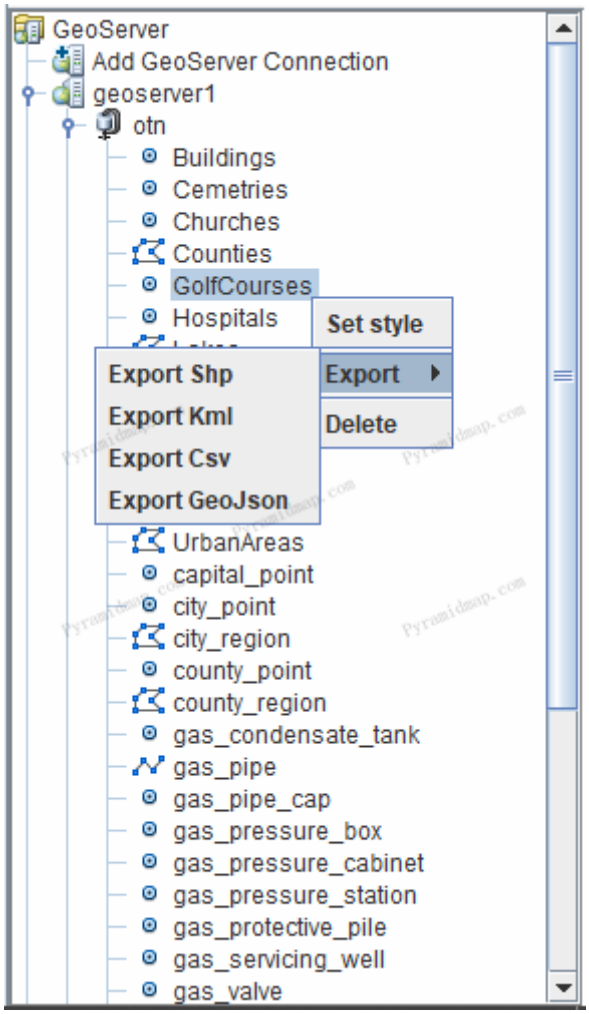


Figure 3-33：GeoServer layer node popup menu

Especially in the layer node under the GeoServer workspace, right click to set the binding relationship between the layer and the sld display symbol in the GeoServer, as shown in Figure 3-34.

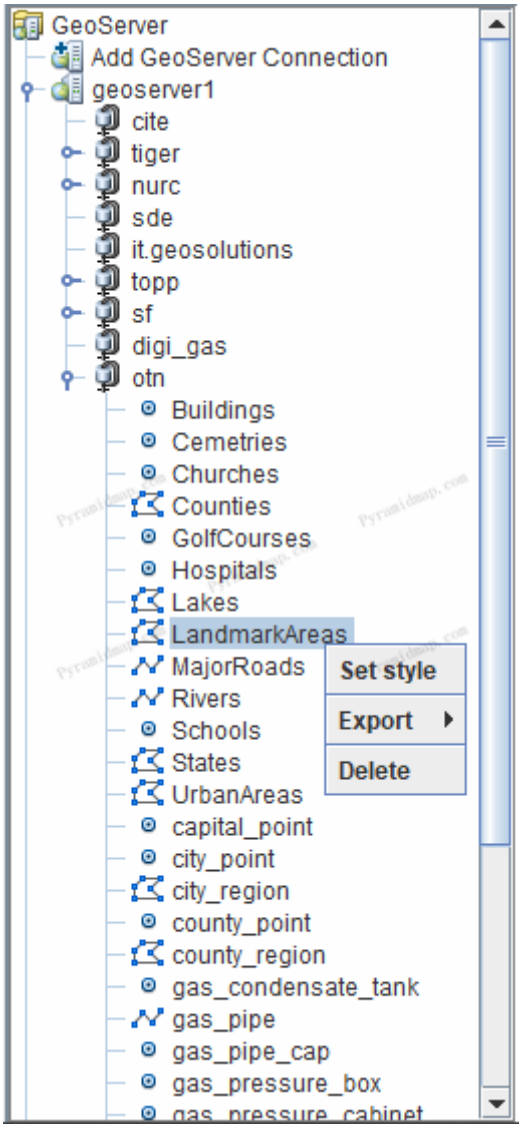


Figure 3-34：Set the binding relationship between the layer and the sld symbol in the GeoServer

PyramidMap will return the sld symbol selection list of the same geometry type on the server according to the selected layer, as shown in Figure 3-35.

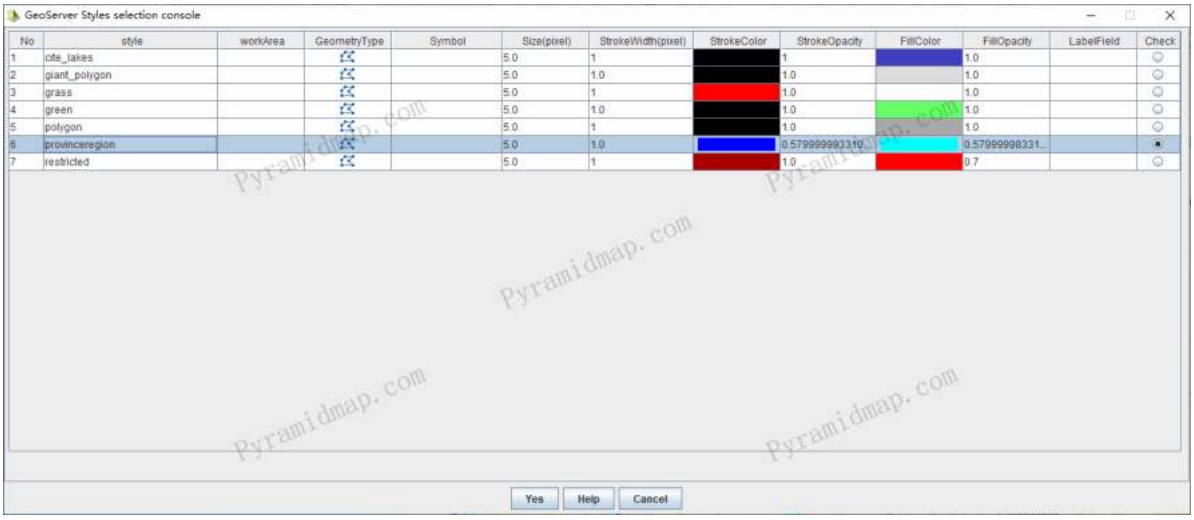


Figure 3-35：Return sld symbol list of the same geometry type on the server according to the selected layer

Click "OK", the selected layer and sld symbol are bound successfully. Subsequently, the WMS service of this layer output by the GeoServer server will be rendered according to this symbol, as shown in Figure 3-36.

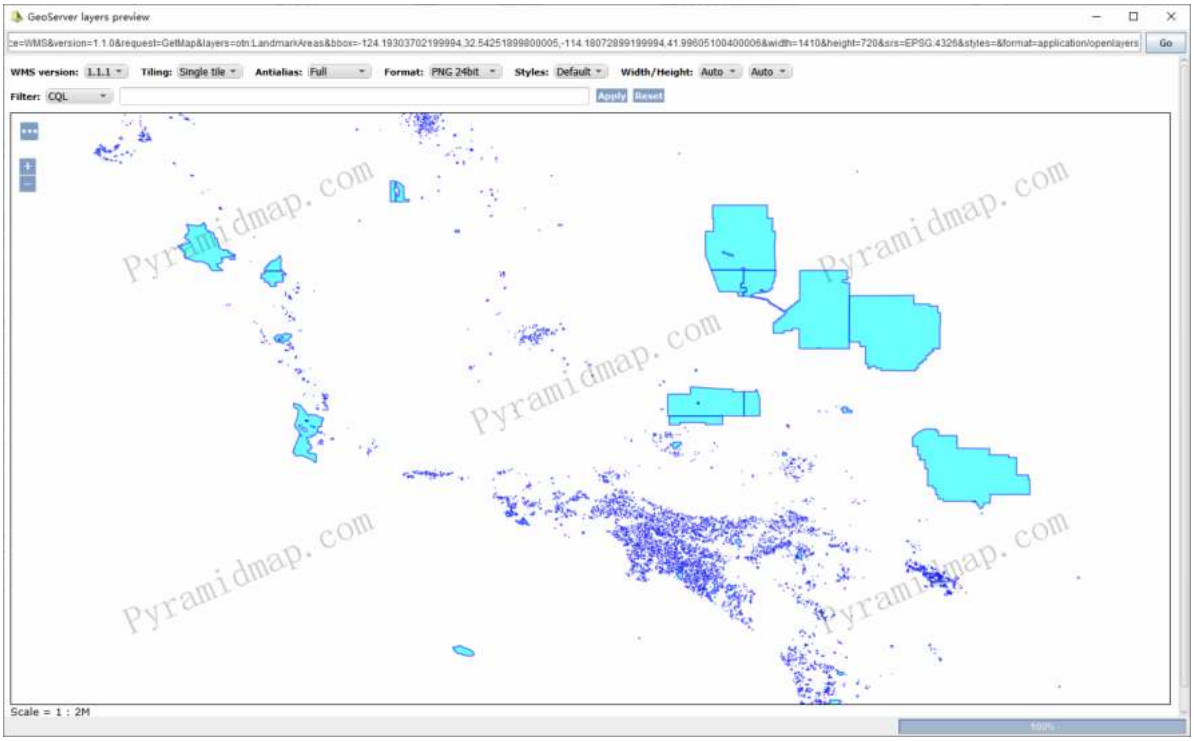


Figure 3-36：The WMS service of this layer output by the GeoServer server will be rendered according to this symbol

3.3 Visible layer node operations

3.3.1 Layer control

The layers in the main map view are classified and managed in checkbox tree nodes. It supports the popup menu and checked visible controlling on each layer node, and the corresponding operations are implemented according to the layer type. The following is layer checkbox node classification and operation for vector layers, as shown in Figure 3-37.

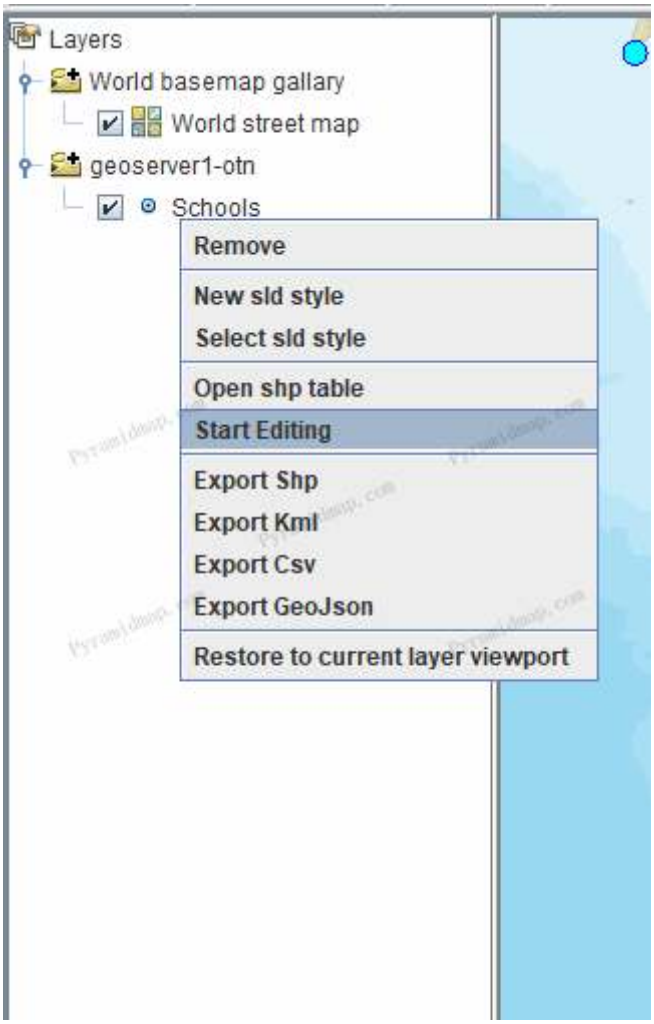


Figure 3-37：Vector layer checkbox node classification and operation

The following is layer checkbox node classification and operation for raster layer, as shown in Figure 3-38.

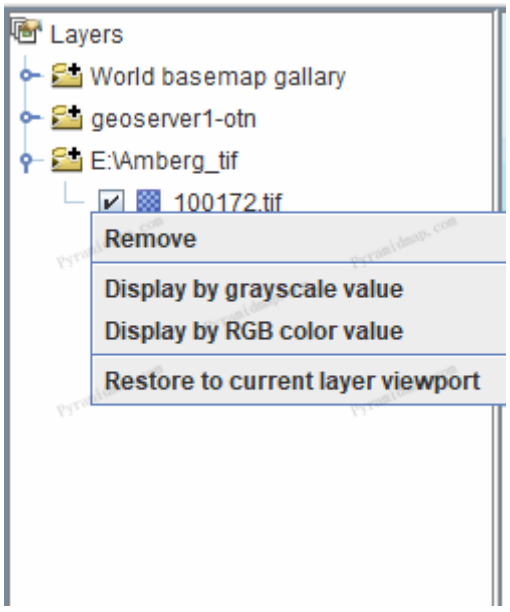


Figure 3-38：Raster layer checkbox node classification and operation

You can control the visibility of layers and the data processing of different types of layers with the classification and operation of layer checkbox nodes.

3.3.2 Symbol rendering

Select New sld Symbol from the shortcut menu of the vector layer display node to enter the sld symbol definition interface, as shown in Figure 3-39.

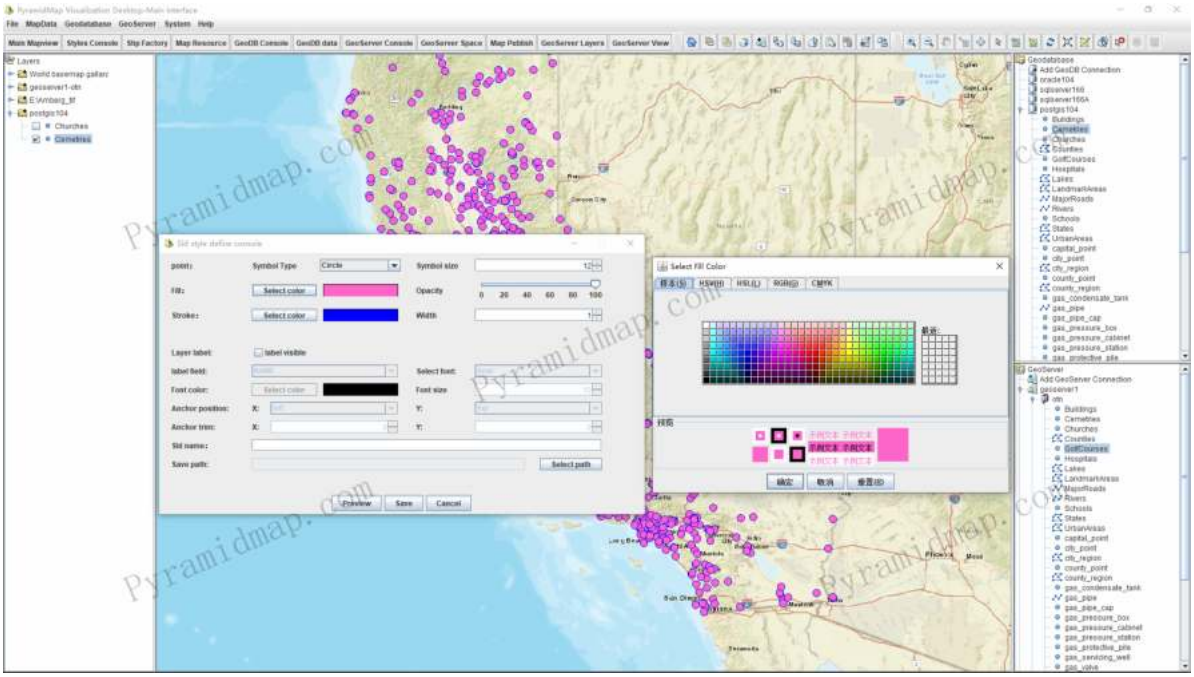


Figure 3-39：Definition and effect of map Sld symbols

With this operation, create a style definition file for point (Point, MultiPoint), line (LineString, MultiLineString), polygon (Polygon, MultiPolygon) type layers, and set the annotation field and font type, size, color, and annotation location. After the effect preview is satisfactory, save it as an sld file and include it in the PyramidMap resource pool for maintenance, The SLD resource pool maintained by PyramidMap client can provide feature symbol selection for layers. Select the SLD symbol on the layer node, as shown in Figure 3-40.

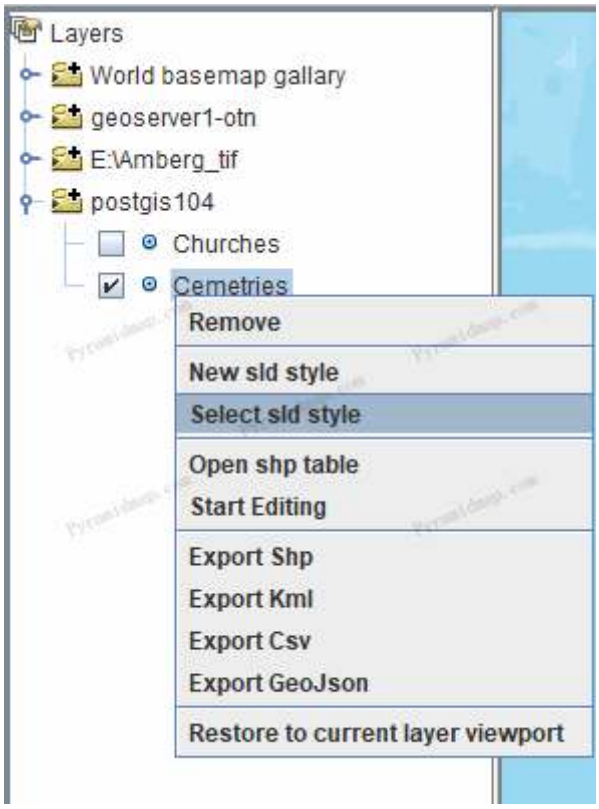


Figure 3-40：Select sld symbol on layer node

PyramidMap will automatically match the Sld data according to the geometry type of the selected layer, and provide a selection list of sld resources of the same geometry type, as shown in Figure 3-41.

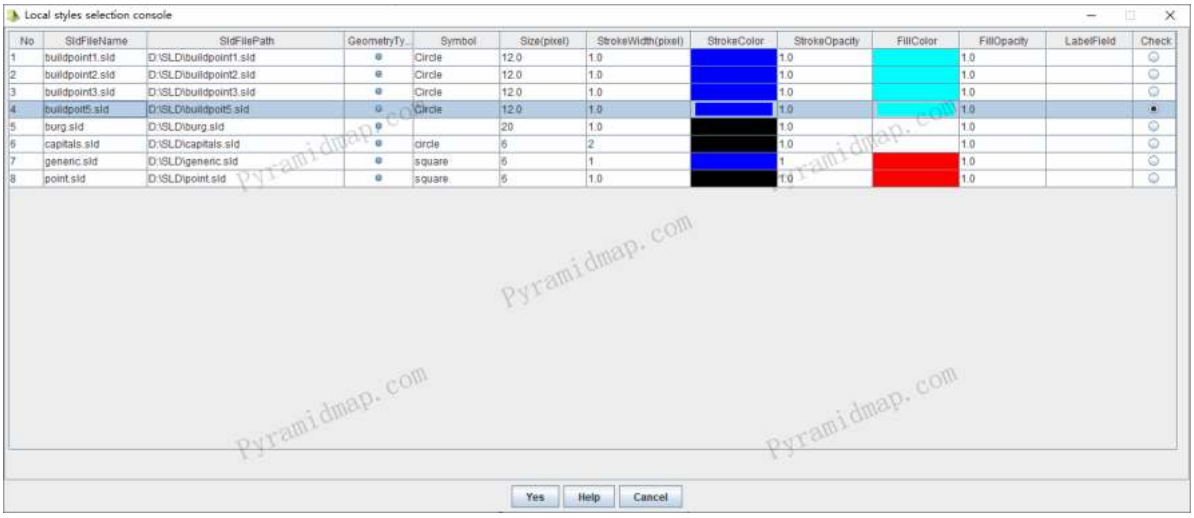


Figure 3-41： SLD resource list of the same geometry type as the selected layer

The rendering effect of the selected sld is applied to the layer, as shown in Figure 3-42.

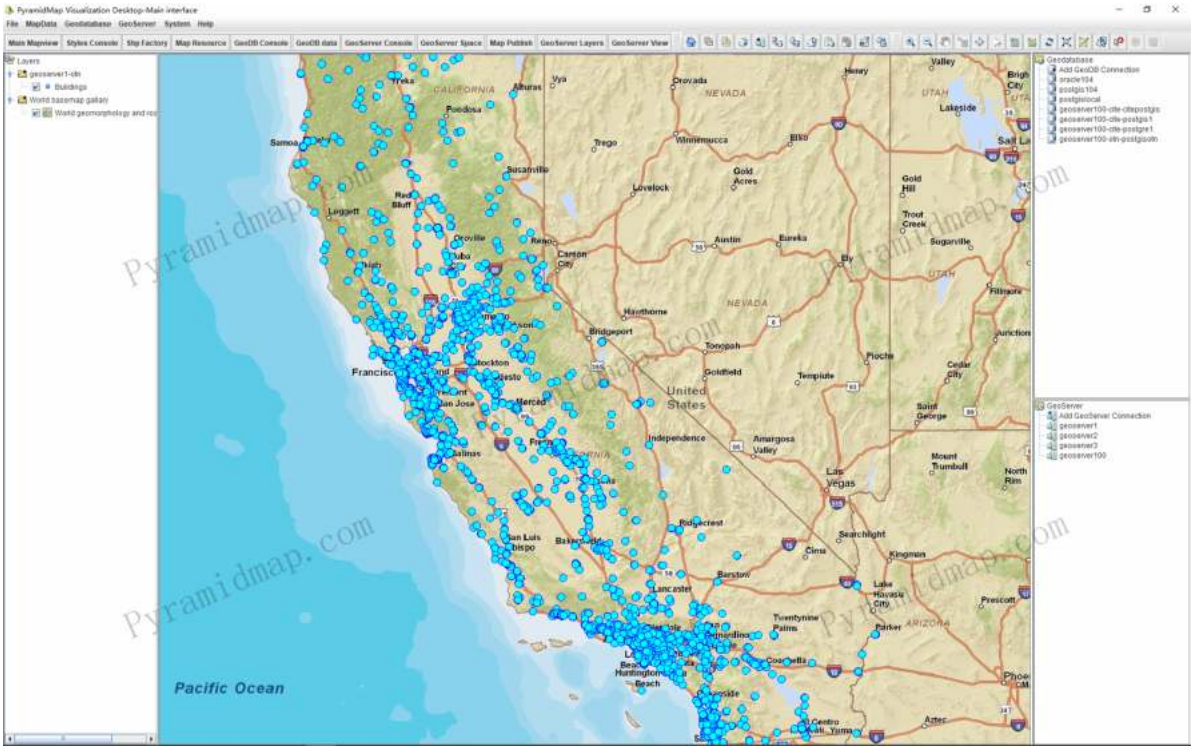


Figure 3-42： Rendering effect of layer after applying the selected sld

3.3.3 Feature data table

Select the "Open shp table" option in the layer node on the left, as shown in Figure 3-43.

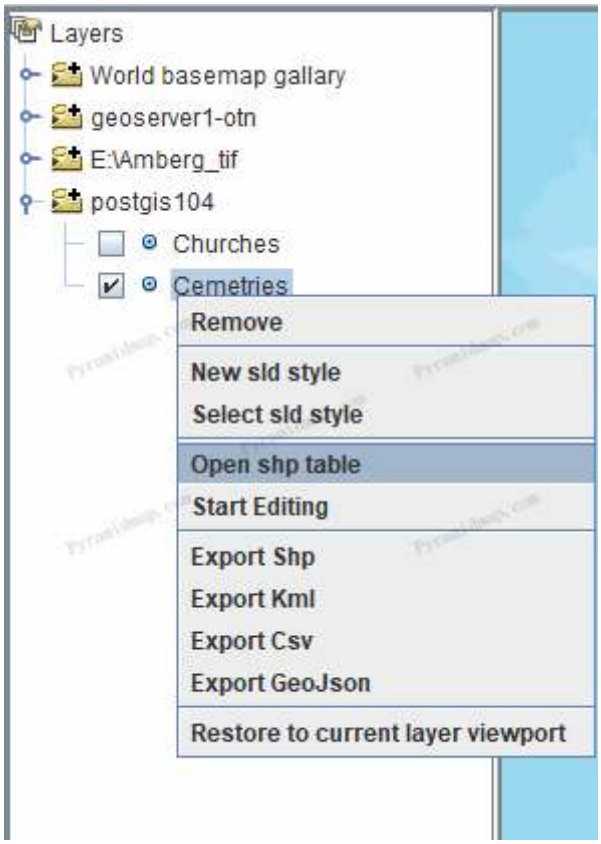


Figure 3-43：Open shp table

The feature data table and query page of the selected layer are shown in Figure 3-44.

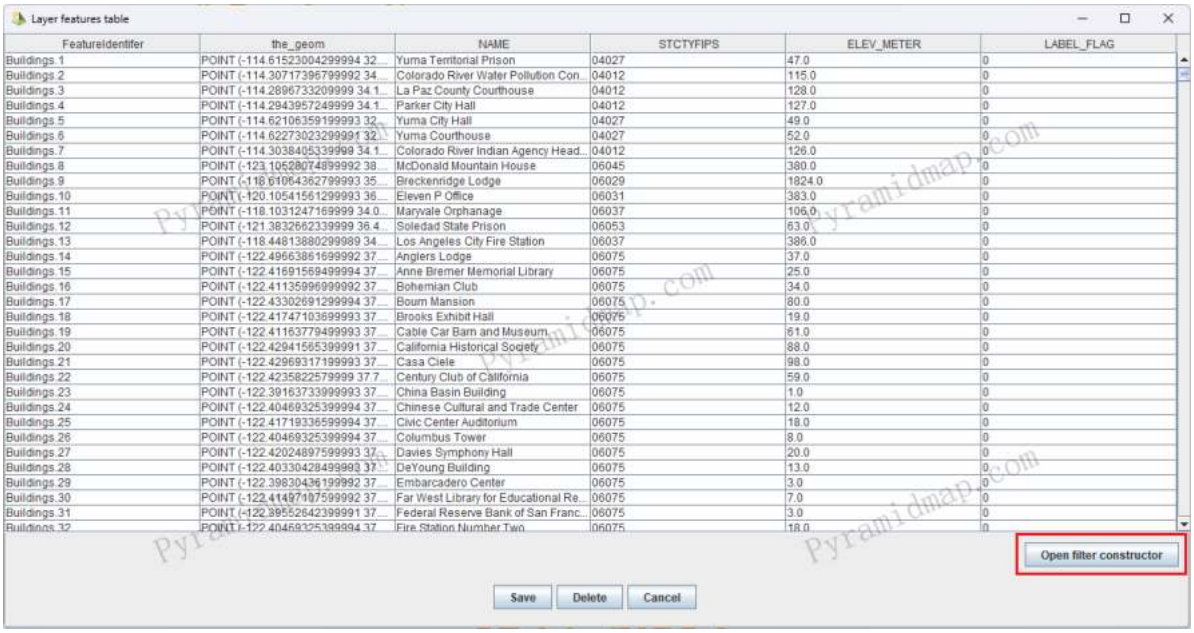


Figure 3-44：Shp table and query interface

In the layer data table interface, you can build a combined query condition based on all fields through the query tool to realize simple and complex queries on layers, as shown in Figure 3-45.

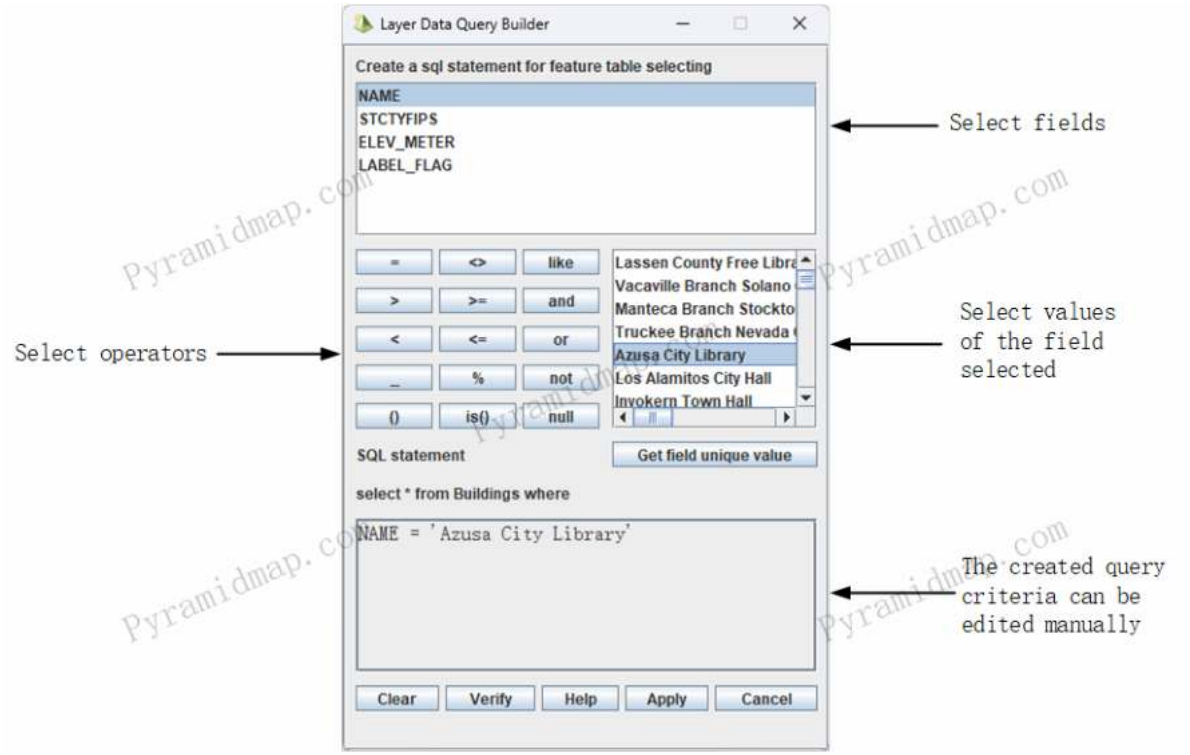


Figure 3-45：Layer table query constructor

In the query constructor, you can verify the validity of the built query statements, as shown in Figure 3-46.

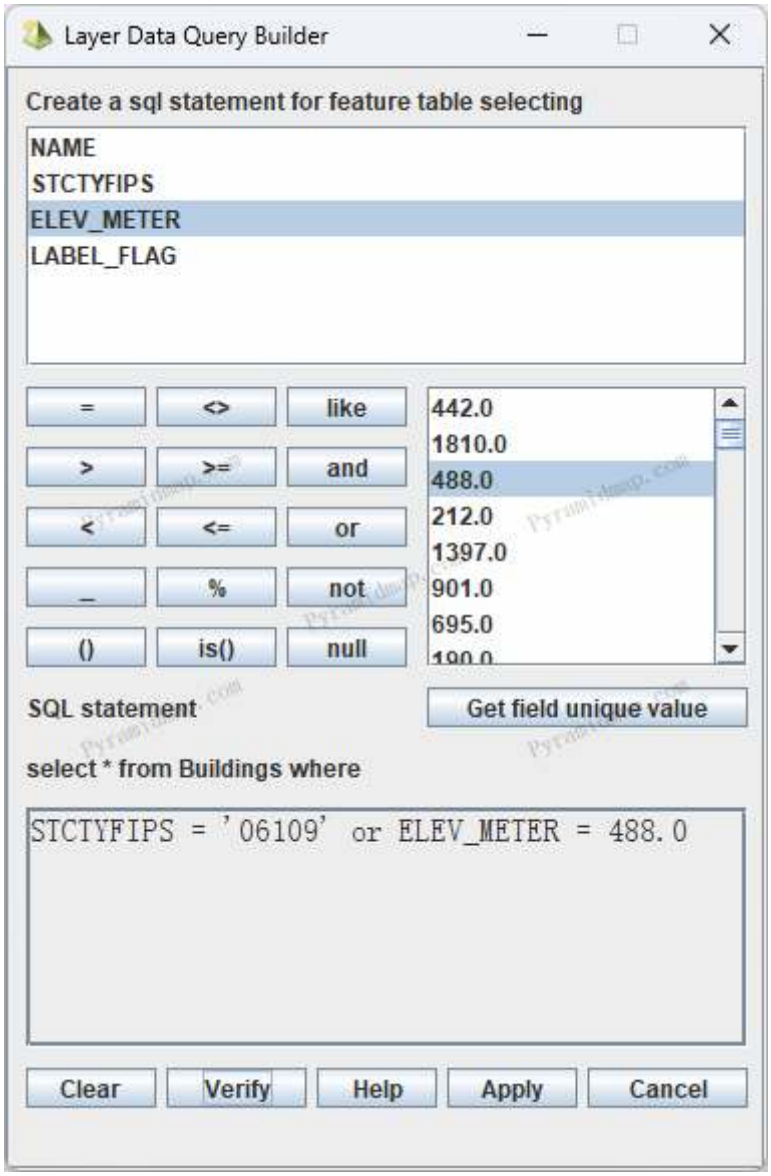


Figure 3-46：Query statement validation

The validation results are shown in Figure 3-47.

Figure 3-47：Query statement validation results

Click "Apply" to execute the query. Based on the above construction conditions, the data table query results are shown in Figure 3-48.

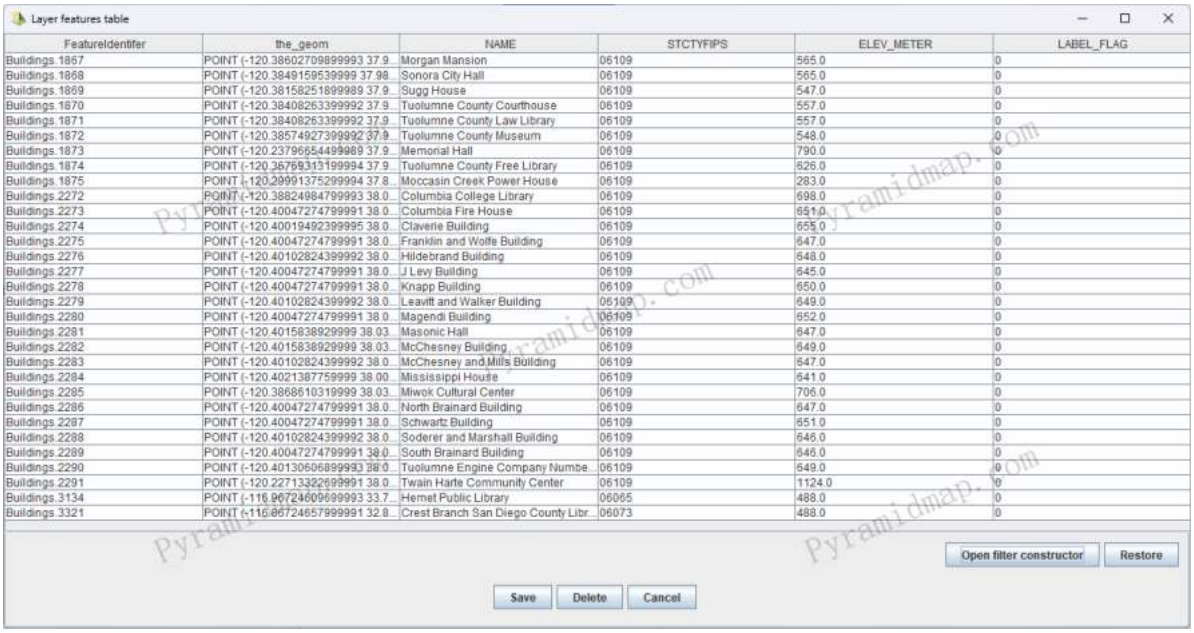


Figure 3-48：The data table query results

The query results are displayed on the map synchronously, as shown in Figure 3-49.

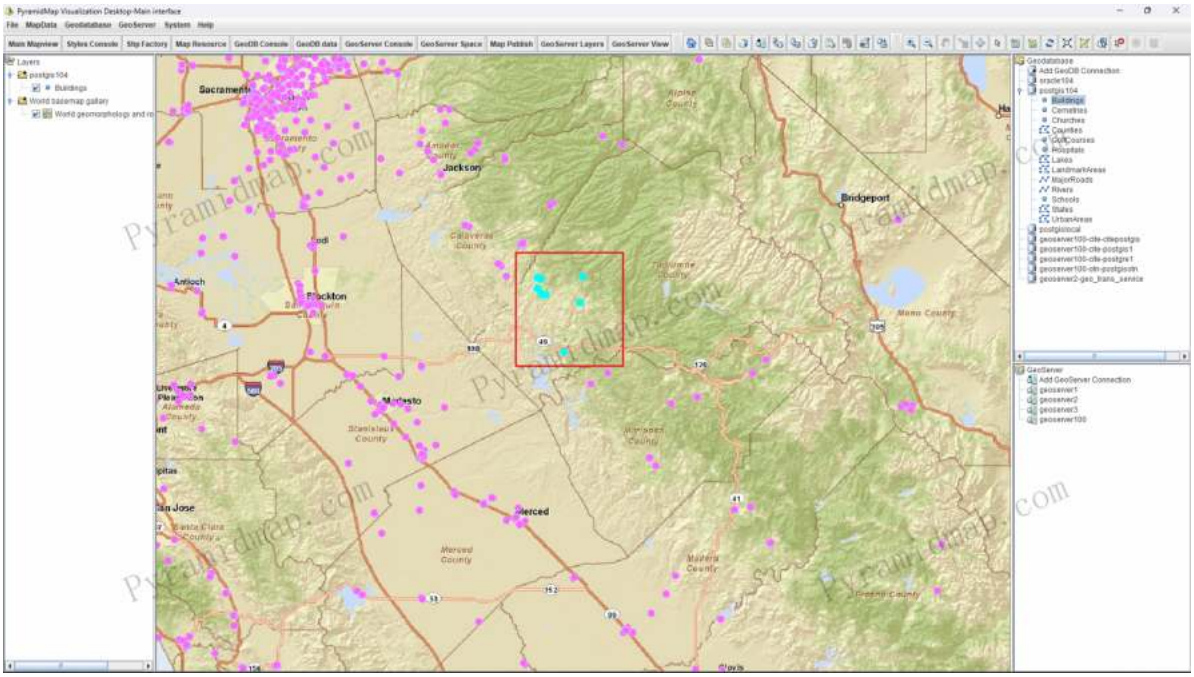


Figure 3-49：The query results are displayed on the map synchronously

In particular, the feature data table interacts with the map. Further, the editing, modification and deletion of feature attribute data can be completed in the data table, and the data can be submitted and saved according to the layer data source type. It supports the Shp vector file type, Geodatabase geographic database type, and GeoServer map server type.

4 Map editing

4.1 Create Shp

In PyramidMap, you can create your own Sh-style vector layer. Users can independently select the feature geometry type, map coordinate system, create layer fields and data types, and create vector layers that fully meet their needs. The design interface is shown in Figure 4-1.

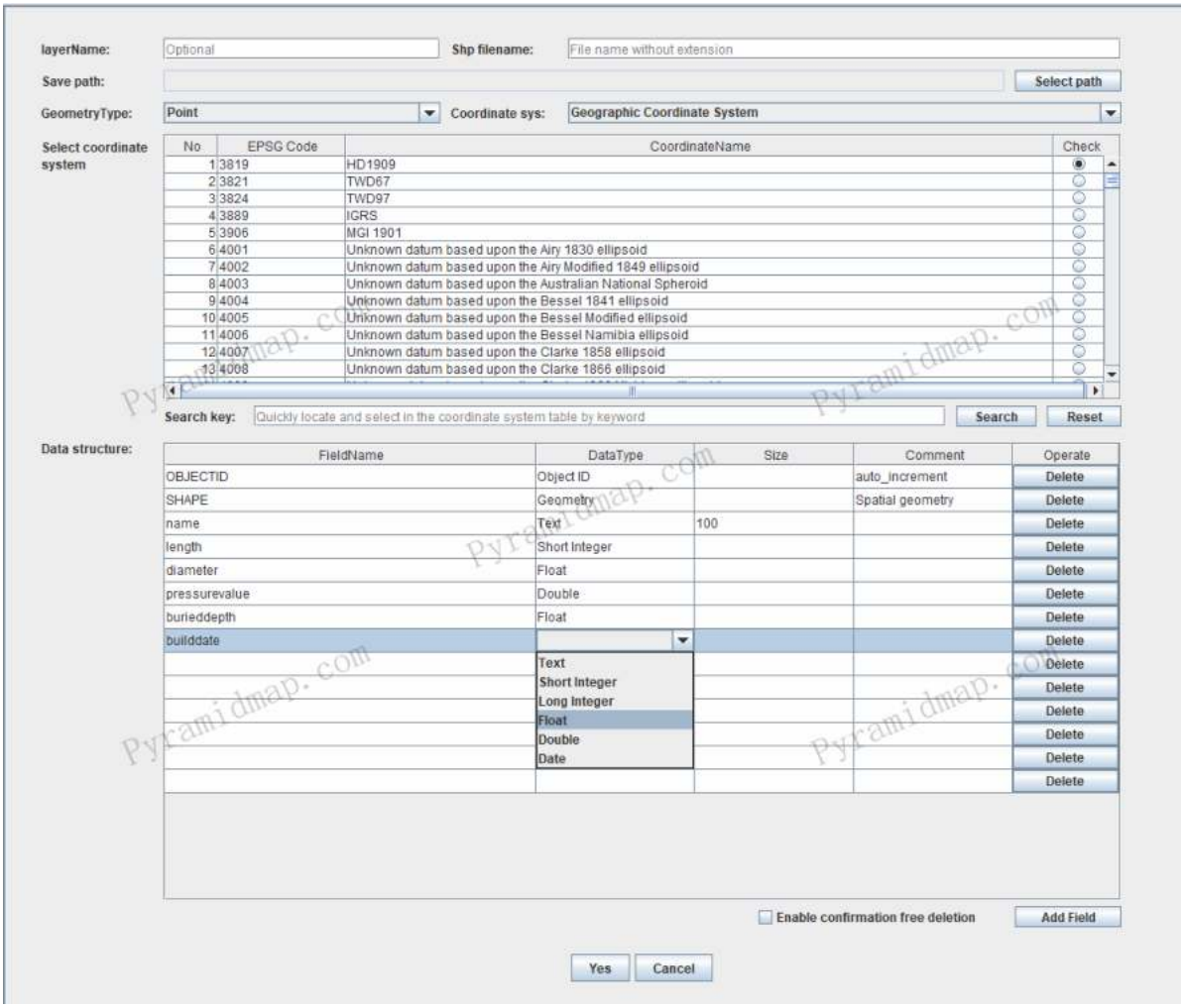


Figure 4-1： Shp layer data structure design

The Shp layer data structure includes three aspects: geometric type, coordinate system, and attribute data. The geometric type indicates the geometric shape of map features, including point (Point/MultiPoint), line (LineString/MultiLineString), and polygon (Polygon/MultiPolygon) types; The coordinate system is responsible for defining and describing the coordinate positions of map features, so as to display them in the correct positions and ranges. At the same time, digital maps not only have spatial data, but also can carry various types of attribute data, which is the unity of spatial and attribute data. PyramidMap covers most commonly used standard coordinate systems at present, including the GCS geographic coordinate system and the PCS projection coordinate system. GCS is responsible for the description of the spatial three-dimensional position, such as WGS84. PCS can understand the projection of the spatial position on the plane, and is responsible for the description of the plane position, such as WGS84 Web Mercator, which is the main coordinate system adopted by the current Web map. PyramidMap realizes the selection of coordinate system through classification list, and provides keyword mode to realize quick query and selection, as shown in Figure 4-2.

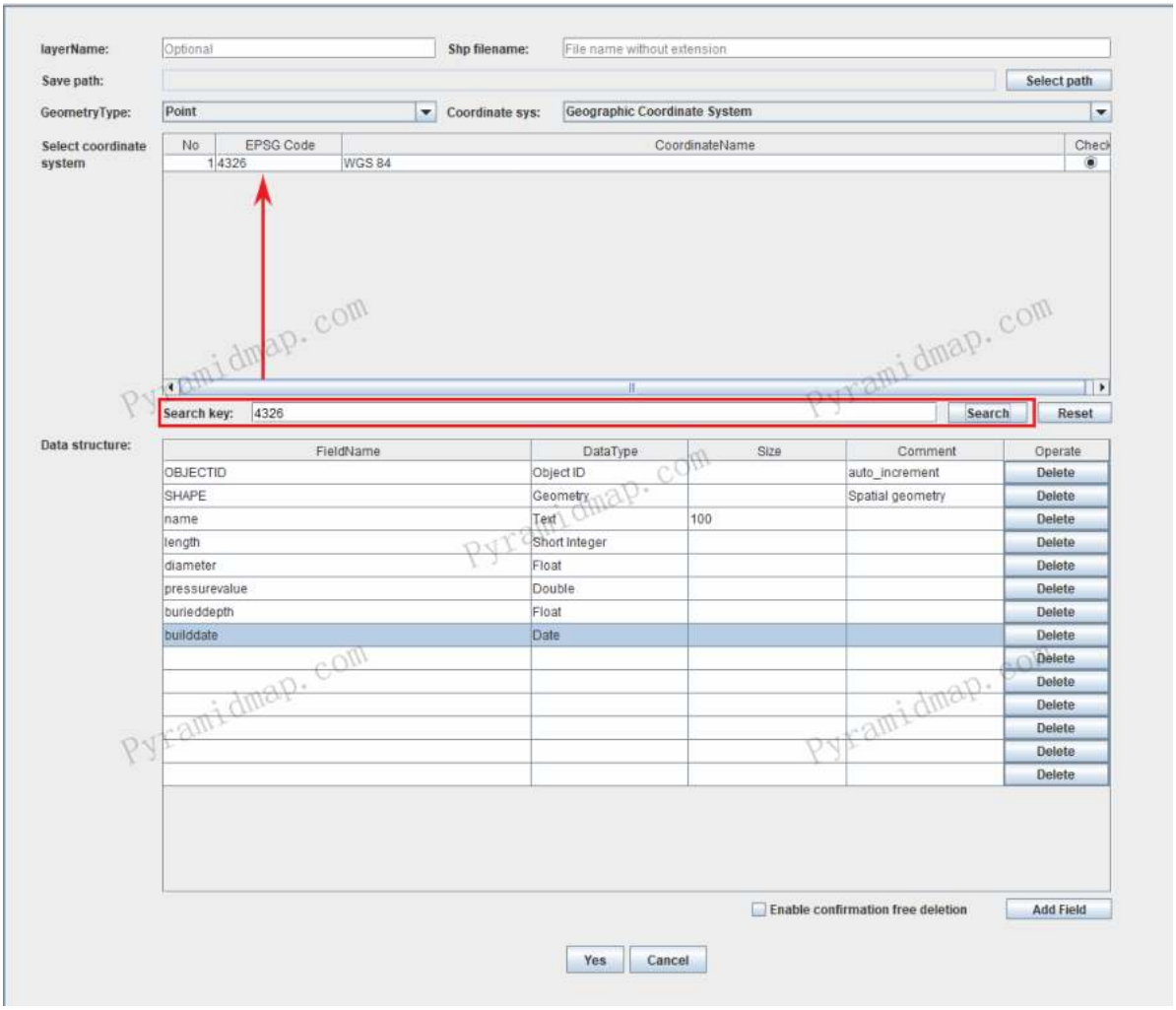


Figure 4-2：Fast selection of coordinate system through keywords

For a Shp type layer, it can have field information, including field naming, data type, and so on, like common database tables, to store all common types of data except spatial data, and realize the attribute information description of a map feature. Attribute data types include text, long integer, short integer, floating point type, double precision type and date time type. The creation process is shown in Figure 4-3.

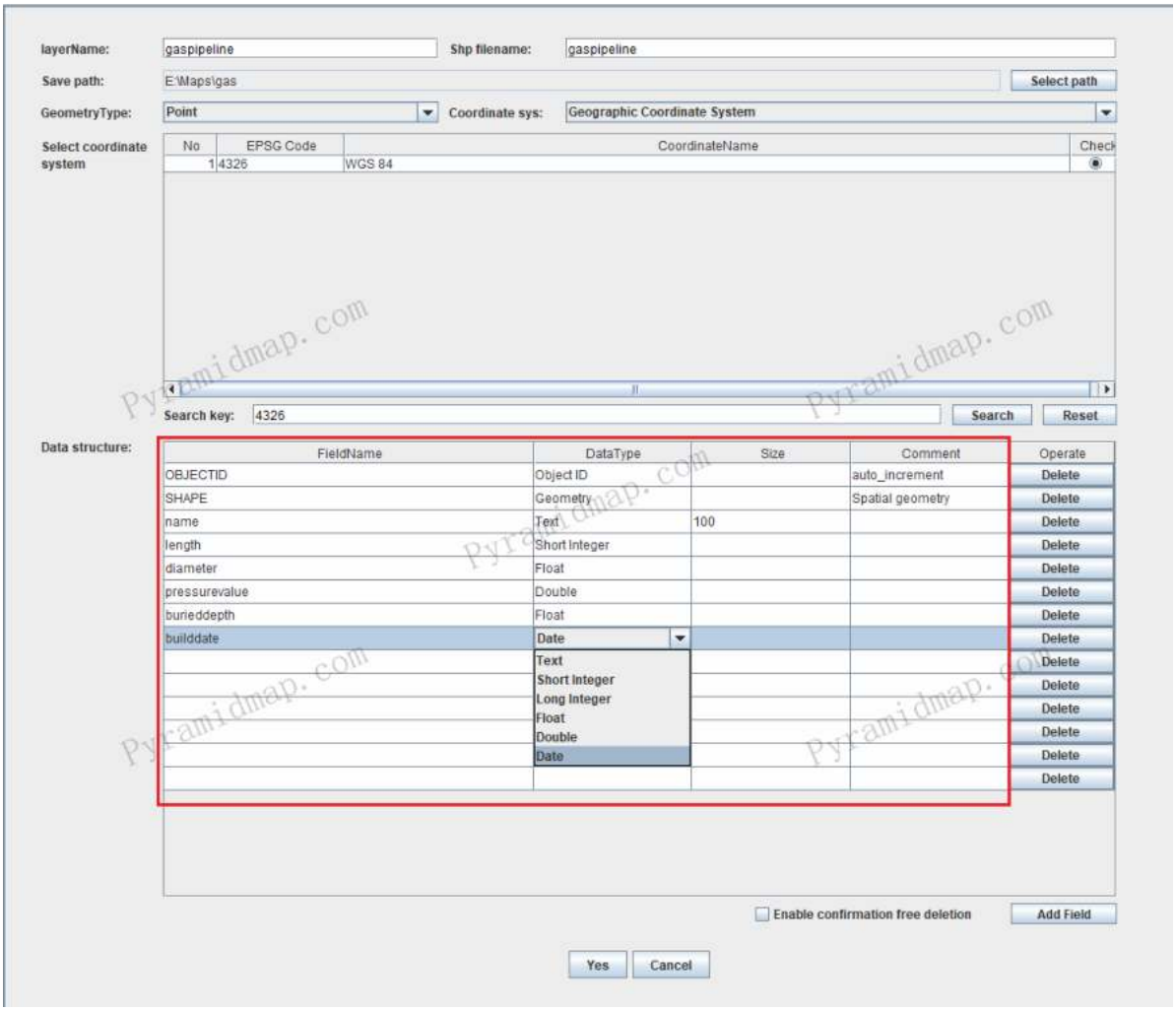


Figure 4-3：Design the field structure of Shp layer table

The created Shp layer is automatically added to the layer resource pool of PyramidMap for unified management, and can be selected from the resource pool list for all-purpose , as shown in Figure 4-4.

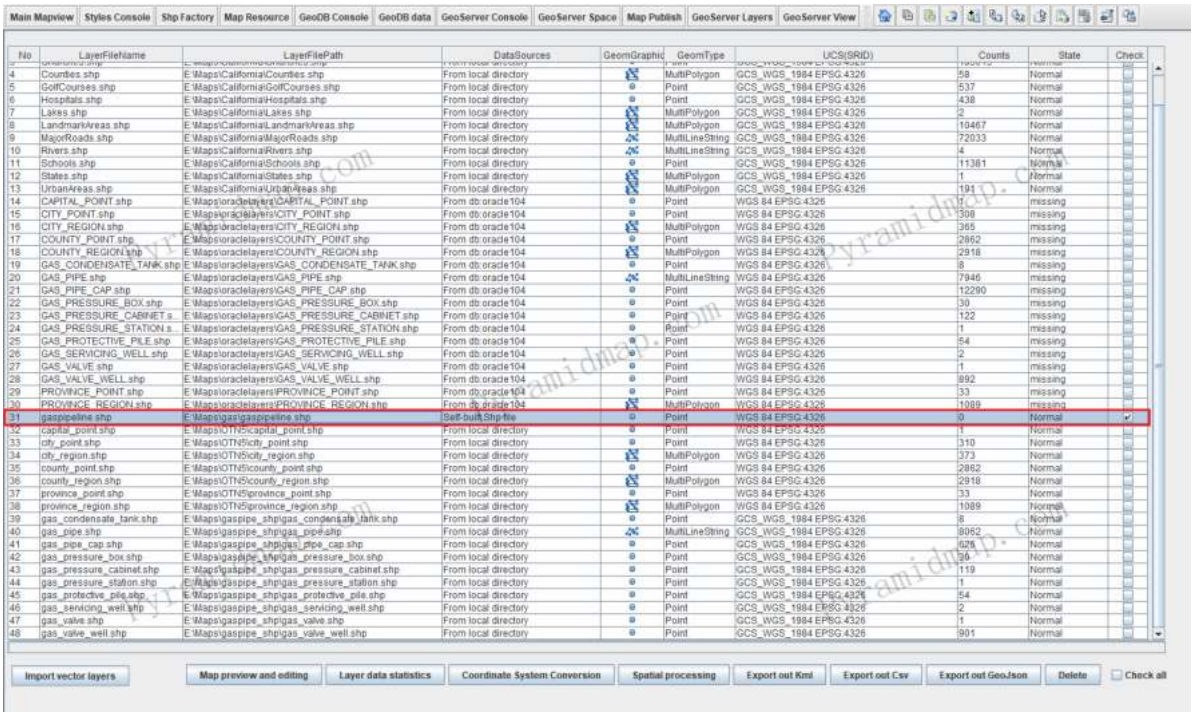


Figure 4-4：The created Shp layer is added to the map resource pool

Select a layer in the resource pool list to draw map elements and assign data values, as shown in Figure 4-5.

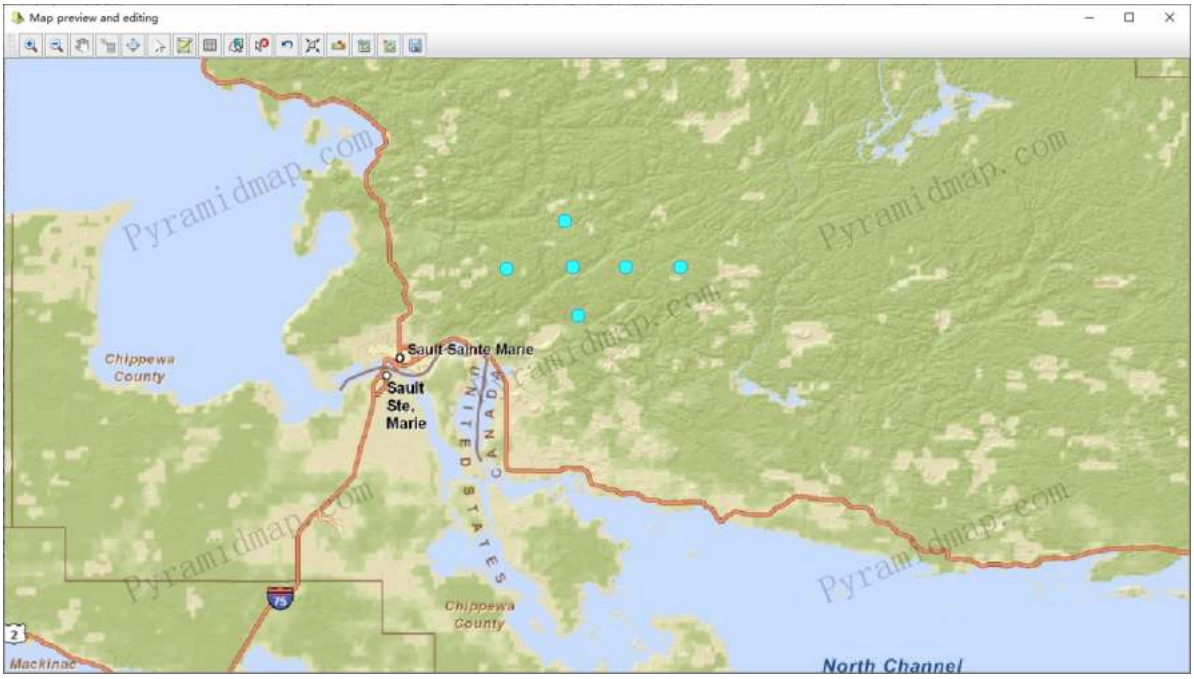


Figure 4-5：Map feature drawing and data assignment for the created Shp layer

This is the complete workflow of creating a map instance and adding it to the resource management pool, mapping, and adding map data.

4.2 Graphical Editing

Map data consists of geometric shapes representing space vectors and feature attributes data. Therefore, map editing includes two parts, they are graphical editing and attributes data editing.

4.2.1 Main view editor

PyramidMap supports the implementation of mouse dotting, line and polygon drawing, and submitting the saving according to the geometric type of the current layer in the main map view and each independent map view. Support Shp vector file, Geodatabase layer, wfs data in GeoServer and other data types. In the main view interface, activate the editing status of the selected layer through the layer node shortcut menu "Open Editing" option, as shown in Figure 4-6.

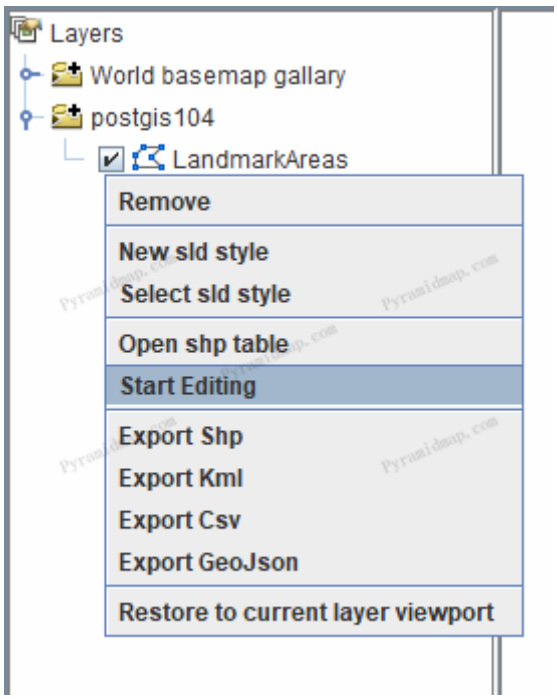


Figure 4-6：Layer on editing

Click the "Draw" button in the toolbar, as shown in Figure 4-7.

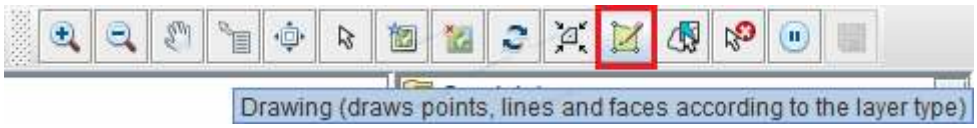


Figure 4-7：For vector layer editing, the "Draw" button in the toolbar

The selected layer enters the editing state, interacts with the mouse, and implements operations such as dotting, drawing lines, and drawing polygons according to the geometric type of the layer, as shown in Figure 4-8.

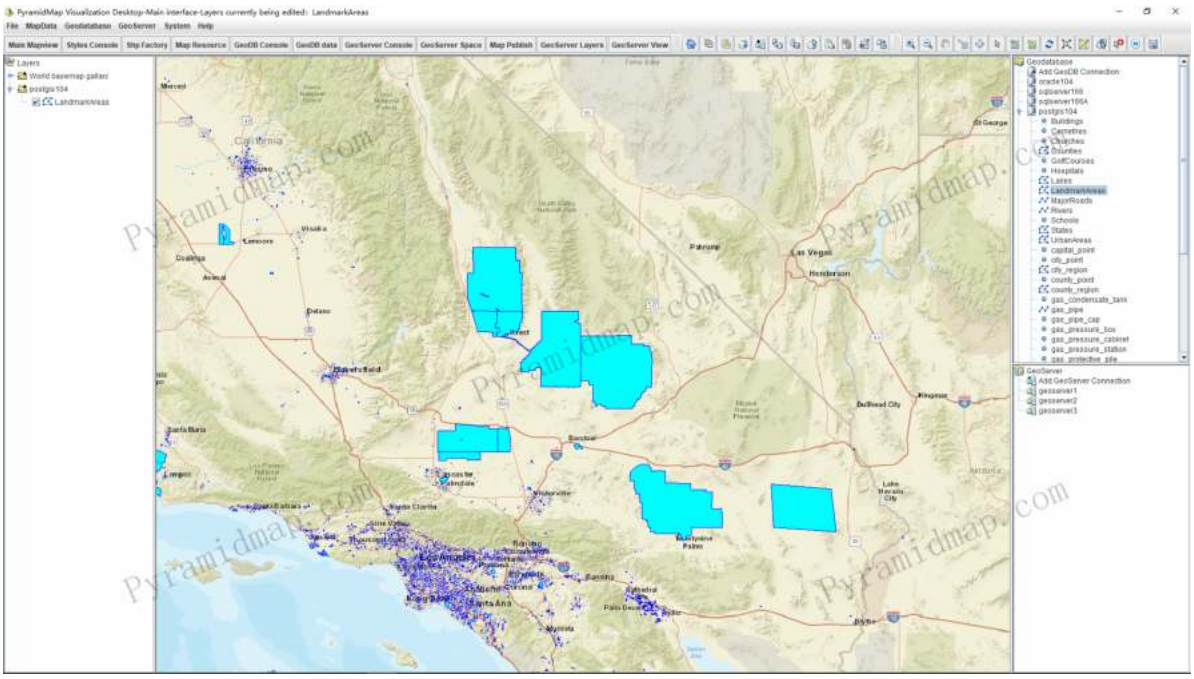


Figure 4-8：Drawing feature graphic on map

After drawing, click the "Save" button in the toolbar, as shown in Figure 4-9.

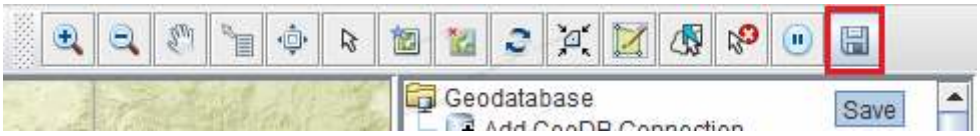


Figure 4-9：For the edited map data, the "Save" button in the toolbar

PyramidMap saves and submits the drawn feature data to the layer data source, and supports Shp vector file, Geodatabase vector layer, and GeoServer WFS layer. After successful saving, the system returns a prompt, as shown in Figure 4-10.

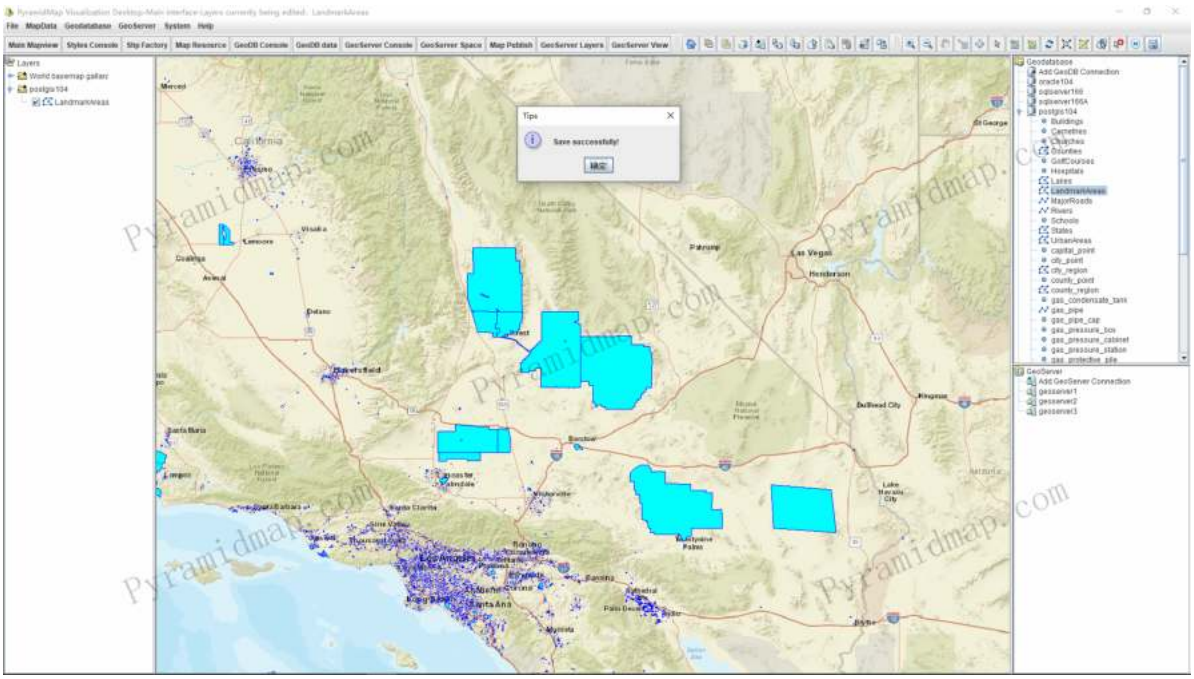


Figure 4-10：Drawing and saving map features

4.2.2 Independent view editor

In the Shp layer resource management and Geodatabase layer resource management modules, the independent display view of each layer can be opened through the "Preview and Edit" button to complete the editing operation function, as shown in Figure 4-11.

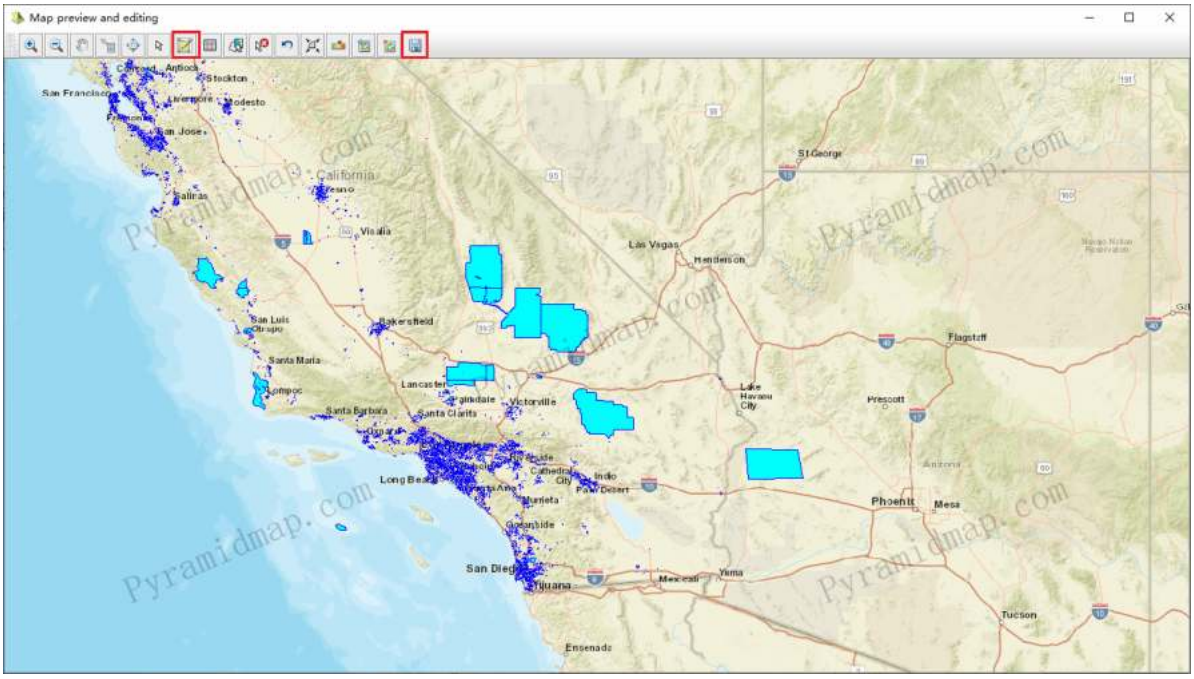


Figure 4-11：Layer independent display editing function page

Click the drawing button to realize the interactive drawing of the mouse on the map view. After that, click the "Save" button to update and save the data to the data source corresponding to the layer, Shp to the layer file, and the database layer to the feature table.

4.3 Attribute data editing

PyramidMap implements digital editing of the layer attribute table, which is respectively implemented in the main interface visualization layer node and the preview and editing in the Shp or Geodatabase geographical database layer list.

4.3.1 Editing in main map view

Visualize the "Open shp table" option in the right-click shortcut menu of the layer node on the main interface, as shown in Figure 4-12.

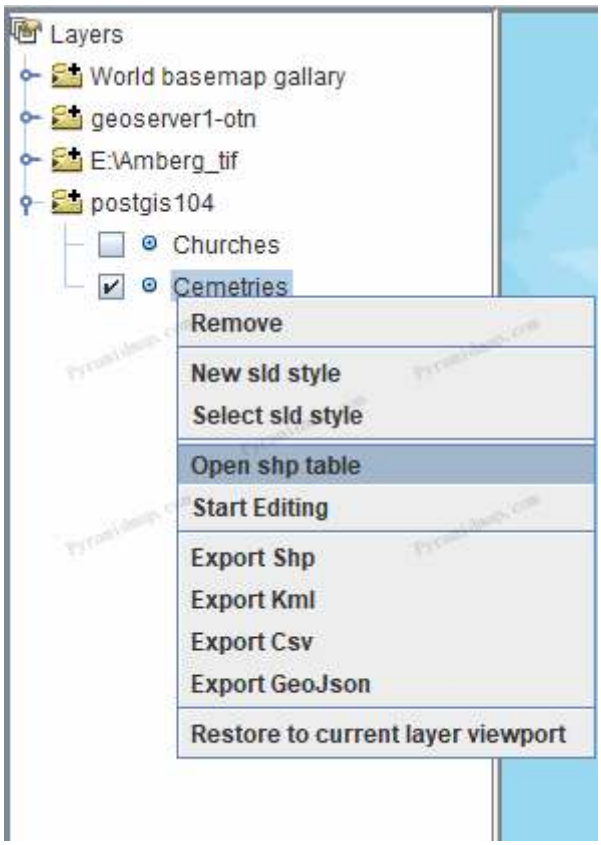


Figure 4-12：Visualize the "Open shp table" in the right-click shortcut menu of the layer node

The opened layer data table is shown in Figure 4-13.

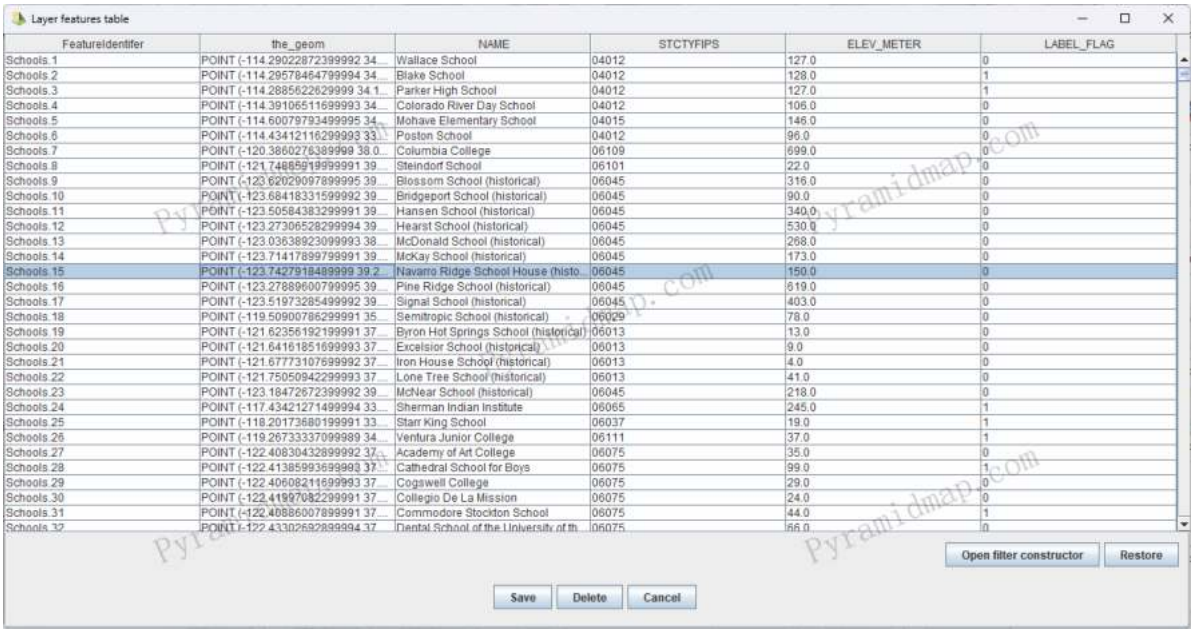


Figure 4-13：Edit attribute data in the shp data table

Double click the table Cell (except for the Id and Geometry fields) to switch to the editing and input status, and the selected features are highlighted on the map at the same time, as shown in Figure 4-14.

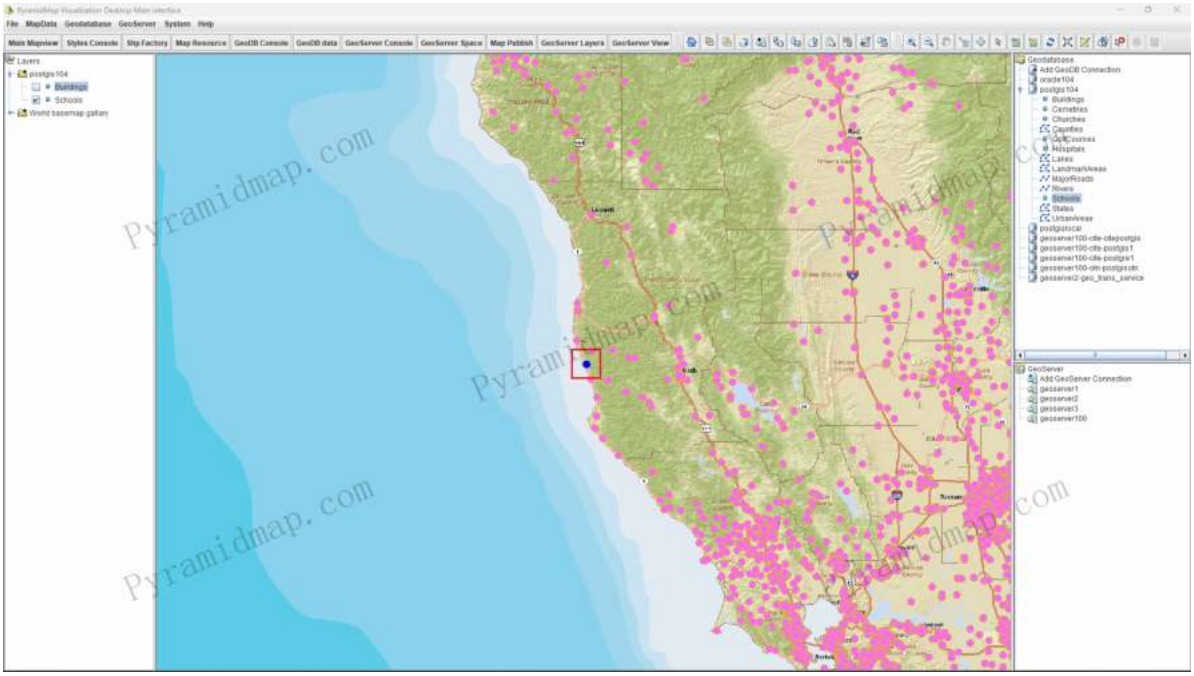


Figure 4-14：The selected features in the data table are highlighted on the map

Batch modification, submission and saving are supported.

4.3.2 Editing in individual map view

Layers in the Shp resource pool and database resource pool can be previewed and edited in an independent display interface, as shown in Figure 4-15.

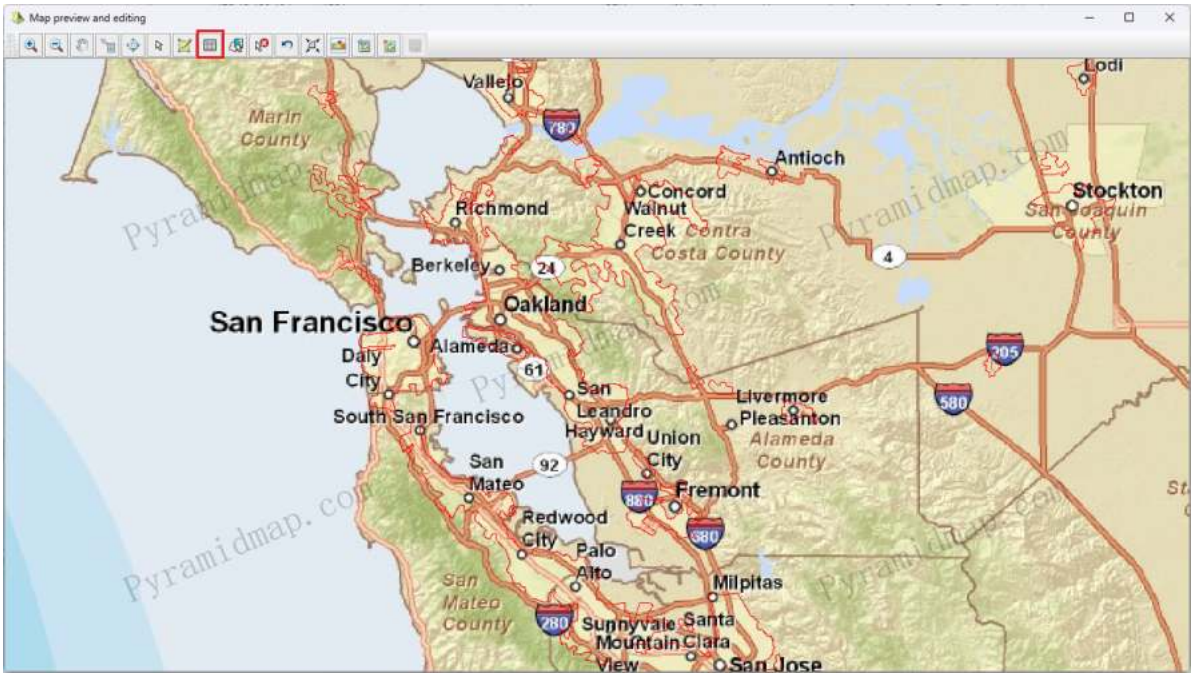


Figure 4-15：Open the data table in the independent view of each layer

Click "Open shp table" to open the layer feature data table, as shown in Figure 4-16.

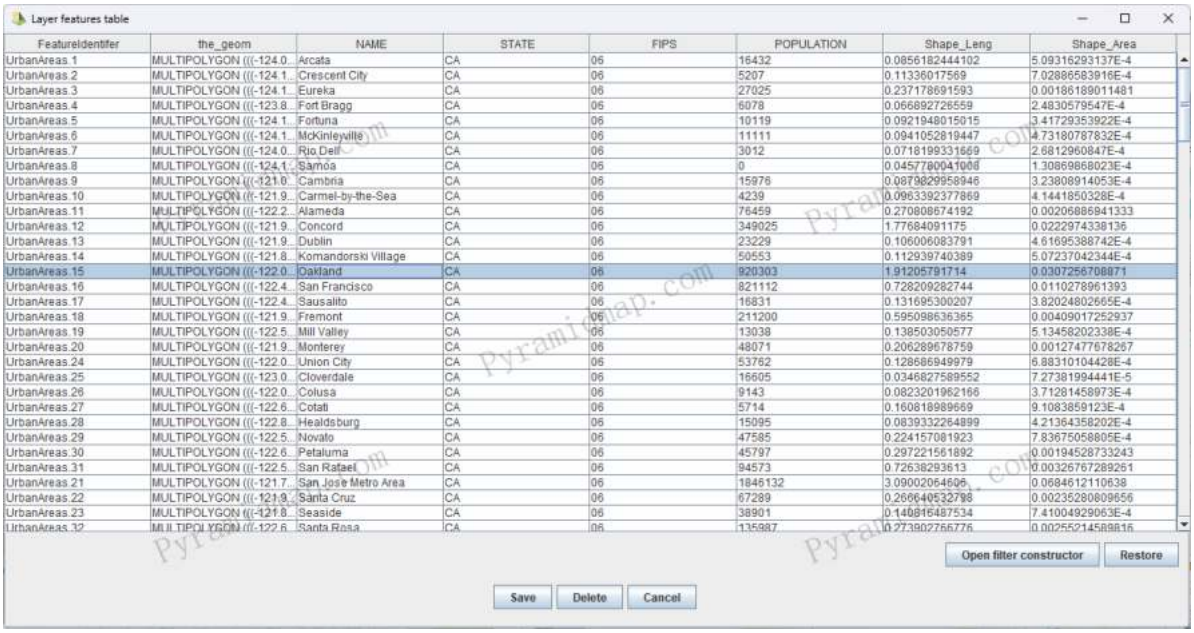


Figure 4-16：Edit attribute data in the shp independent view

Double click the table Cell (except for the Id and Geometry fields) to switch to the editing input status, and the selected features will be highlighted on the map view at the same time, as shown in Figure 4-17.

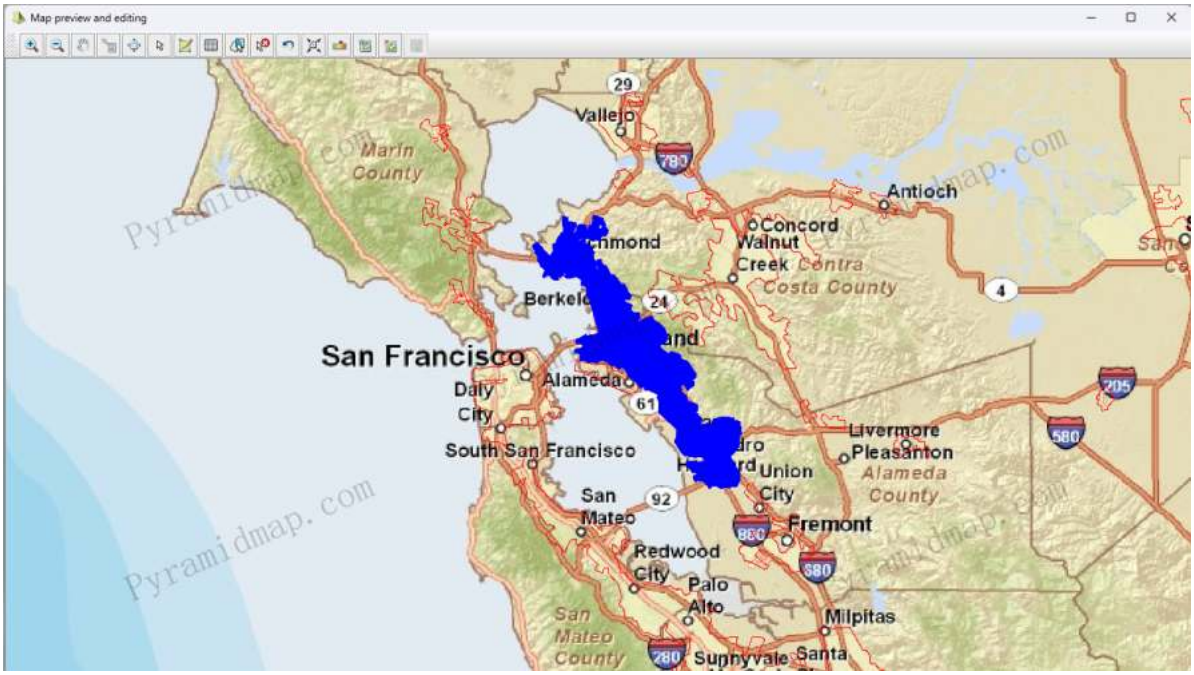


Figure 4-17： Layer feature highlight by being selected in independent view

Batch modification, submission and saving are supported.

5 Geodatabase and GeoServer

5.1 Geodatabase connection pool

PyramidMap supports direct connection access with geographic databases to realize the import, export, storage and conversion of map data, and supports (but is not limited to) Oracle, PostGIS (PostgreSQL+GIS function extension), MySQL, SQLServer and other databases. After PyramidMap creates a database connection, it is managed in the database connection pool mode to import, export, preview, edit and other operations of the map. PyramidMap provides two ways to create a geographic database connection: 1. create a database connection through the map database node on the main map display interface; 2. create a database connection on the database configuration page through "System" - "Geodatabase console" entrance.

5.1.1 Geodatabase data source node

In the geographic database node of the main interface, double-click New Database Connection, as shown in Figure 5-1.

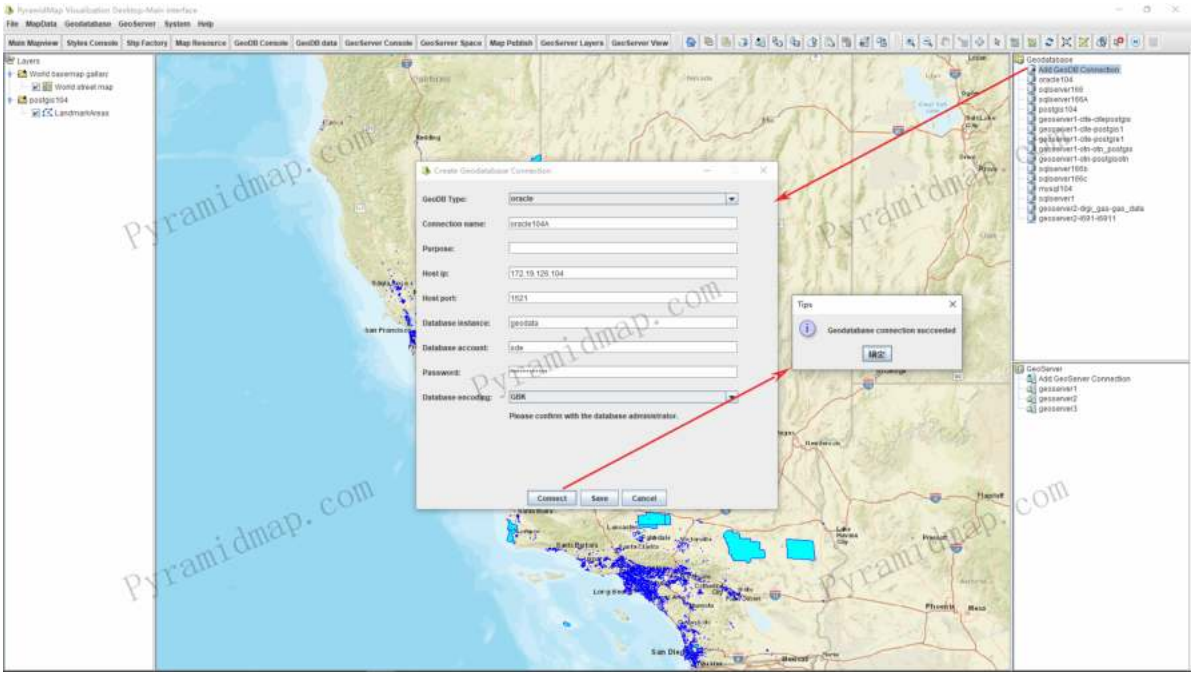


Figure 5-1：Main interface create new Geodatabase connection

Open the geographic database connection configuration interface, select the geographic database type, and enter the correct connection parameters. After the connection test is successful, it can be saved and created as an effective geographic database connection, included in the PyramidMap geographic database resource connection pool, and dynamically added to the geodatabase node and the inside layers node, as shown in Figure 5-2.

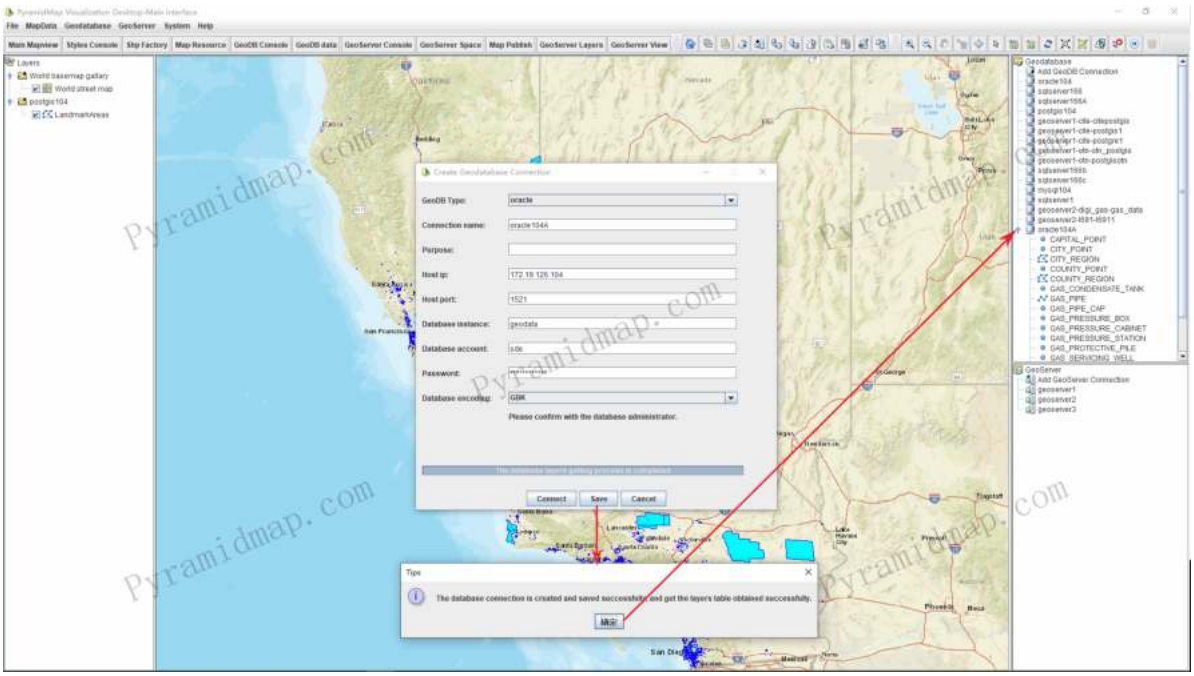


Figure 5-2：Geodatabase connection created successfully

Description of interface input parameters:

- GeoDB type: Select a database type (Oracle, PostGIS, MySQL)
- Connection name: Customize the Geodatabase connection name.
- Purpose: Customize the Geodatabase connection purpose describe.
- Host IP：IP address of the server where the Geodatabase is hosted.
- Port：The port number used by the database. (Default port number: Oracle 1521, Postgre 5432, MySQL 3306)
- Database instance: the name of the database's service instance to connect to.

- Schema：The schema to be connected is mainly for PostGIS, and others can be ignored. In Oracle, this parameter is consistent with the user name.
- The connection button: test whether the newly created database connection is valid.
- The save button: save the new database connection.
- The cancel button: Exit the interface without performing any operation.

5.1.2 Geodatabase connection pool

Open the Geodatabase connection pool interface through "System" - "Geodatabase console", or directly click the "GeoDB console" button in the toolbar， as shown in Figure 5-3.

Figure 5-3：Create a Geodatabase connection through the system settings portal

The geodatabase connection configuration page is shown in Figure 5-4.

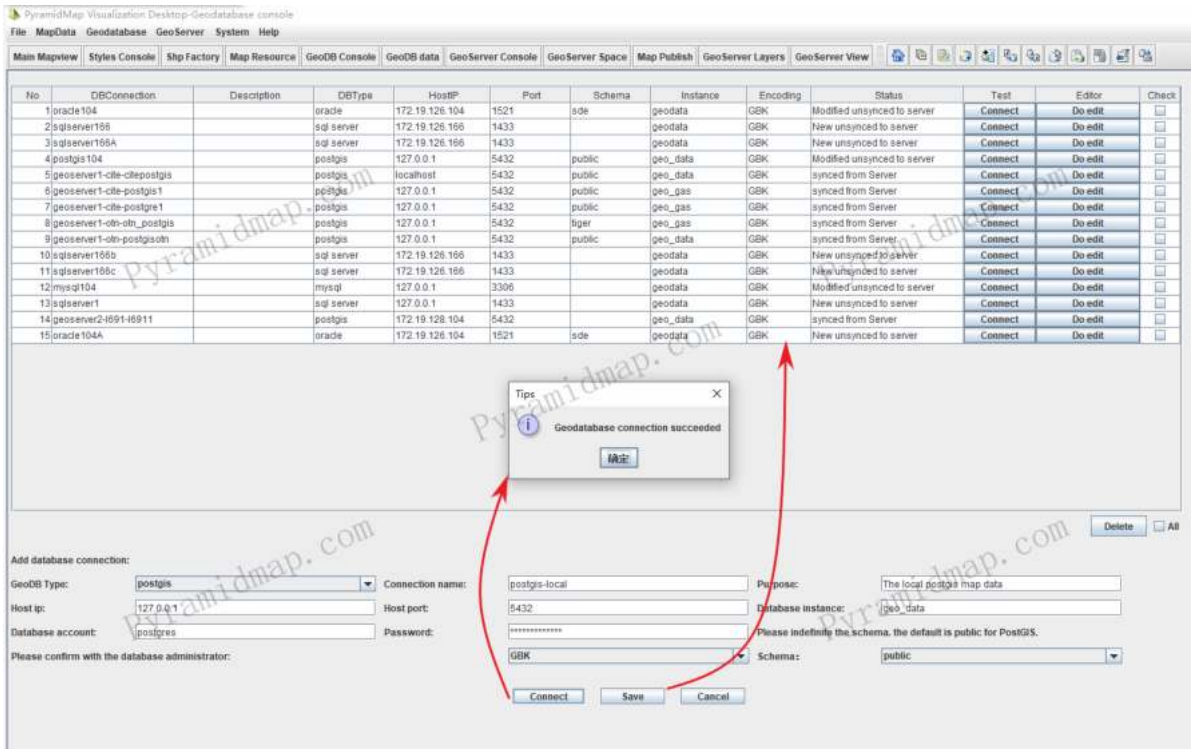


Figure 5-4：Geodatabase Connection Configuration and pool

The connections in the pool can be retested, edited and deleted, as shown in Figure 5-5.

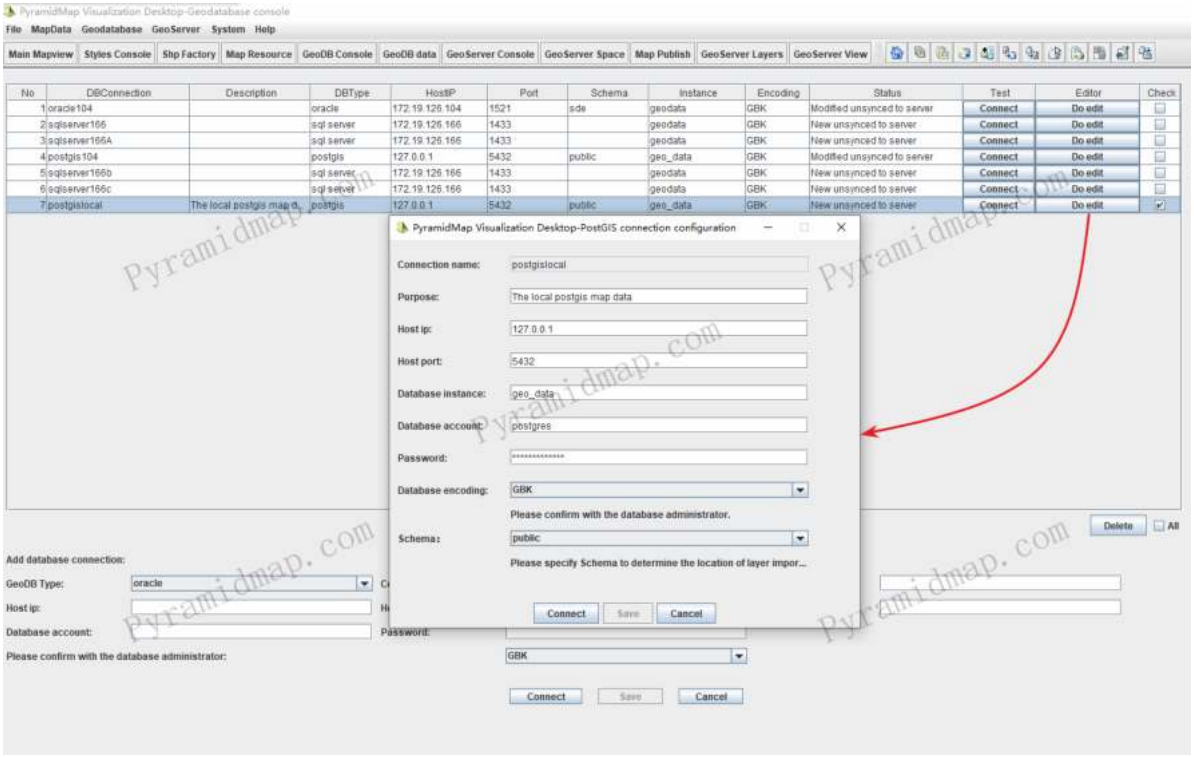


Figure 5-5： The connections in the pool can be retested, edited and deleted

Use the connection pool list to test, edit, modify, and delete the Geodatabase connection. Each connection has two button options : Connect and Do Edit.

.Connect: test whether the database connection is successful.

.Do edit: Re edit the Geodatabase connection to make it available.

5.2 GeoServer connection pool

PyramidMap supports direct connection access with GeoServer, realizes multi type layer publishing function, and provides layer service interface for WebGIS. After the connection parameters are configured and tested successfully, create and maintain the GeoServer resource connection pool. PyramidMap provides two ways to create a GeoServer connection: 1. Through the GeoServer tree node on the main interface; 2. Implement it on the GeoServer connection configuration module through "System" - "GeoServer console".

5.2.1 GeoServer data node

In the GeoServer connection node of the main interface, double-click Add GeoServer Connection, as shown in Figure 5-6.

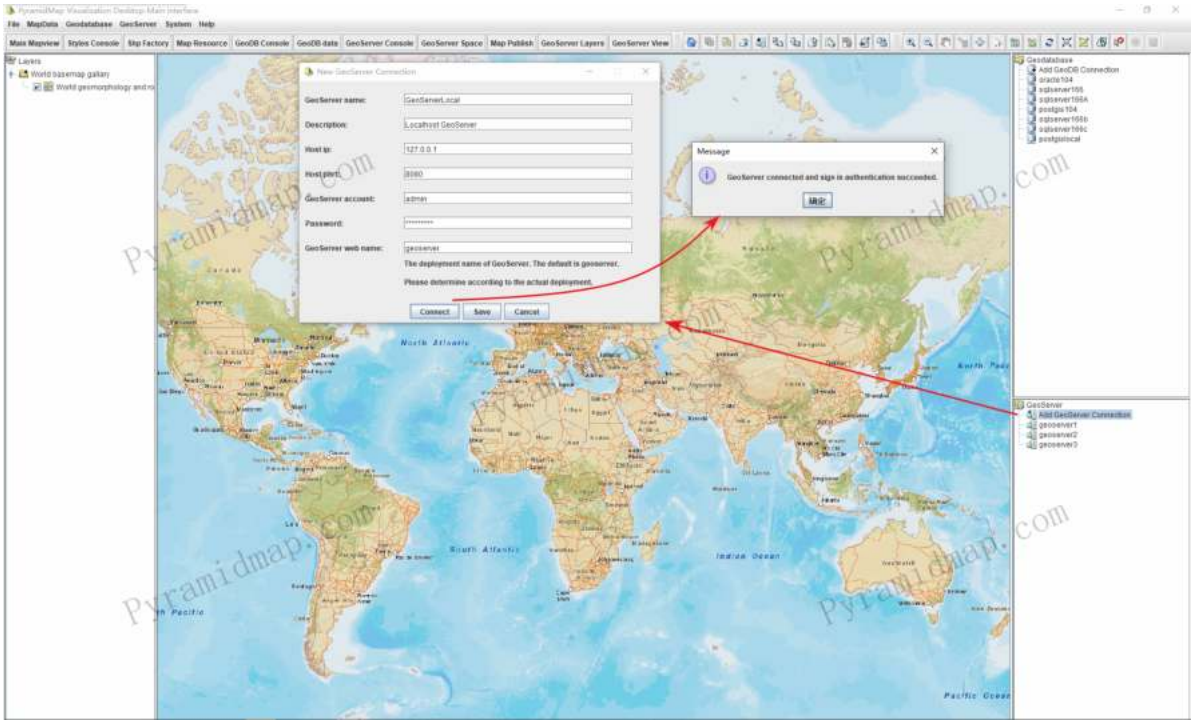


Figure 5-6：Create GeoServer connection through double-clicking on the GeoServer node in the main interface

Open the GeoServer connection configuration interface, enter the correct connection parameters, after the connection testing successful, you can save and create a valid GeoServer connection and hosting the connection in resource pool, and dynamically add it to the GeoServer connection node. Description of interface input parameters:

- GeoServer name: Customize the GeoServer server connection naming.
- Description：Customize the GeoServer connection purpose describe.
- Host IP：IP address of the server where the GeoServer is hosted.
- Port：GeoServer port number. (The port number of the web server hosting GeoServer, such as Tomcat)
- GeoServer account：GeoServer administrator account, default admin, please contact the web administrator for confirmation.
- Password: GeoServer administrator password, please contact the web administrator for confirmation.
- GeoServer web name：The deployment name of GeoServer in the web service. The default is geoserver. Please contact the web administrator for confirmation.

5.2.2 GeoServer connection pool

Open the GeoServer connection pool management interface through "System" - "GeoServer console", or directly click the "GeoServer console" button in the toolbar, as shown in Figure 5-7.

Figure 5-7：Create GeoServer connection menu

In the GeoServer connection pool management interface, create a new GeoServer connection and incorporate it into the unified resource management pool. The workflow is shown in Figure 5-8.

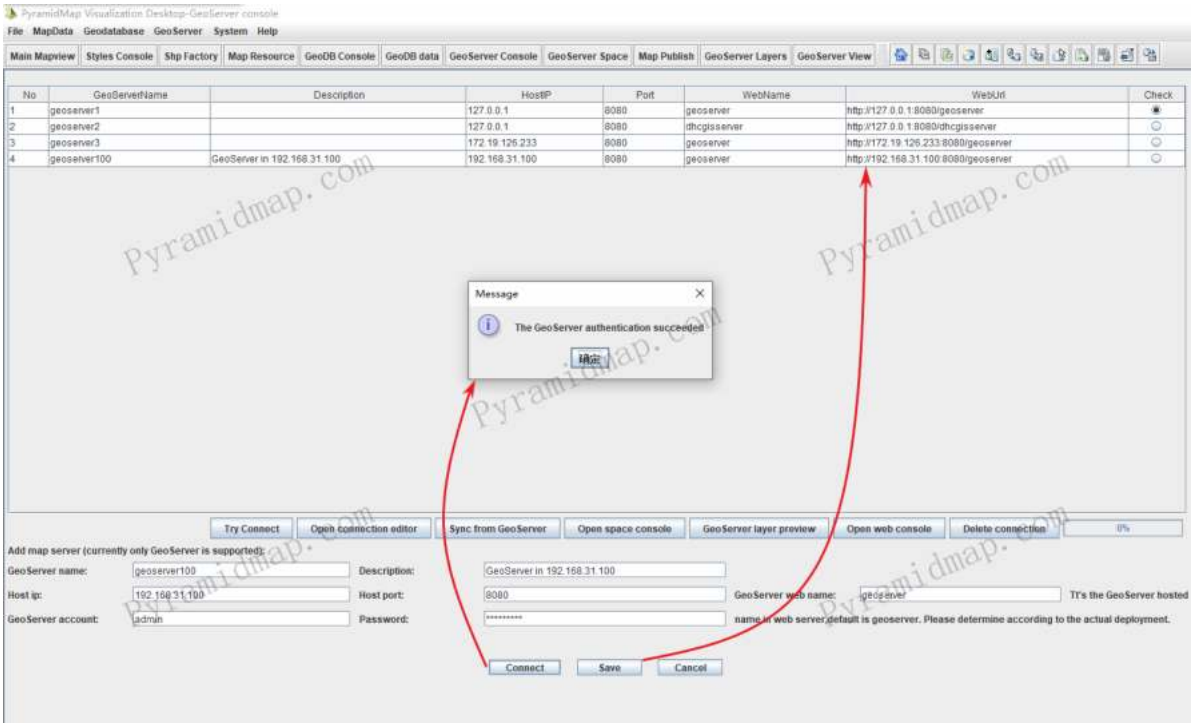


Figure 5-8：Create GeoServer connection and connections pool

The GeoServer connection created successfully is added to the resource connection pool.

5.2.3 Manage GeoServer connections

PyramidMap maintain the GeoServer connections in resource pool, manage the server internal workspace, data storage and layers in the function

modules, as shown in Figure 5-9.

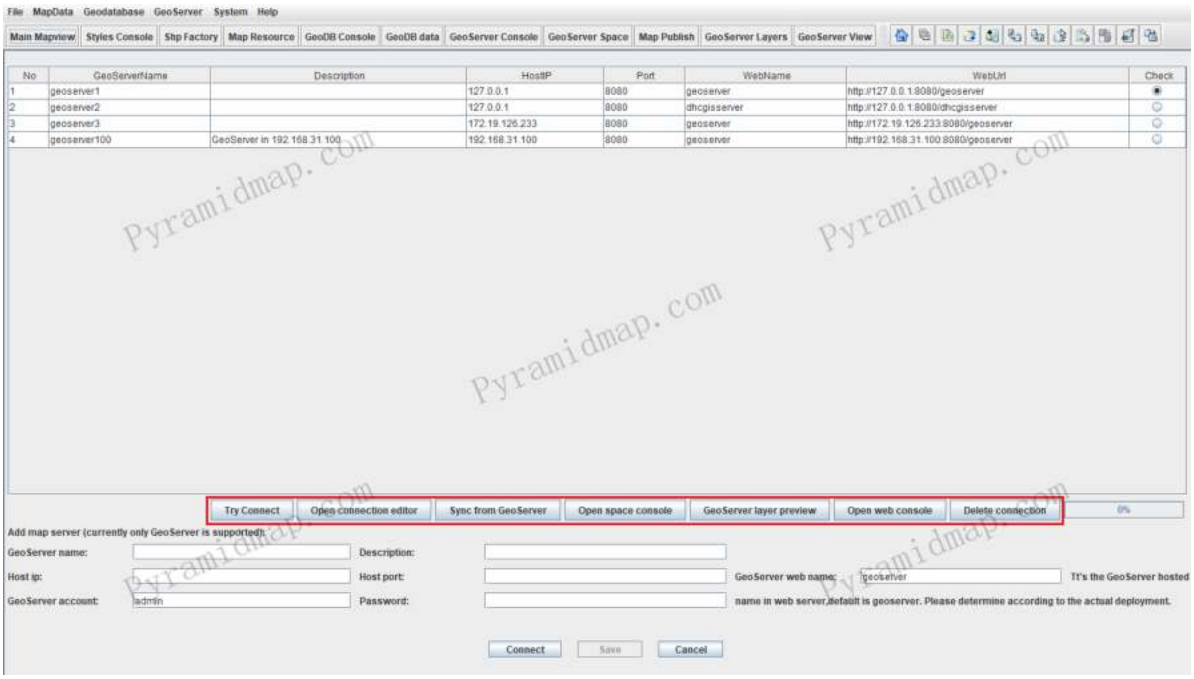


Figure 5-9：Internal management of GeoServer

GeoServer internal management identify：

- Try connect: test whether the selected map server connection is available.
- Open Connection editor: Edit the selected GeoServer connection properties.

- Sync from GeoServer: obtain the selected GeoServer workspace, data storage and database connection properties data, and synchronizing them to the client.
- Open space console: query, edit and modify, delete the workspace and data storage of the selected GeoServer.
- GeoServer layer preview: get the list of selected GeoServer layers and preview them.
- Delete connection: Delete the selected GeoServer connection.

5.3 GeoServer internal operate

The internal space of GeoServer is divided into three levels: workspaces, data storages and layers. As the client of GeoServer, PyramidMap can visually maintain these modules. PyramidMap provides multiple forms of access management to GeoServer server space.

5.3.1 GeoServer Workspace

Through the GeoServer node tree in the main interface, you can right-click on the GeoServer node layer and the workspace node layer to provide management access to the workspace and data storage. The management entry of the GeoServer node to the workspace is shown in Figure 5-10.

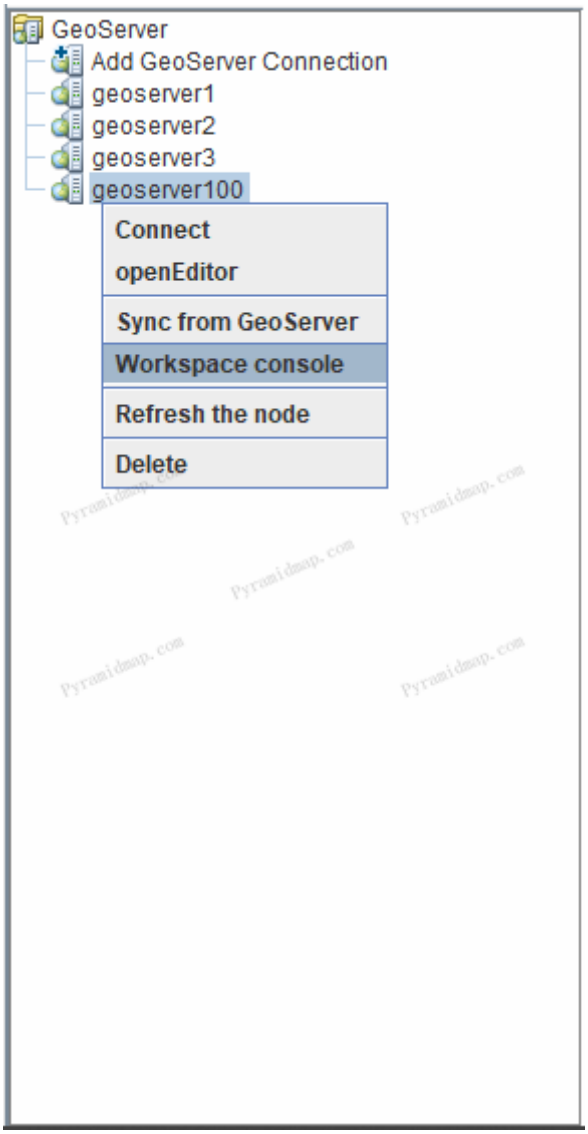


Figure 5-10：GeoServer node entrance to workspace

Enter the workspace management module, as shown in Figure 5-11.

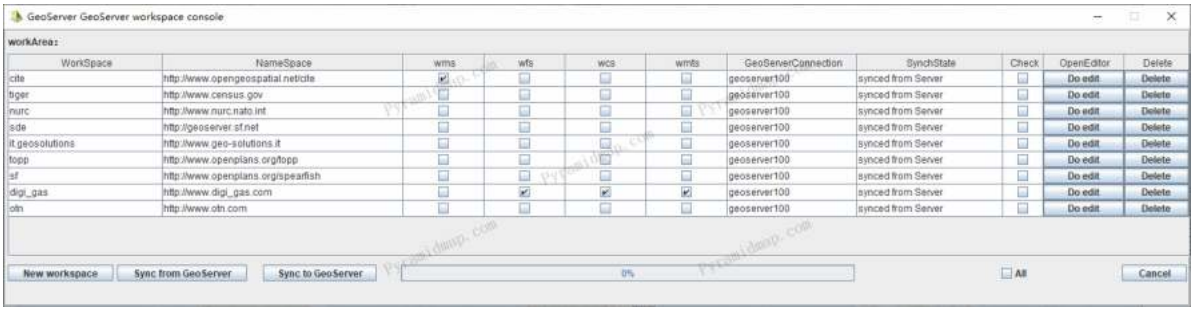


Figure 5-11： The GeoServer's workspaces pool manage interface

In the workspace module, you can perform the following operations: create a new workspace, synchronize the server workspace to the client, and submit the client workspace to the server. In particular, in the workspace list management pool, you can provide independent attribute editors and delete each workspace in the list table. The new workspace interface and and data interaction with GeoServer is shown in Figure 5-12.

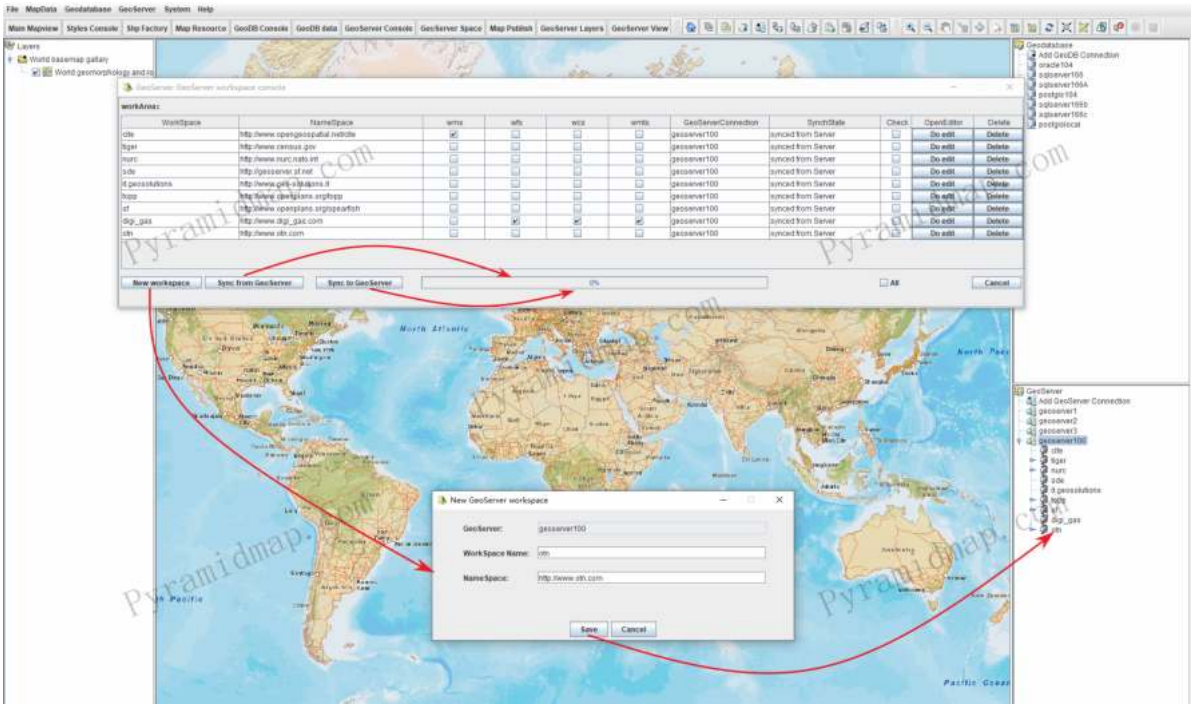


Figure 5-12： The new workspace interface and and data interaction with GeoServer

The new workspace will be automatically attached to the GeoServer node.

5.3.2 GeoServer data storage

In the workspace node, a data storage entry is provided, as shown in Figure 5-13.

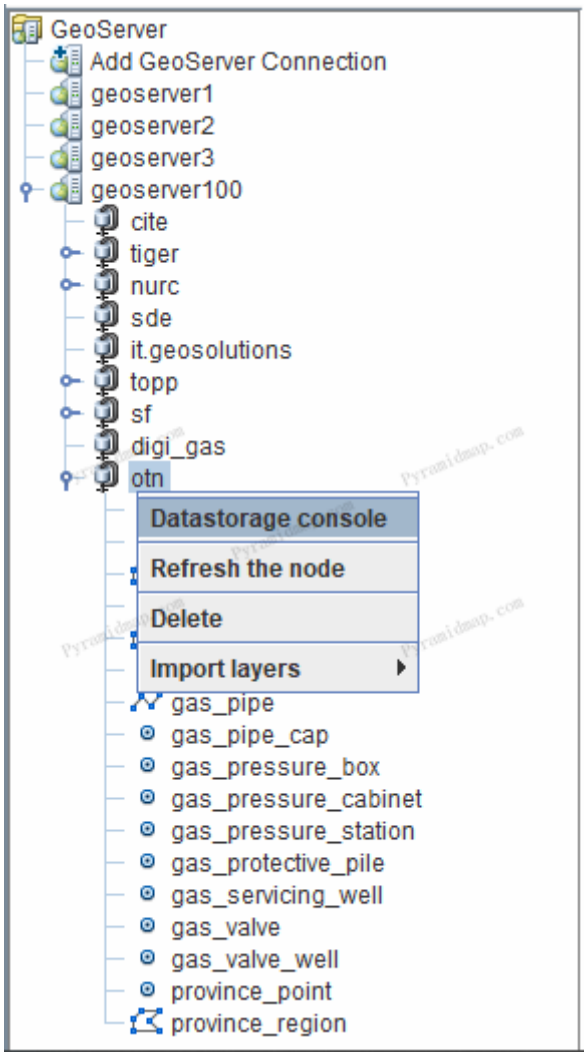


Figure 5-13：Workspace node to data storage management entrance

Then enter the data storage management module, as shown in Figure 5-14.

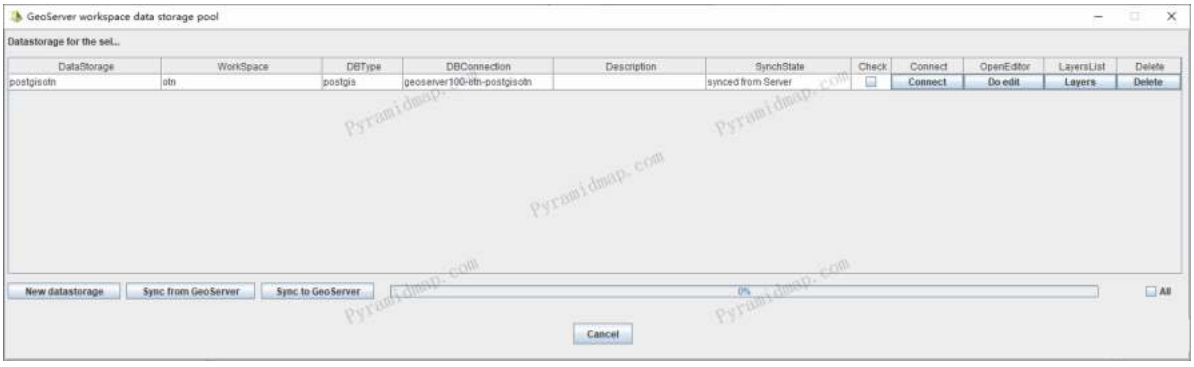


Figure 5-14：The data storage pool interface from the workspace node

In the data storage module, you can perform the following operations: create a new data storage, synchronize the server side data storage to the client, and submit the client side data storage cache to the server. In particular, in the data storage list management pool, you can provide independent editing and deletion operations for each data storage, as shown in Figure 5-15.

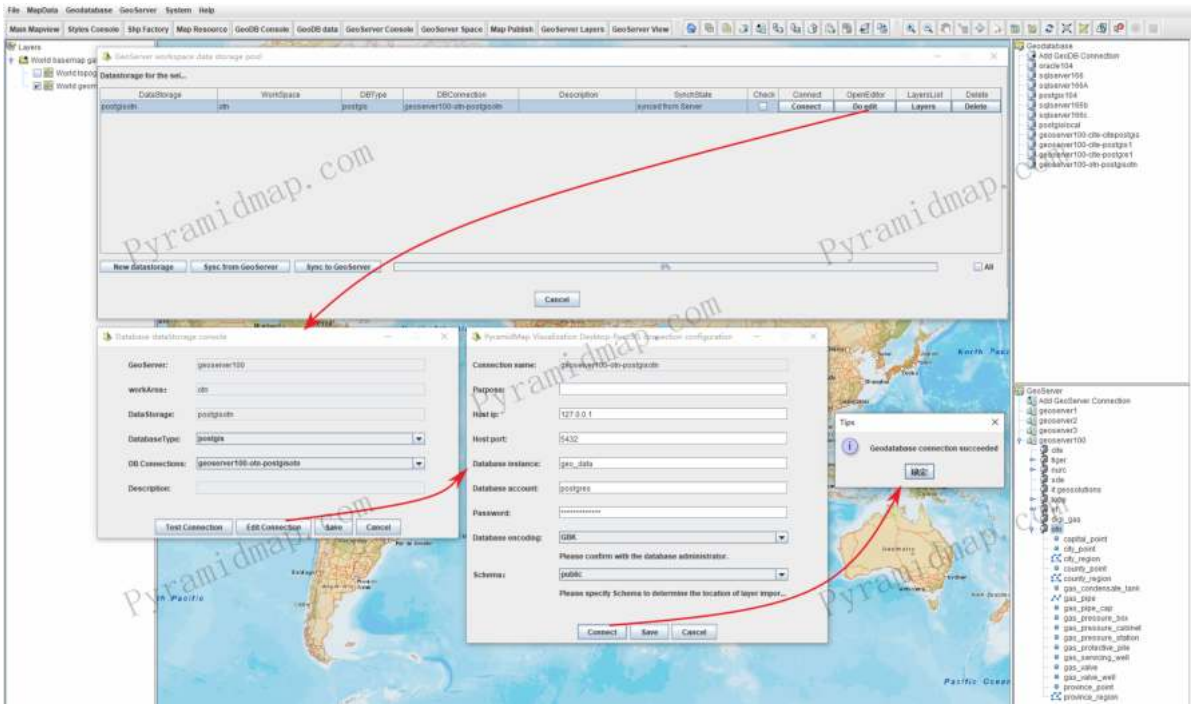


figure5-15：Data storage management pool of GeoServer workspace

In the New Data Storage module. You can select the database type corresponding to the data storage, and select the geodatabase connection that matches the type to automatically bring in the configuration of database connection parameters. The selected database connection can be dynamically edited, as shown in Figure 5-16.

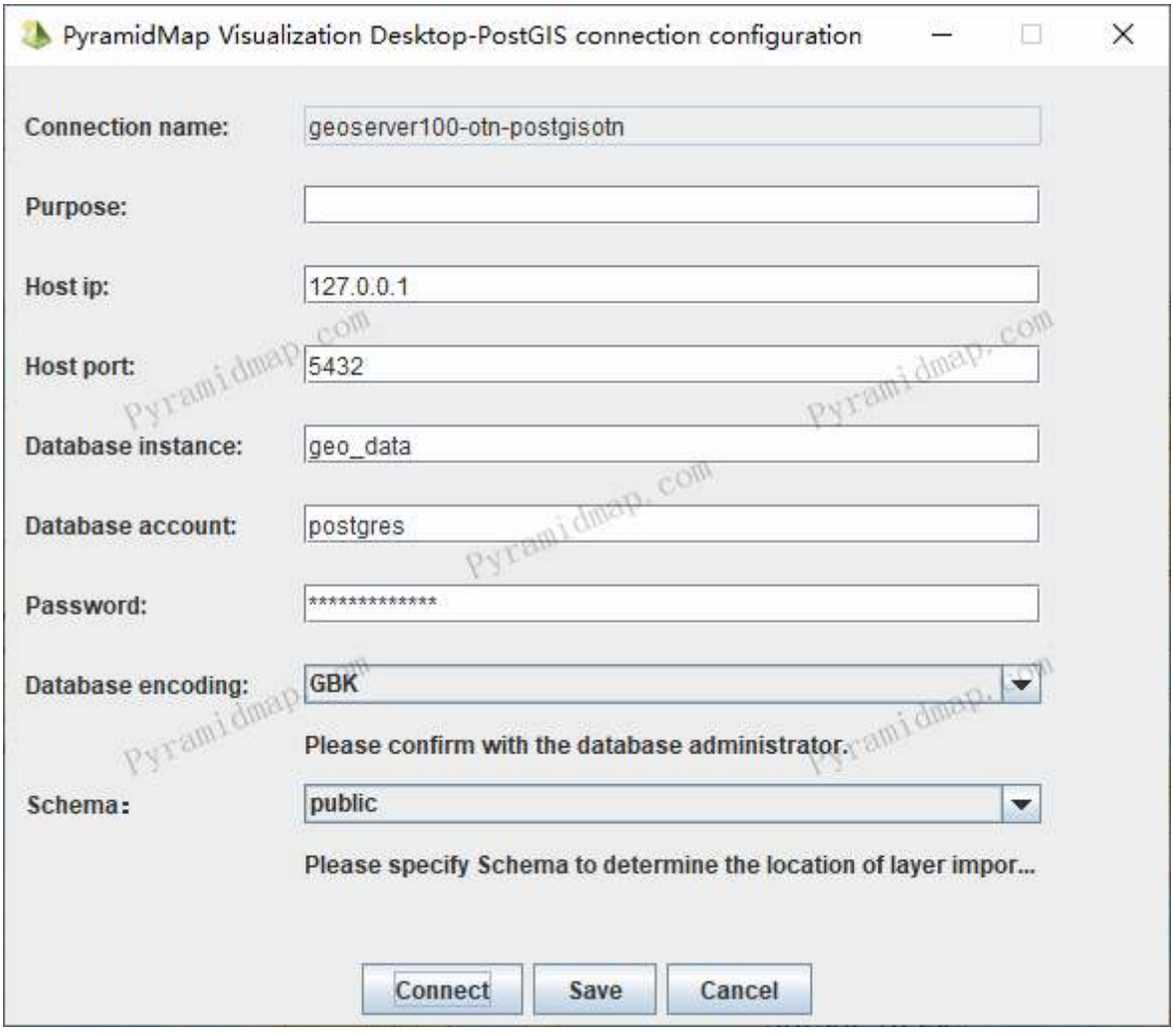


Figure 5-16：Edit the database connection for the datastorage

The predefined geodatabase connection serves as an independent resource management pool to provide data sources for GeoServer data storage.

5.3.3 GeoServer pool console

PyramidMap centrally manages GeoServer connections in the form of resource management pools, as shown in Figure 5-17.

Figure 5-17：GeoServer connections resource management pool entrance

PyramidMap creates and maintains the GeoServer resource connection pool, and manages and maintains its internal service space for each GeoServer connection. The module is shown in Figure 5-18.

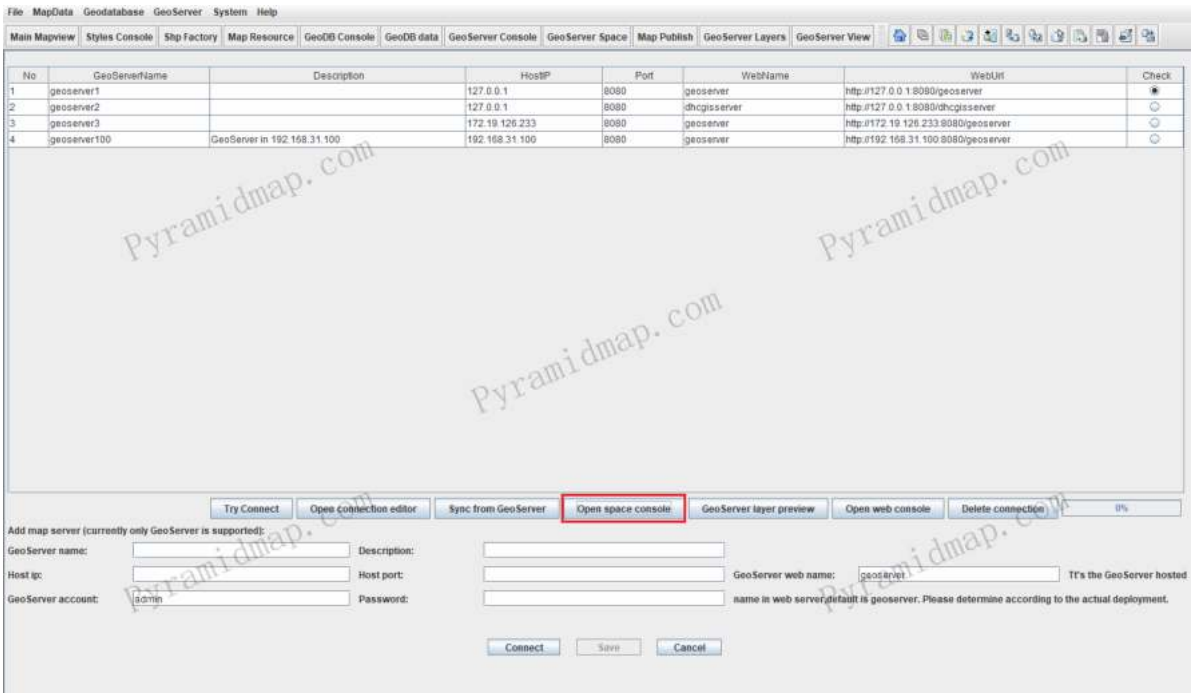


图5-18：GeoServer connections pool and operation options

Select the GeoServer and click “open space console“ button, as shown in Figure 5-19.

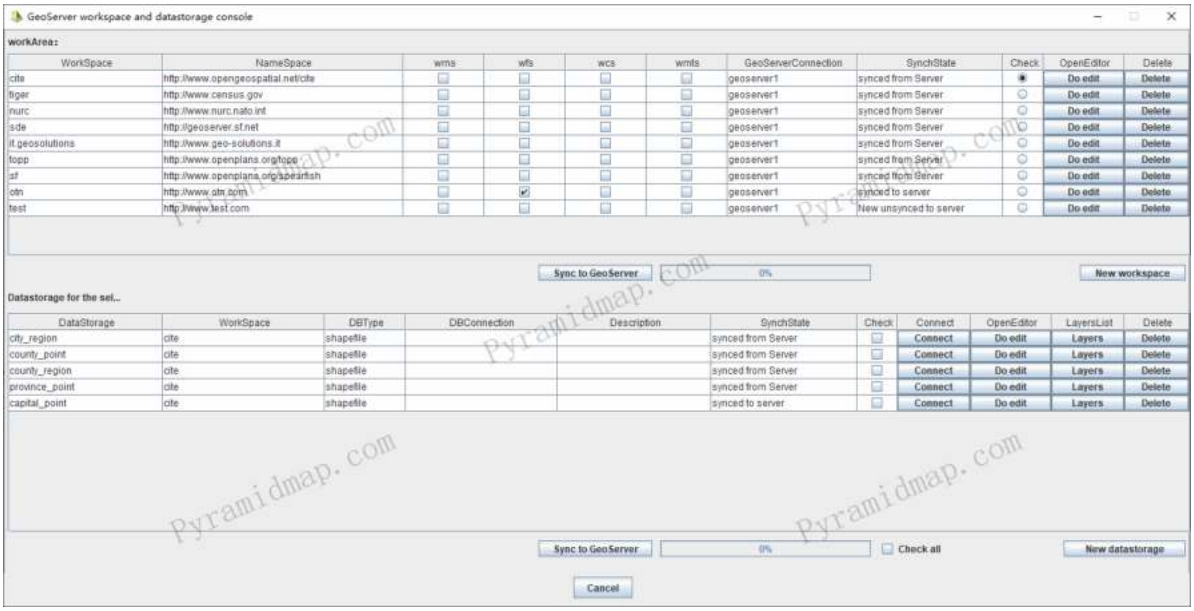


Figure 5-19：GeoServer workspace and data storage managing pool

The GeoServer workspace and data storage managing pool module displays the list of all workspaces of the server and the data storages list of each workspace. The client side and the server side maintain two-way synchronization to achieve visual management of the server side data by the client side.

In particular, PyramidMap implements a client cache maintenance mechanism for GeoServer. New and modified workspaces and data stores are temporarily stored on the client. When necessary, they are submitted to the GeoServer server in batches. At the same time, the GeoServer server data can be synchronized to the client at any time. This is the two-way synchronization mechanism between PyramidMap and GeoServer.

6 Map data and conversion

PyramidMap supports five types of map data sources, namely Shp file vector layer, file image layer, Geodatabase vector layer, GeoServer vector layer and raster tile layer.

6.1 Shp layers pool

PyramidMap imports the client's Shp file vector layers into the resource pool through a file browser to form a Shp management list pool and supports various operations with corresponding buttons, as shown in Figure 6-1.

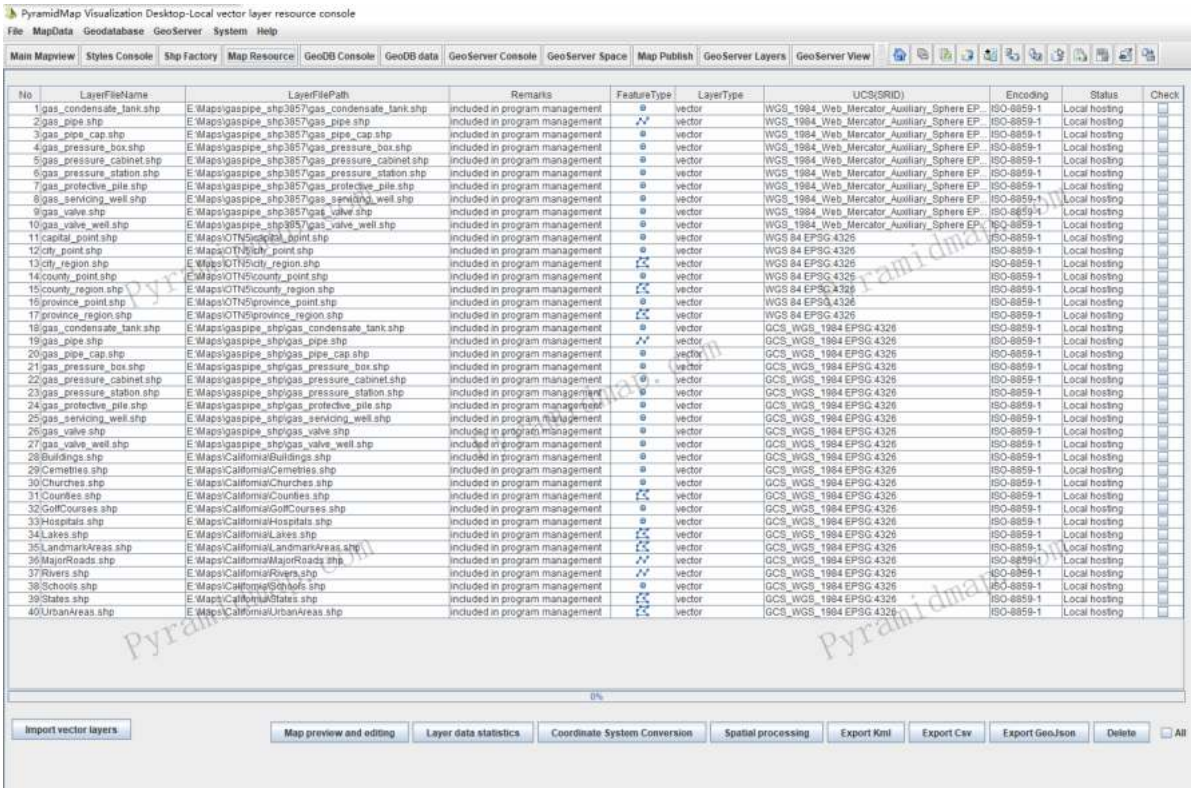


Figure 6-1： Shp layers resource pool

Support various operations on Shp layer resources, including:

- Import vectorlayers: import client Shp files and GeoJson files into the resource management pool.
- Map preview and editing: preview and edit the Shp layer in independent view of each layer in the list pool.
- Layer data statistics: perform the features data statistics of the shp layer in the list pool.
- Coordinate system conversion: perform coordinate system conversion on the shp layer in the list pool.
- Spatial processing: perform spatial processing on shp layers in the list pool, including merging and intersection.
- Data conversion: Shp to Kml, Shp to Csv, Shp to GeoJson.
- Delete: Delete the shp layer in the list pool.

In particular, through the map preview and editing options, the selected layer file will be opened in an independent map view to preview and edit the layer, as shown in Figure 6-2.

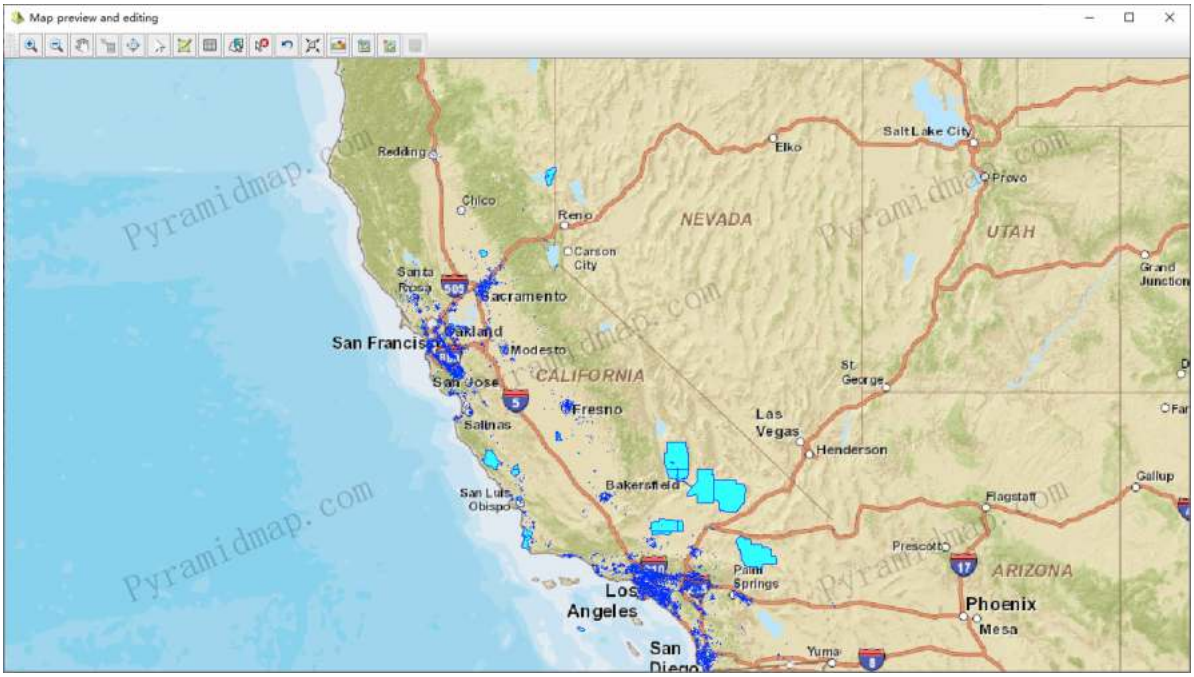


Figure 6-2：Open independent preview and editing view of single shp vector layer

Independent map view provides each layer with separate display, rendering, base map selection and overlay, graphical editing, attribute data editing in table, feature selection and deletion operations. It is a comprehensive map service for a single layer.

6.2 Raster layers pool

PyramidMap imports raster image layers of client file types into the raster resource pool through a file browser to form an raster file management list, which supports various operations with corresponding buttons, as shown in Figure 6-3.

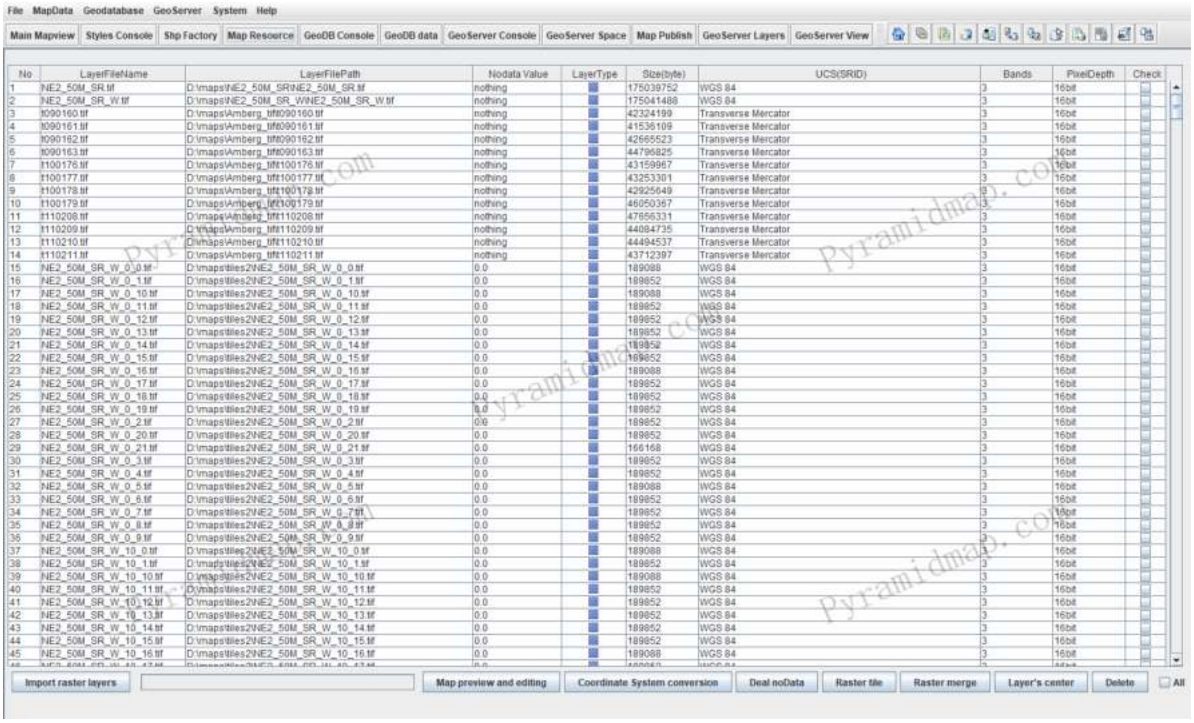


Figure 6-3：Raster layer resource management pool

Support various operations on raster layer resources pool, including:

- Import raster Layer: import the client raster layer file into the resource management pool.
- Map preview and editing: preview and edit the raster layers in the list pool.

- Coordinate system conversion: perform coordinate system conversion on raster layers in the list pool.
- Deal noData: process the invalid value of noData for the raster layer in the list pool, mainly to remove the black background and other invalid pixels of the image.
- Raster mosaic: A mosaic combines multiple raster images to obtain a seamless raster.
- Raster tile: This is a process that reverses with the raster Mosaic, divide a whole image into multiple slice images according to rules.
- Layer's center: calculate the center point position of the raster.
- Delete: Delete the raster layer in the list pool.

In particular, through the map preview and editing options, the selected layer file will be opened in an independent map view to preview and edit the layer, as shown in Figure 6-4.

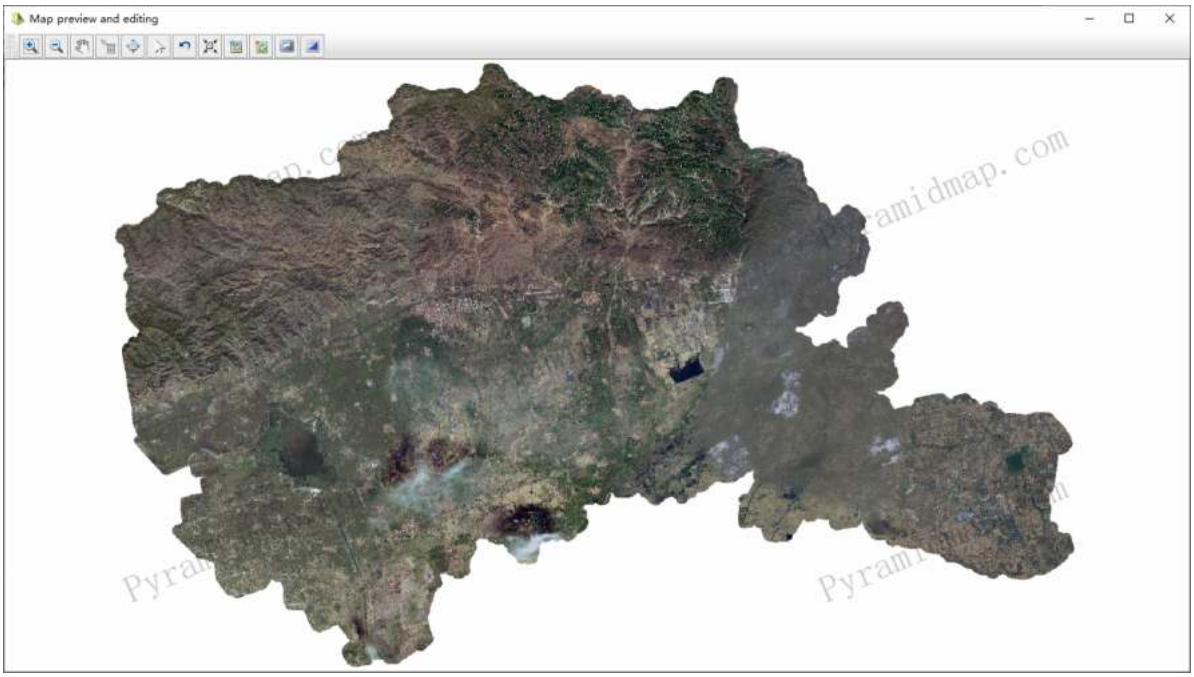


Figure 6-4：Open independent preview and editing view of single tiff raster layer

Independent map view provides each layer with separate display, rendering, base map selection and overlay, image-based editing, data table editing, feature selection and deletion operations. It is a comprehensive map service for a single layer.

6.2.1 NoData processing

In general, raster images will have NoData values. These NoData are invalid values that do not have actual value and will interfere with image data analysis. Black image frame is a common NoData error, which is particularly common for UAV images and raster data sets after geographical reference processing. In this example, we remove the black border of raster image through NoData invalid value processing. The processing process is shown in Figure 6-5.

Figure 6-5：Remove the black border of raster image through NoData invalid value processing

PyramidMap perform batch NoData processing on images in the resource pool, as shown in Figure 6-6.

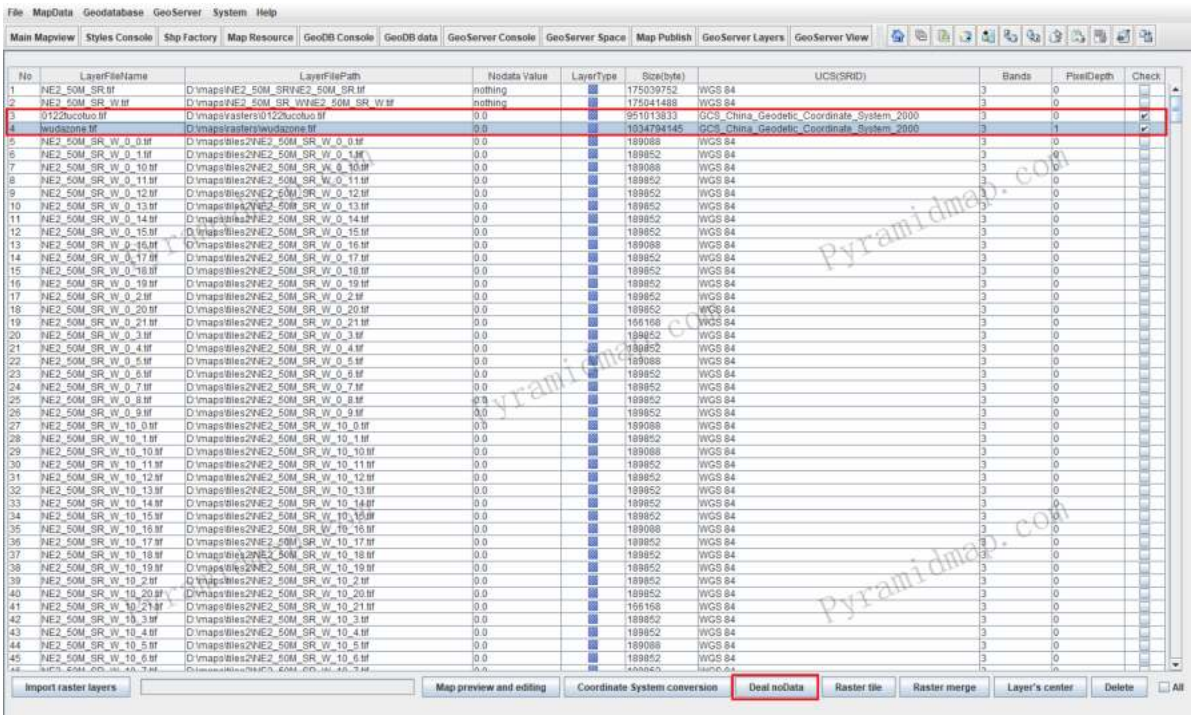


Figure 6-6：Batch NoData processing of images in the resource pool

The image with black background before processing is shown in Figure 6-7.

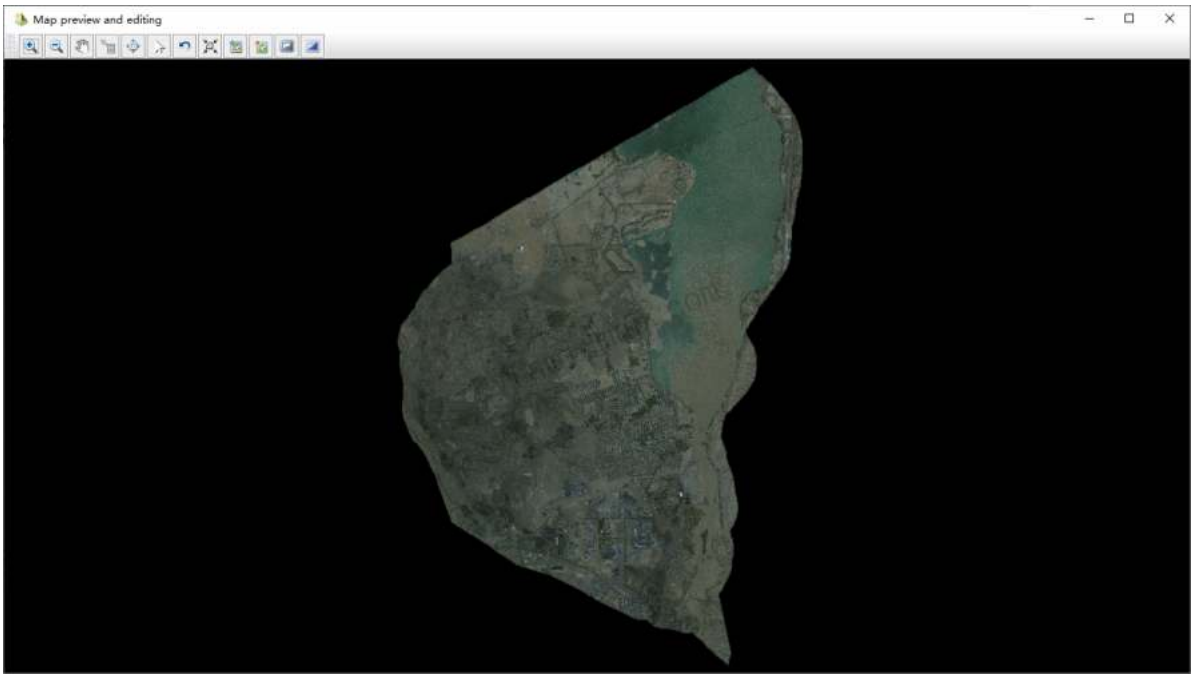


Figure 6-7：The image with black background before processing

After processing, remove the black background, as shown in Figure 6-8.

Figure 6-8：Eliminate black background after NoData processing

6.2.2 Raster tile processing

The significance of raster tiles is that a very large remote sensing image (a single image may exceed 100G, or even larger) can be cut into a number of slices that meet the requirements according to self-defined rules. The raster tiling is shown in Figure 6-9.

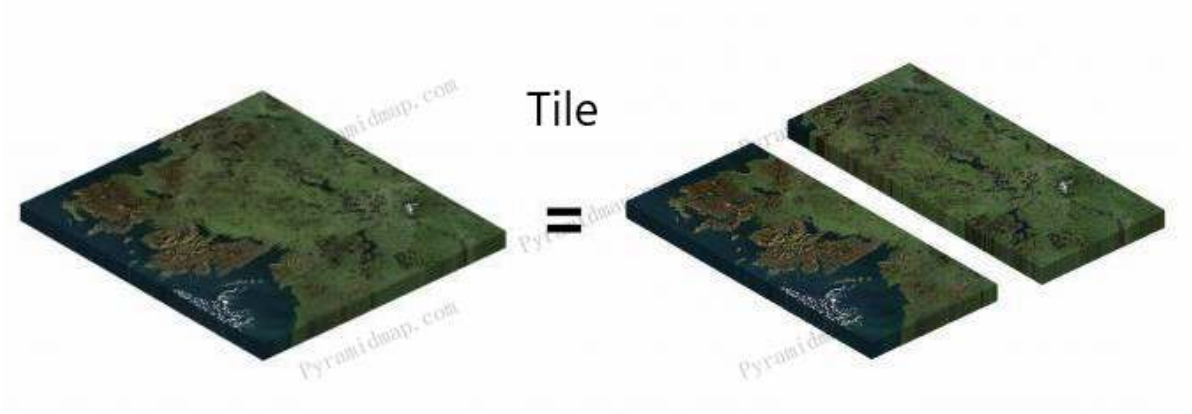


Figure 6-9：Schematic diagram of raster tile

PyramidMap can slice rasters in the resource pool in batches, as shown in Figure 6-10.

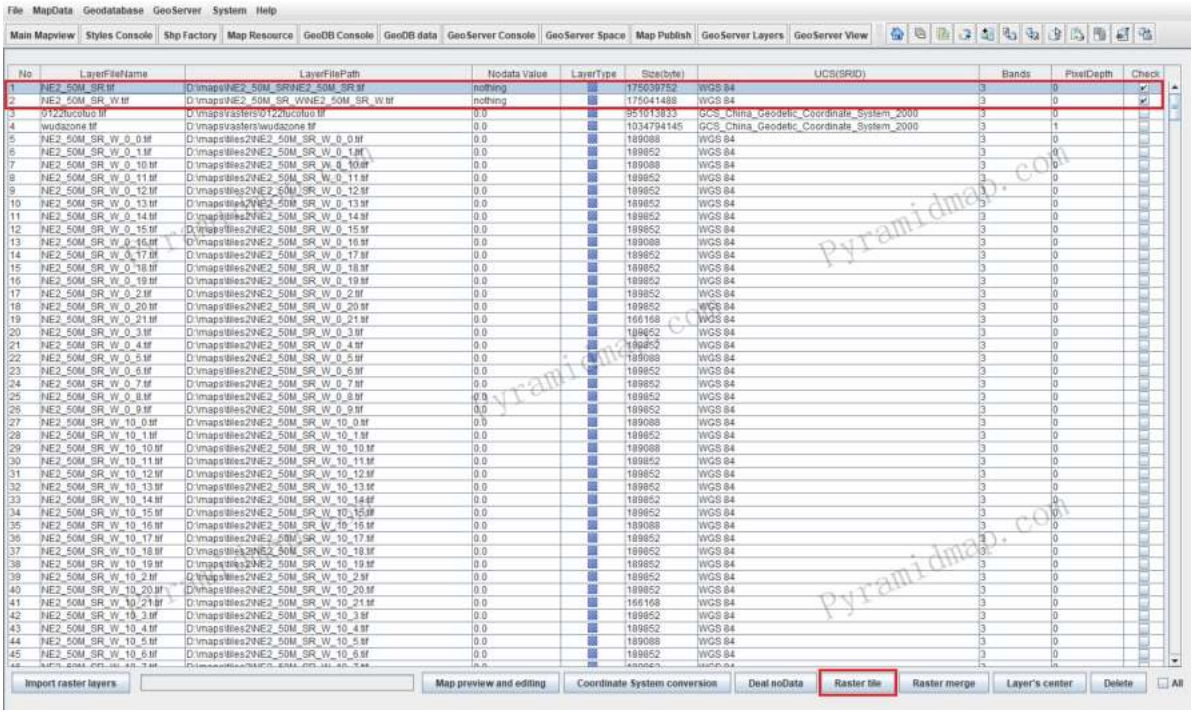


Figure 6-10：Select the raster in the resource pool for creating tiles

The generating raster tiles mode dialog box is shown in Figure 6-11.

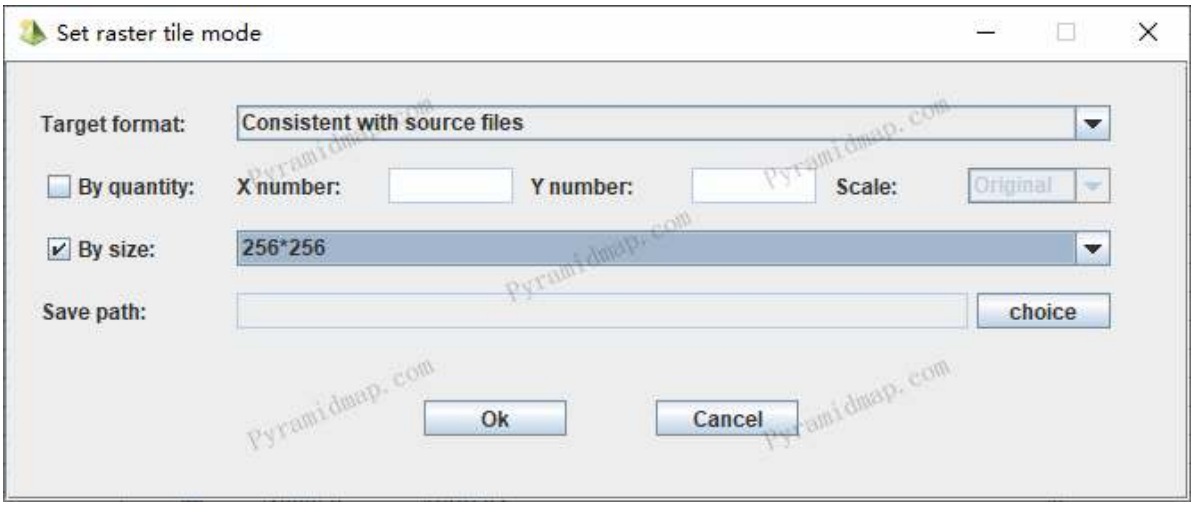


Figure 6-11：The generating raster tiles mode dialog box

Select the tile file format, which can be consistent with the source file, or select Tiff, png, jpg, webp and other different data formats. You can creating tiles according to the number and size strategies, and finally output to the specified save path.

With the NE2_ 50M_ SR_ W.tif in the resource pool as an example, the whole image is shown in Figure 6-12.

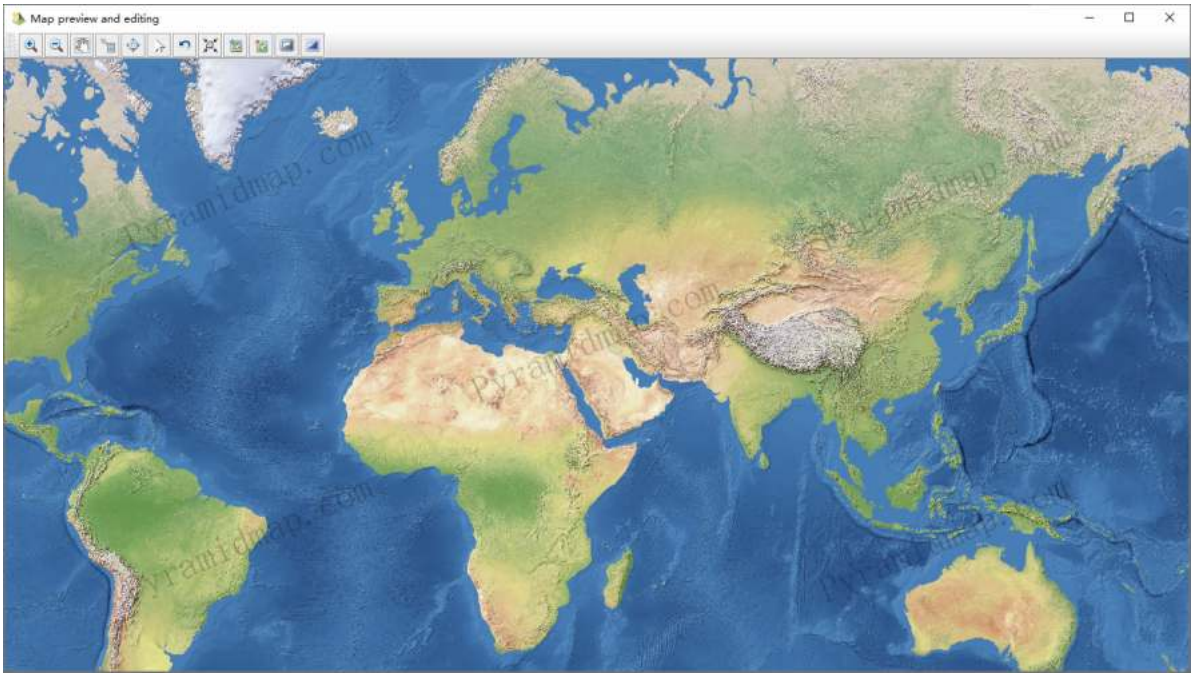


Figure 6-12： the whole raster image

Taking the 256 * 256 (pixel) slicing strategy as an example, the generated tiles is shown in Figure 6-13.

Figure 6-13： The effect of tiles generated by the whole raster

6.2.3 Raster mosaic processing

In a sense, raster mosaicing is the reverse process of the raster tiling. Mosaicing is to combine multiple raster images through mosaic to obtain a seamless raster image. The image merging diagram is shown in Figure 6-14.

Figure 6-14：Schematic diagram of raster mosaicing

PyramidMap batch mosaicing rasters in the resource pool, as shown in Figure 6-15.

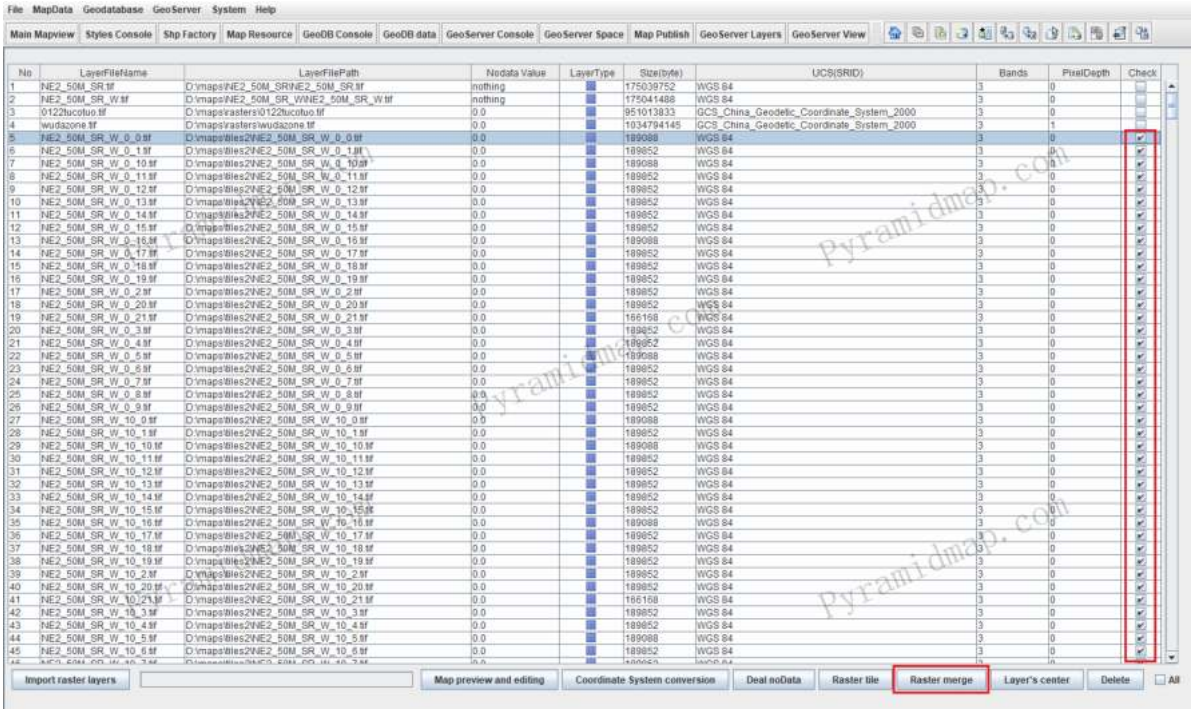


Figure 6-15：PyramidMap mosaicing rasters in the resource pool in batches

The raster mosaicing mode dialog box is shown in Figure 6-16.

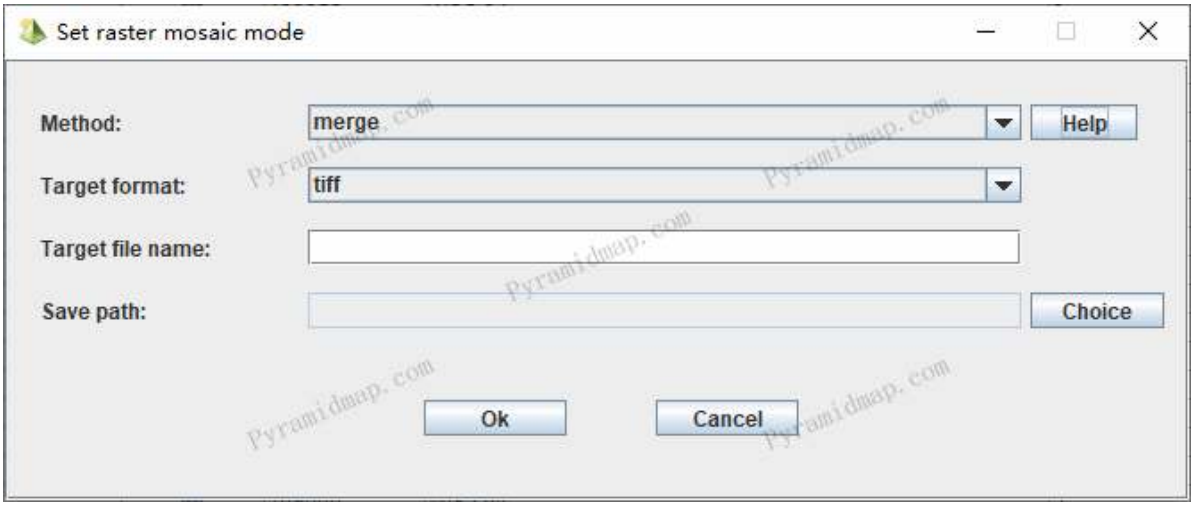


Figure 6-16：The raster mosaicing mode dialog box

The effect of rasters mosaicing is shown in Figure 6-17.

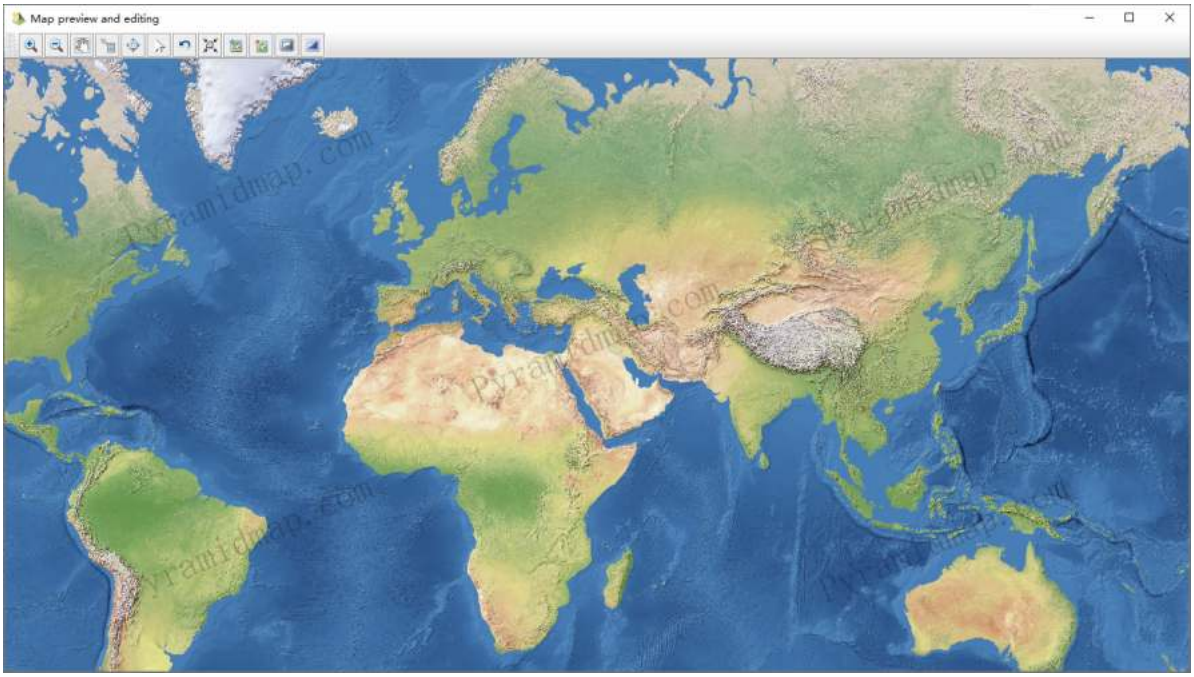


Figure 6-17：The effect of rasters mosaicing

Two common methods for combining adjacent or overlapping raster layers are MERGE and MOSAIC. The following is an explanation of the differences between these two types of work. The MOSAIC and MERGE functions work similarly, but there are also differences between them. When the input grids do not have any overlapping area, there is no difference in the output from either MERGE or MOSAIC. The difference is only in the processing of overlapping areas. In the case of MERGE, the sequence of input grids determines the values assigned to cells, giving priority to those entered first. The merge processing mode is shown in Figure 6-18.

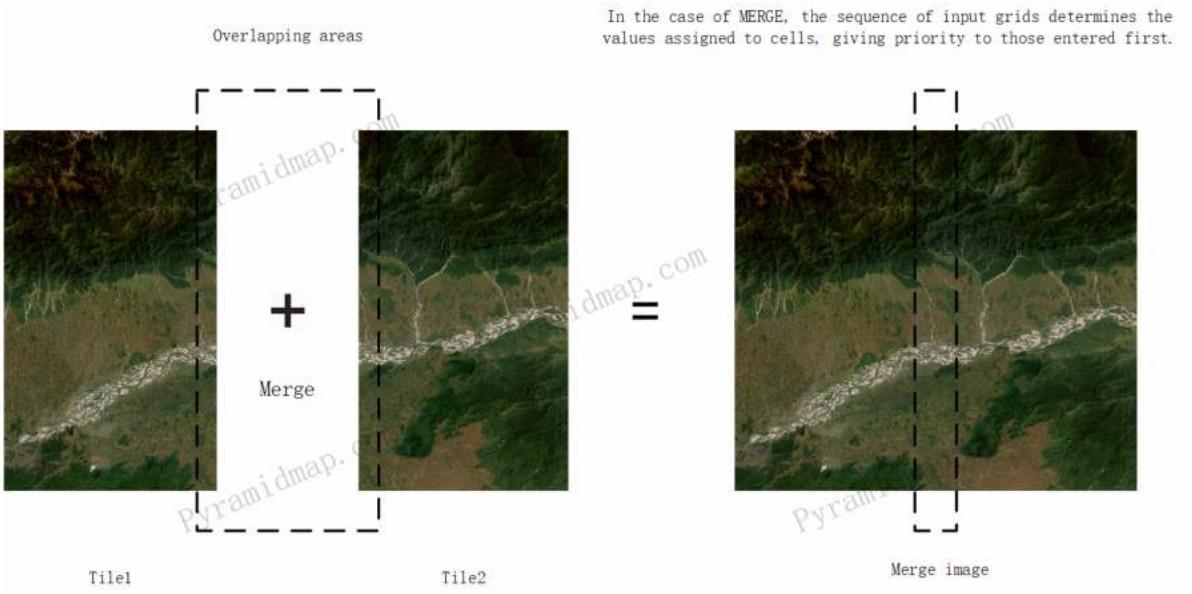


Figure 6-18：The merge processing mode

For MOSAIC, overlapping areas were *blended* to make a smooth transition and the sequence of entry is irrelevant. MOSAIC is typically used for ***continuous*** data (such as the spatially adjacent grids representing Digital Elevation Models, satellite images acquired in a slightly different time, containment plumes, etc.) The Mosaic processing mode is shown in Figure 6-19.

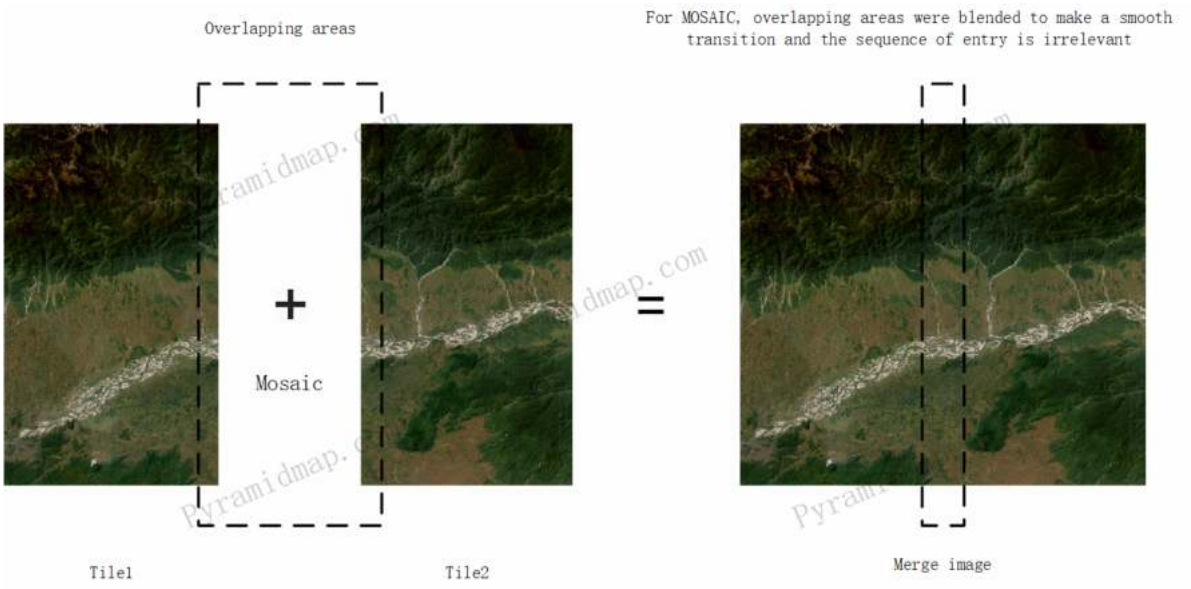


Figure 6-19：The mosaic processing mode

6.3 Geodatabase layers pool

PyramidMap imports client shp vector layers into Geodatabase through database connection pool, obtains layer list through database connection pool, and supports various operations with corresponding buttons.

6.3.1 Importing Shp into Geodatabase

PyramidMap maintains the Geodatabase connection pool and the Shp vector layer resource pool to import the Shp vector layer into the Geodatabase in batches. It supports but is not limited to Oracle, PostGIS and MySQL. The import interface and process are shown in Figure 6-20.

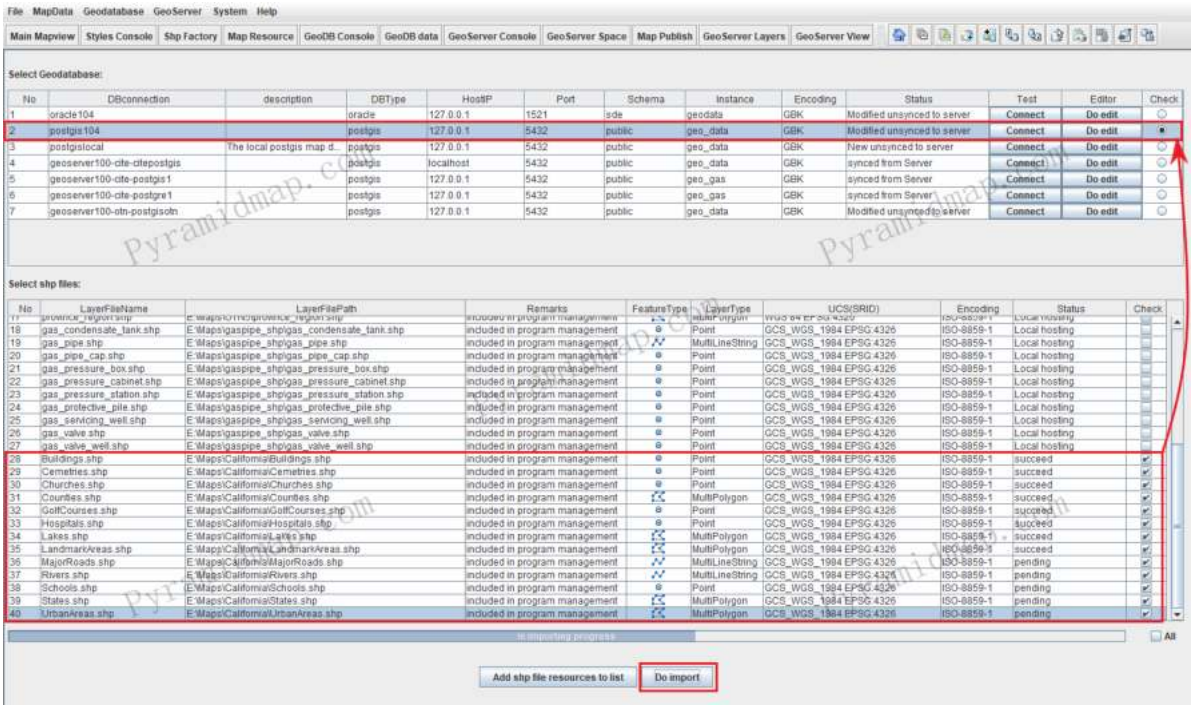


Figure 6-20：Shp vector layerS imported to Geodatabase workflow

In this module, users can selectively import Shp vector layers into Geodatabase in batches. After importing, each Shp layer generates a layer feature table with the same name. As a reciprocal process, the layer feature table in Geodatabase can also be exported to different geographic feature data such as Shp, Csv, Kml, GeoJson, etc.

6.3.2 Geodatabase exporting out shp

As a reciprocal process, the features table in Geodatabase can also be exported to different geographical element data such as Shp, Csv, Kml, GeoJson, etc. The operation interface and flow are shown in Figure 6-21.

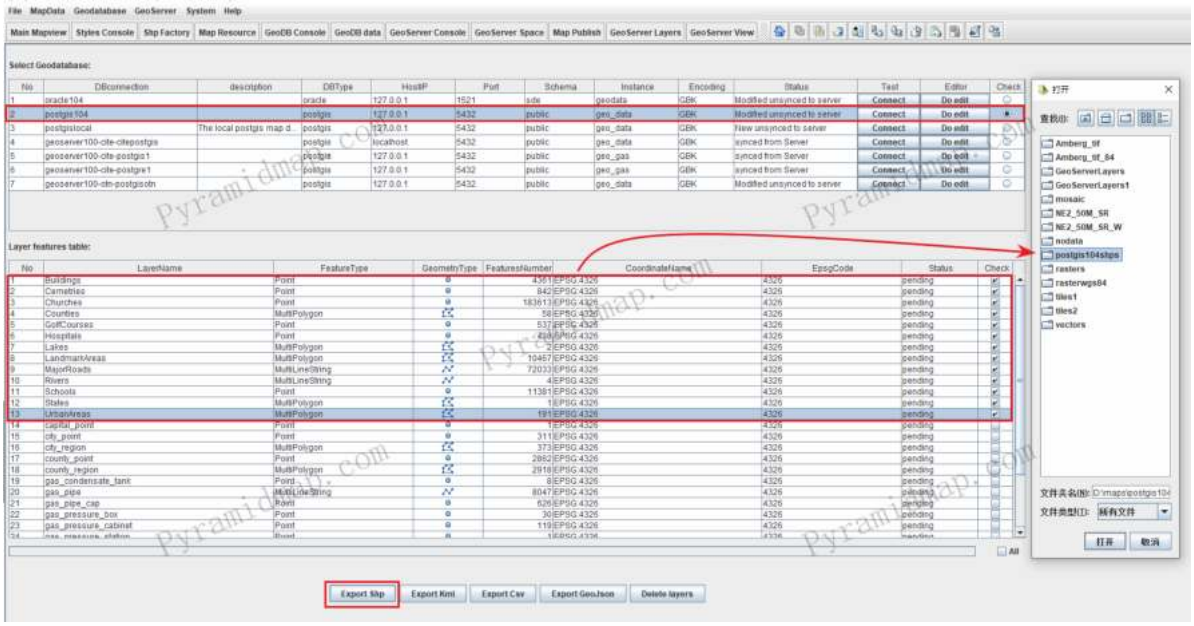


Figure 6-21：Geodatabase layer table export interface and workflow chart

In this module, users can selectively export the layer tables in Geodatabase as Shp, Csv, Kml and GeoJson under the specified path. Taking the exported Shp file as an example, the export process, export status and export file are shown in Figure 6-22.

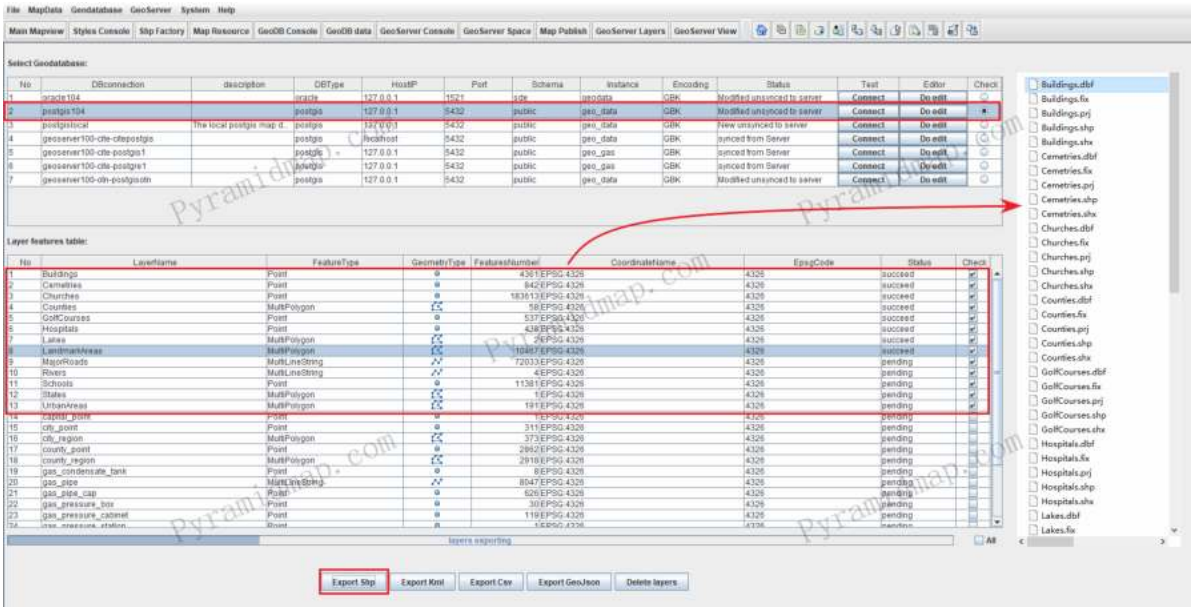


Figure 6-22：Geodatabase layer table export process, export status and export file flow chart

Select the database connection, dynamically obtain its internal layer resources, perform corresponding processing, and support various operations on layer resources with corresponding buttons, including:

- Export Shp：Export Geodatabase layers to shp files.
- Export Kml：Export Geodatabase layers to kml files.
- Export Csv：Export Geodatabase layers to csv files.
- Export GeoJson：Export Geodatabase layers to geojson files.

- Delete layers：Bulk delete the selected Geodatabase layers.

Reload and display the exported Shp layer in the map view, as shown in Figure 6-23.

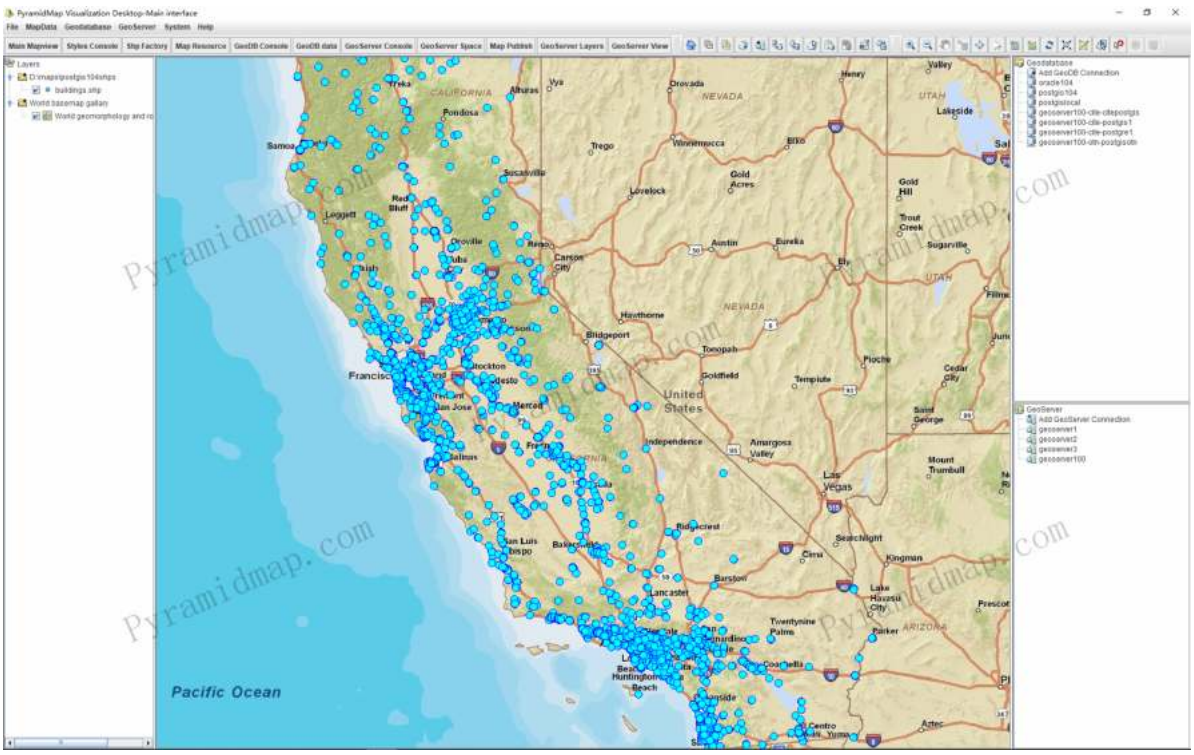


Figure 6-23：Display of Shp layer exported from Geodatabase

6.3.3 Geodatabase layers preview and edit

The layer table in Geodatabase can be queried and previewed directly. The operation interface and flow diagram are shown in Figure 6-24.

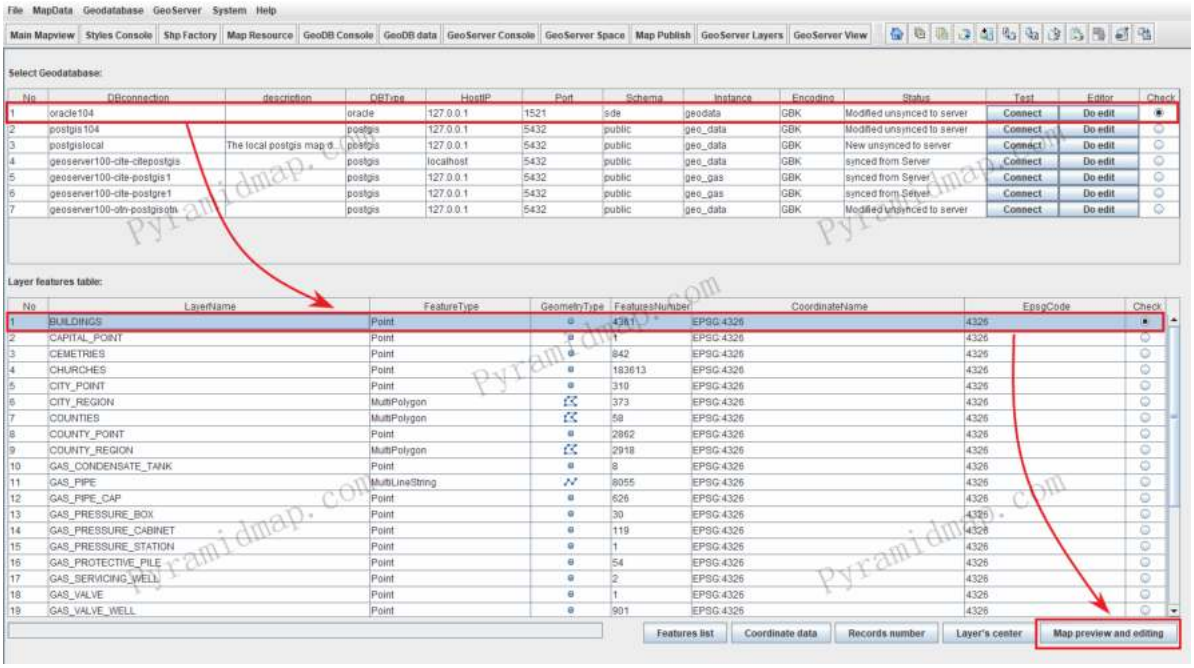


Figure 6-24：Geodatabase layer table query and preview

Select the database connection, dynamically obtain its internal layer resources, perform corresponding processing, and support various operations on layer resources with corresponding buttons, including:

- Feature List: forms the feature list of the selected layer.

- Coordinate data: form a list of geographical coordinates of the selected layer.
- Records number: perform data statistics on the features in the layer.
- Layer's center: calculates the center point location of the layer.
- Map preview and edit: preview and edit the layers in the management pool.

In particular, through the map preview and editing options, the selected layer file will be opened in an independent map view to preview and edit the layer, as shown in Figure 6-25.

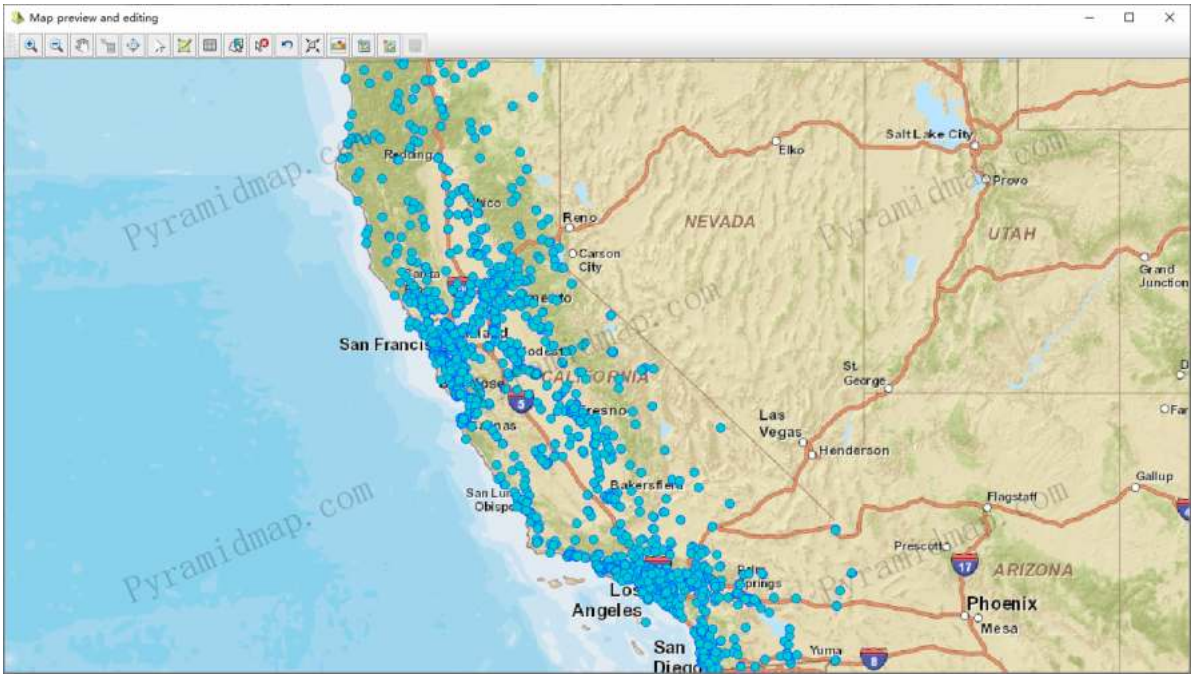


Figure 6-25：Open the independent preview and editing view of the single geodatabase layer

Independent map view provides each layer with separate display, rendering, base map selection and overlay, image-based editing, data table editing, feature selection and deletion operations. It is a comprehensive map service for a single layer.

6.4 GeoServer vector layers pool

PyramidMap publishes vector layers of client Shp file to GeoServer through GeoServer connection, and obtains the Internal layers through GeoServer connection in the pool, supporting various operations with corresponding buttons.

6.4.1 GeoServer layers preview

TSelect the GeoServer connection to dynamically acquire its internal layers and perform corresponding processing., as shown in Figure 6-26.

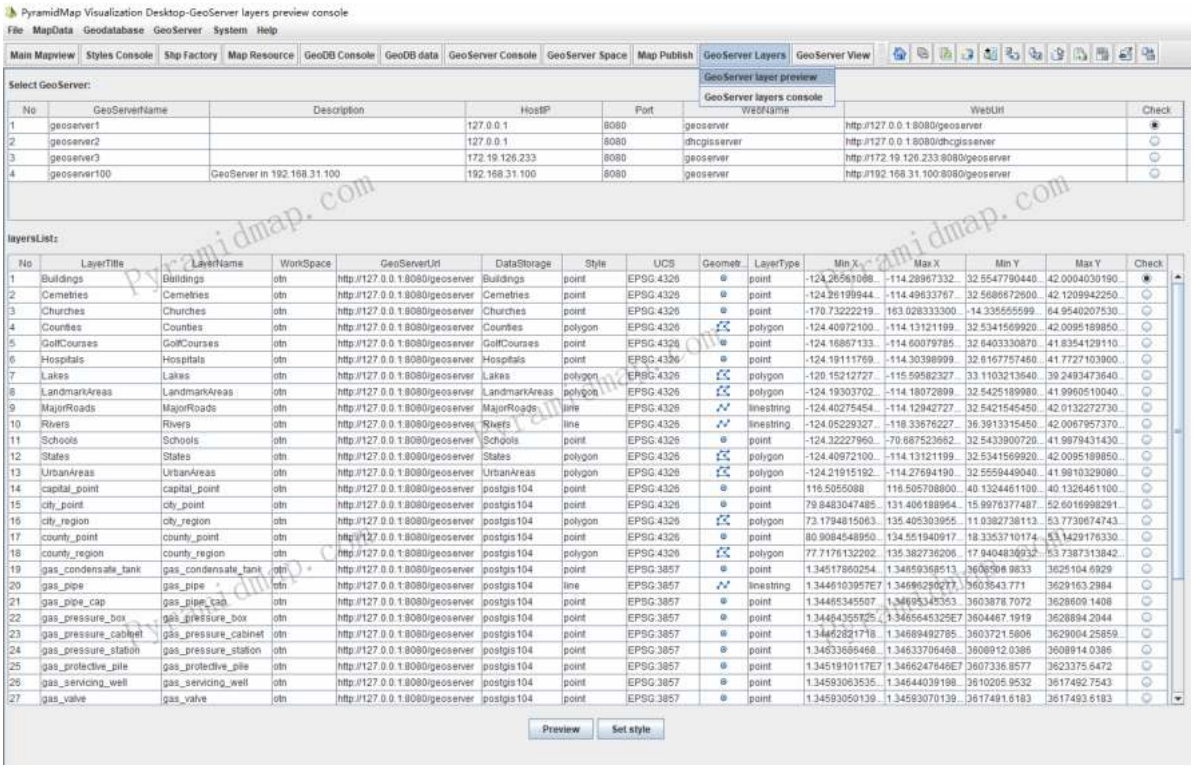


Figure 6-26：GeoServer connections pool and its internal layers pool

Various operations on layer resources are supported, including:

- Preview: preview the selected layer through WMS service mode.
- Set Style: set the sld display symbol matching its geometric type for the selected layer, as shown in Figure 6-27.

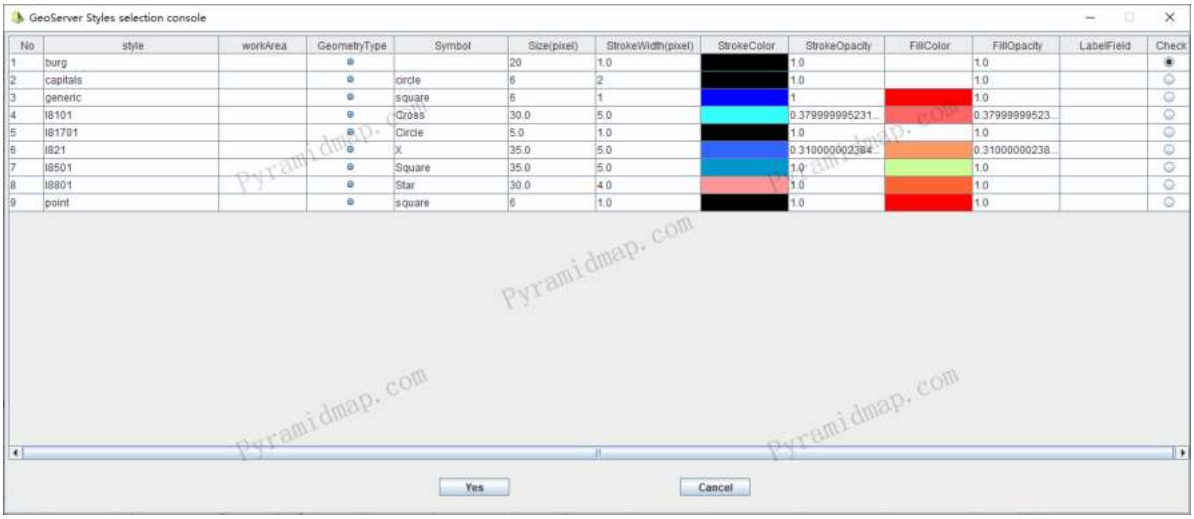


Figure 6-27：Get the internal styles in the GeoServer selected and form styles list pool

Select style in the list and assign it to the selected layer.

In particular, through the map preview and editing options, the selected layer file will be opened in the independent GeoServer map view to preview the layer. The editing function is not supported temporarily, as shown in Figure 6-28.

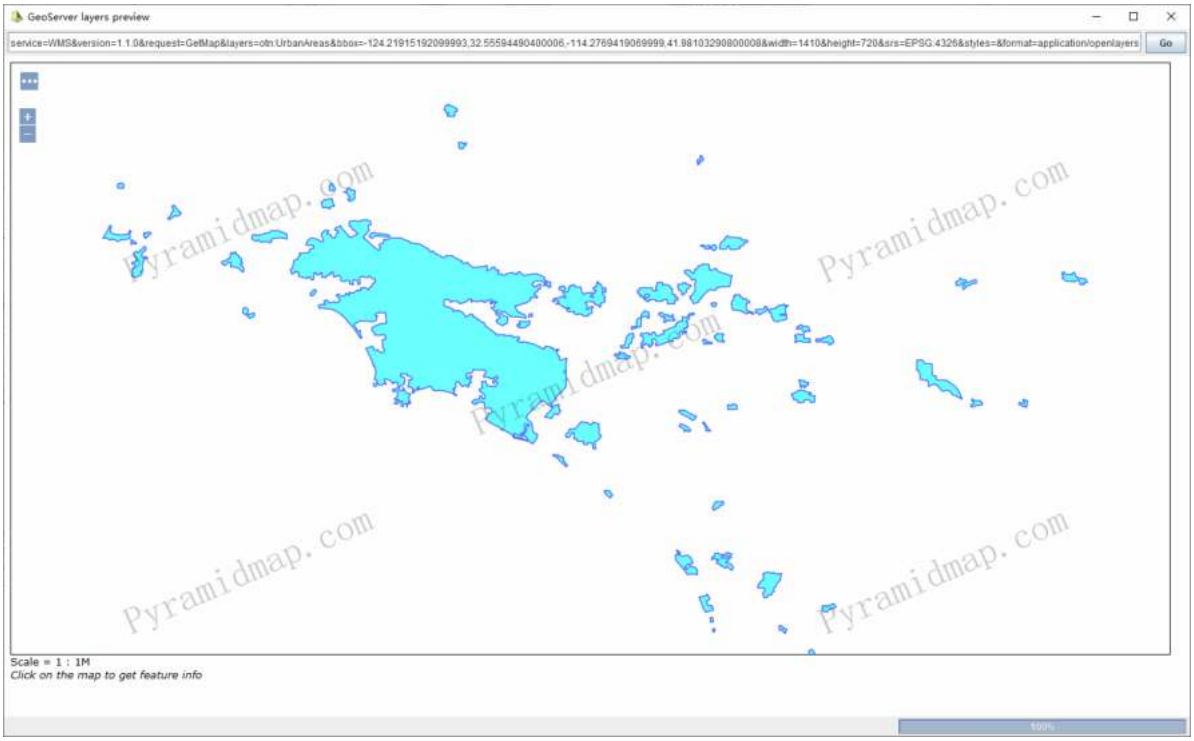


Figure 6-28：The GeoServer vector layer is previewed according to the preset sld style

6.4.2 GeoServer layers exporting

As a reciprocal process with layers publishing, the layers hosted in GeoServer can be exported to different geographic feature data such as Shp, Csv, Kml, GeoJson, etc. The operation interface and flow are shown in Figure 6-29.

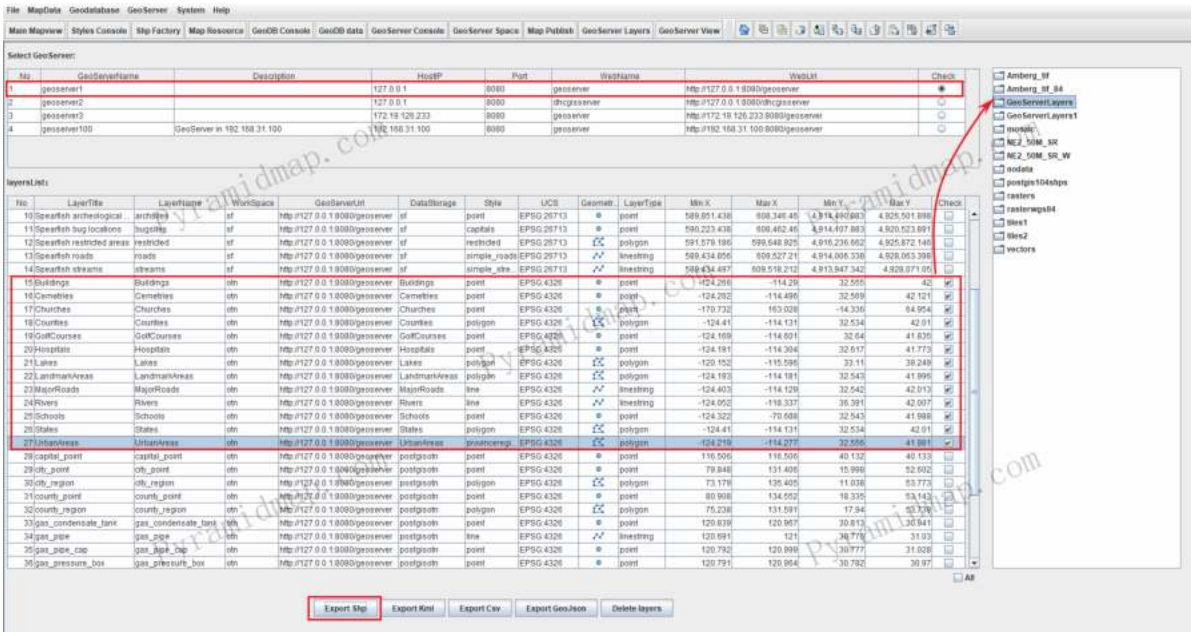


Figure 6-29：GeoServer layer export selection and specified export path

In the GeoServer layer resource list, select a layer and export it to the specified path in batch. The export process is displayed with a progress bar, and the flow diagram is shown in Figure 6-30.

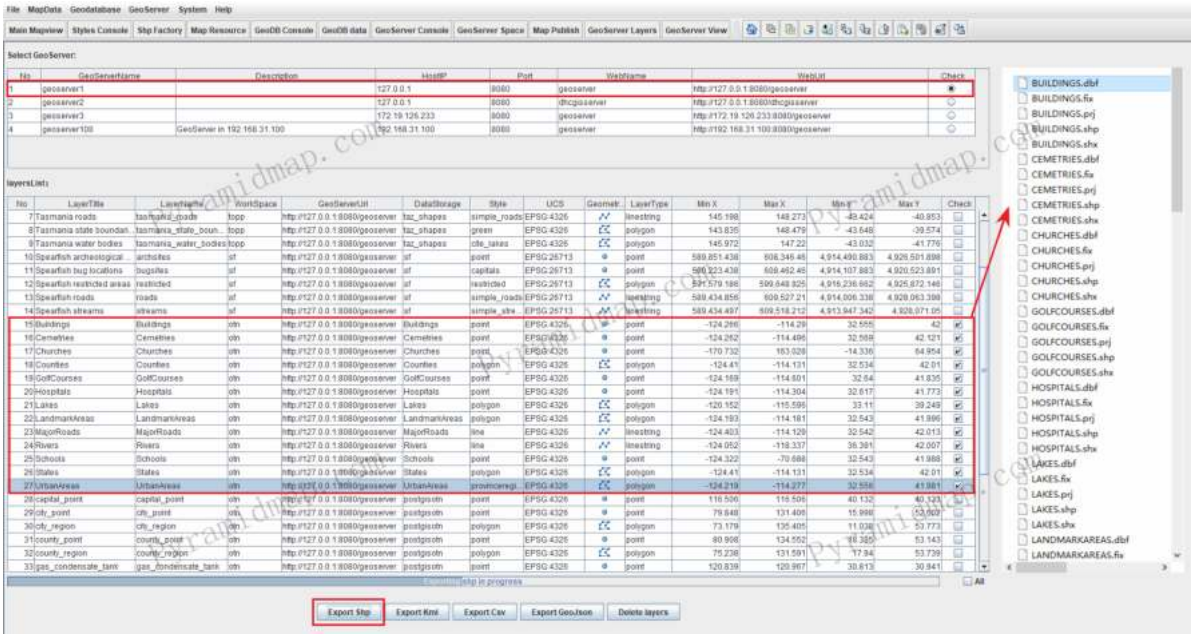


Figure 6-30：GeoServer layer export process diagram

The selected layer is exported to the specified target path, and the export progress is displayed through the progress bar. The exported map is reloaded into the map view in the form of Shp vector file, as shown in Figure 6-31.

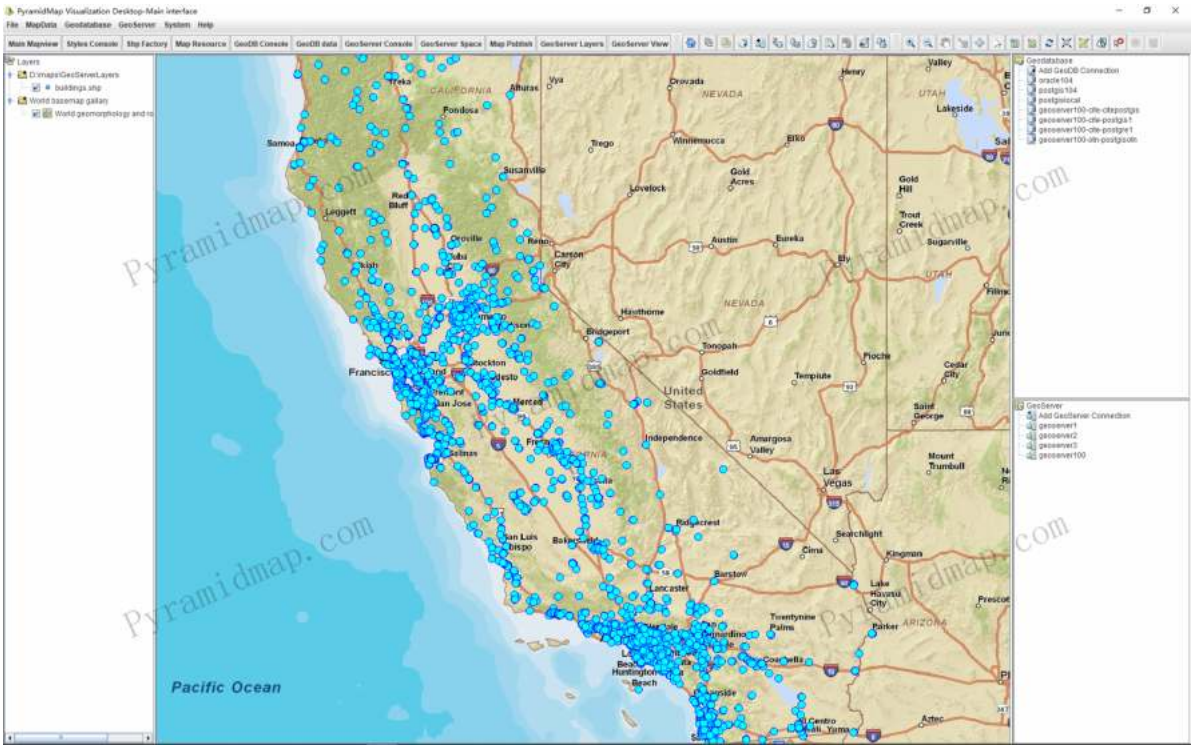


Figure 6-31：The exported Shp vector layer of GeoServer is reloaded to the map view for display

6.5 GeoServer raster layer pool

Select the raster layer in the Figure 6-8 GeoServer map server connection pool and its list, and the selected layer file will be opened in the independent GeoServer map view to preview the layer. The editing function is not supported temporarily, as shown in Figure 6-32.

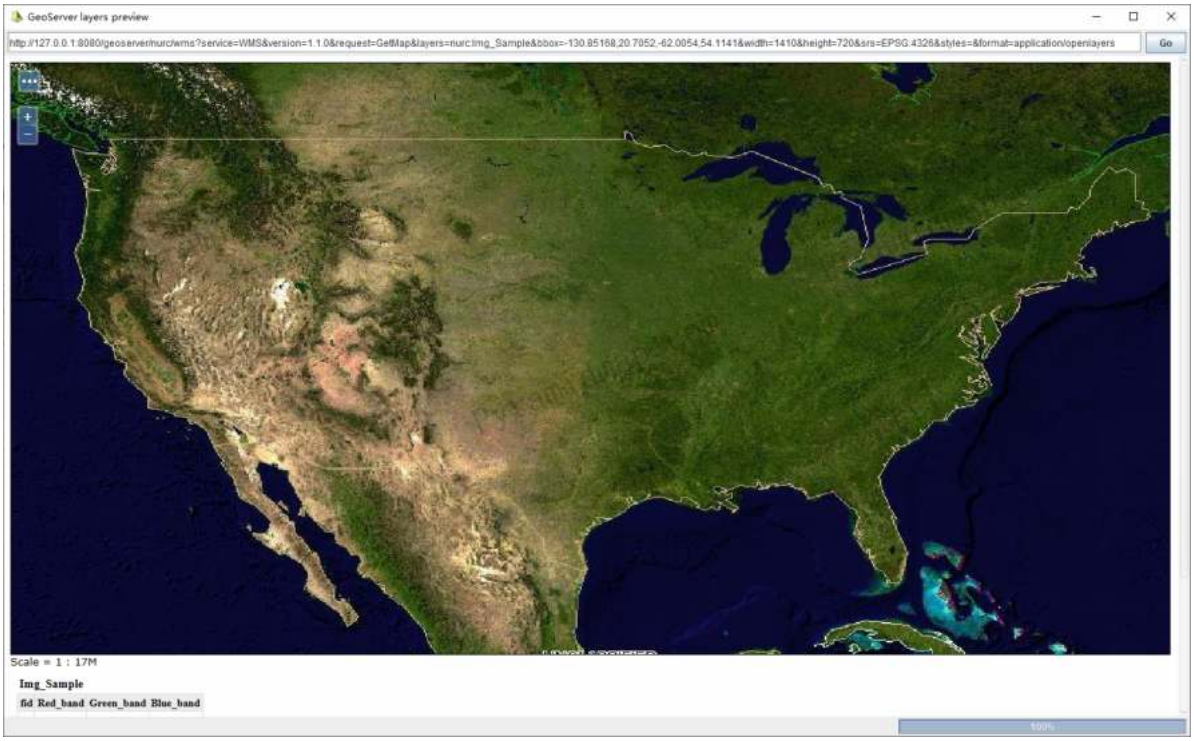


Figure 6-32：The GeoServer raster layer is previewed

6.6 Coordinate System Conversion

PyramidMap supports coordinate system conversion of Shp vector file and raster file layers. Select a layer from the above two types in the resource pool, and select "Coordinate System Conversion" button, as shown in Figure 6-33.

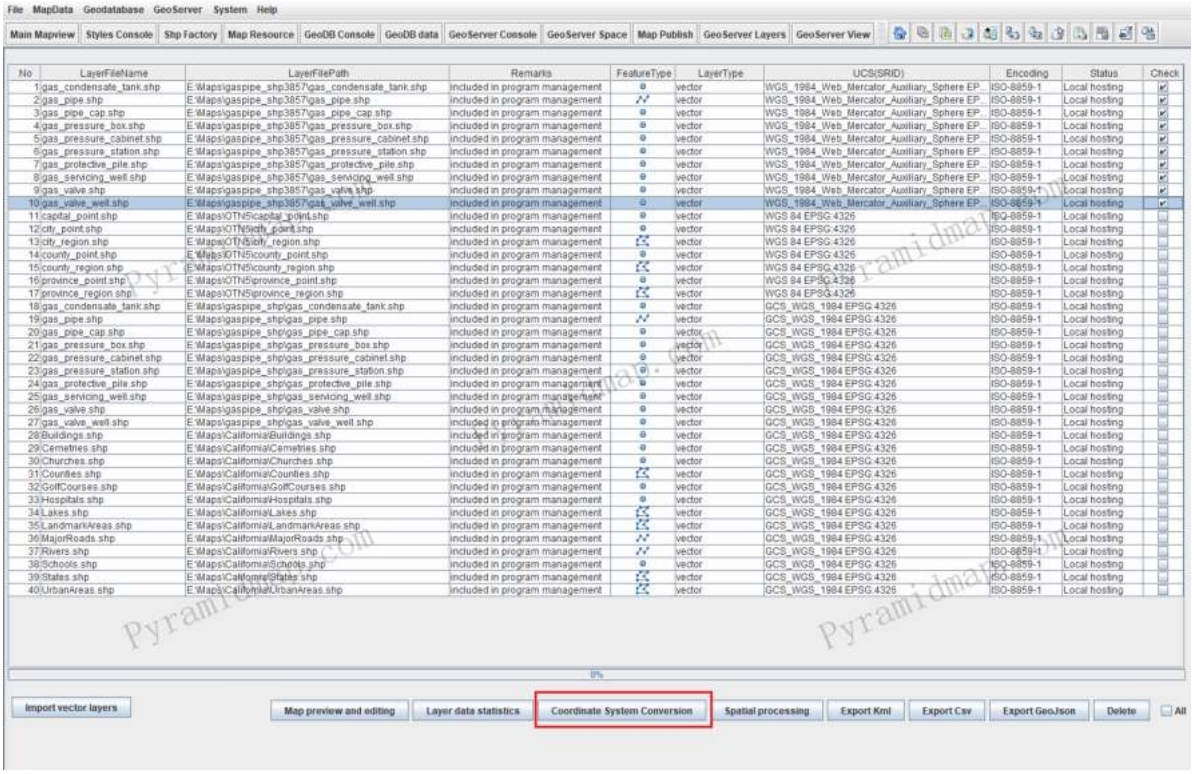


Figure 6-33：Select a layer for coordinate system conversion

The coordinate system conversion interface pops up, as shown in Figure 6-34.

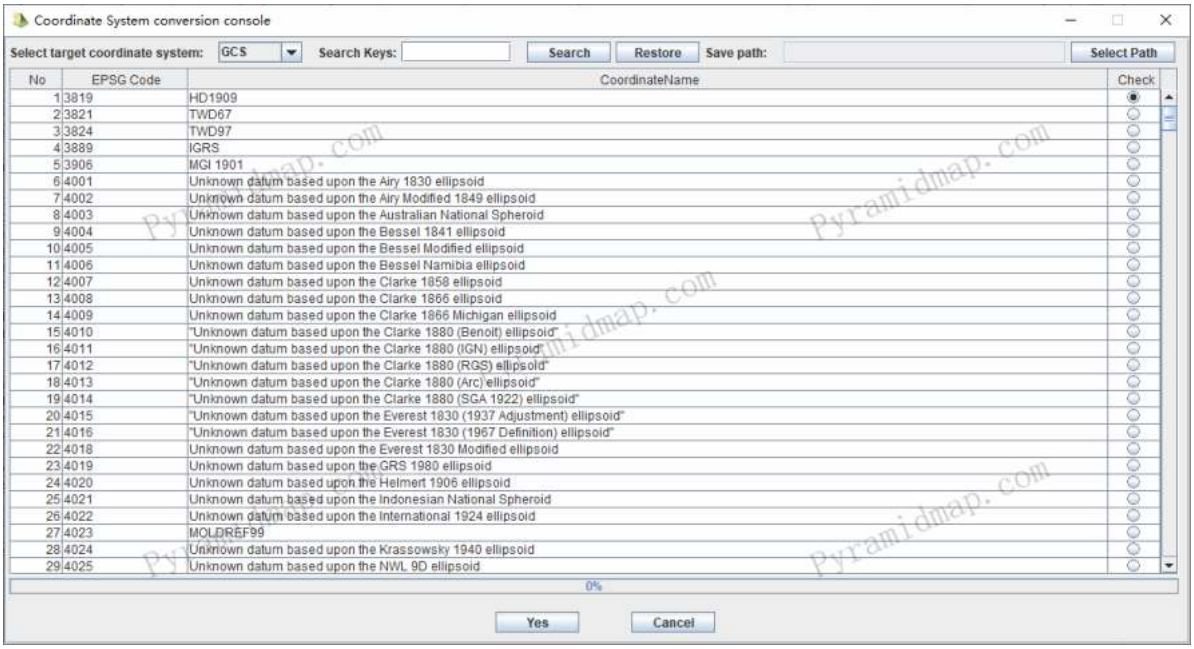


Figure 6-34：Select in coordinate system resource pool for conversion

In the coordinate system conversion interface, select the type of target coordinate system, which is divided into two types: spatial coordinate system and plane coordinate system, as well as many standardized coordinate systems to which it belongs. It supports global search by name and EPSG code. Taking WGS84 as an example, we can perform global keyword search according to coordinate system code 4326 to accurately obtain the target coordinate system we want, as shown in Figure 6-35.

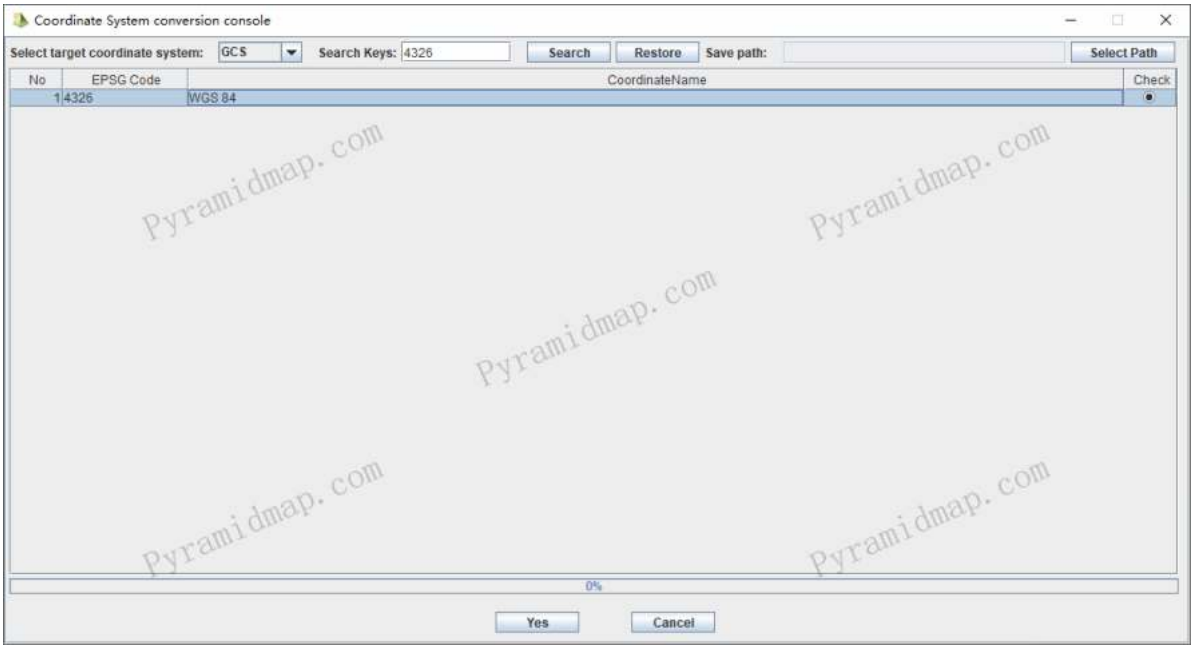


Figure 6-35：Select in coordinate system with global keyword searching according to coordinate system code

Select the target storage path and click "OK" to perform coordinate system conversion. The selected layers will be converted and saved to the target path according to the specified coordinate system. The progress bar displays the conversion progress, as shown in Figure 6-36.

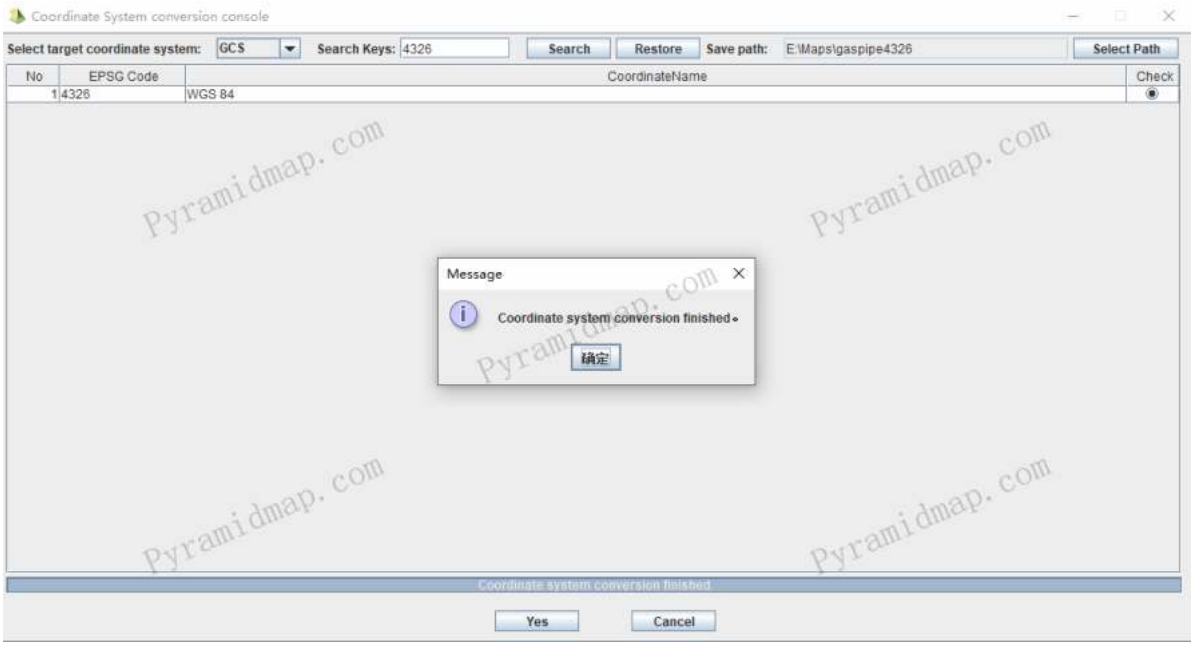


Figure 6-36：Converts the selected layer to the specified coordinate system under the target path

6.7 Data conversion

PyramidMap supports the mutual conversion between multi-source heterogeneous data and Shp layers, giving map application systems the ability to diversify data sources and convert maps into diversified production data. PyramidMap supports bidirectional conversion between Shp and Csv, Excel, GeoJson, as well as unidirectional conversion from Shp to Kml/Kmz. The functional entrances for converting Csv, Excel, and GeoJson to Shp are shown in Figure 6-37.

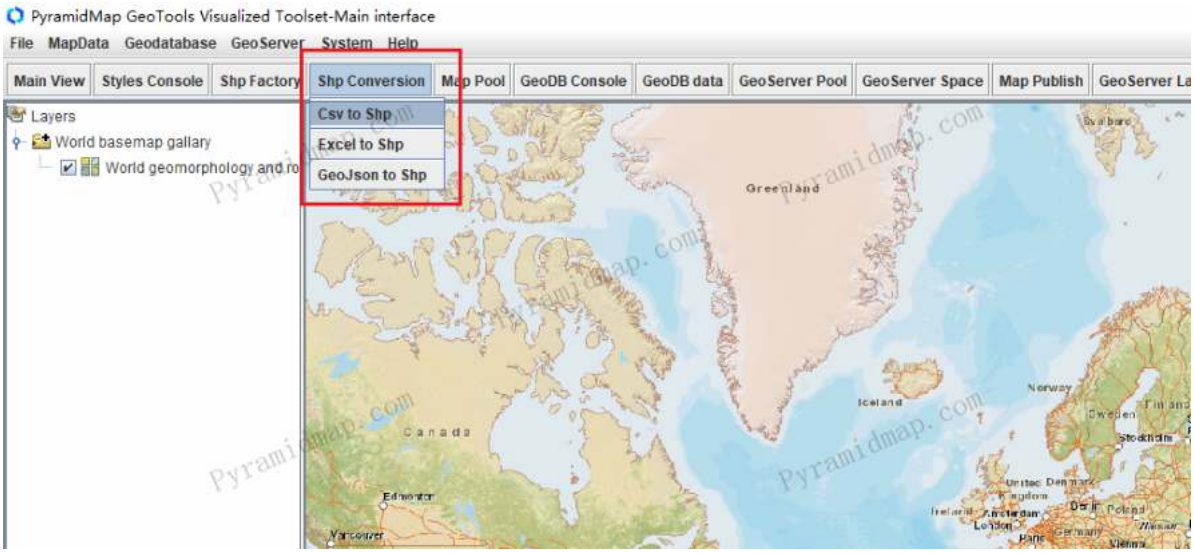
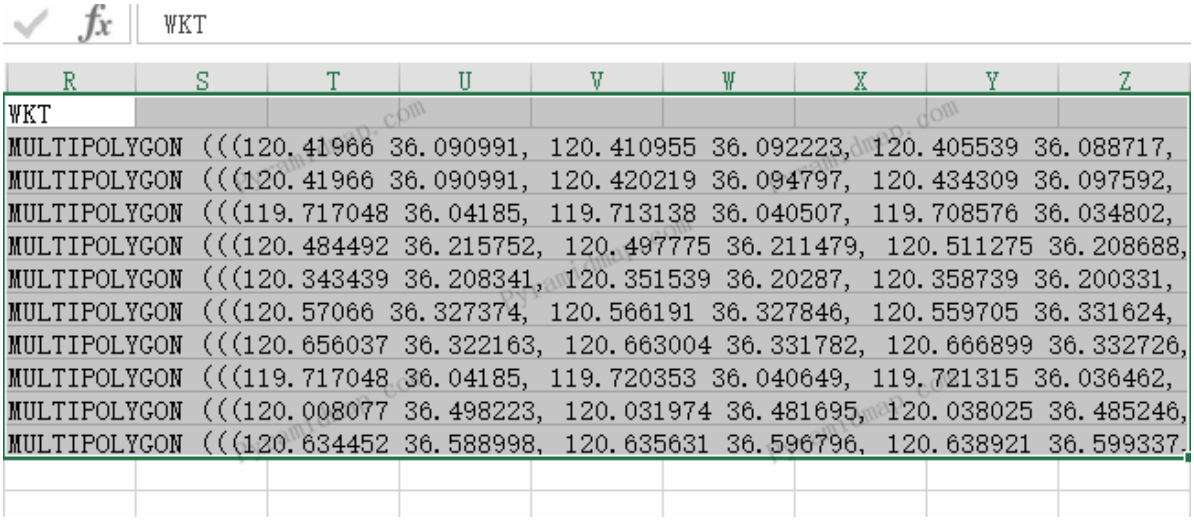


Figure 6-37: Csv, Excel, GeoJson to Shp Function Entry

6.7.1 Csv to Shp

PyramidMap supports the conversion of CSV which meets contractual specifications into Shp graphics, and the data source supports feature types such as Point/MultiPoint, LineString/MultiLineString, Polygon/MultiPolygon, etc. PyramidMap parses CSV according to the agreed specifications and converts it into SHP. The PyramidMap converter reads from CSV format and uses a column named WKT as geometric data. The WKT column contains geometry as well known text. If you are writing data to CSV format, make sure to create geometry and write it to the WKT column. The WKT data format that meets the specifications is shown in Figures 6-38.



R	S	T	U	V	W	X	Y	Z
WKT								
MULTIPOLYGON (((120.41966 36.090991, 120.410955 36.092223, 120.405539 36.088717,								
MULTIPOLYGON (((120.41966 36.090991, 120.420219 36.094797, 120.434309 36.097592,								
MULTIPOLYGON (((119.717048 36.04185, 119.713138 36.040507, 119.708576 36.034802,								
MULTIPOLYGON (((120.484492 36.215752, 120.497775 36.211479, 120.511275 36.208688,								
MULTIPOLYGON (((120.343439 36.208341, 120.351539 36.20287, 120.358739 36.200331,								
MULTIPOLYGON (((120.57066 36.327374, 120.566191 36.327846, 120.559705 36.331624,								
MULTIPOLYGON (((120.656037 36.322163, 120.663004 36.331782, 120.666899 36.332726,								
MULTIPOLYGON (((119.717048 36.04185, 119.720353 36.040649, 119.721315 36.036462,								
MULTIPOLYGON (((120.008077 36.498223, 120.031974 36.481695, 120.038025 36.485246,								
MULTIPOLYGON (((120.634452 36.588998, 120.635631 36.596796, 120.638921 36.599337.								

Figure 6-38: WKT data format that meets specifications

Other columns will be written to Shp as attribute data. Specifically, for Point type files, PyramidMap also supports, and only supports using longitude | latitude named fields to represent coordinate values. In other words, for Point type CSV files that without WKT columns but instead use longitude | latitude (case insensitive) named fields to represent coordinate values, PyramidMap also supports conversion to Shp. The data format example is shown as below.

```
LATITUDE, LONGITUDE, CITY, NUMBER
46.066667,11.116667,Trento,140
44.9441,-93.0852,St Paul,125
13.752222,100.493889,Bangkok,150
45.420833,-75.69,Ottawa,200
44.9801,-93.251867,Minneapolis,350
46.519833,6.6335,Lausanne,560
48.428611,-123.365556,Victoria,721
-33.925278,18.423889,Cape Town,550
-33.859972,151.211111,Sydney,436
41.383333,2.183333,Barcelona,914
39.739167,-104.984722,Denver,869
52.95,-1.133333,Nottingham,800
45.52,-122.681944,Portland,840
37.5667,129.681944,Seoul,473
50.733992,7.099814,Bonn,700
```

The Csv to Shp conversion view is shown in Figure 6-39.

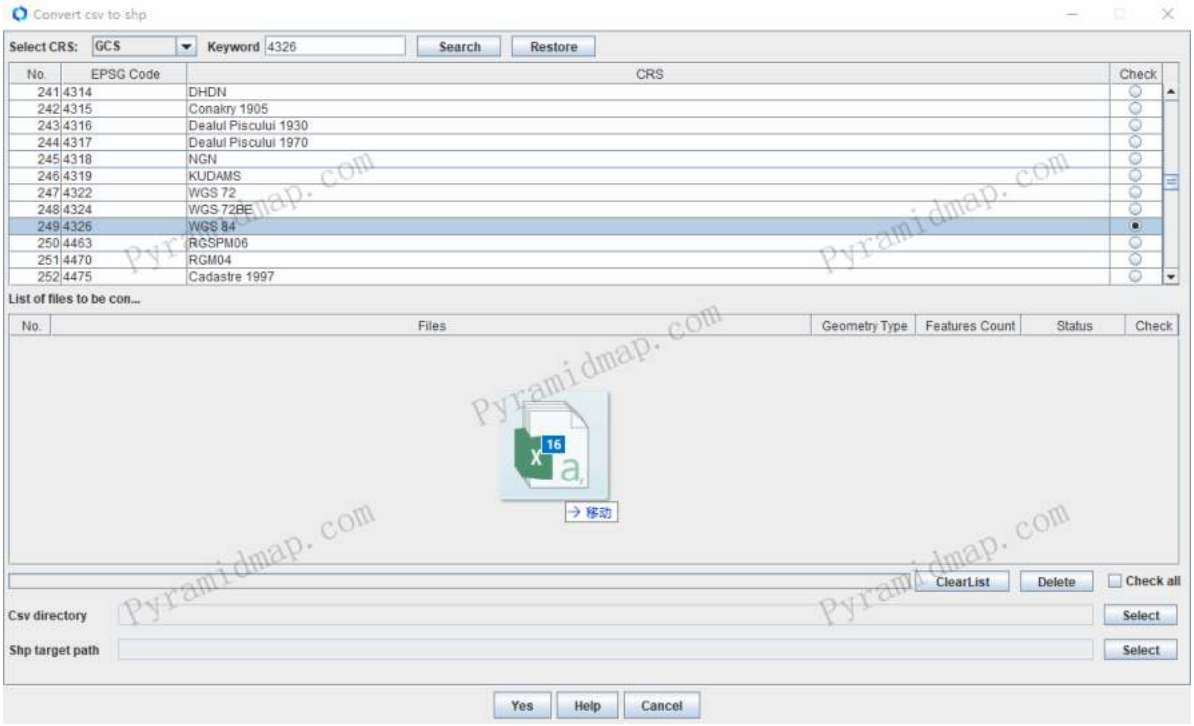


Figure 6-39: Csv to Shp Conversion Interface

PyramidMap supports two methods of selecting CSV data: file selector and drag and drop. Taking the drag and drop mode as an example, it is shown in Figure 6-40.

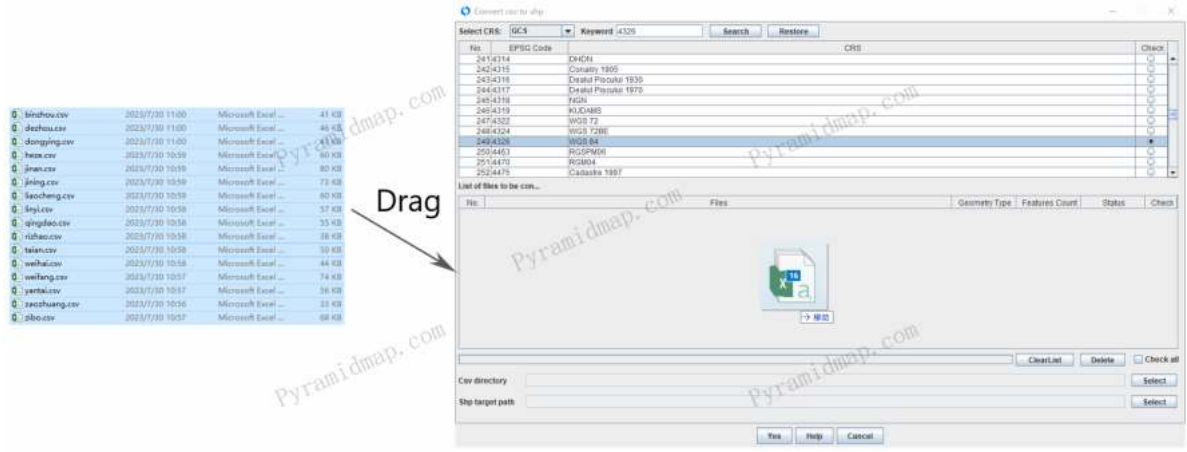


Figure 6-40: Selecting and dragging CSV files to the conversion interface

Form a list of files to be converted, as shown in Figure 6-41.

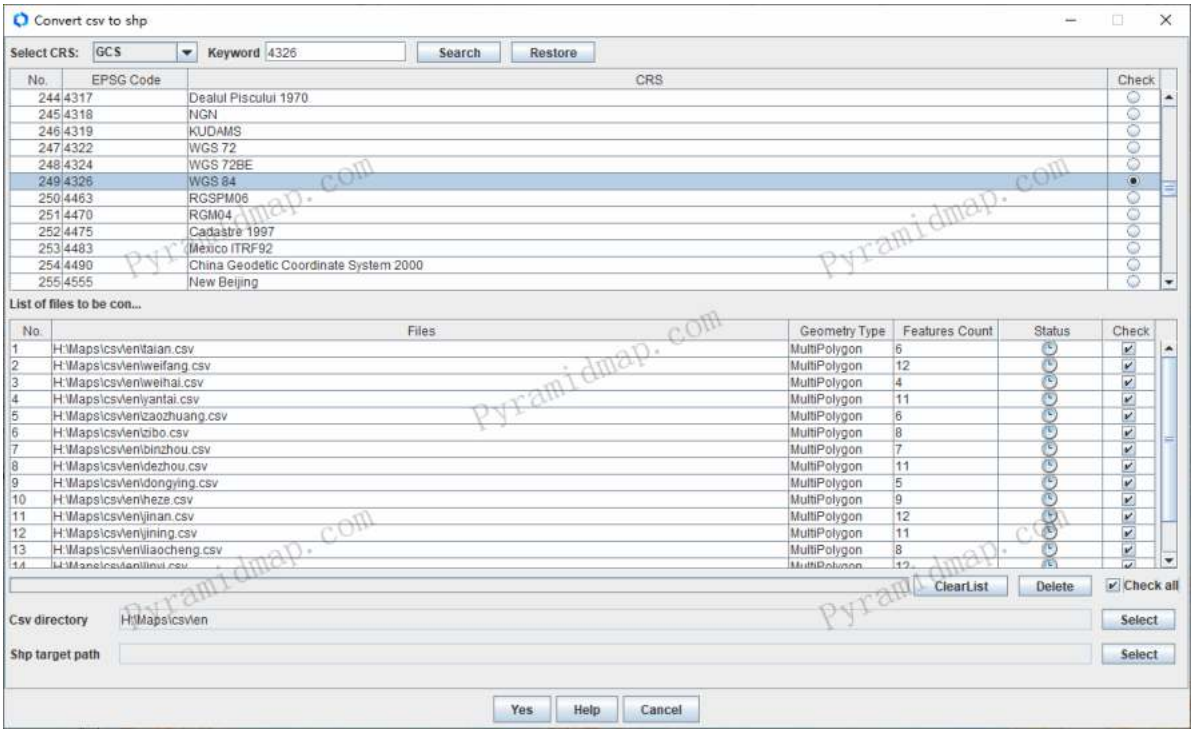


Figure 6-41: Dragging and Dropping CSV Files to Form a Conversion List

Specifically, in general, the wkt data in CSV does not explicitly indicate coordinate system information, so the output file should be specified with a * * Spatial Reference System * * (SRS). PyramidMap supports a wide range of SRSs (approximately 5000), and we are constantly updating them. Specify the * * Spatial Reference System * * (SRS) for the output file, as shown in Figures 6-42.

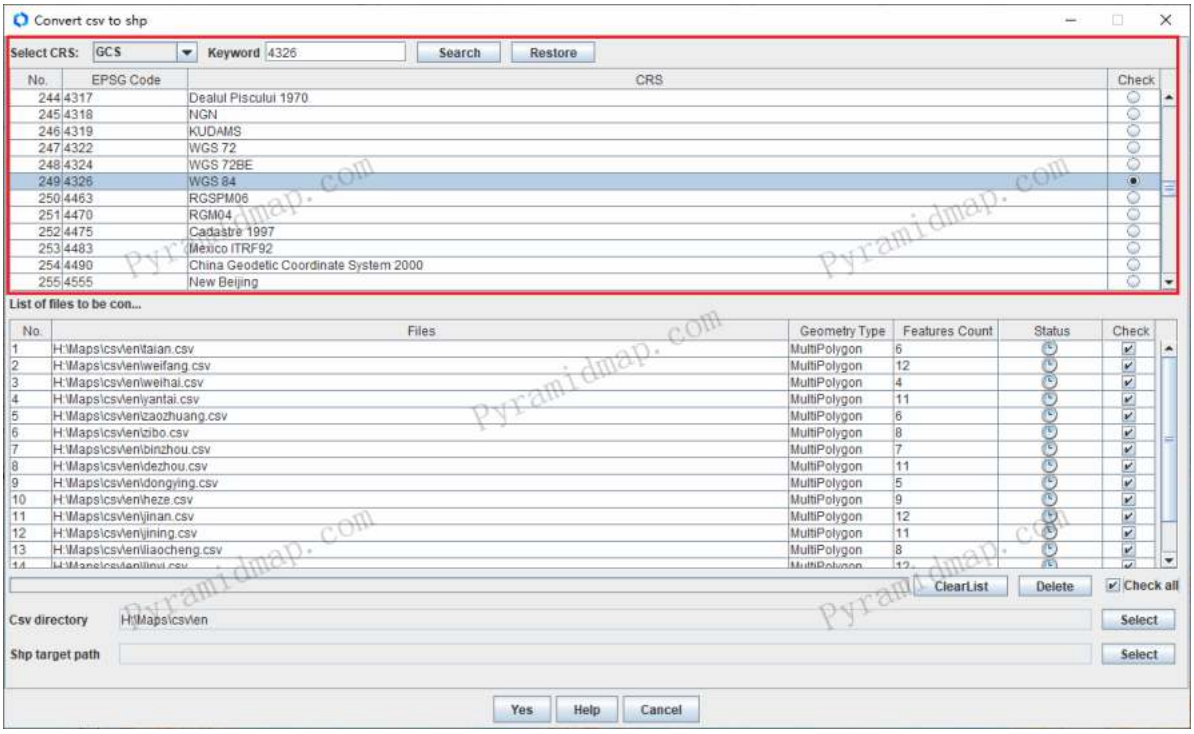


Figure 6-42: Specifying a Spatial Reference System (SRS) for Output Files

The spatial reference system (SRS) is divided into the Geographic coordinate system (GCS) representing three-dimensional space and the projection coordinate system (PCS) representing right angles to the plane. We classify them in these two ways, and conduct Full-text search through keywords. Perform the conversion process, as shown in Figure 6-43.

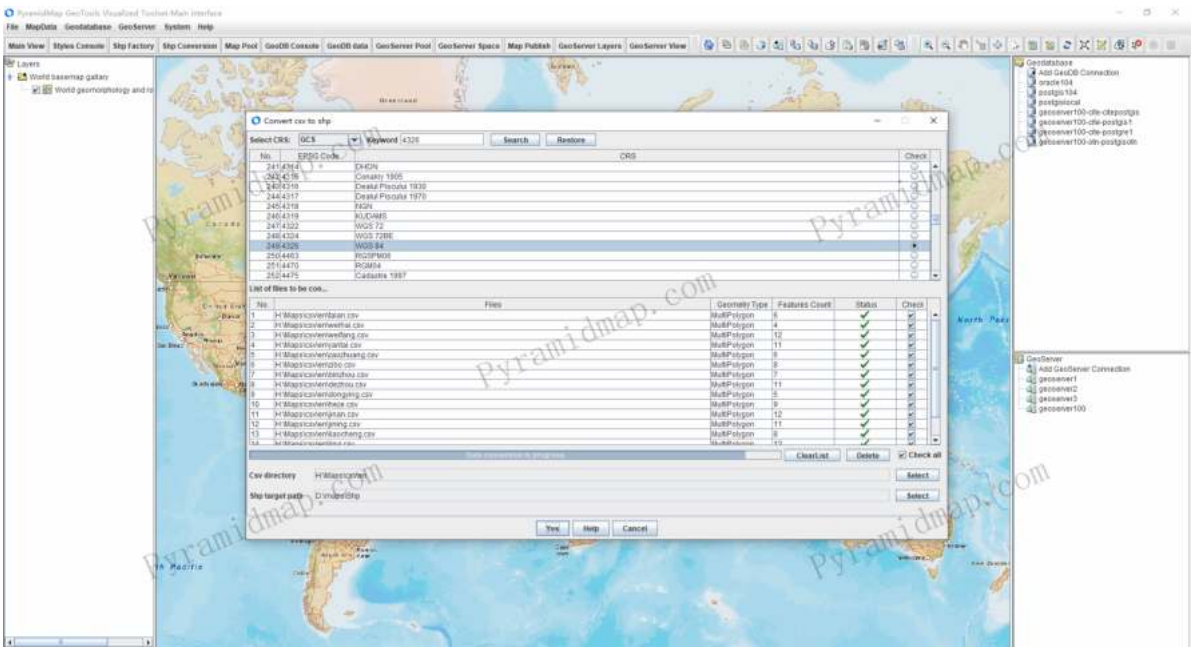


Figure 6-43: Performing conversion on CSV file list

The conversion is complete, as shown in Figure 6-44.

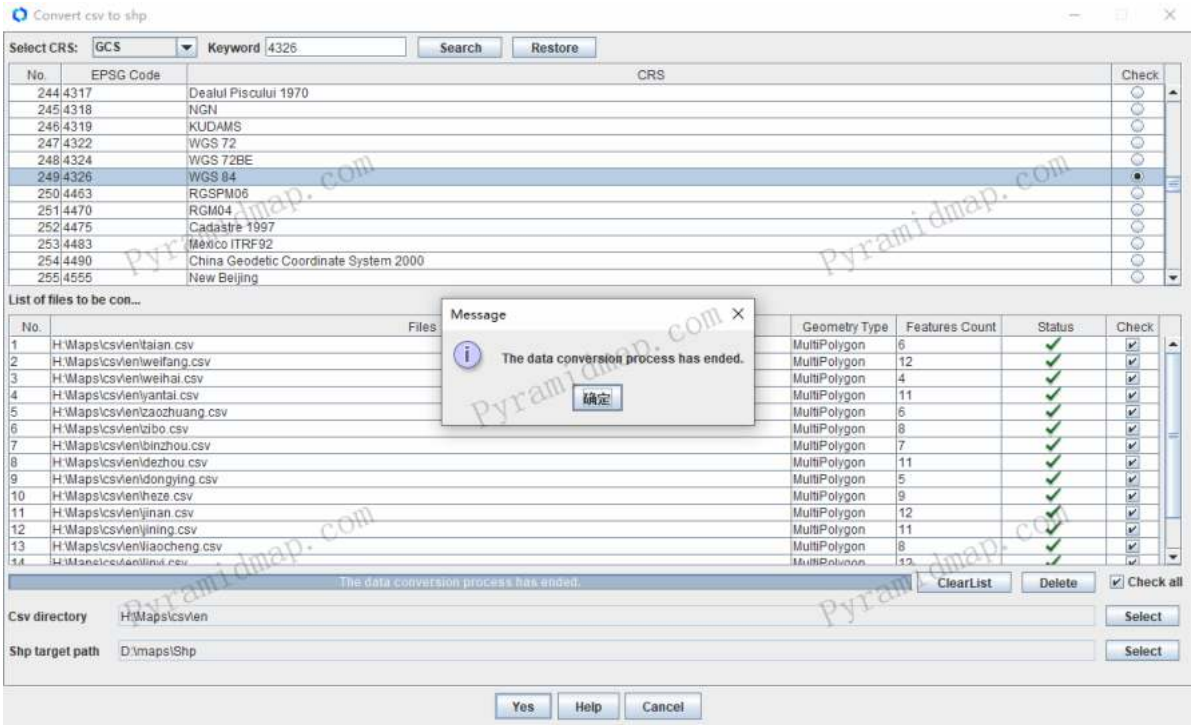


Figure 6-44: CSV file list conversion completed

Form a shp and overlay it onto the map view. The preview effect is shown in Figure 6-45.

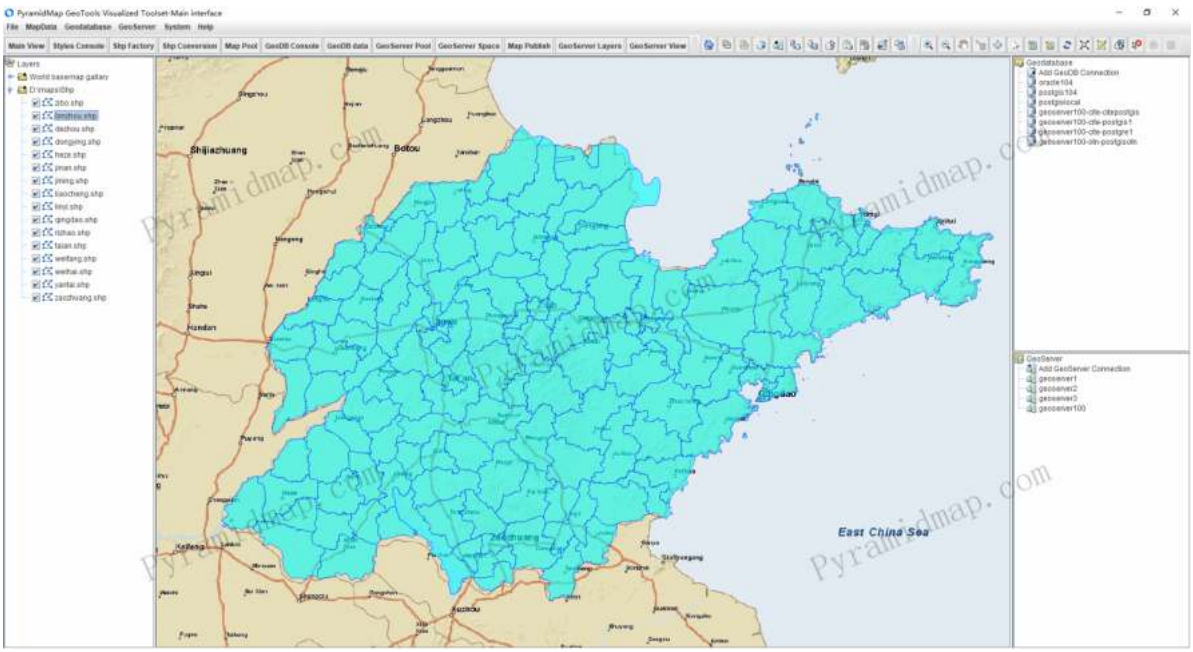


Figure 6-45: Superimposing the formed shp onto the map view, preview effect

6.7.2 Excel to Shp

PyramidMap supports Excel conversion to Shp graphics that meet contractual specifications, and the data source supports feature types such as Point/MultiPoint, LineString/MultiLineString, Polygon/MultiPolygon. PyramidMap parses Excel according to the agreed specifications and converts it into shp. The PyramidMap converter reads from Excel format and uses a column named WKT as geometric data. The WKT column contains geometry as well known text. If you are writing data in Excel format, please ensure that the geometry is created and written into the WKT column. The WKT data format that meets the specifications is shown in Figures 6-46.

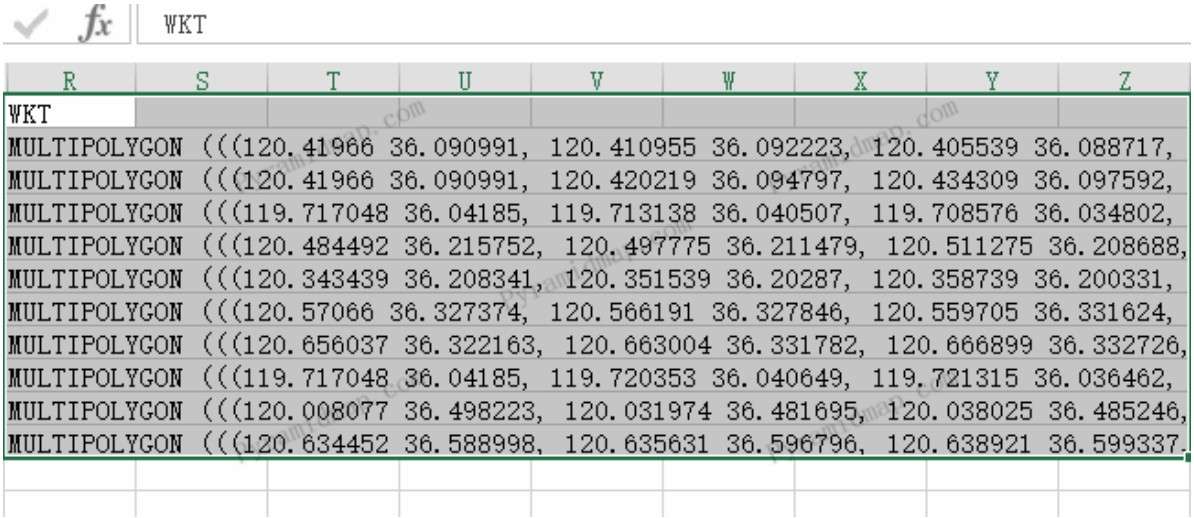


Figure 6-46: WKT data format that meets specifications

Other columns will be written to Shp as attribute data. Specifically, similar to the section on converting Csv to Shp in 6.7.1, PyramidMap also supports Point type files and only supports the use of longitude | latitude named fields to represent coordinate values. In other words, PyramidMap also supports the conversion to Shp for Point type Excel files that without WKT columns but instead use longitude | latitude (case insensitive) named fields to represent coordinate values.

The Excel to SHP conversion interface is shown in Figure 6-47.

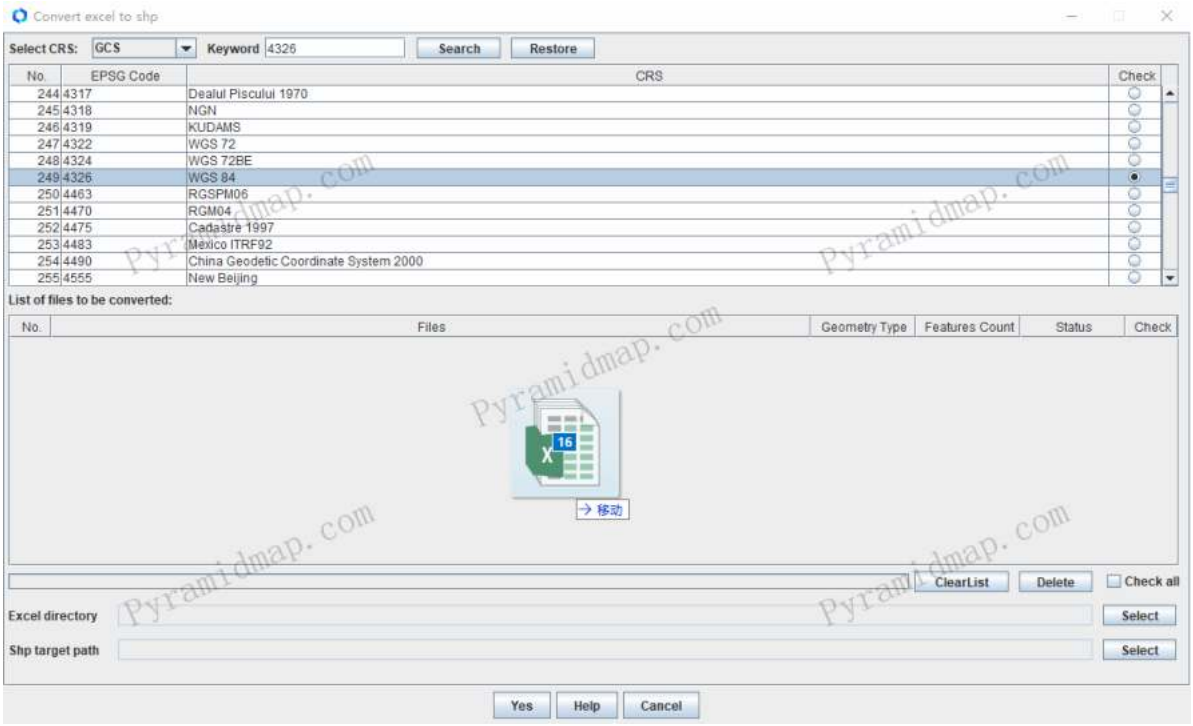


Figure 6-47: Excel to SHP Conversion Interface

PyramidMap supports two methods of selecting Excel data: file selector and drag and drop. Taking the drag and drop mode as an example, it is shown in Figure 6-48.

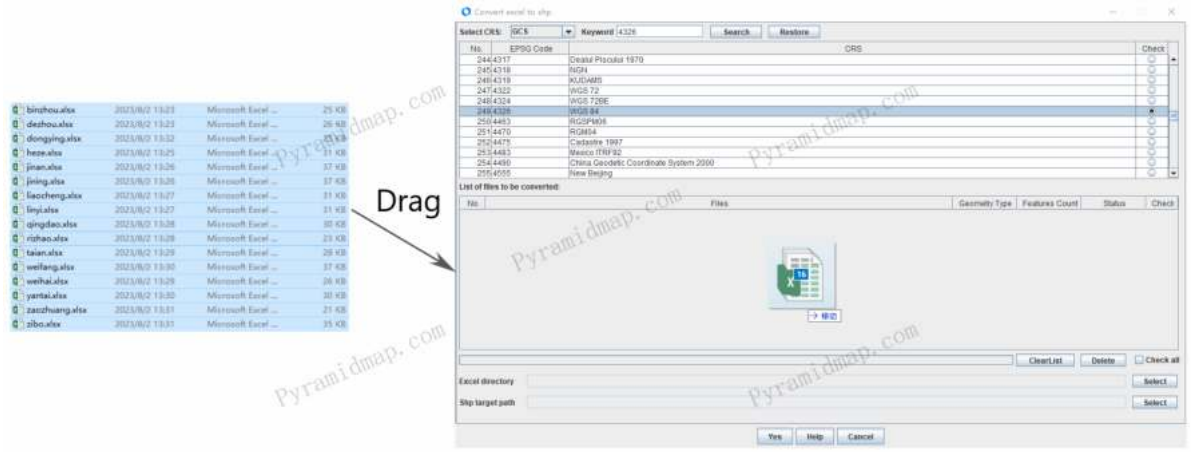


Figure 6-48: Select and drag an Excel file to the conversion interface

Form a list of files to be converted, as shown in Figures 6-49.

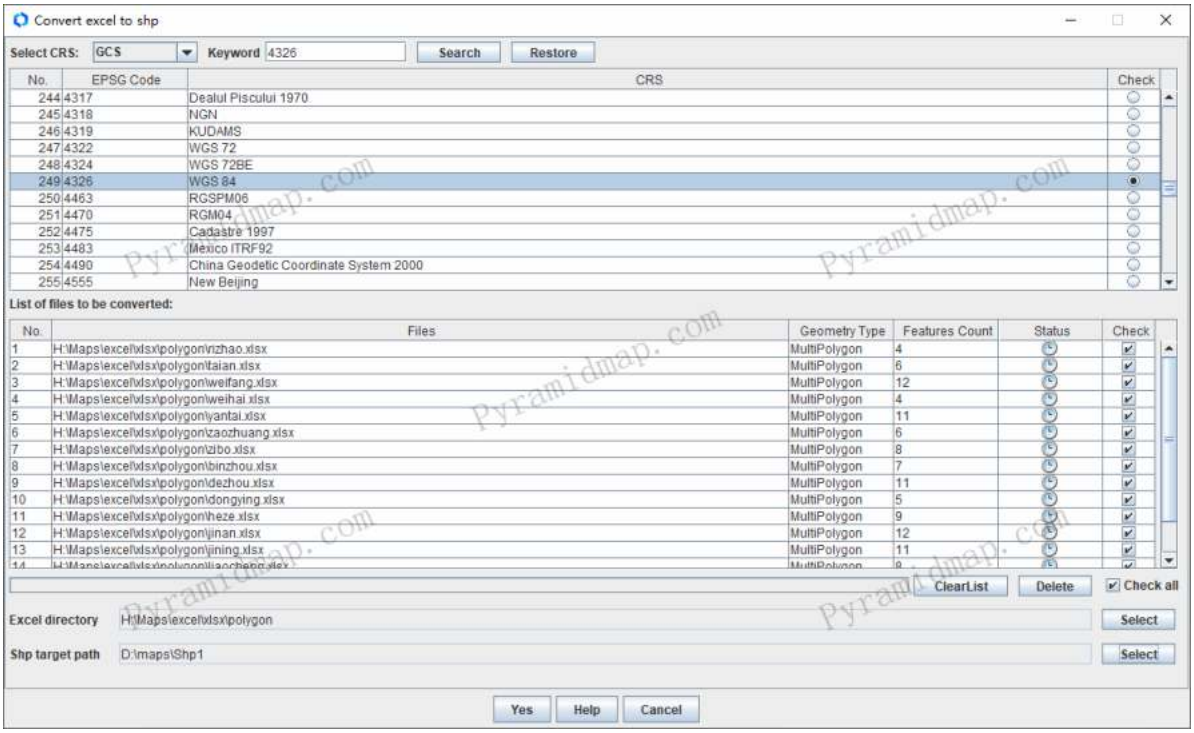


Figure 6-49: Dragging and Dropping Excel Files to Form a Conversion List

Specifically, in general, the wkt data in Excel does not explicitly indicate coordinate system information, so a * * Spatial Reference System * * (SRS) should be specified for the output file. PyramidMap supports a wide range of SRSs (approximately 5000), and we are constantly updating them. Specify the * * Spatial Reference System * * (SRS) for the output file, as shown in Figures 6-50.

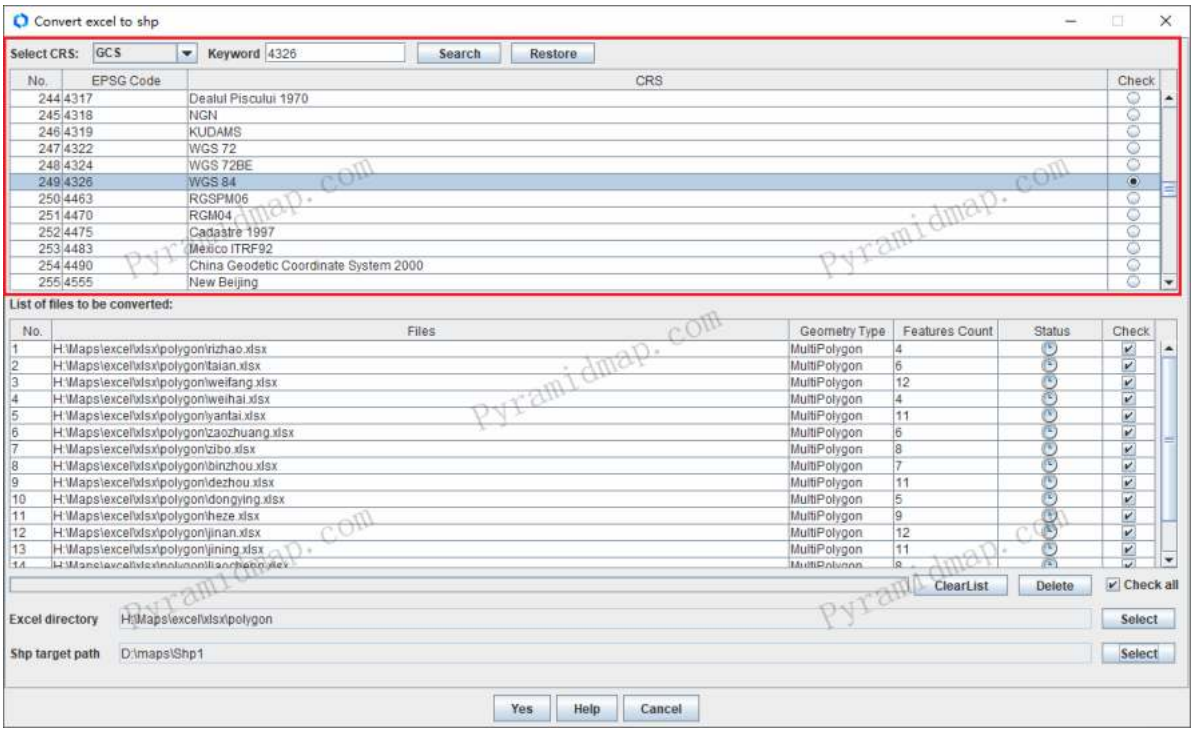


Figure 6-50: Specifying a Spatial Reference System (SRS) for Output Files

The spatial reference system (SRS) is divided into the Geographic coordinate system (GCS) representing three-dimensional space and the projection coordinate system (PCS) representing right angles to the plane. We classify them in these two ways, and conduct Full-text search through keywords. Perform the conversion process, as shown in Figure 6-51.

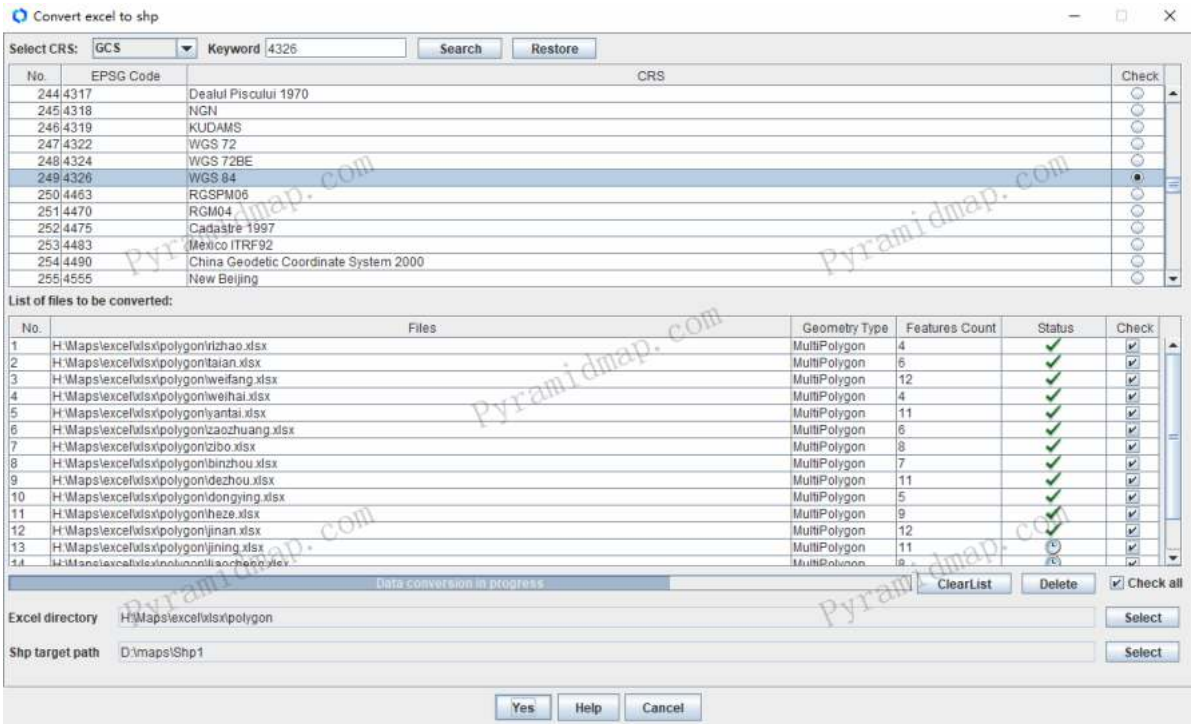


Figure 6-51: Performing Conversion on Excel File List

The conversion is complete, as shown in Figure 6-52.

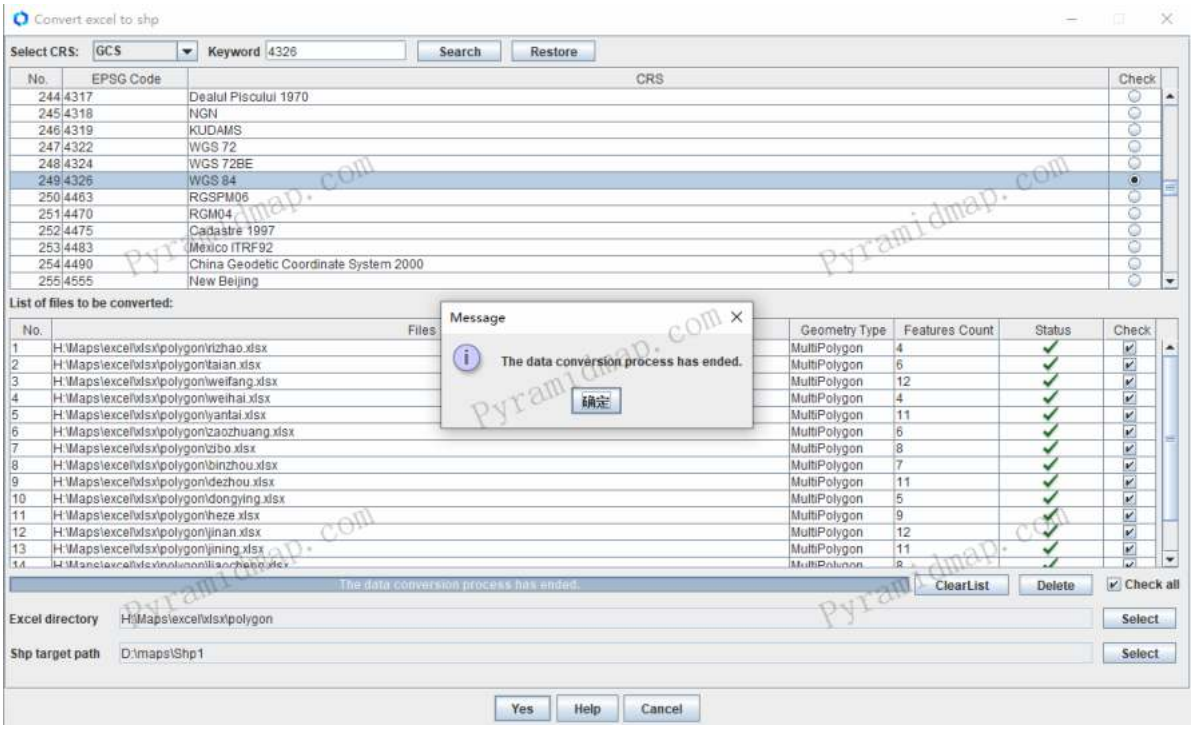


Figure 6-52: Excel file list conversion completed

Form a shp and overlay it onto the map view. The preview effect is shown in Figure 6-53.

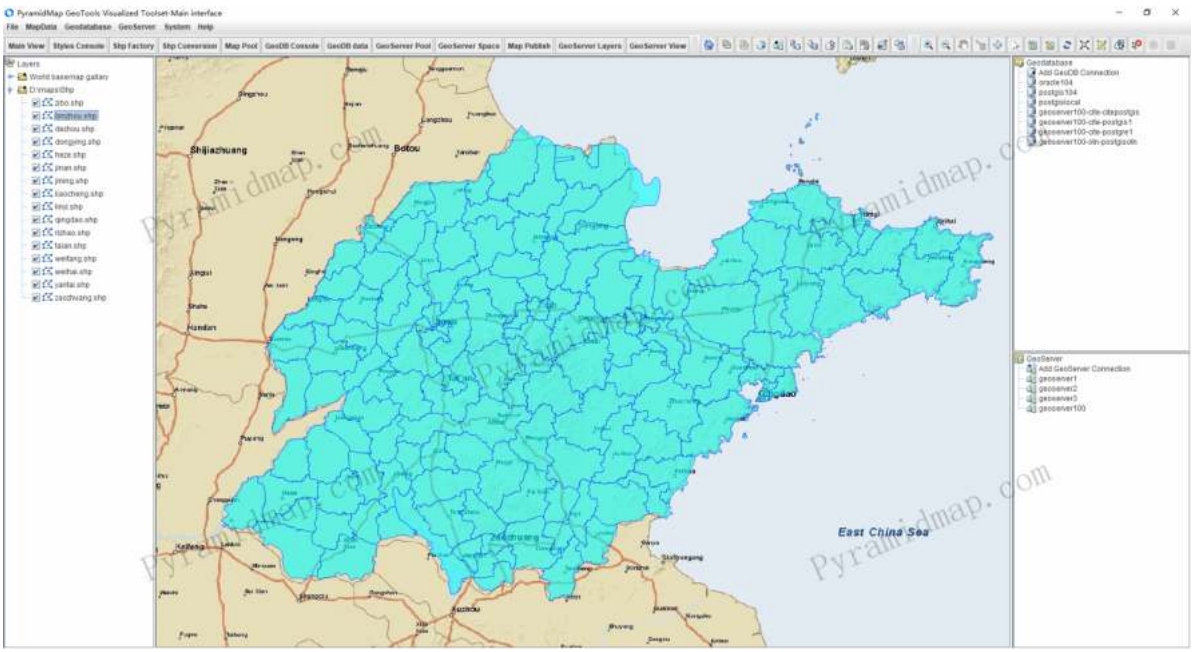


Figure 6-53: Superimposing the formed shp onto the map view, preview effect

6.7.3 GeoJSON to Shp

GeoJSON is an open standard geospatial data exchange format that can represent simple geographic features and their non-spatial attributes. It has become a de facto data standard and is increasingly widely used in data exchange between GIS systems and platforms. GeoJSON is based on JavaScript Object Representation (JSON) and is a format used for encoding various geographic data structures. GeoJSON uses geographical coordinate Frame of reference to define six basic types of geometry: Point, LineString, Polygon, MultiPoint, MultiLineString, and MultiPolygon. GeoJSON geometry can be combined with attribute data to define the features of features and provide data support for conversion to Shp format. The following is an example of a valid GeoJSON file:

```
{
    "type": "FeatureCollection",
    "features": [{
        "type": "Feature",
        "properties": {
            "adcode": 370281,
            "name": "***city",
            "center": [120.006202, 36.285878],
            "centroid": [119.953343, 36.24043],
            "childrenNum": 0,
            "level": "district",
            "acroutes": [100000, 370000, 370200],
            "parent": {
                "adcode": 370200
            }
        },
        "geometry": {
            "type": "MultiPolygon",
            "coordinates": [
                [
                    [
                        [119.717048, 36.041844],
```

```
                        [119.72035, 36.040649],
                        [119.721314, 36.036459],
                        [119.724365, 36.037674],
                        [119.729332, 36.037267],
                        [119.730267, 36.035008],
                        [119.731875, 36.035606],
                        [119.733143, 36.034548],
                        [119.734037, 36.032421],
                        [119.734633, 36.028226],
                        [119.717048, 36.041844]
                    ]
                ]
            ]
        }
    }]
}
```

PyramidMap will parse and convert GeoJSON into shp according to standard specifications, verify the validity of the file, and display error messages when the file is invalid. To treat a GeoJSON file as a valid file in PyramidMap, it must start with the required type parameter set to FeatureCollection. You can convert GeoJSON into Shp for loading in project or layer form in the map. Specifically, if the coordinate system CRS parameter is not specified in the data, the coordinate data will be processed as WGS84:4326 by default.

The GeoJSON to shp conversion interface is shown in Figure 6-54.

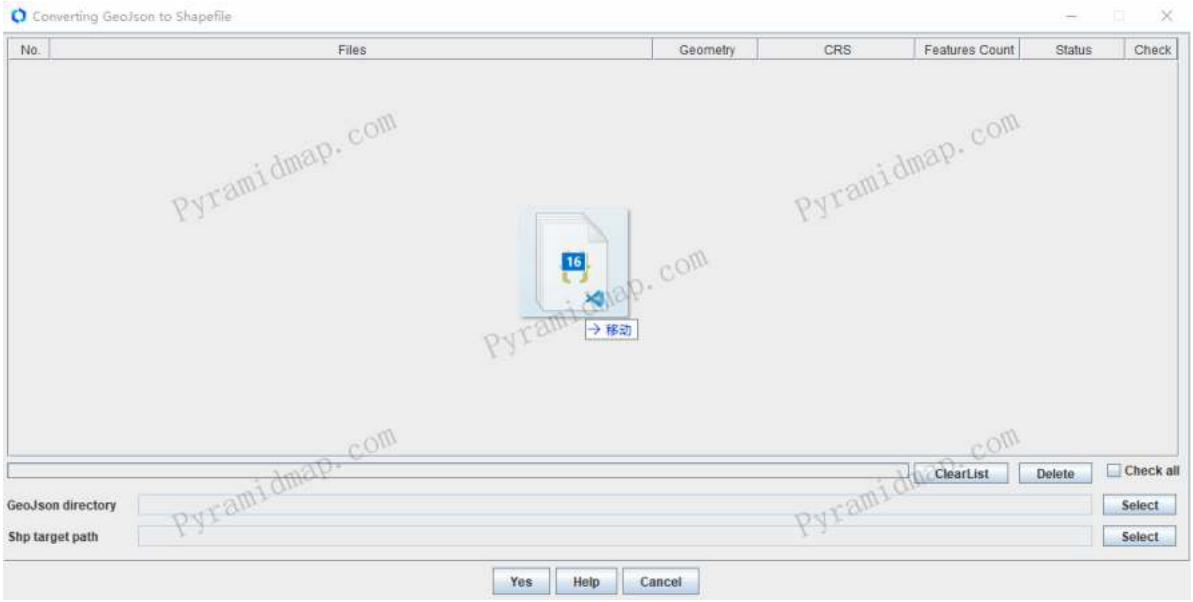


Figure 6-54: GeoJSON to shp conversion interface

PyramidMap supports two methods of selecting GeoJSON data: file selector and drag and drop. Taking the drag and drop mode as an example, it is shown in Figure 6-55.

Figure 6-55: Selecting and dragging GeoJSON files to the conversion interface

Form a list of files to be converted, as shown in Figure 6-56.

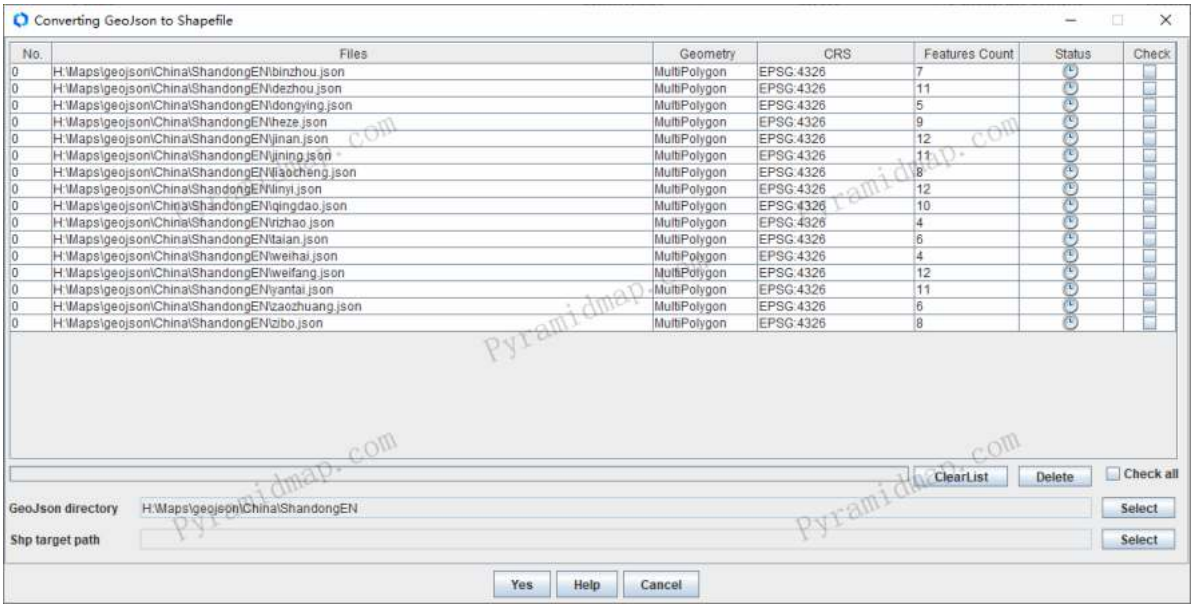


Figure 6-56: Dragging and Dropping GeoJSON Files to Form a Conversion List

GeoJSON uses geographical coordinate Frame of reference to define six basic types of geometry: Point, LineString, Polygon, MultiPoint, MultiLineString, and MultiPolygon. GeoJSON geometry can be combined with attribute data to define the features of features and provide data support for conversion to Shp format. Perform the conversion process, as shown in Figures 6-57.

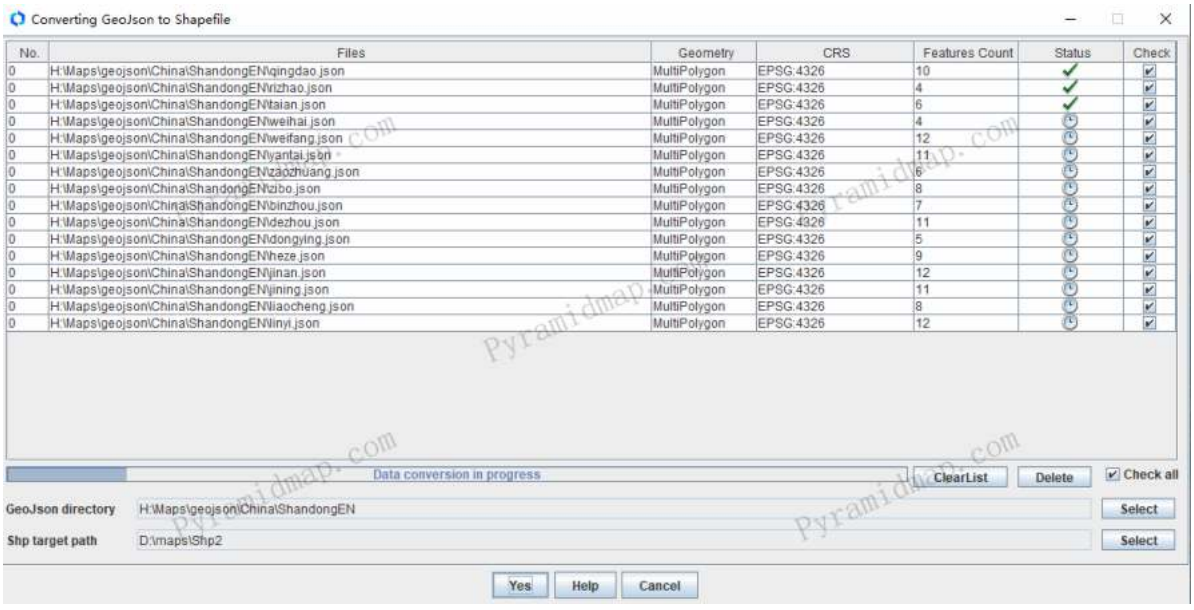


Figure 6-57: Performing conversion on GeoJSON file list

The conversion is complete, as shown in Figure 6-58.

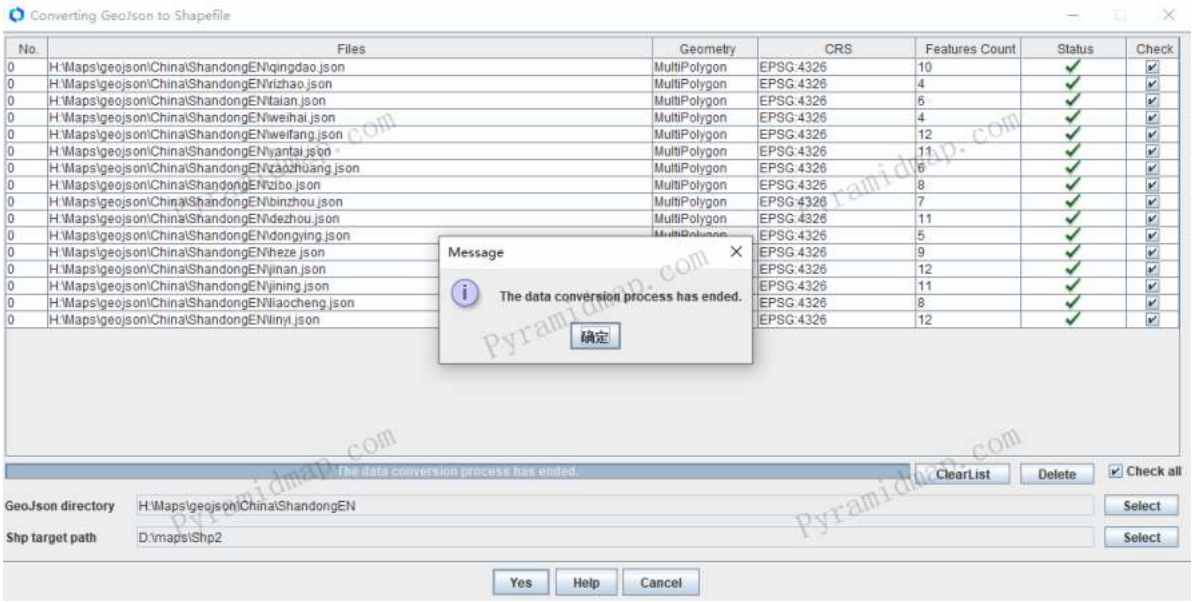


Figure 6-58: GeoJSON file list conversion completed

Form a shp and overlay it onto the map view. The preview effect is shown in Figure 6-59.

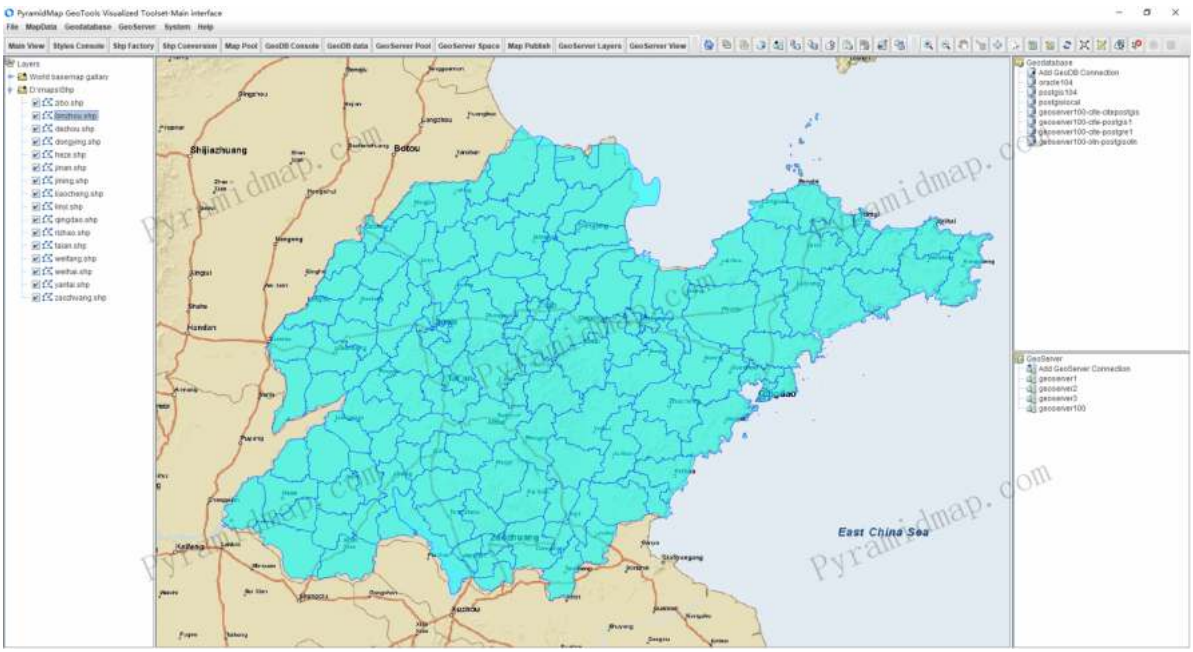


Figure 6-59: Superimposing the formed shp onto the map view, preview effect

6.7.4 Shp to Csv GeoJSON

PyramidMap supports the conversion of Shp vector layers to structured data types such as Kml, Csv, GeoJson, etc. On the vector layer node of PyramidMap Home screen, the data conversion operation is realized through the right-click menu, as shown in Figure 6-60.

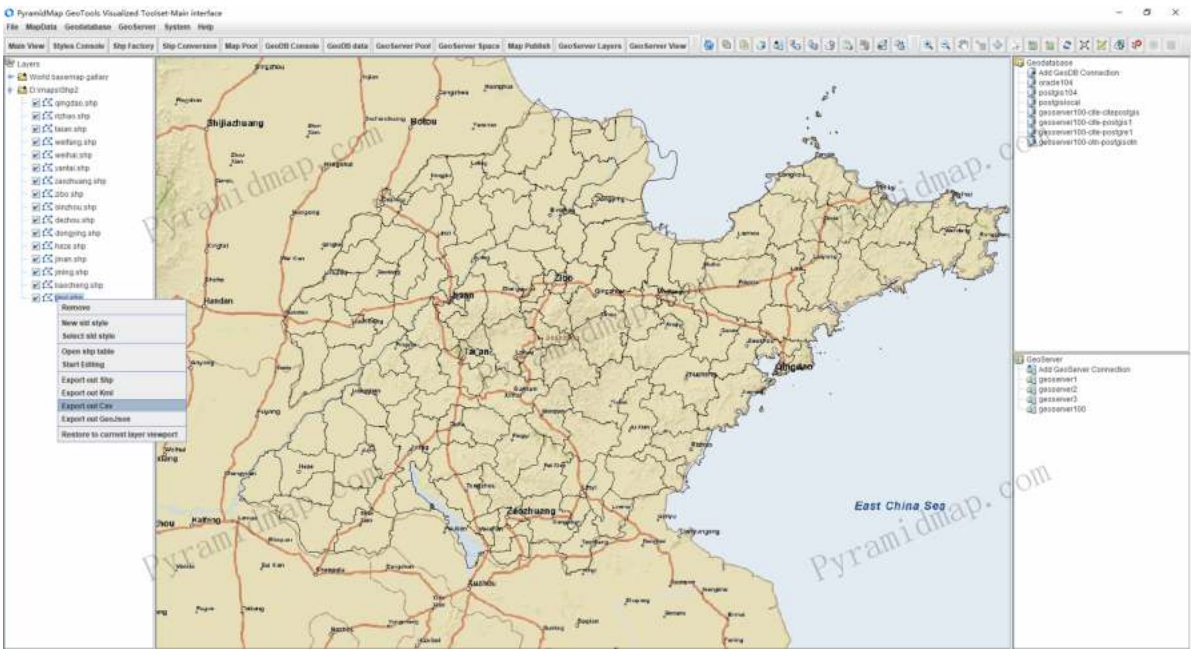


Figure 6-60: PyramidMap vector layer node right-click to converting operation

By using the loaded vector layer nodes, it is easy to export maps to multiple types of structured data such as Shp, Csv, Kml, GeoJSON, etc. The operation of the same industry can also be completed in the vector map resource pool, as shown in Figure 6-61.

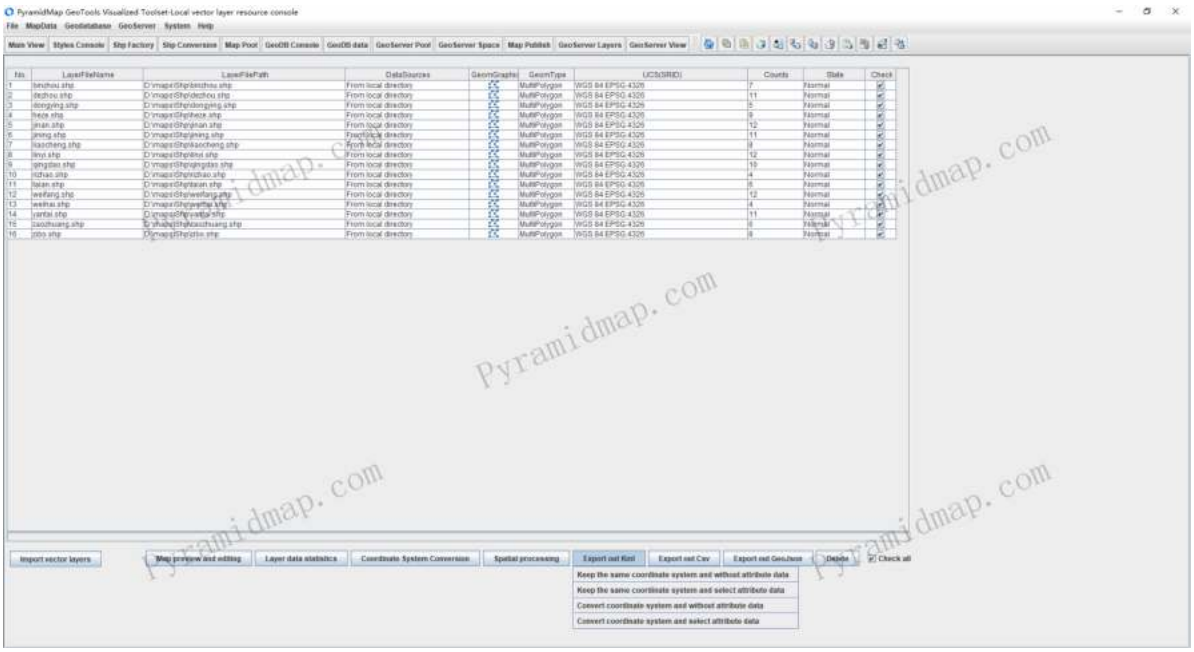


Figure 6-61: Vector layer resource pool and data conversion

Taking Csv data as an example, the transformed data fragments are shown below.

```
LATITUDE, LONGITUDE, CITY, NUMBER
46.066667, 11.116667, Trento, 140
44.9441, -93.0852, St Paul, 125
13.752222, 100.493889, Bangkok, 150
45.420833, -75.69, Ottawa, 200
44.9801, -93.251867, Minneapolis, 350
46.519833, 6.6335, Lausanne, 560
48.428611, -123.365556, Victoria, 721
-33.925278, 18.423889, Cape Town, 550
-33.859972, 151.211111, Sydney, 436
```

```
41.383333, 2.183333, Barcelona, 914
39.739167, -104.984722, Denver, 869
52.95, -1.133333, Nottingham, 800
45.52, -122.681944, Portland, 840
37.5667,129.681944,Seoul,473
50.733992,7.099814,Bonn,700,2016
```

6.7.5 Shp to Kml

Keyhole Markup Language (KML) is an XML based format used to store geographic data and related content, and is an official Open Geospatial Consortium (OGC) standard. The KML format is easy to publish on the Internet and can be viewed through many free applications such as Google Earth and ArcGIS Explorer, making it commonly used for sharing geographic data with non GIS users. KML files have an extension of * *. kml * * or * *. kmz * * (representing compressed KML files).

Same as the method of exporting Csv and GeoJSON, PyramidMap implements data conversion from vector layer to Kml through layer nodes and map resource pool selection list in the Home screen. The layer node conversion of the Home screen is shown in Figure 6-62.

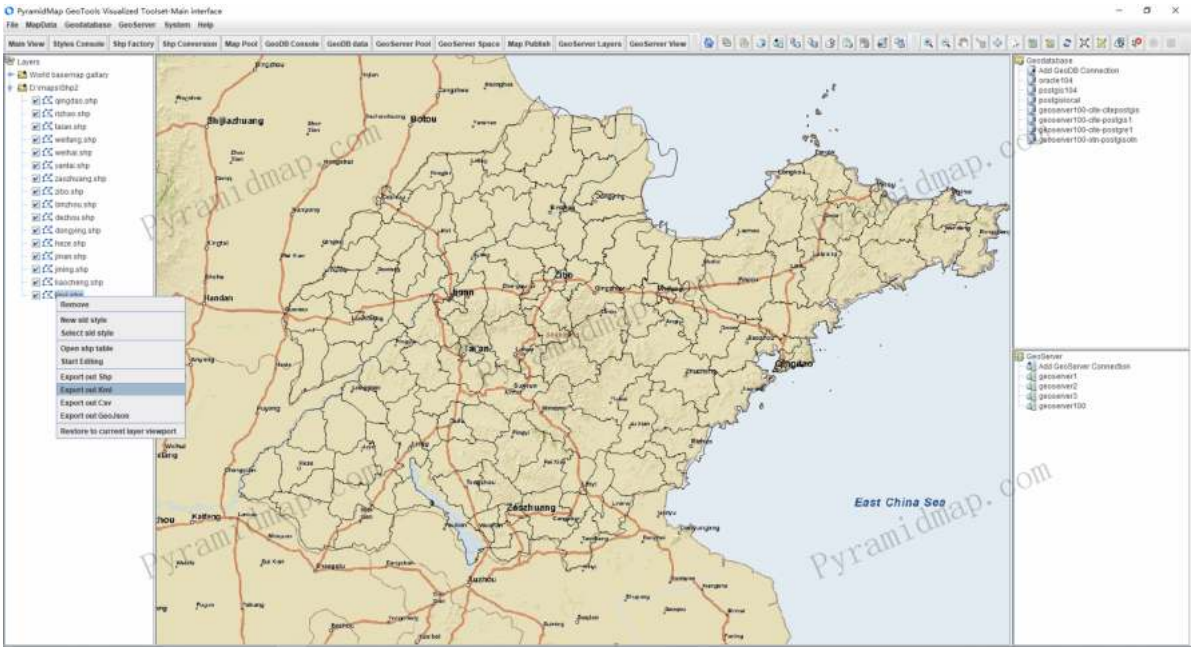


Figure 6-62: PyramidMap vector layer node right-click kml conversion operation

The same conversion operation can also be completed in the vector map resource pool, as shown in Figure 6-63.

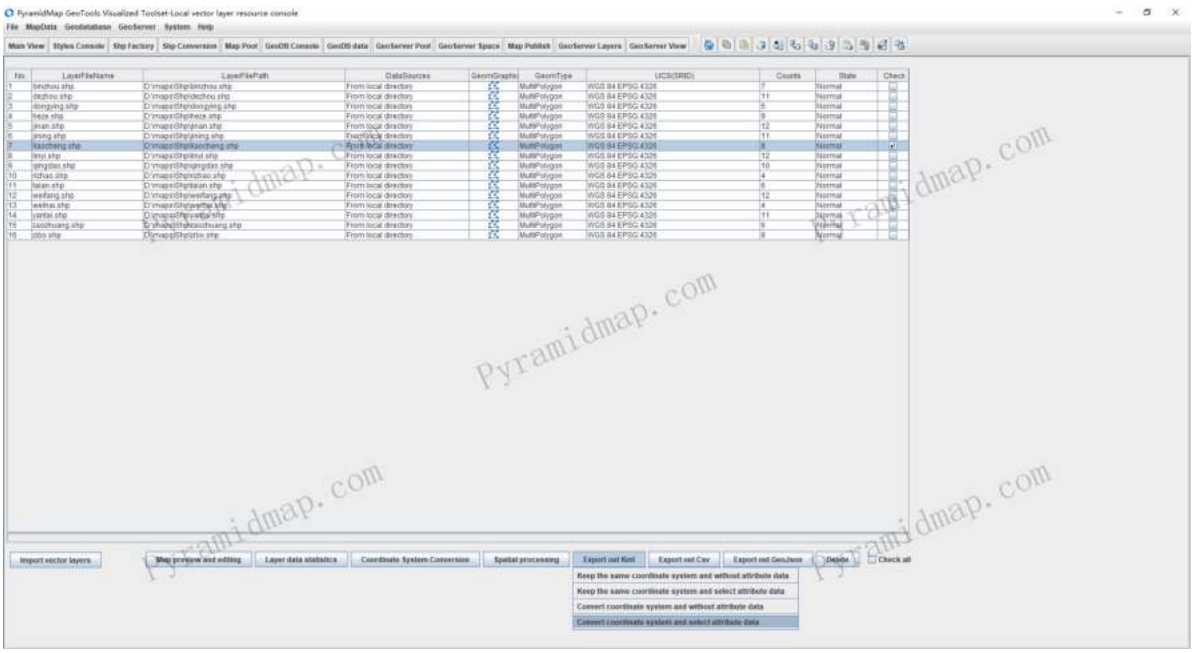


Figure 6-63: Vector layer resource pool and kml data conversion

Select the Shp layer in the list, select the target data format and options, and take the "Convert Coordinate System to Select Attribute Data" option as an example. The execution interface is shown in Figure 6-64.

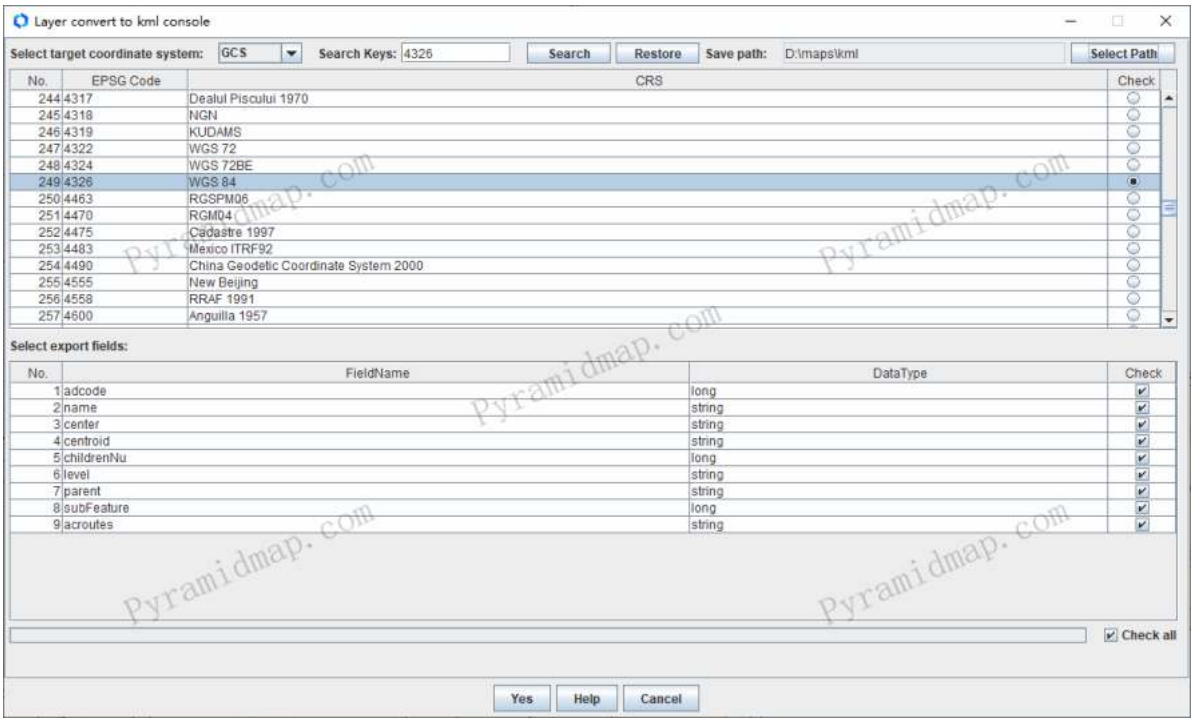


Figure 6-64: Shp to Kml Setting Coordinate System and Attribute Data Options

Select the target coordinate system and the fields to be exported, click "OK", and the selected shp layer will be selected according to the specified coordinate system and fields, and exported as a kml file under the target path. The exported kml data fragment is as follows:

```
<?xml version="1.0" encoding="UTF-8"?><kml
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:kml="http://earth.google.com/kml/2.1">
<Document id="featureCollection">
<Placemark id="fid-79657dd2_189aaf861b2_-7ffd">
<name>**city</name>
```

```
<MultiGeometry>
<Polygon>
<outerBoundaryIs>
<LinearRing>
<coordinates>121.737819,37.128871 121.740542,37.12828 121.743526,37.12536
121.737819,37.128871</coordinates>
</LinearRing>
</outerBoundaryIs>
</Polygon>
<Polygon>
<outerBoundaryIs>
<LinearRing>
<coordinates>121.484626,36.732883 121.490872,36.738411 121.491364,36.742102
121.484626,36.732883</coordinates>
</LinearRing>
</outerBoundaryIs>
</Polygon>
</MultiGeometry>
</Placemark>
</Document>
</kml>
```

7 Map rendering and sld symbol

The map symbol system determines the rendering effect of map elements, and refined symbol design allows you to make beautiful maps. PyramidMap visual symbol design tool can make your map more colorful and vivid. Through the color palette, you can create map symbols of different geometric types for points, lines and surfaces. The symbol features include: stroke color, stroke width, fill color, transparency, size, icon, label field, label font, font color, font size, font normal or bold, label position, fine adjustment offset, etc. Finally, you can save them as an sld file. The Sld file describes the display mode of map elements. PyramidMap realizes sld localization creation, editing in maintenance pool, maintains two-way synchronization with the GeoServer server, and remotely sets the sld symbol of the GeoServer layers internal at client.

7.1 Define sld symbols at client

7.1.1 Create sld on visualizing layer nodes

At the visualization layer node on the left of the main map interface, create the sld symbol through the right-click shortcut menu, as shown in Figure 7-1.

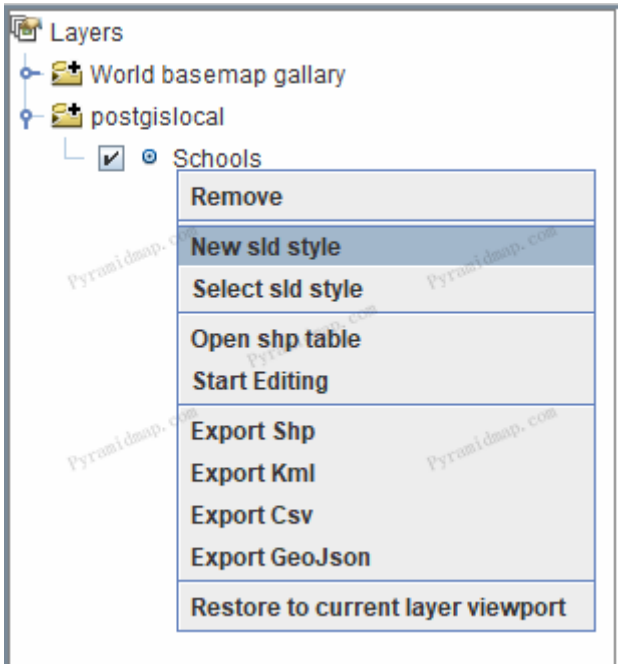


Figure 7-1：Creating sld symbols on visualization layer node

PyramidMap will implement the sld symbol definition method through the visual palette according to the geometric type (point, line, polygon) of the selected layer, as shown in Figure 7-2.

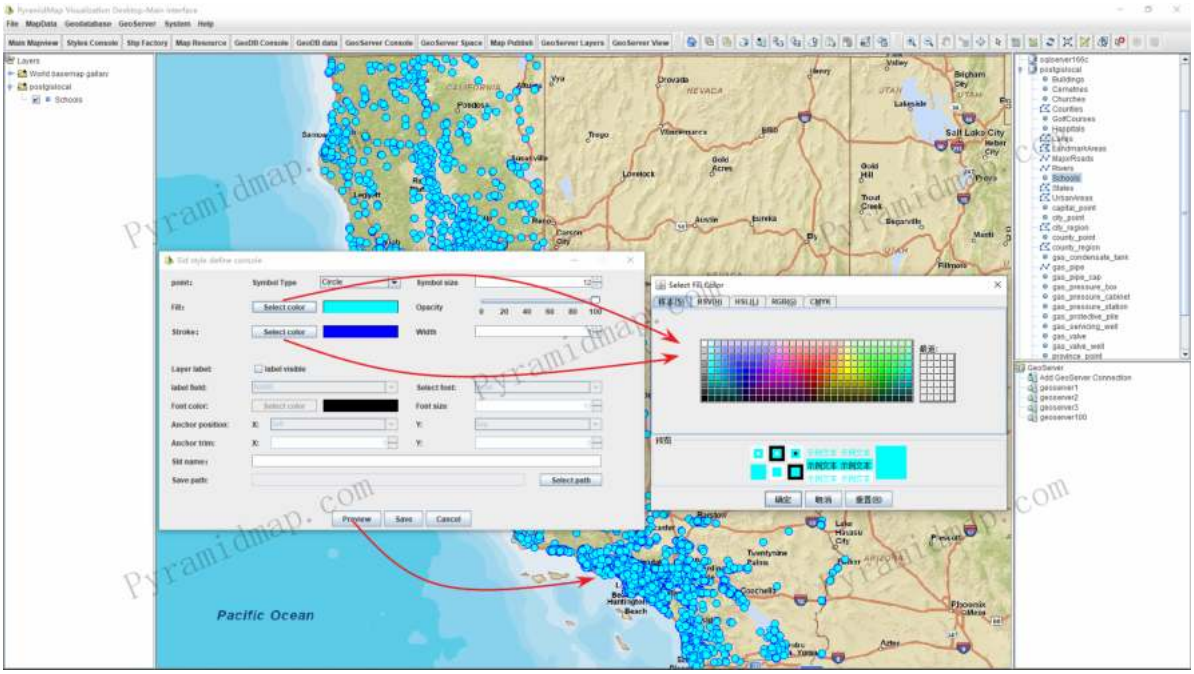


Figure 7-2：Create sld symbol definition on layer node through palette

In the sld definition module, create map symbols for different geometric types of points, lines, and surfaces through the color palette. The symbol features include: stroke color, stroke width, fill color, transparency, size, icon, annotation field, font, font color, size, normal or bold, annotation position, fine adjustment offset, etc. The display effect can be previewed in real time on the layer, saved as an sld file, and maintained in the sld resource pool at the same time, As shown in Figure 7-3.

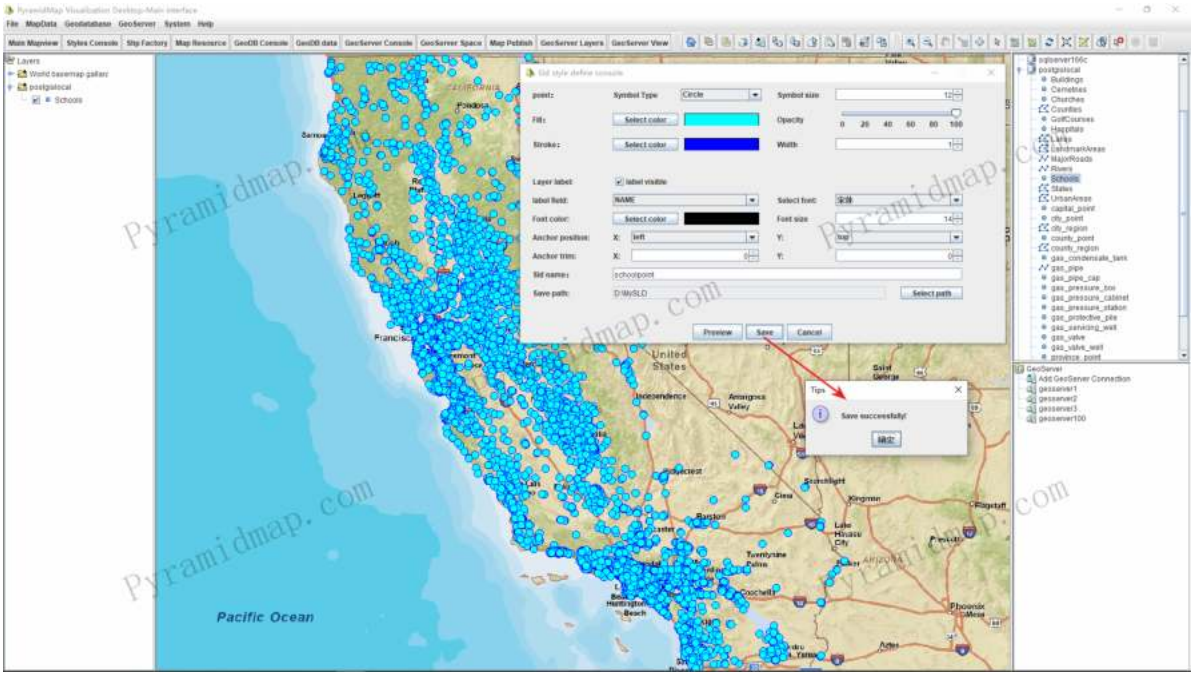


Figure 7-3：Create and save sld symbol definition on layer node through palette

7.1.2 Create map symbols in the sld resource pool

PyramidMap performs centralized and unified management of client SLDs in the way of resource management pool. Enter through the "Styles console" entry of the main interface menu to open the SLD resource management pool module, as shown in Figure 7-4.

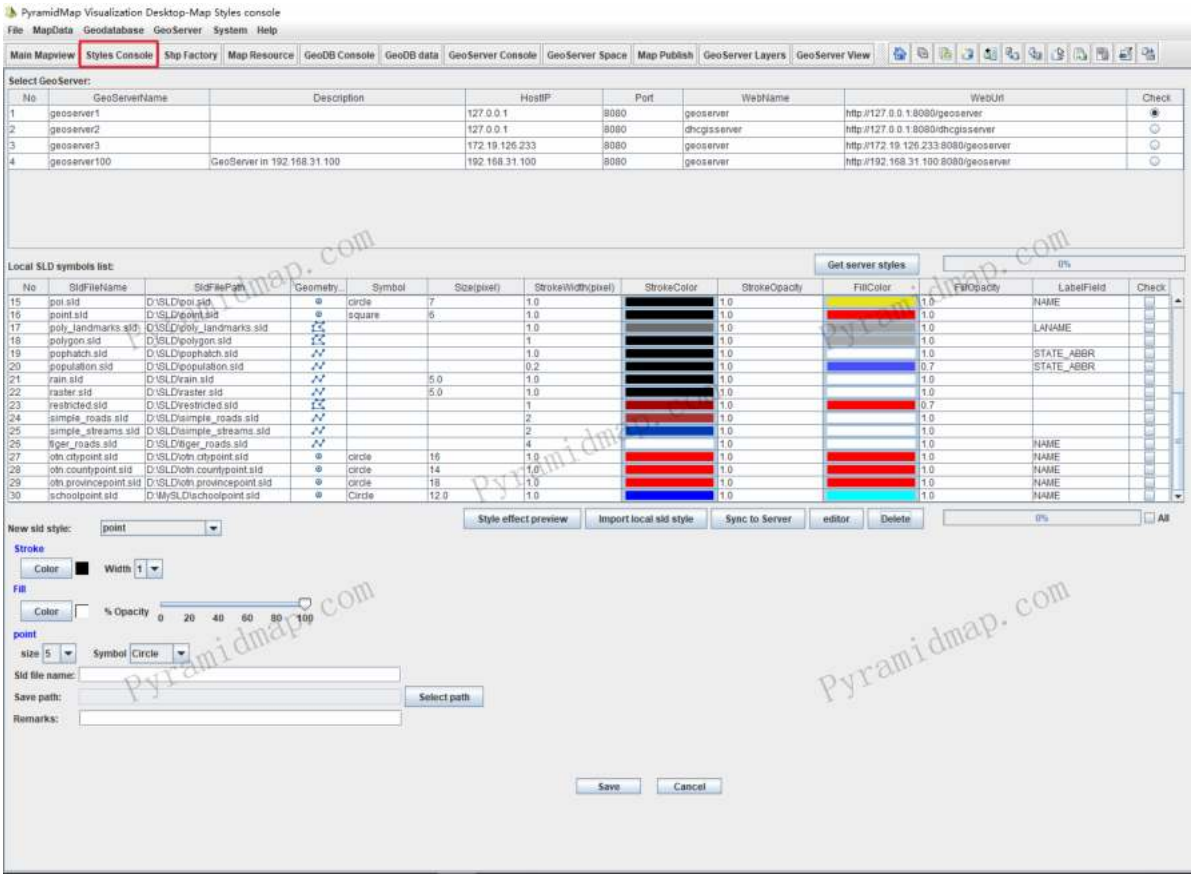


Figure 7-4：Sld symbol resource pool and creation module

PyramidMap maintains a local SLD resource pool itself, and uniformly and centrally manages the SLD files created by the client and obtained from the GeoServer. There are two ways to obtain the Sld data source, one is from the GeoServer, the other is created at the PyramidMap client. All work flows are completed in the SLD unified resource management pool module, as shown in Figure 7-5.

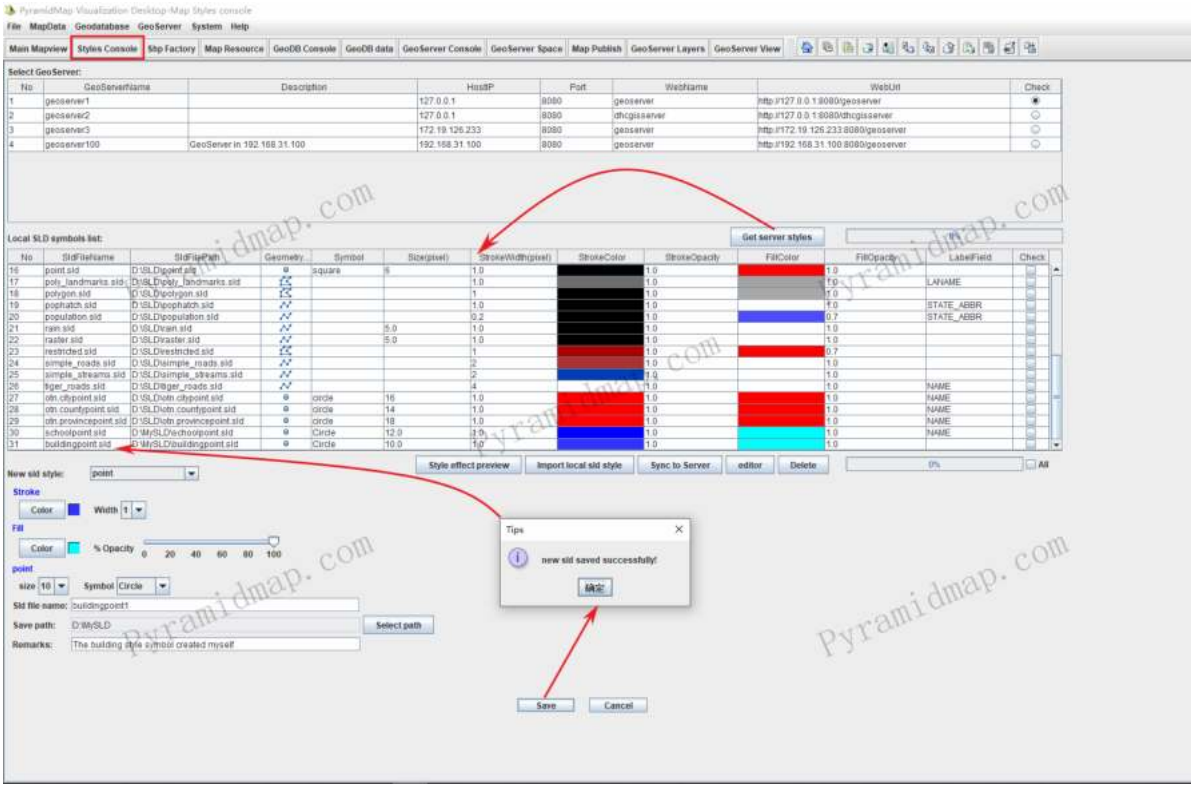


Figure 7-5：Complete the sld symbol creation and management workflow in the sld unified resource management pool

The defined sld file is included in the resource management list to realize resource sharing. You can select symbols in the sld resource pool to preview the effect, as shown in Figure 7-6.

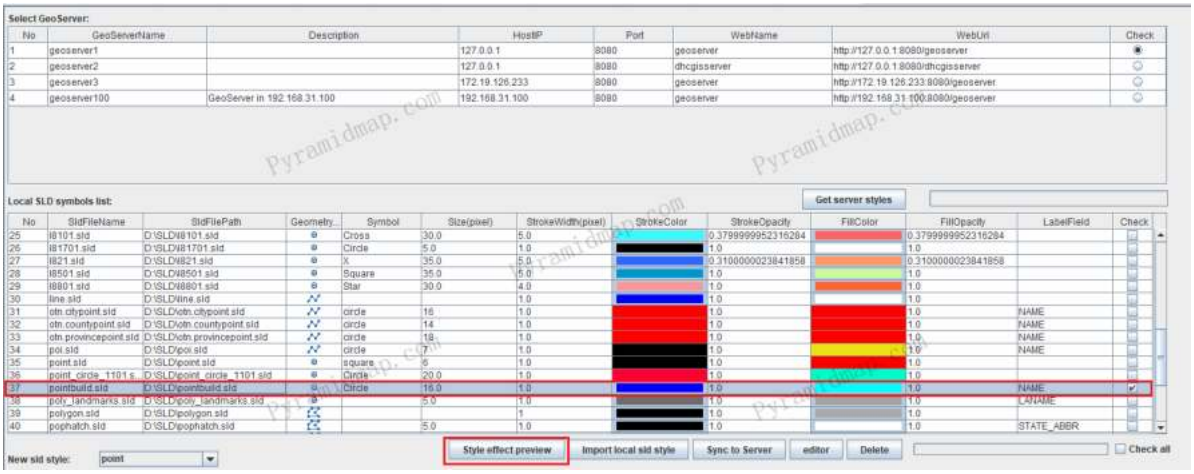


Figure 7-6：Select the map symbol in the sld resource pool for effect preview

PyramidMap will match in the layer resource pool according to the geometry type of the selected sld symbol, and return the list of layers of the same type, as shown in Figure 7-7.

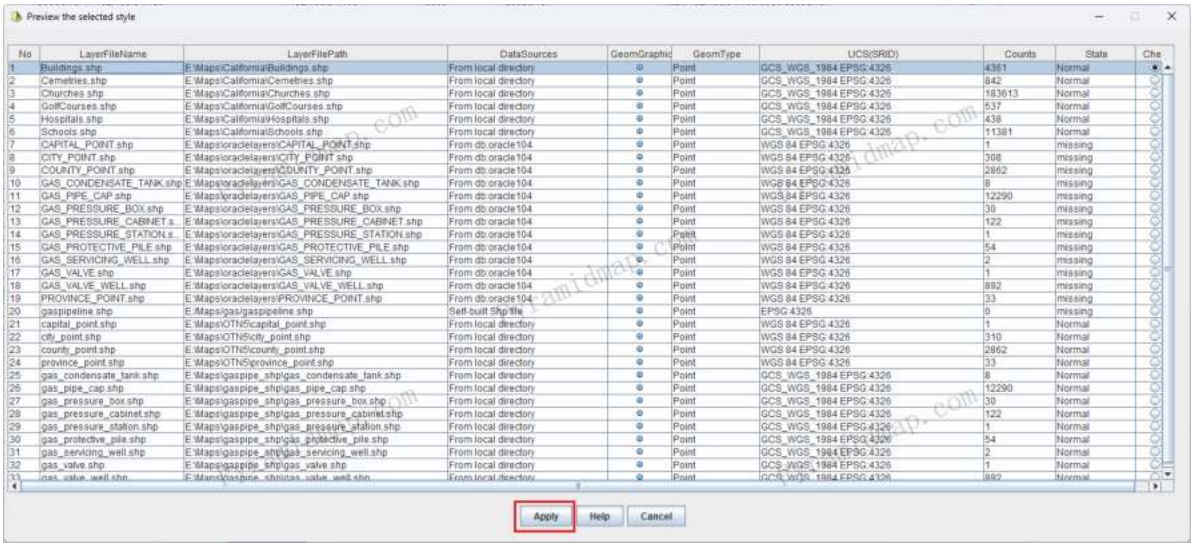


Figure 7-7：Returns the list of layers with the same geometry type as the selected sld

Click "Apply" to preview the effect, as shown in Figure 7-8.

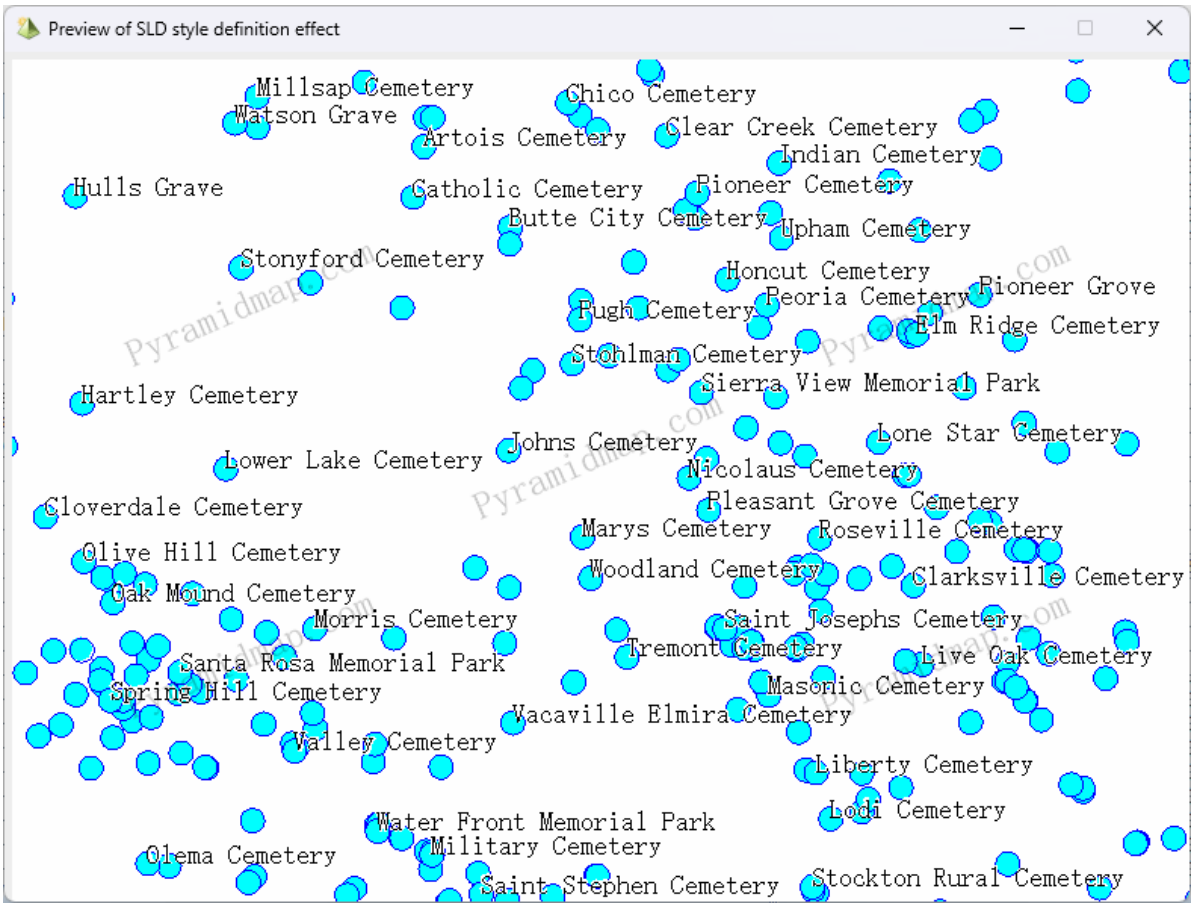


Figure 7-8：Sld symbol map effect preview

7.1.3 Get GeoServer sld symbols

Obtain sld symbols from the GeoServer through connection pool and add to the local SLD resource pool, as shown in Figure 7-9.

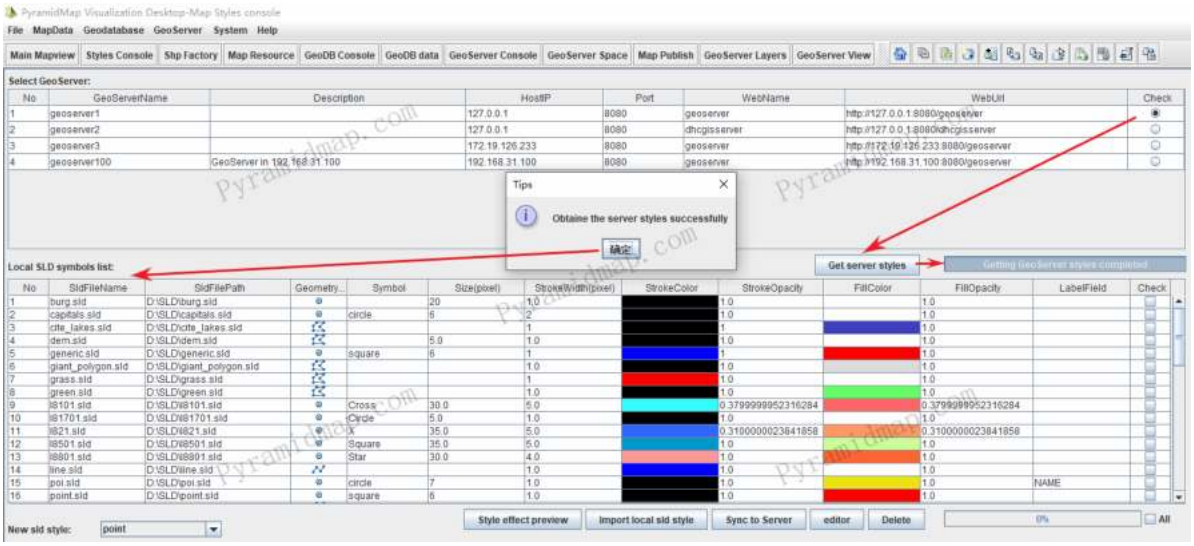


Figure 7-9：Obtain sld symbols from the GeoServer through connection pool

Select the GeoServer connection, click "Get server styles", PyramidMap gets the global SLDs in GeoServer and the SLDs in each workspace, and downloads them to the client resource pool for sharing.

7.2 Map rendering effect with sld

At the visualization layer node on the left side of the main interface, right-click the shortcut menu to Open the sld selection list. In this module, the sld resource files of the same type will be automatically filtered from the sld symbol resource pool maintained by the system according to the geometric type (point, line, and face) of the selected layer to form a selectable list. You can select the corresponding sld symbol definition to achieve the desired map rendering effect ,all of the workflow as shown in Figure 7-10.

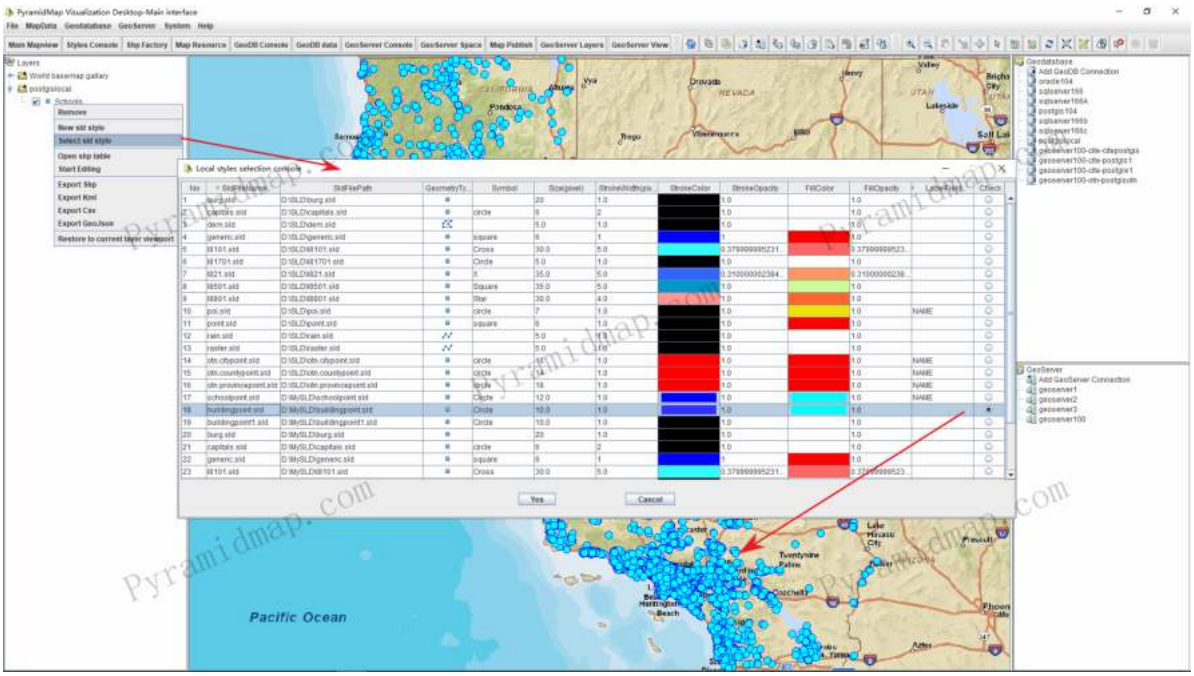


Figure 7-10：Select sld for visualization layer node to achieve map rendering effect

7.3 Client sld symbols submitted to GeoServer

PyramidMap submits the client sld symbols to the GeoServer through the connection pool, as shown in Figure 7-11.

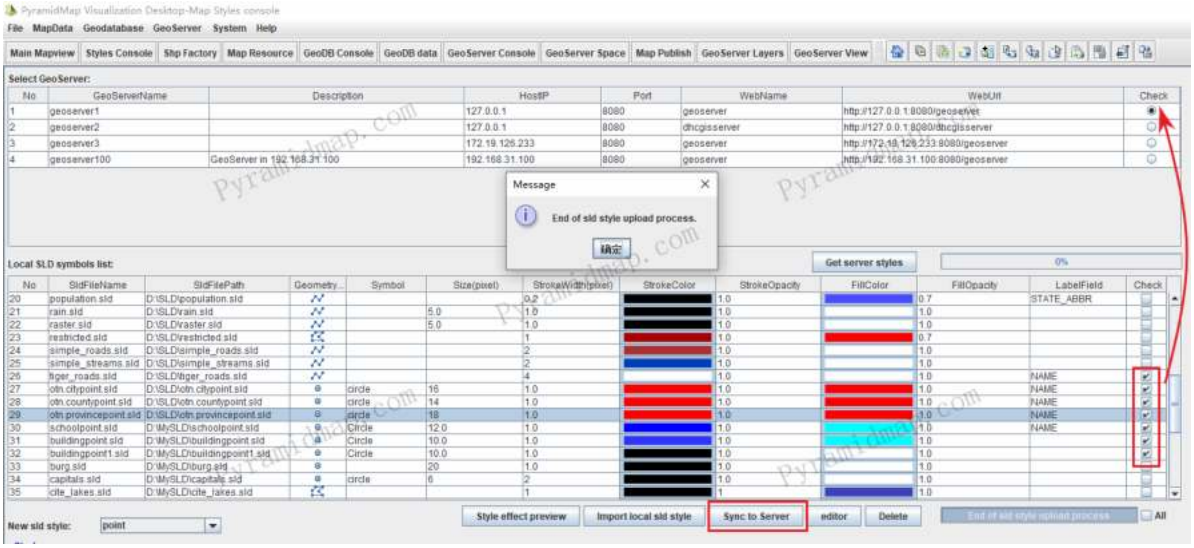


Figure 7-11： Client sld resources submitted to the GeoServer

Select all or part of the sld files and click “Sync to Server” to synchronously submit the selected sld symbols to the global space inside the GeoServer.

8 Publishing map service

WebGIS is the trend of map application development and the most extensive map application mode at present, including browser end, mobile end and embedded terminal application. Vector layer, raster layer and Geodatabase layer must be published as map service url to be applied in WebGIS terminal which hosted in map server such as GeoServer that provides web map service. GeoServer is based on the OpenGIS Web server specification, follows the OGC open standard, and can run in any J2EE/servlet based container, such as tomcat, webLogic, and webSphere, etc. GeoServer has complete functions and supports multiple map service functions, such as WMS/WFS/WCS/WMTS/KML. In the traditional way, using the GeoServer console to publish map services is very complicated and requires highly professional staff.

The significance of PyramidMap is to provide a visual guidance process to publish the layers in the local resource pool to the GeoServer server, which is simpler and easier to use than the traditional web console mode of GeoServer. The human-computer interaction is more friendly and intuitive, and the operation is convenient, which greatly reduces the professional skill requirements for operators. Even companies and individuals without GIS capabilities can easily use it, which is the biggest feature of the software. PyramidMap supports three types of layer publishing: Shp file type layer, image file type layer, and geographic database type layer. The main interface provides shortcut menu entries, as shown in Figure 8-1.

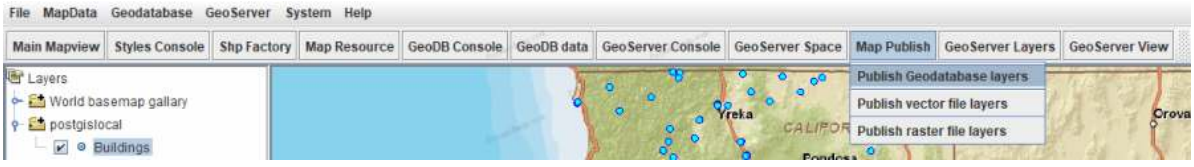


Figure 8-1： Main interface map service publishing shortcut menu entry

GeoServer supports the following three data storage modes of layer services: Geodatabase layer type, Shp vector file type, and raster image file type.

8.1 Publish Shp vector layers

Publish the local Shp vector layer to the shapefile directory on the GeoServer and use it as a data storage. GeoServer allows to store shp in file mode and output map services to web client. This is a complex process to package and submit client Shp files to the data cache path preset by GeoServer, and output them as rest map services for WebGIS access. PyramidMap simplifies this process through high integration, and makes it easier through visual guidance,the operation flows is shown in Figure 8-2.

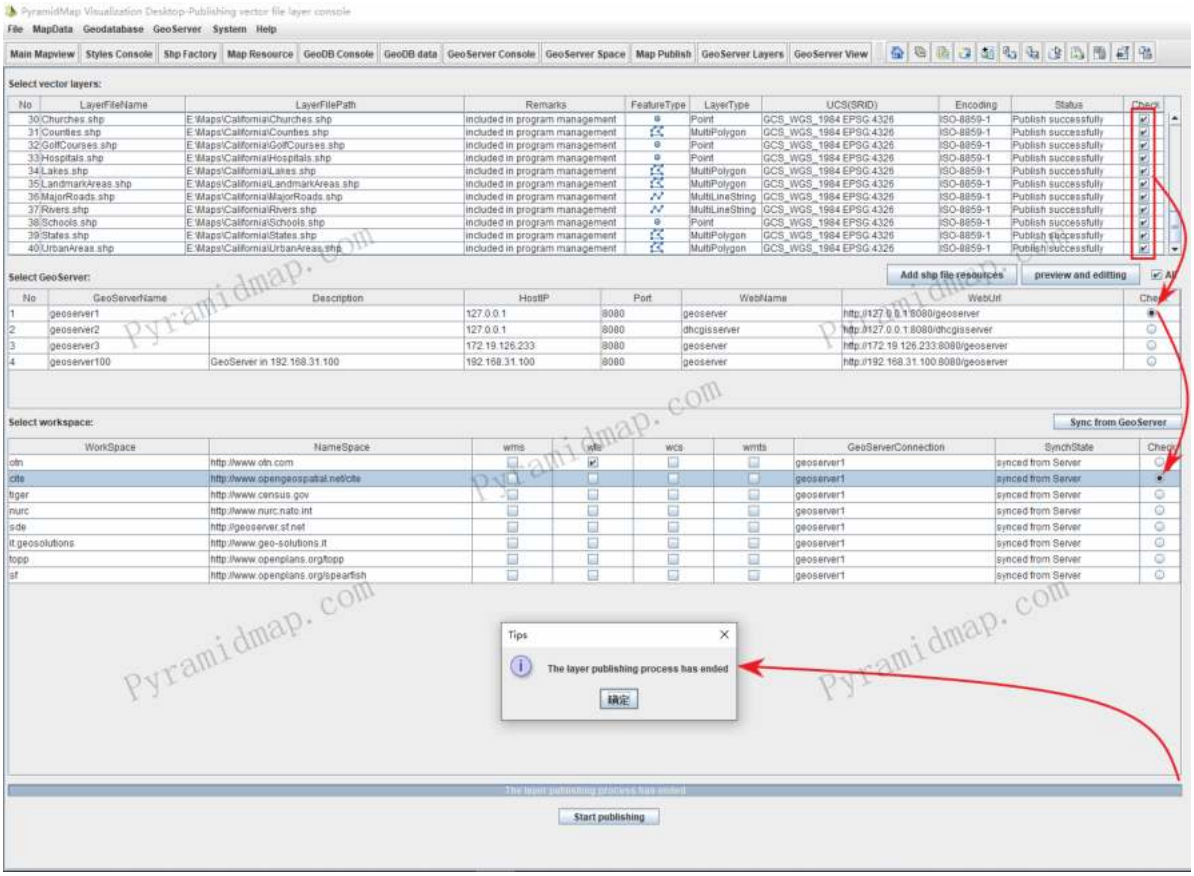


Figure 8-2：Workflow of publishing Shp vector layer to shapefile directory on GeoServer

The Shp file is uploaded to the shapefile directory preset by GeoServer, stored as a file, and exported to the map rest service.

8.2 Publish raster layers

Like the Shp vector layer publishing process, GeoServer allows raster layers being stored in file directory mode and output services to web client. Select the layers to publish in the local raster files resource pool, and then select the target GeoServer and workspace to publish. As shown in Figure 8-3.

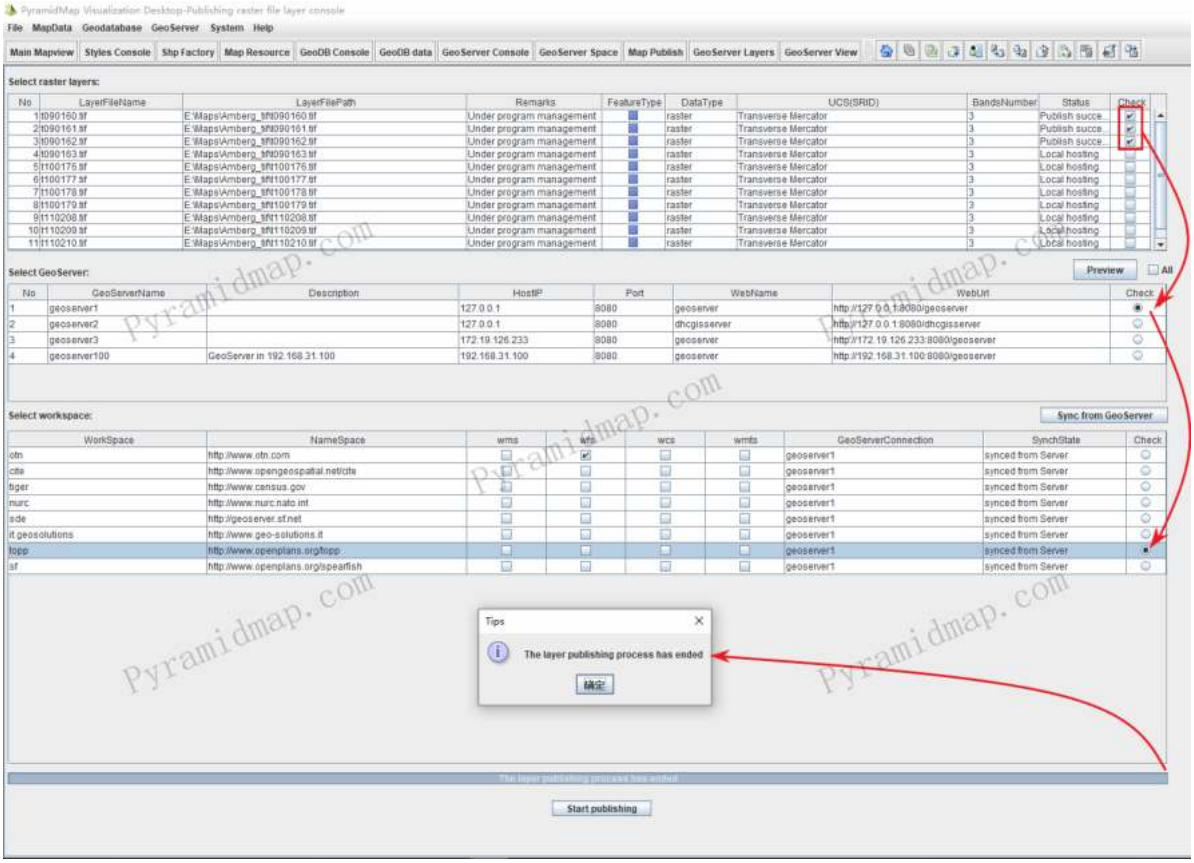


Figure 8-3：Workflow of publishing raster layer to raster file directory on GeoServer

8.3 Publish Geodatabase layers

The more powerful service function of GeoServer is that it can adapt to most DBMS geographic database systems, publish the map data as a service, and provide flexible web map services in a more extensive way to meet large-scale industrial map applications. Based on this, PyramidMap integrates the adaptation interface to the geographic database supported by GeoServer, supports but is not limited to publishing the layers in Oracle, PostGIS, MySQL and other geographic databases to GeoServer, and outputs WMS/WFS and other types of map services, as shown in Figure 8-4.

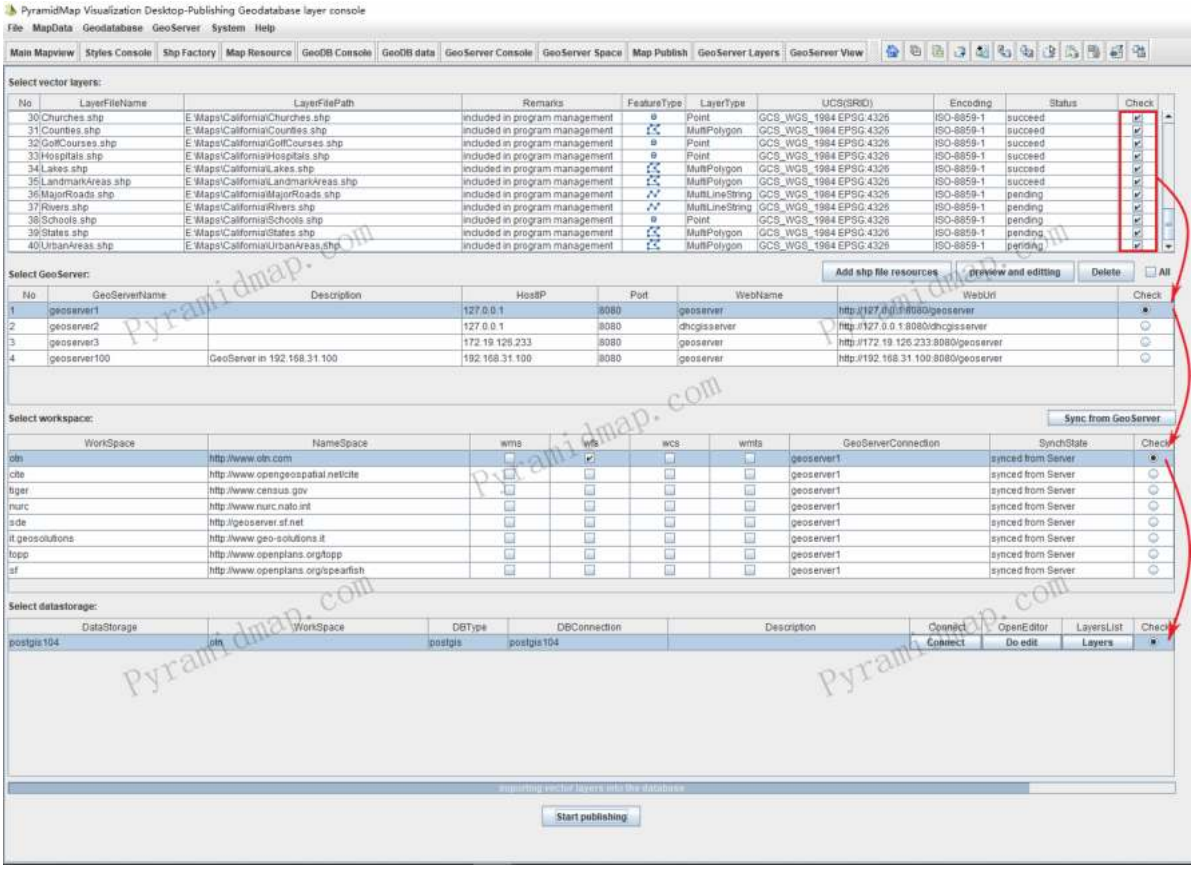


Figure 8-4：Workflow of publishing geodatabase layer to GeoServe

Select the vector layer to publish in the local vector layer resource pool, and then select the GeoServer target server to publish, the workspace in the server, and the data store. The map will first be imported into the geographic database corresponding to the data store, and then published as a map service in zaiGeoServer. PyramidMap realizes the traditional complicated publishing process through an integrated visual process, greatly reducing the difficulty of work and improving the efficiency.

8.4 Manage GeoServer layers

As the visualization client of GeoServer map server, PyramidMap implements unified management of layers in GeoServer, including layer preview and query. PyramidMap's management of GeoServer layers includes three main functions: GeoServer data source node in the main interface, as shown in Figure 8-5.

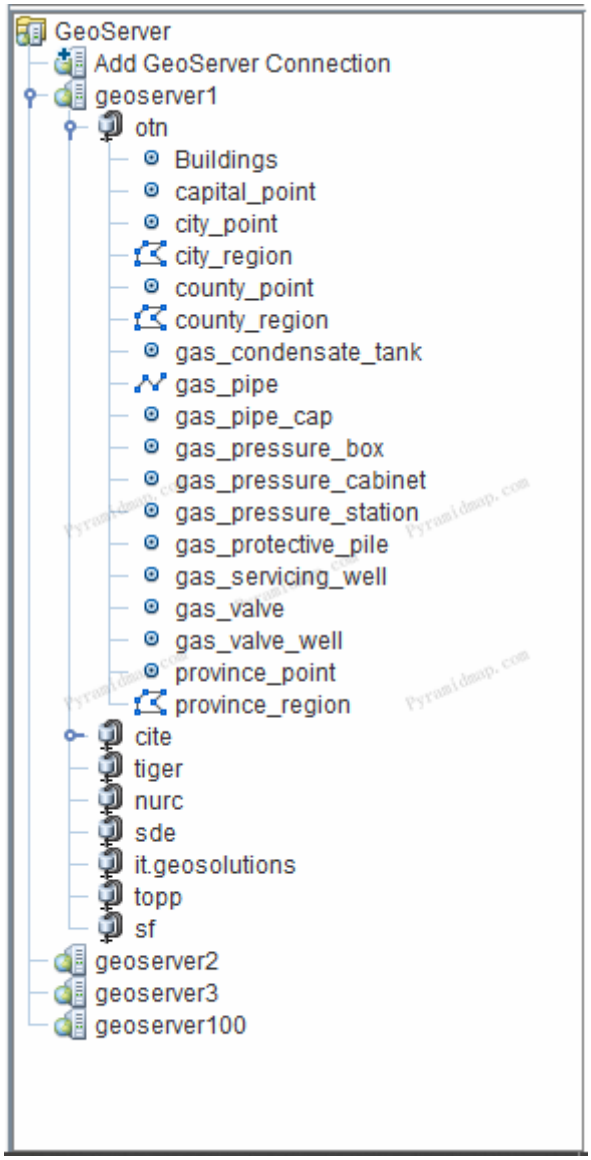


Figure 8-5：GeoServer data source node in the main interface

Through the GeoServer data source node, you can complete various hierarchical operations on the GeoServer workspace, data storage, and layers. PyramidMap provides access to GeoServer layer preview list and GeoServer layer management list through toolbar menu items, as shown in Figure 8-6.

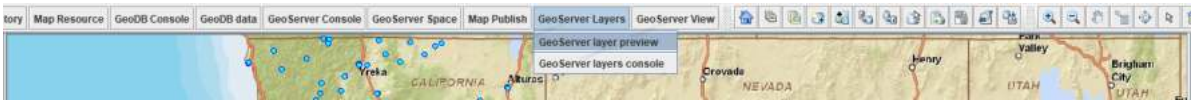


Figure 8-6：Main interface GeoServer layers operation entrance

Through the above menu items, the layer preview and management of GeoServer can be realized.

8.4.1 GeoServer layers preview

PyramidMap previews the layers published by the server through the GeoServer resource connection pool. The list of layers is shown in Figure 8-7.

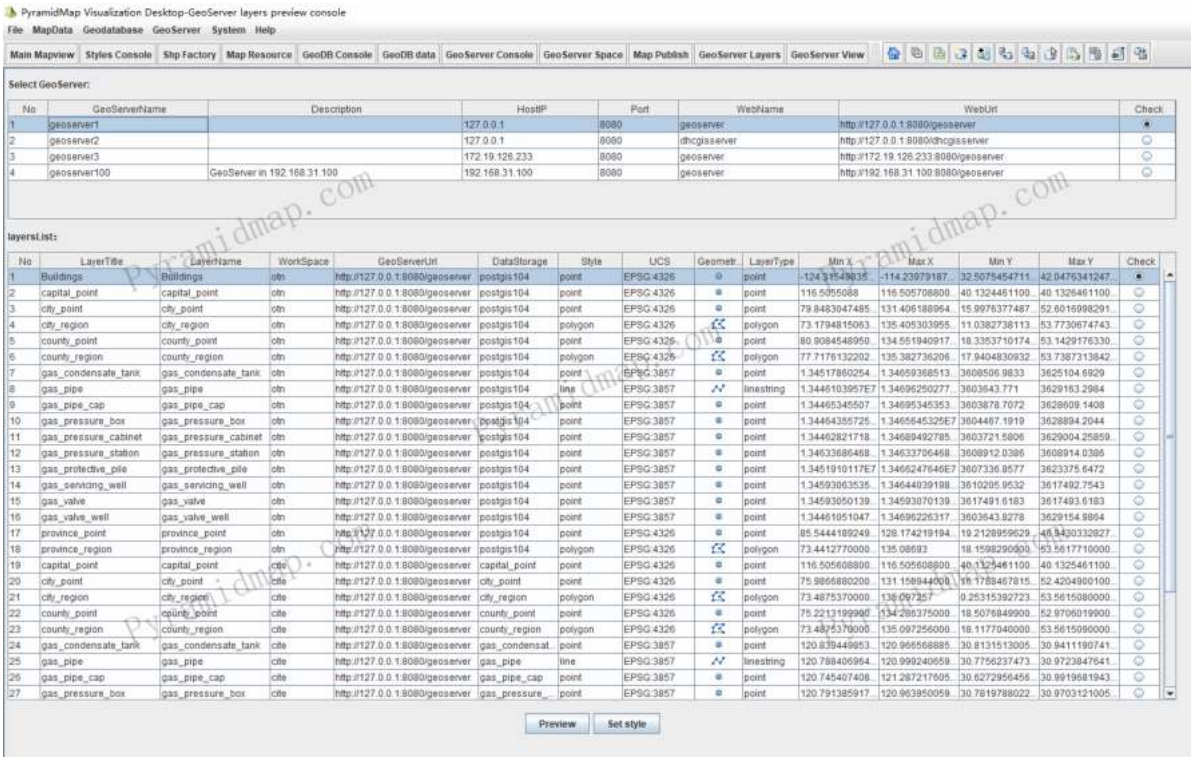


Figure 8-7：GeoServer layer list

The GeoServer layer list includes two types: vector and image. The vector layer is divided into point, line and face types. Select the vector layer and click Preview. PyramidMap will load and display the selected vector layer through WMS, as shown in Figure 8-8.

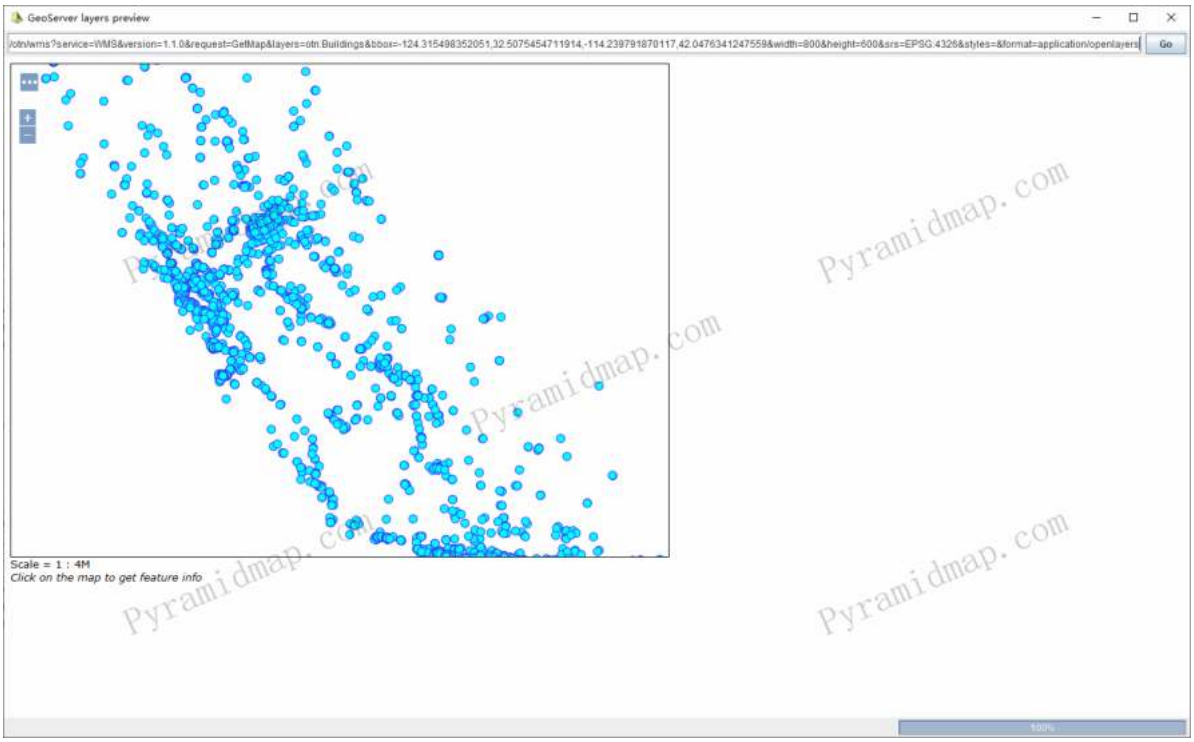


Figure 8-8：GeoServer vector layer preview

Select an raster layer and click Preview. PyramidMap will load and display the selected raster layer in WMS mode, as shown in Figure 8-9.

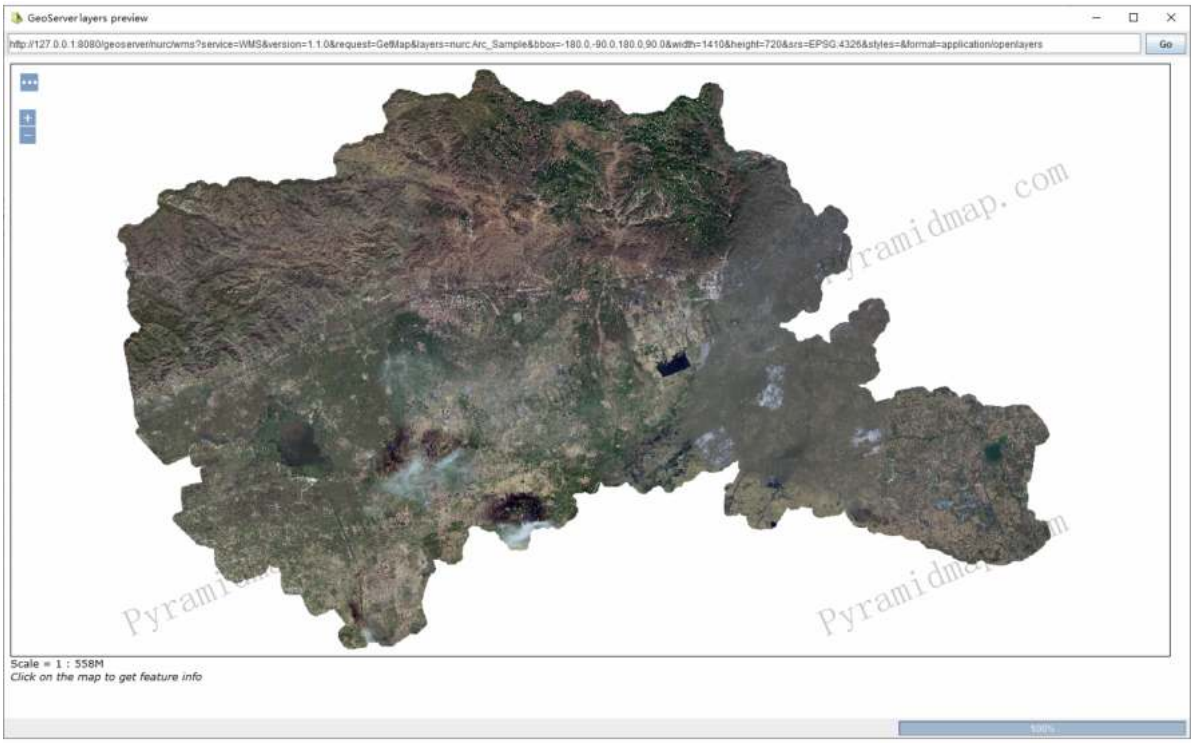


Figure 8-9：GeoServer raster layer preview

8.4.2 GeoServer layers export and conversion

PyramidMap provides some column export and data conversion operations for the layers in GeoServer, which is not available in regular GeoServer, giving more flexibility and operable space to map data. As shown in Figure 8-10.

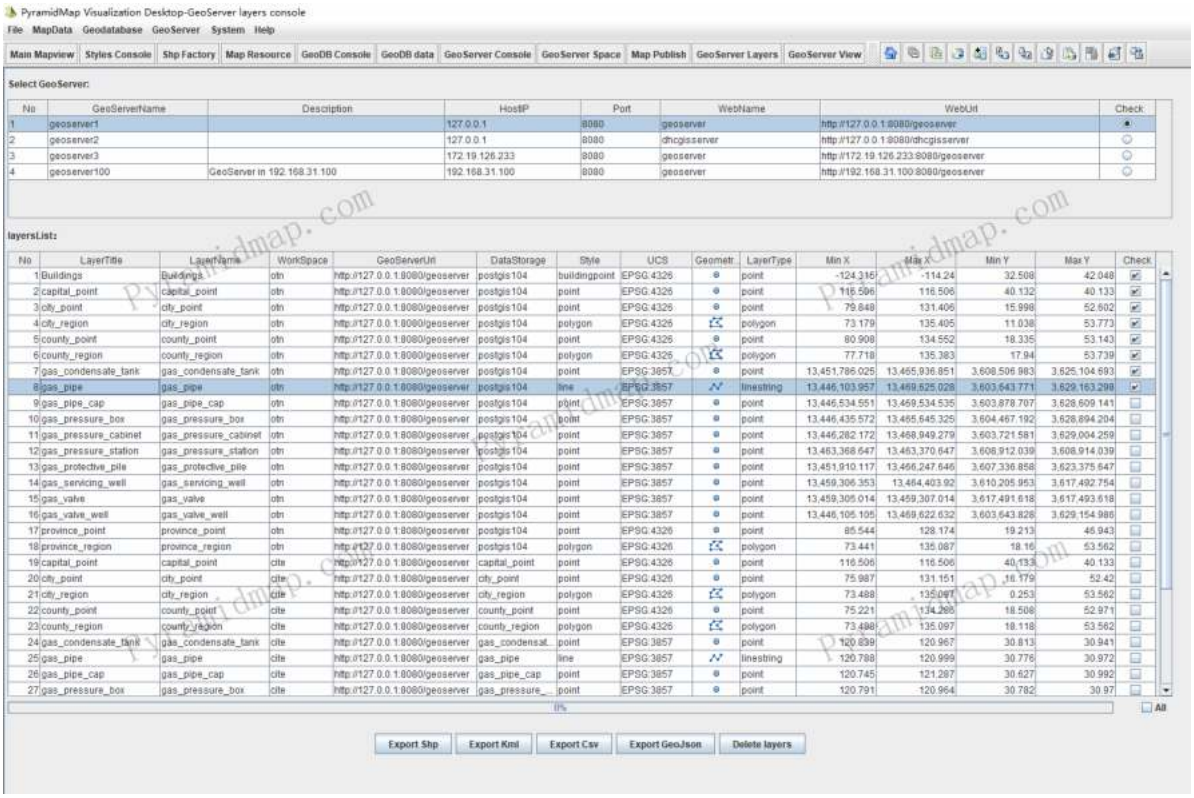


Figure 8-10：GeoServer layers export and conversion

PyramidMap can export the layers in GeoServer to Shp, Kml, Csv, GeoJson and other formats, realizing the visual transformation of map data and expanding the utilization space of map data.