map2loop-Notebook的地质数据

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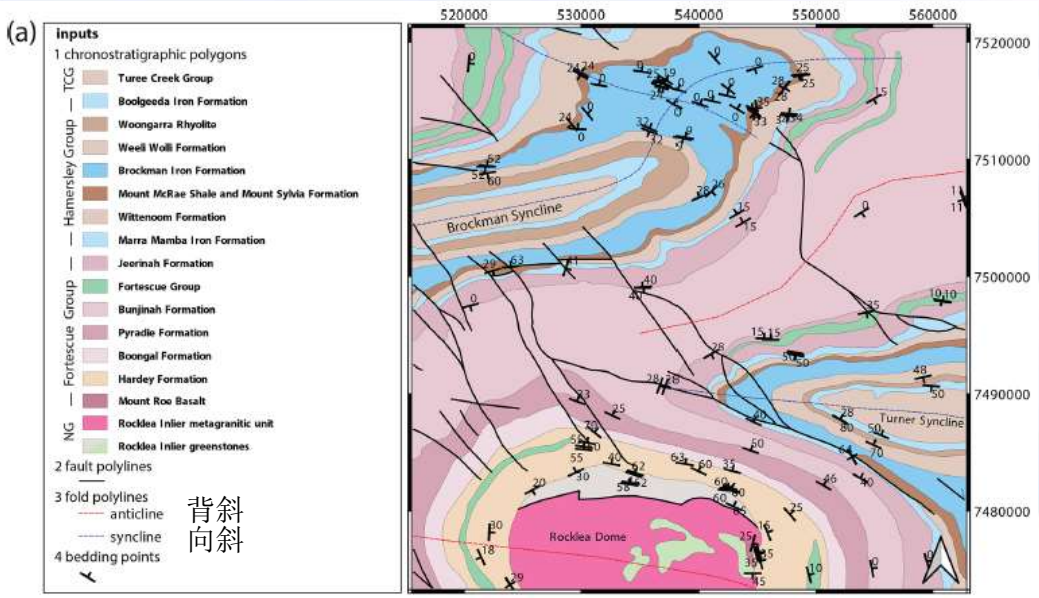
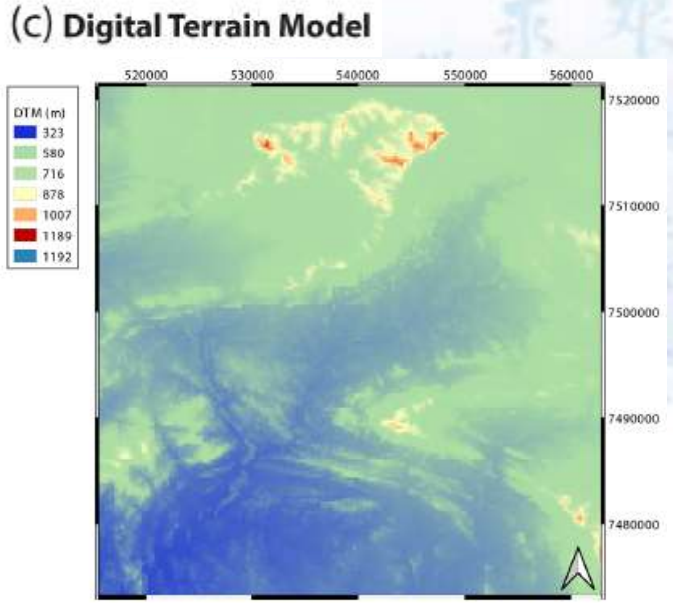
map2loop-Jupyter Notebook中的示例代码，需要的数据集，一个是从ASUD上自动下载的，一个是自备的数据集（下面介绍）。

需要理解我国的地质数据下载及包含的信息，这个很重要。



背斜
向斜
层理点



SRTM 90m 栅格数据

(b) **Stratigraphic (overlies ->) Relationships**

Turee Creek Group -> Boolgeeda Iron Formation
Wittenoom Formation -> Marra Mamba Iron Formation
Marra Mamba Iron Formation -> Jeerinah Formation
Jeerinah Formation -> Bunjinah Formation
Bunjinah Formation -> Pyradie Formation
Pyradie Formation -> Boongal Formation
Weeli Wolli Formation -> Brockman Iron Formation

从ASUD提取的二分层序关系

图1 输入map2loop的6类输入: (a) 基岩地质图(1:50万); (b) 前7类的层序关系; (c) SRTM DTM

“最低输入数据标准”

- geology polygons with stratigraphic code and rock type info (required)
- fault polylines (required)
- bed dips as points in dip, dip direction (required)
- mineral deposit layer (optional)
- fold axial trace layer (optional)

地质图（矢量格式）：

(1) 带层序编号和岩石类型信息的多边形（必须的）

(2) 断层多段线（必须的）

(3) 层理dip（dip和dip方向的点）（必须的） bedding point

(4) 矿物沉积层（可选） mindeps point

(5) 褶皱轴向轨迹层（可选）

2 输入数据

map2loop使用Geopandas库从几种格式（shapefiles, MapInfo tab, JSON）文件加载数据，地理空间数据可以是任意标准的参考坐标系统（EPSG）。使用这些库加载和转换输入的地质几何和属性（表2）。

Table 2. Geometric features imported and saved by *map2loop* and *map2model*. The geometric objects refer to specific *Geopandas* data objects.

Geometric object	Input geological feature	Augmented-output geological feature
Point	Bedding	Bedding, contacts, faults, fold axial traces
Polyline	Faults, fold axial traces	None
MultiPolyline	Faults, fold axial traces	None
Polygon	Stratigraphic domains	None
MultiPolygon	Stratigraphic domains	None
Raster	DTM	DTM

2 输入数据

map2loop与map2model使用的6种输入数据（图1），这2个库使用一个配置文件，用户指定GIS层的哪个场。Jupyter Notebook帮助用户从输入层创建HJSON格式的配置文件（Utility 1 – Configfilegenerator.ipynb）。map2loop需要的最低输入数据见附录A。

2.1 Chronostratigraphic Polygon （必须） 和 MultiPolygon layer

The layer may contain a mixture of single Polygons, MultiPolygons (sets of Polygons with the same non-spatial attributes), and or Polygons with holes (also stored as MultiPolygons, 图3)。这些对象作为Geopandas数据对象。

每个Polygon需要包含如下元素：
（1）定义节点的有序封闭循环*x y*坐标的列表；
（2）层序编号或更低层级（如formation, member）的名称，称之为"units"
（3）一个或更多高层级的层序定义（如group, supergroup, spuersuite, province），称之为"groups"
（4）一个或更多岩性描述，有助于确定unit是否是火山、基石或其他类型的侵入体或其他类型的沉积岩？
（5）可选地（但重要的）：细尺度层序单元的最大和最小估计年代。
基岩地质图包含各formation的最大和最小年代，但是由于缺少绝对的地质年代约束，一个group内共享相同的范围。

2.2 Fault Polyline （必须）和 MultiPolyline layer

该矢量层描述在surface处的断层或窄的剪切带的位置、方向和位移信息。

该层由MultiPolylines（具有相同非空间属性的Polylines组）混合组成。map2loop将MultiPolylines分解为分离的Polylines，允许正确实施断层长度和方向的分析。比用户定义长度还短的断层给过滤掉，降低模型的复杂度。

各Polyline需要包含如下元素：

（1）定义节点的顺序开放循环xy坐标列表；

（2）唯一的识别号，以某种方式标记断层；

（3）在中点处存储断层的倾角和倾角方向（或走向）。

使用1:50万的地质图，由map2loop过滤提取断层。

2.3 Fold axial trace Polyline layer （可选）

map2loop过滤地质图，提取褶皱轴向轨迹。

2.4 Bedding orientation point layer

该矢量层描述层理的局部方向，一般不包含在地质图内，但可以从单独的数据库或地质野薄找到。还可以通过航拍图像解译或3点分析得到。

各点应包含如下元素：

（1）定义Point的单个*xy*坐标

（2）倾角信息

（3）倾角方向或走向信息，这里称为“azimuth”，以避免混淆

（4）层理的Polarity (upright or overturned)

使用2016 WAROX露头数据集。

2.5 Reference stratigraphy

Australian Stratigraphic Units Database, ASUD，可以下载组(formation)的层级及上层的层序细节信息，如2.1节提到的最大-最小年代的Polygon。层序信息一般没有空间信息，但假设映射的层序年代Polygon与ASUD的编码相同，如此得到层序关系（如A overlies B），map2model执行拓扑分析，这样有助于定义地图区域上的局部层序。map2loop目前从ASUD数据集（定义相邻层序关系对, A overlies B）密集提取，来定义局部层序（图1b）。

(b) **Stratigraphic (overlies ->) Relationships**

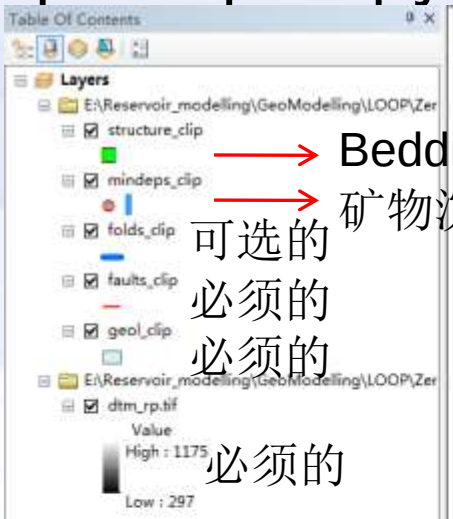
Turee Creek Group -> Boolgeeda Iron Formation
Wittenoom Formation -> Marra Mamba Iron Formation
Marra Mamba Iron Formation -> Jeerinah Formation
Jeerinah Formation -> Bunjinah Formation
Bunjinah Formation -> Pyradie Formation
Pyradie Formation -> Boongal Formation
Weeli Wolli Formation -> Brockman Iron Formation

图1(b)

2.6 Digital terrain model

SRTM 90m

map2loop-Jupyter Notebook自备数据集 说明



→ Bedding point必须的

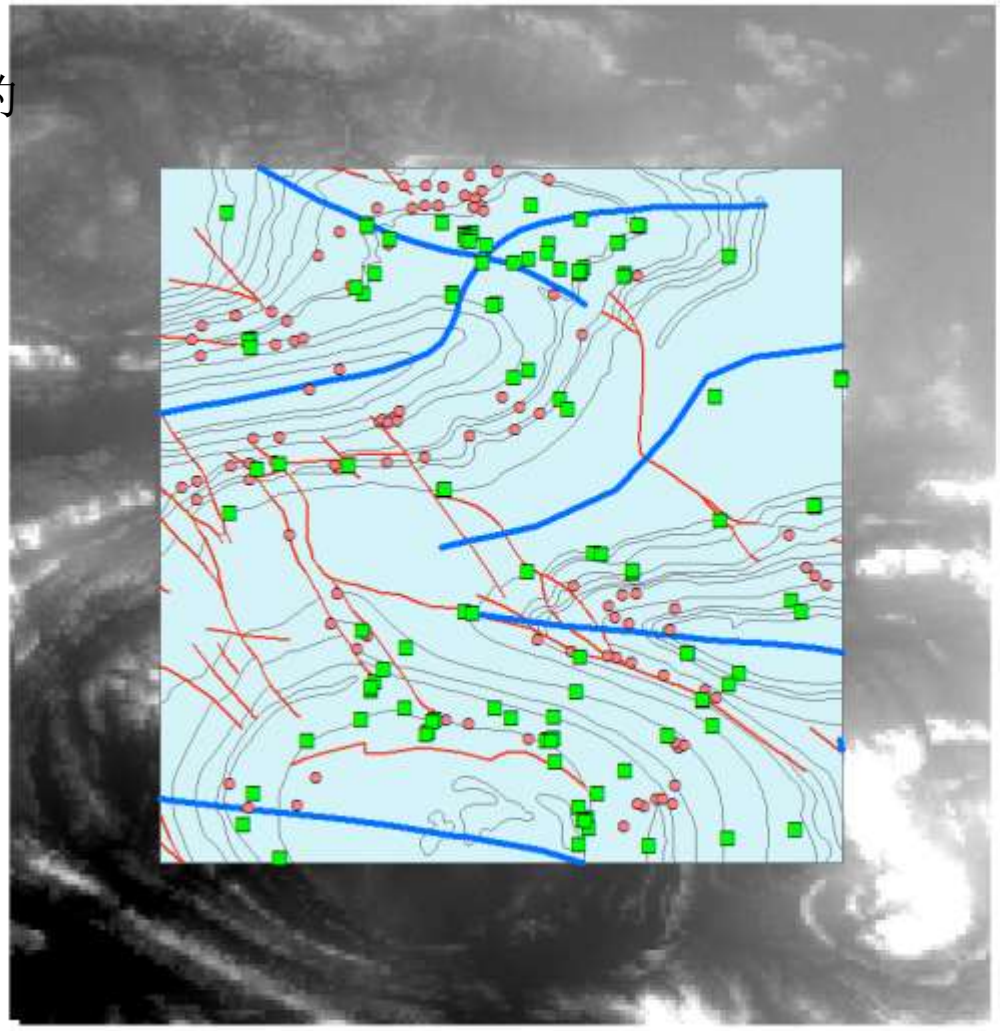
→ 矿物沉积层 可选的

可选的

必须的

必须的

必须的



ArcGIS 10.0 打开数据集的界面

(1) 带层序编号和岩石类型信息的Polygon（必须的）

	A	B	C
1	UNITNAME	code	colour
2	Hart_Dolerite	P___ha_od	#8EE4B4
3	Broome__Mowla_and_Melligo_	K__bm_st	#DFFEB8
4	King_Leopold_Sandstone	P__KMl_st	#ECCBA7
5	Yampi_Formation	P__KMy_sta	#ECCBA7
6	Wallal_Sandstone	J__wa_st	#ADFED5
7	Pentecost_Sandstone	P__KMp_st	#ECCBA7
8	Carson_Volcanics	P__KMc_bb	#D2F4E1
9	Warton_Sandstone	P__KMw_st	#F5E5D3
10	Gidley_Granophyre	A_FFgi_gv	#FEBFBA
11	Erskine_Sandstone	R__er_st	#BAFCEC
12	Wotjulum_Porphyry	P___wj_gmap	#FECFCB
13	Maitland_River_Supersuite	A_MR_g	#FE9E98
14	Jarlemai_Siltstone	J__ja_sl	#DFFEB8
15	Miaree_Granite	A_MRmi_gm	#FE9E98
16	Winning_Group	K_WN_sf	#DFFEB8
17	Fortescue_Group	A_FO_od	#8EE4B4
18	Elgee_Siltstone	P__KMe_xsl_kd	#E6A89A
19	Hearson_Cove_Monzogranite	A_MRhe_gmp	#FE9E98
20	Mount_Roe_Basalt	A_FOr_b	#C4C798
21	Noonkanbah_Formation	P__no_sf	#B5E1FC
22	Bastion_Group	P__BA_s	#D5B9AA
23	Gidley_Granophyre	A_FFgi_og	#A5E9C3
24	Kylena_Formation	A_FOk_b	#C4C798
25	Antrim_Plateau_Volcanics	E__ap_xbb_s	#EFBEE7
26	Speewah_Group	P__SP_s	#E99ECE
27	Louden_Volcanic_Member	A_CDbl_xb_s	#63FD67
28	Regal_Formation	A__re_b	#D4EFB9
29	Cleaverville_Formation	A_GCe_ca	#6BC3F9

500kibg_colours.csv

geol_clip.shp

(1) 带层序编号和岩石类型信息的Polygon（必须的）

Table

geol_clip

FID	Shape	gml_id	objectid	lithstrtno	code	unitname	gswastatus	rank
0	Polygon	geol_500k.15789	15791	2258	A-HAm-cib	Marra Mamba Iron Formation	Formal	Formation
1	Polygon	geol_500k.15268	15270	4124	A-HAu-xsl-ci	Mount McRae Shale and Mount Sylvia Formation	Informal	Formation
2	Polygon	geol_500k.15980	15982	4104	P_-HAo-ci	Boolgeeda Iron Formation	Formal	Formation
3	Polygon	geol_500k.15265	15267	4124	A-HAu-xsl-ci	Mount McRae Shale and Mount Sylvia Formation	Informal	Formation
4	Polygon	geol_500k.15792	15794	2257	A-HAd-kd	Wittenoom Formation	Formal	Formation
5	Polygon	geol_500k.6146	6146	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
6	Polygon	geol_500k.7277	7278	2219	A-FO-od	Fortescue Group	Informal	Formation
7	Polygon	geol_500k.6145	6145	2219	A-FO-od	Fortescue Group	Informal	Formation
8	Polygon	geol_500k.6144	6144	2219	A-FO-od	Fortescue Group	Informal	Formation
9	Polygon	geol_500k.8405	8406	2257	A-HAd-kd	Wittenoom Formation	Formal	Formation
10	Polygon	geol_500k.14339	14340	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
11	Polygon	geol_500k.14339	14340	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
12	Polygon	geol_500k.14339	14340	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
13	Polygon	geol_500k.14339	14340	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
14	Polygon	geol_500k.14339	14340	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
15	Polygon	geol_500k.14339	14340	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
16	Polygon	geol_500k.14339	14340	3368	A-FOj-xs-b	Jeerinah Formation	Formal	Formation
17	Polygon	geol_500k.14310	14311	4143	A-FOu-bbo	Bunjinah Formation	Formal	Formation

Group

(1) 带层序编号和岩石类型信息的Polygon（必须的）

Table

geol_clip

descriptn	parentcode	parentname
Chert banded iron-formation mudstone and siltstone; minor carbonate; metamorphosed	A-HAL-xkt-ci	Hamersley Group lower
Mudstone siltstone chert banded iron-formation and dolomite; metamorphosed	A-HAL-xkt-ci	Hamersley Group lower
Fine-grained finely laminated iron-formation mudstone siltstone and chert; metamorphosed	P_-HAU-xci-f	Hamersley Group upper
Mudstone siltstone chert banded iron-formation and dolomite; metamorphosed	A-HAL-xkt-ci	Hamersley Group lower
Thinly bedded dolomite and dolomitic shale with minor black chert shale banded iron formation and sandstone	A-HAL-xkt-ci	Hamersley Group lower
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Dolerite dyke or sill	A-FO-xb-s	Fortescue Group
Dolerite dyke or sill	A-FO-xb-s	Fortescue Group
Dolerite dyke or sill	A-FO-xb-s	Fortescue Group
Thinly bedded dolomite and dolomitic shale with minor black chert shale banded iron formation and sandstone	A-HAL-xkt-ci	Hamersley Group lower
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Siliciclastic sedimentary rocks mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks che	A-FOS5-xs-b	Fortescue Group sequence 5
Pillowed and massive basaltic flows; basaltic breccia and basaltic volcanic sandstone; minor chert; amygdaloidal	A-FOS4-xbo-bbo	Fortescue Group sequence 4

code

(1) 带层序编号和岩石类型信息的Polygon（必须的）

Table

geol_clip

	rocktype1	lithname1	qualifier1	qualifier2	mixedrock	rocktype2
	sedimentary other chemical or biochemical	iron formation	banded			
	sedimentary siliciclastic	siltstone/mudstone			Mixed	sedimentary other chemical or biochemical
	sedimentary other chemical or biochemical	iron formation				
	sedimentary siliciclastic	siltstone/mudstone			Mixed	sedimentary other chemical or biochemical
	sedimentary carbonate	dolostone/dolomite				
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	igneous mafic intrusive	dolerite				
	igneous mafic intrusive	dolerite				
	igneous mafic intrusive	dolerite				
	sedimentary carbonate	dolostone/dolomite				
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	sedimentary siliciclastic				Mixed	igneous mafic volcanic
	igneous mafic volcanic	basalt	pillowed			

(1) 带层序编号和岩石类型信息的Polygon（必须的）

Table

geol_clip

lithname2	mixedqual1	mixedqual2	wastraunit	supersuite	suite	supergroup	group_	subgroup
				0		Mount Bruce Supergroup	Hamersley Group	Hamersley Group lower
iron formation				0		Mount Bruce Supergroup	Hamersley Group	Hamersley Group lower
				0		Mount Bruce Supergroup	Hamersley Group	Hamersley Group upper
iron formation				0		Mount Bruce Supergroup	Hamersley Group	Hamersley Group lower
				0		Mount Bruce Supergroup	Hamersley Group	Hamersley Group lower
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	
				0		Mount Bruce Supergroup	Fortescue Group	
				0		Mount Bruce Supergroup	Fortescue Group	
				0		Mount Bruce Supergroup	Hamersley Group	Hamersley Group lower
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 5
				0		Mount Bruce Supergroup	Fortescue Group	Fortescue Group sequence 4

(1) 带层序编号和岩石类型信息的Polygon（必须的）

formation	member	bed	state	watectunit	ssuite_tec	suite_tec
Marra Mamba Iron Formation			Western Australia	West Australian Craton		
Mount McRae Shale and Mount Sylvia Formation			Western Australia	West Australian Craton		
Boolgeeda Iron Formation			Western Australia	West Australian Craton		
Mount McRae Shale and Mount Sylvia Formation			Western Australia	West Australian Craton		
Wittenoom Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
			Western Australia	West Australian Craton		
			Western Australia	West Australian Craton		
			Western Australia	West Australian Craton		
Wittenoom Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
Jeerinah Formation			Western Australia	West Australian Craton		
Pupiinah Formation			Western Australia	Large igneous provinces a	Fortescue Large Ig	

Supergroup – group – formation – member -bed

(1) 带层序编号和岩石类型信息的Polygon（必须的）

ssuite_tec	suite_tec	craton	superterra	craton_ter	domain_	greenstone	superbasin
Fortescue Large Ig							

(1) 带层序编号和岩石类型信息的Polygon（必须的）

basin	subbasin	subbasin_e	orogen	province	prov_tzone
Hamersley Basin			Capricorn Orogen		
Hamersley Basin			Capricorn Orogen		
Hamersley Basin			Capricorn Orogen		
Hamersley Basin			Capricorn Orogen		
Hamersley Basin			Capricorn Orogen		
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				
Fortescue Basin					
Fortescue Basin					
Fortescue Basin					
Hamersley Basin			Capricorn Orogen		
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				
Fortescue Basin	Northeast Pilbara Sub-basin; Northwest Pilbara Sub				

(1) 带层序编号和岩石类型信息的Polygon（必须的）

ageto	max_age_ma	maxuncerty	min_age_ma	minuncerty	max_age_da	min_age_da	extract_da	shape_leng
Neoarchean	2629		2597	5	Inferred	Isotopic	2016-06-30	.039055
Neoarchean	2541		2501		Inferred	Inferred	2016-06-30	.035313
Paleoproterozoic	2445	5	2445		Isotopic	Inferred	2016-06-30	.092180
Neoarchean	2541		2501		Inferred	Inferred	2016-06-30	.152647
Neoarchean	2597	5	2504		Isotopic	Inferred	2016-06-30	.261429
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	.146706
Neoarchean	2775		2629		Inferred	Inferred	2016-06-30	.041118
Neoarchean	2775		2629		Inferred	Inferred	2016-06-30	.171699
Neoarchean	2775		2629		Inferred	Inferred	2016-06-30	.158809
Neoarchean	2597	5	2504		Isotopic	Inferred	2016-06-30	.546847
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	14.712743
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	14.712743
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	14.712743
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	14.712743
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	14.712743
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	14.712743
Neoarchean	2713		2629	5	Inferred	Isotopic	2016-06-30	14.712743
Neoarchean	2718		2715		Inferred	Inferred	2016-06-30	11.920568

shape_area

(2) 断层多段线（必须的）

faults_clip.shp

Table

faults_clip

FID	Shape	gml_id	objectid	feature	type	fname	code	dip	dip_est	dip_dir
0	Polyline	linear_500k.7344	7344	Fault or shear zone, major	exposed	None		90	-999	45
1	Polyline	linear_500k.7436	7436	Fault or shear zone, major	exposed	None		90	-999	45
2	Polyline	linear_500k.7439	7439	Fault or shear zone, major	exposed	None		90	-999	45
3	Polyline	linear_500k.5471	5471	Fault or shear zone	exposed	None		90	-999	45
4	Polyline	linear_500k.962	962	Fault or shear zone	exposed	None		90	-999	45
5	Polyline	linear_500k.2229	2229	Fault or shear zone	exposed	None		90	-999	45
6	Polyline	linear_500k.2235	2235	Fault or shear zone	exposed	None		90	-999	45
7	Polyline	linear_500k.2248	2248	Fault or shear zone	exposed	None		90	-999	45
8	Polyline	linear_500k.2843	2843	Fault or shear zone	exposed	None		90	-999	45
9	Polyline	linear_500k.2997	2997	Fault or shear zone	exposed	None		90	-999	45
10	Polyline	linear_500k.3496	3496	Fault or shear zone	exposed	None		90	-999	45
11	Polyline	linear_500k.3498	3498	Fault or shear zone	exposed	None		90	-999	45
12	Polyline	linear_500k.5252	5252	Fault or shear zone	exposed	None		90	-999	45
13	Polyline	linear_500k.5298	5298	Fault or shear zone	exposed	None		90	-999	45
14	Polyline	linear_500k.5475	5475	Fault or shear zone	exposed	None		90	-999	45
15	Polyline	linear_500k.5484	5484	Fault or shear zone	exposed	None		90	-999	45

(2) 断层多段线（必须的）

faults_clip.shp

plunge	plunge_est	plunge_dir	max_age_ev	min_ag	symbol	extract_da	shape_leng	fdipest_va	f_length
0					Fault or shear zone, majo	2016-06-29	.696075	None	2013.825012
0					Fault or shear zone, majo	2016-06-29	.215472	None	20398.167266
0					Fault or shear zone, majo	2016-06-29	.344530	None	35247.789929
0					Fault or shear zone; expo	2016-06-29	.022973	None	2363.15637
0					Fault or shear zone; expo	2016-06-29	.027184	None	2805.655743
0					Fault or shear zone; expo	2016-06-29	.058889	None	3602.300744
0					Fault or shear zone; expo	2016-06-29	.191623	None	16771.902009
0					Fault or shear zone; expo	2016-06-29	.068989	None	7375.732544
0					Fault or shear zone; expo	2016-06-29	.209410	None	8401.232406
0					Fault or shear zone; expo	2016-06-29	.144270	None	14710.040274
0					Fault or shear zone; expo	2016-06-29	.212902	None	22078.032014
0					Fault or shear zone; expo	2016-06-29	.146143	None	15681.763068
0					Fault or shear zone; expo	2016-06-29	.033900	None	3484.327628
0					Fault or shear zone; expo	2016-06-29	.077828	None	822.382873
0					Fault or shear zone; expo	2016-06-29	.042940	None	4407.264293
0					Fault or shear zone; expo	2016-06-29	.028535	None	2980.007179
0					Fault or shear zone; expo	2016-06-29	.030849	None	3275.664409
0					Fault or shear zone; expo	2016-06-29	.074018	None	7519.876538
0					Fault or shear zone; expo	2016-06-29	.037058	None	3960.975363
0					Fault or shear zone; expo	2016-06-29	.063097	None	6746.415398
0					Fault or shear zone; expo	2016-06-29	.023527	None	2522.451375
0					Fault or shear zone; expo	2016-06-29	.039098	None	2572.026858
0					Fault or shear zone; expo	2016-06-29	.062307	None	2826.476157
0					Fault or shear zone; expo	2016-06-29	.089243	None	7145.334682
0					Fault or shear zone; expo	2016-06-29	.043725	None	4494.784666
0					Fault or shear zone; expo	2016-06-29	.142243	None	786.143534

(3) 层理倾角（dip和dip方向的点）（必须的）

Table

structure_clip

FID	Shape	dip	feature	structypei	azimuth2	index_righ	gml_id	objectid
0	Point	40	Bed	BEIN	385	44	geol_500k.7875	7876
1	Point	60	Bed	BEIN	365	31	geol_500k.16188	16190
2	Point	35	Bed	BEIN	435	31	geol_500k.16188	16190
3	Point	45	Bed	BEIN	180	59	geol_500k.16613	16615
4	Point	65	Bed	BEIN	385	58	geol_500k.16190	16192
5	Point	60	Bed	BEIN	370	31	geol_500k.16188	16190
6	Point	40	Bed	BEIN	360	11	geol_500k.14339	14340
7	Point	33	Bed	BEIN	380	18	geol_500k.7579	7580
8	Point	58	Bed	BEIN	368	58	geol_500k.16190	16192
9	Point	62	Bed	BEIN	378	31	geol_500k.16188	16190
10	Point	60	Bed	BEIN	388	31	geol_500k.16188	16190
11	Point	18	Bed	BEIN	245	31	geol_500k.16188	16190
12	Point	55	Bed	BEIN	365	31	geol_500k.16188	16190
13	Point	30	Bed	BEIN	335	58	geol_500k.16190	16192
14	Point	70	Bed	BEIN	400	19	geol_500k.9861	9862
15	Point	50	Bed	BEIN	190	22	geol_500k.14368	14369
16	Point	55	Bed	BEIN	190	22	geol_500k.14368	14369
17	Point	28	Bed	BEIN	150	17	geol_500k.14310	14311
18	Point	30	Bed	BEIN	420	31	geol_500k.16188	16190
19	Point	29	Bed	BEIN	235	31	geol_500k.16188	16190
20	Point	28	Bed	BEIN	110	17	geol_500k.14310	14311
21	Point	50	Bed	BEIN	190	22	geol_500k.14368	14369
22	Point	55	Bed	BEIN	190	22	geol_500k.14368	14369
23	Point	63	Bed	BEIN	355	43	geol_500k.15988	15990
24	Point	25	Bed	BEIN	105	28	geol_500k.16191	16193
25	Point	21	Bed	BEIN	435	31	geol_500k.16188	16190
26	Point	28	Bed	BEIN	110	22	geol_500k.14368	14369
27	Point	25	Bed	BEIN	385	18	geol_500k.7579	7580
28	Point	15	Bed	BEIN	330	11	geol_500k.14339	14340
29	Point	15	Bed	BEIN	330	11	geol_500k.14339	14340
30	Point	55	Bedding, show		368	31	geol_500k.16188	16190
31	Point	40	Bedding, show		370	31	geol_500k.16188	16190

4 (0 out of 118 Selected)

structure_clip

structure_clip.shp

(4) 矿物沉积层（可选）

mindeps_clip.shp

Table

mindeps_clip

FID	Shape	gml_id	site_code	site_title	short_name	site_commo	site_type_	
0	Point	mindeps_2018_28350.901	S0001175	Beasley River Limonites	Beasley R	Fe	Deposit	Unspecifie
1	Point	mindeps_2018_28350.909	S0001184	Brockman 2 - Pit 4 (Brockman)	Brockman 2 Pit 4	Fe	Mine	Openpit
2	Point	mindeps_2018_28350.910	S0001185	Brockman 3 (Brockman)	Brockman 3	Fe	Deposit	Unspecifie
3	Point	mindeps_2018_28350.911	S0001186	Brockman 1 Iron	Brockman 1	Fe	Deposit	Unspecifie
4	Point	mindeps_2018_28350.1070	S0001387	Turner Syncline Section 17 Main West	Sec 17 Main West	Fe	Mine	Openpit
5	Point	mindeps_2018_28350.1071	S0001388	Turner Syncline Section 10	Turner Syncline Sec 10	Fe	Mine	Openpit
6	Point	mindeps_2018_28350.1223	S0001587	Brockman 4 - Pit 3 Central	Pit 3 - Central	Fe	Mine	Openpit
7	Point	mindeps_2018_28350.1224	S0001588	Brockman Syncline Resources Group	Brockman Syncline	Fe	Mine	Openpit
8	Point	mindeps_2018_28350.1234	S0001599	Rocklea South	Rocklea South	Fe	Deposit	Unspecifie
9	Point	mindeps_2018_28350.2306	S0002943	Brockman 543E	Brockman 543E	Fe	Deposit	Unspecifie
10	Point	mindeps_2018_28350.2307	S0002944	Brockman 2 Group	Brockman 2 Detr	Fe	Mine	Openpit
11	Point	mindeps_2018_28350.2308	S0002945	Brockman 4 - Deposit N	Brockman 4 N	Fe	Deposit	Unspecifie
12	Point	mindeps_2018_28350.2309	S0002946	Boolgeeda	Boolgeeda	Fe	Deposit	Unspecifie
13	Point	mindeps_2018_28350.2313	S0002950	Brockman 3 (Marra Mamba)	Brockman 3 Marra Mamba	Fe	Deposit	Unspecifie
14	Point	mindeps_2018_28350.2324	S0002964	Turner Syncline B1 Main	B1 Main	Fe	Mine	Openpit
15	Point	mindeps_2018_28350.2325	S0002965	Turner Syncline B26	Turner Syncline B26	Fe	Deposit	Unspecifie
16	Point	mindeps_2018_28350.2342	S0002982	Turner Syncline West Resource Estimat	Turner Syncline W	Fe	Mine	Openpit
17	Point	mindeps_2018_28350.2511	S0003220	Hardey River Sand 1	Hardey River Sand 1	Sd, Gvl	Mine	Openpit
18	Point	mindeps_2018_28350.2677	S0003430	Brockman 4 - Deposit M	Brockman 4 M	Fe	Deposit	Unspecifie
19	Point	mindeps_2018_28350.2678	S0003431	Brockman 4 - Deposit O	Brockman 4 O	Fe	Deposit	Unspecifie
20	Point	mindeps_2018_28350.2679	S0003432	Brockman 4 - Deposit Q	Brockman 4 Q	Fe	Deposit	Unspecifie
21	Point	mindeps_2018_28350.2680	S0003433	Brockman 4 - Deposit R	Brockman 4 R	Fe	Deposit	Unspecifie
22	Point	mindeps_2018_28350.3444	S0004387	Brockman 2 - Pit 1 (Detritals)	Brockman 2 Pit 1	Fe	Mine	Openpit

(5) 褶皱轴向轨迹层（可选）

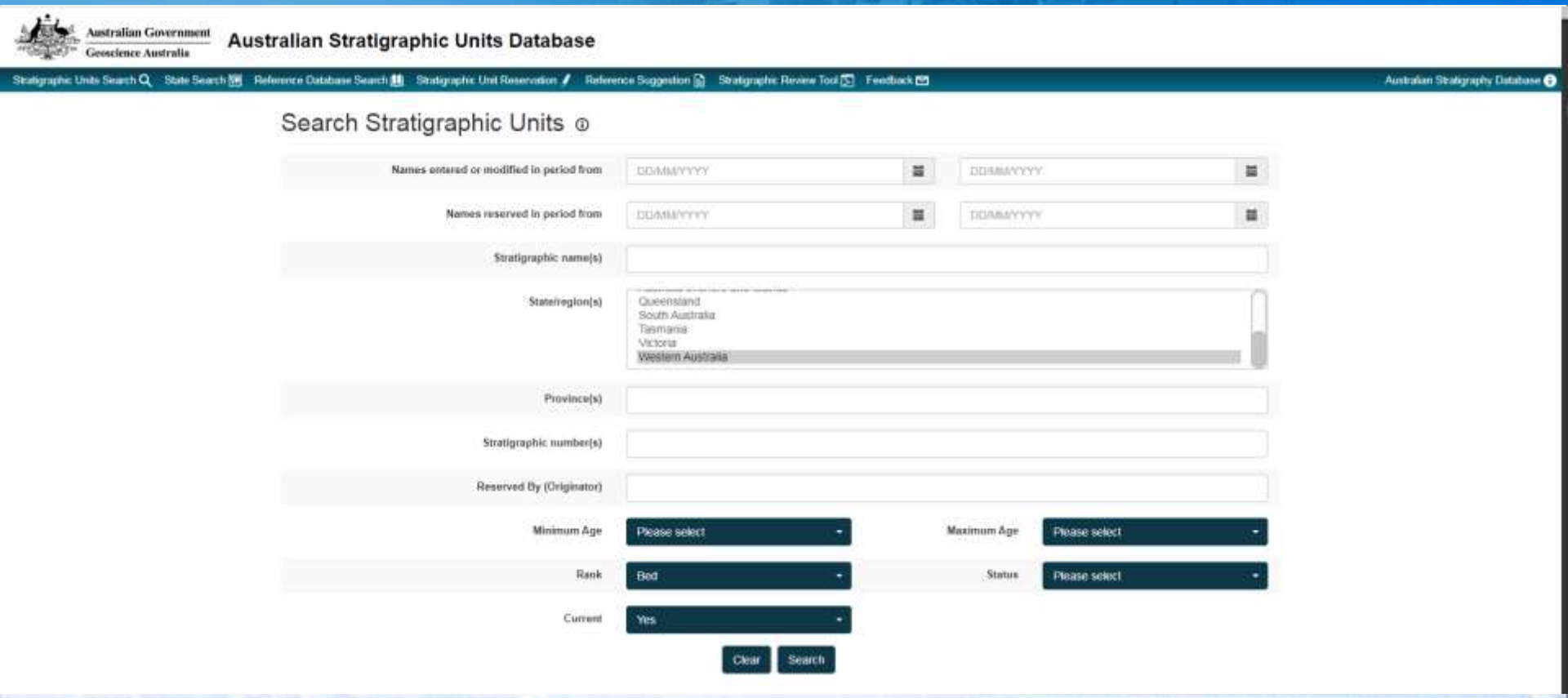
Table

folds_clip

FID	Shape	gml_id	objectid	feature	type	fname	code
0	Polyline	linear_500k.11202	11202	Fold axial trace	anticline, exposed	Rocklea Dome	
1	Polyline	linear_500k.13532	13532	Fold axial trace	syncline, exposed	Boolgeeda Syncline	
2	Polyline	linear_500k.13533	13533	Fold axial trace	syncline, exposed	Boolgeeda Syncline	
3	Polyline	linear_500k.13632	13632	Fold axial trace	syncline, exposed	Panhandle Syncline	
4	Polyline	linear_500k.13665	13665	Fold axial trace	syncline, exposed	Turner Syncline	
5	Polyline	linear_500k.9633	9633	Fold axial trace	anticline, exposed		
6	Polyline	linear_500k.11909	11909	Fold axial trace	syncline, exposed		

folds_clip

dip	dip_est	dip_dir	plunge	plunge_est	plunge_dir	max_age_ev	min_age_ev	symbol	extract_da
0			0					Fold axial trace; anticline, exposed	2016-06-29
0			0					Fold axial trace; syncline, exposed	2016-06-29
0			0					Fold axial trace; syncline, exposed	2016-06-29
0			0					Fold axial trace; syncline, exposed	2016-06-29
0			0					Fold axial trace; syncline, exposed	2016-06-29
0			0					Fold axial trace; anticline, exposed	2016-06-29
0			0					Fold axial trace; syncline, exposed	2016-06-29



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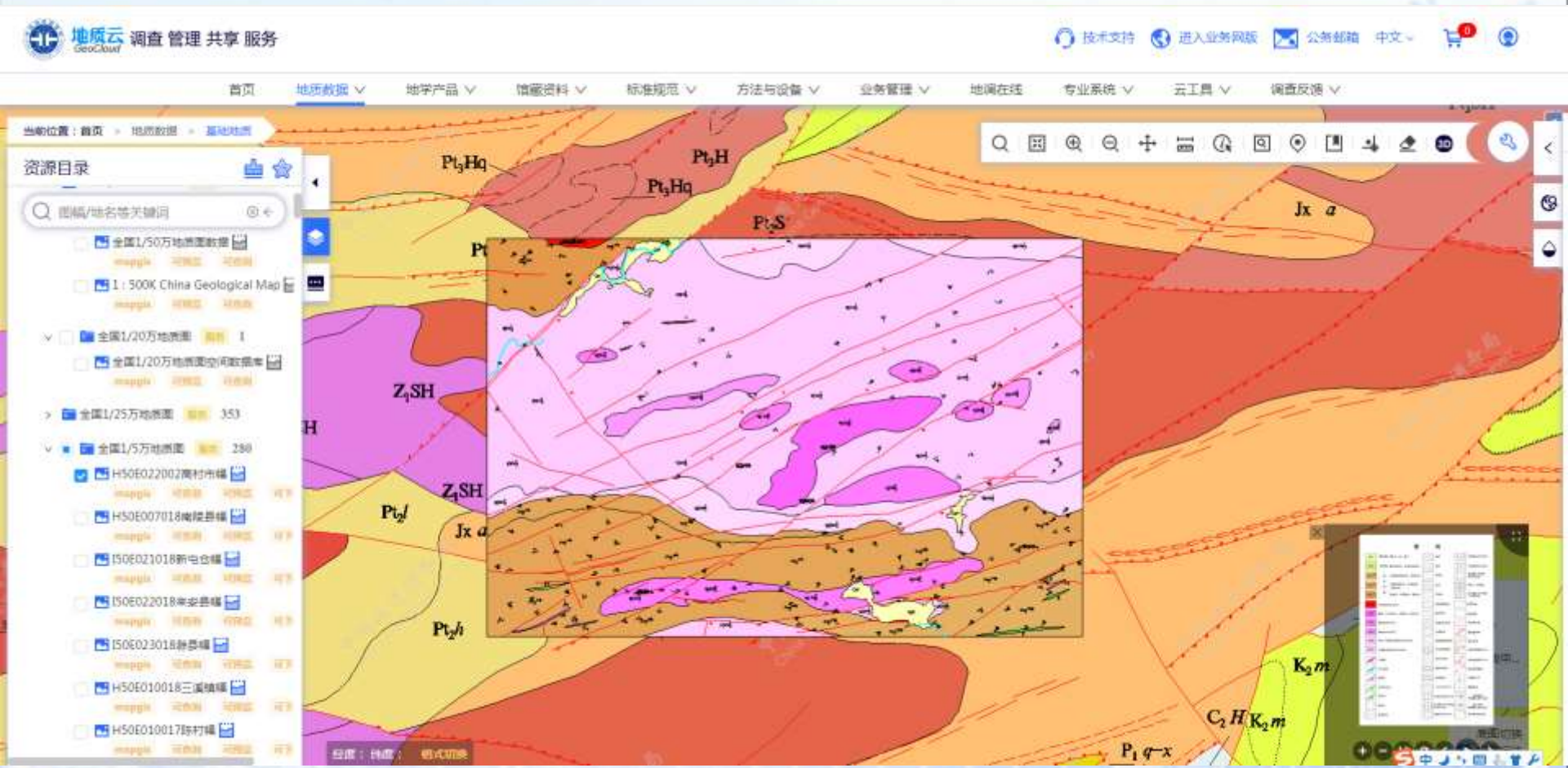
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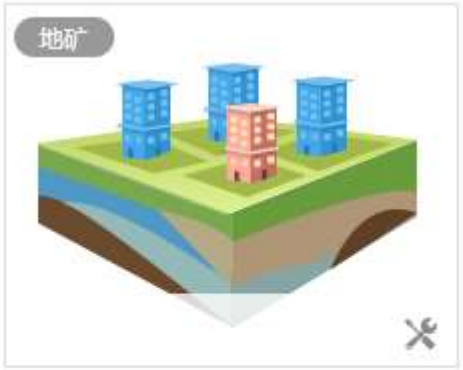

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