

地之道(GeoTaos/GeoTaos_Map)--使用手册(第1.0版)

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0. Introduction

GeoTaos_Map为简易GIS平台软件,对DEM等地理信息进行可视化同时通过嵌入机能模块的方式提供各种数据处理功能。GeoTaos用于计算断层位错,地下注水及水库蓄水等引起的地壳变形及库伦应力变化。GeoTaos_Map与GeoTaos均已嵌入了完全相同的地震活动性综合分析模块Dao_Seismicity。GeoTaos_Map可作为通用性地震活动综合统计分析软件。GeoTaos可用于定量分析地下抽水注水,水库蓄水过程等对附近断层的作用并研究其对区域地震活动的可能影响。

本使用手册主要对嵌入GeoTaos_Map及GeoTaos的地震活动性综合分析方法进行简要说明。本第1.0版为快速响应部分用户要求而提供,完成度尚低,有待陆续完善。

用户可进入开发者个人公式网业 <http://staff.aist.go.jp/xinglin-lei/> 下载 GeoTaos_Map.exe 或 GeoTaos.exe. 初次用户可以从[File]菜单联结相关在线实例数据库。完整的软件包包括一整套国内外有关单位公开的数据库，如地形DEM数据，活动断层数据，地震目录，典型地球模型及其格林函数等。数据量大，将通过讲习班等方式无偿提供。

GeoTaos_Map is a simple GIS software for visualization and data processing of GIS data. GeoTaos is an interactive software for calculation and visualization of Coulomb failure stress change (dCFS) due to fault slip, underground injection, and impoundment of dam. GeoTaos_Seismicity provides integrated utilities, which are embedded within GeoTaos_Map and GeoTaos, for seismic data process including statistical approaches of seismic activity, correlation between tidal force and seismicity and so on. GeoTaos_Map, GeoTaos, and GeoTaos::Seismicity are side productions of our ongoing researches and will be updated with stoping. However, there is no any time table for implementation.

GeoTaos_Map and GeoTaos can be executed alone on PCs with a Windows operation system. OpenGL (available in Windows systems by default) is fully utilized for 3D visualization. GeoTaos_Map and GeoTaos and all embedded programs are developed using VC++ with Object-Oriented-Programming architectures and thus is ready for further extension and modification.

Since we are releasing these programs to the public free of any charge, we shall be glad if anyone who has downloaded and used it for his/her work acknowledges our contribution by referring to the following articles.

GeoTaos_Map and GeoTaos are distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY.

0.1. References

正式使用相关数据时请引用:

活动断层数据: 邓起东主编, 1:400,000中国活动构造图, 地震出版社, 2007.

地震目录: 中国地震台网中心, USGS等。

软件及算法: 由于相关软件及模块为作者长年研究工作的副产品,非商业性软件,请适当引用以下文献。

雷兴林, 马胜利, 苏金蓉, 王小龙, 2013. 汶川地震后中下地壳及上地幔的粘弹性效应引起的应力变化与芦山地震的发生机制, 地震地质, 35, 2, 411-422, doi:10.3969/j.issn.0253-4967.2013.02.01

Lei Xinglin, Ma Shengli, Su Jinrong, Wang Xiaolong, 2013. Inelastic triggering of the 2013 Mw6.6 Lushan earthquake by the 2008 Mw 7.9 Wenchuan earthquake, Seismology and Geology, 35, 2, 411-422, doi:10.3969/j.issn.0253-4967.2013.02.01

Lei X.-L., S. Ma, W. Chen, C. Pang, J. Zeng, B. Jiang, 2013. A detailed view of the injection-induced seismicity in a natural gas reservoir in Zigong, Southwestern Sichuan Basin, China, J. Geophys. Res. Solid Earth, 118, doi:10.1002/jgrb.50310.

Lei X.-L., C. Xie, B. Fu, 2011. Remotely triggered seismicity in Yunan, Southwestern China following the 2004 Mw9.3 Sumatra earthquake J. Geophys. Res., 116, B08303, doi:10.1029/2011JB008245. (The earliest 50 quickbirds can use the login ID and password, 03724449, to access the article from <http://www.agu.org/journals/jb/jb1108/2011JB008245/>).

Lei X.-L., Possible roles of the Zipingpu Reservoir in triggering the 2008 Wenchuan earthquake, *Journal of Asian Earth Sciences* (2010), doi:10.1016/j.jseaes.2010.05.004.

雷兴林, 马胜利, 闻学泽, 苏金蓉, 杜 方. 2008. 地表水体对断层应力与地震时空分布影响的综合分析——以紫坪铺水库为例. *地震地质*, 30(4): 1046-1064.

Lei X L, Yu G, Ma S, Wen X, Wang Q, 2008. Earthquakes induced by water injection at ~3 km depth within the Rongchang gas field, Chongqing, China. *J. Geophys. Res.* 113, B10310, doi:10.1029/2008JB005604.

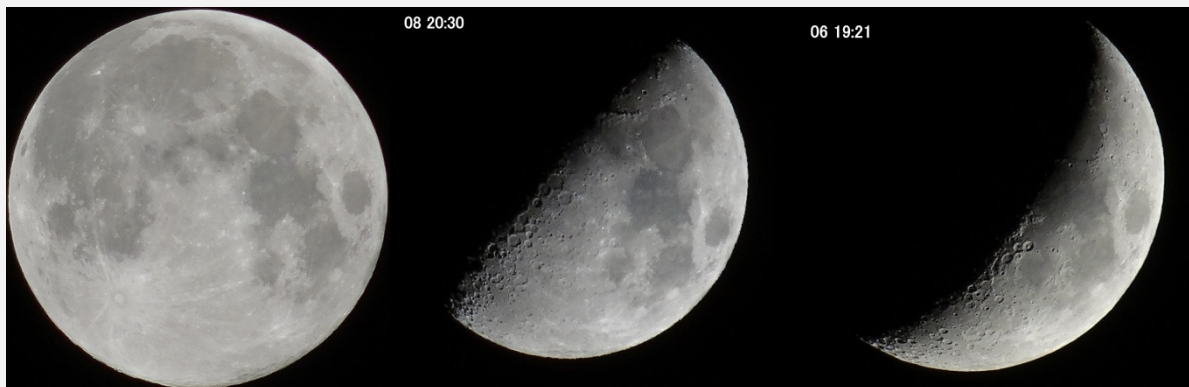
Lei X L and Satoh T., 2007. Indicators of critical point behavior prior to rock failure inferred from pre-failure damage. *Tectonophysics*, 431: 97-111.

0.2 系统要求及其它

GeoTaos_Map与GeoTaos均可在任何安装了MS-Windows2000+的PC环境下单独运行。由于用户界面较多, 最好成绩使用尽可能大的全彩色显示屏。建议像素大于1600X1200, 两个以上显示屏。

公布GeoTaos_Map与GeoTaos目的是希望这些软件有用。由于在诸多计算中模型及参数选择的妥当性由使用者支配, 有些结果可能由于参数选择不当而错误。作者对使用相应软件得到结果的正确性没有任何保证。同时对由于使用相应软件导致计算机操作系统死机及可能引起的损失也不负任何责任。

观测数据只是真实在低维空间的一个投影, 必然是片面的。请看以下一组月亮照片, 中秋圆月阳光直到月面, 月亮显得平台如镜, 弦月时月残了但陨石坑却很清晰。我们对地质现象的观测又何尝不是这样。地之道系列软件对观测数据进行数值处理, 必须对其结果要进行全方位的分析, 才能获得正确的认识论。任何用户须切记!

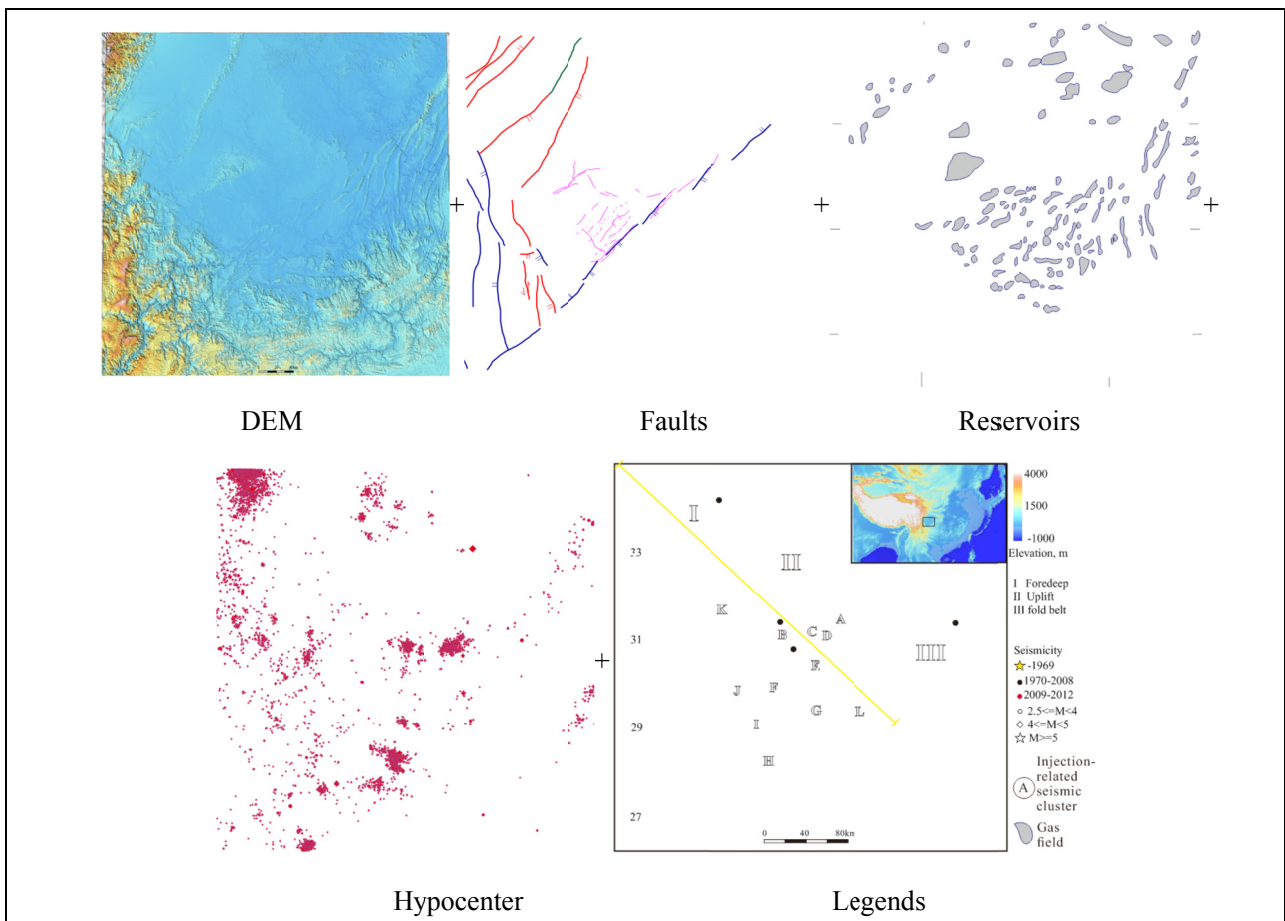


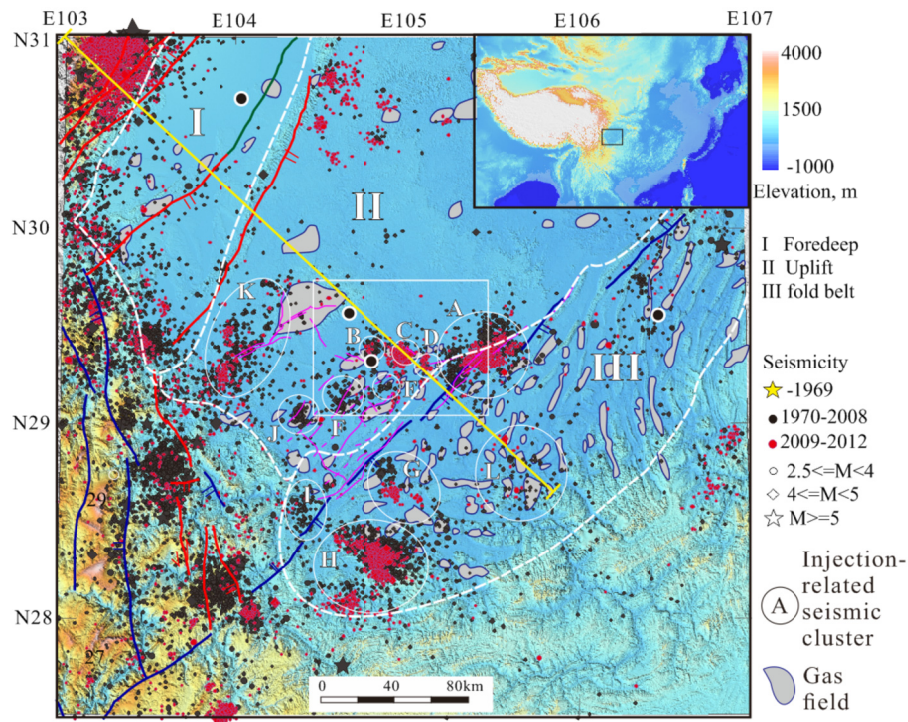
0.3 Output

All graphical outputs (except image in 3D view) can be copied with either DIB or WMF/EMF format to the Windows clipboard and pasted to commercial graphic editor software such as Core Draw. For line graph, it is suggested to save a graph to a diskette file in WMF and then imports it from Core Draw. Follows are hints for

making high quality figures using the multi-layer structure of GeoTaoS and Core Draw. Figure-1 of Lei et al. (JGR, 2013) is used as an example.

- 1) Turns off all layers showing only the DEM layer. Copy the shaded map as DIB and paste it to a Paint Shop software to crop the image for removing margins. Then copy and paste the image to Core Draw as a layer named as "DEM".
- 2) Turns off all layers showing only the fault layer. Save the map to a WMF file and then import the file from Core Draw. Thus the fault traces are vectors in Core Draw and one change its properties such as color, line wideness, and so on. Copy (from GeoTaoS as WMF) and paste (to Core Draw) works, but the lines will show zigzags.
- 3) Similar way for reservoir layer.
- 4) Show only earthquake hypocenters, this time one use Copy (as WMF) and paste method.
- 5) You can add some legends and other marks in new layers from Core Draw





An example of high quality figure (Lei et al., 2013) mad by GeoTaos + Core Draw

1. Fundamental notes

1.1 GeoTaos::Seismicity =>[GeoTaos Seismicity.pdf](#)

1.2 GeoTaos::AftSim =>[GeoTaos Aftsim.pdf](#)

1.3 GeoTaos::CAP =>[GeoTaos CAP.pdf](#)

1.4 GeoTaos::Tides =>[GeoTaos Tide.pdf](#)

1.5 GeoTaos::CFS =>[GeoTaos CFS.pdf](#)

2. User's Guide

2.1 Supported Files =>[GeoTaos Files.pdf](#)

2.2 GeoTaos_Map =>[GeoTaos Map/GeoTaos Map man.pdf](#)

2.3 GeoTaos::Seismicity =>[GeoTaos Seismicity/GeoTaos Seis man.pdf](#)

2.4 GeoTaos::Seismicity =>[GeoTaos Seismicity/GeoTaos Seis Reloc.pdf](#)

2.4 GeoTaos::Earth =>[GeoTaos/GeoTaos Earth.pdf](#)