A Big Earth Data Platform for Three Poles

**Numerical simulation map of the influence of thermal state of overlying continental plate on subduction dynamics**

1、Description

Main contents: the dynamic process of ocean continent subduction not only depends on the properties of subducted oceanic plate, but also depends on the properties and state of overlying continental plate, In particular, little is known about the influence of the thermal state of the continental lithosphere on the subduction dynamics. Using two-dimensional thermal mechanical numerical simulation method, the performance of the continental lithosphere with different thermal states in the ocean continent subduction process is discussed The main results and implications are as follows: (1) when the geothermal gradient of the overlying continental crust is low (10 ~ 15 ℃ km − 1), the oceanic plate begins to subduct at a low angle, and then, driven by its own negative buoyancy, the subduction angle gradually increases and rapidly retreats, forming an ocean basin with a width of 600 ~ 1100km, With the continuous retreat of the trench, the horizontal deviatoric stress in the overlying continental plate alternates between positive and negative, lithospheric thinning mainly occurs near the subduction zone, and the surface has obvious extension and subsidence. (2) when the geothermal gradient of the overlying continental crust is higher (greater than 15 ℃ km − 1), the retreat of the oceanic plate promotes the strong extension of the overlying continental plate, The horizontal deviatoric stress in the overlying continental plate is characterized by compression and then tension, resulting in the surface uplift and then slow subsidence. (3) increasing the age of the oceanic lithosphere will accelerate the retreat process of the trench, (4) the movement of the overlying continental plate towards the trench will slow down the retreat of the trench. When the geothermal gradient of the crust is greater than 17.5 ℃ km − 1, the hot continental crust will collapse and thrust to the subducted oceanic lithosphere, This process will also slow down the retreat of the trench. The spatial changes of the subduction process of the paleo Western Pacific plate in the early Cretaceous and their possible influence on the tectonic evolution of the East Asian basin
It is considered that the development of the wide rift basin system in the Amur super terrane in the early Cretaceous is related to the slow retreat of the trench and the collapse of the hot crust; The relatively cold North China Craton lithosphere retreated rapidly due to oceanic trench, resulting in the development of passive rift basins on the continental margin

2、Keywords

Theme：numerical simulation,Tectonics,Rift basin,Trench retreat
Discipline：Solid earth
Places：Global
Time：None

3、Data details

1.Scale：None

2.Projection：

3.Filesize：1.64MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：55.0 | - |
| west：100.0 | - | east：135.0 |
| - | south：30.0 | - |

5、Time frame:2021-06-15 16:00:00+00:00--2021-06-16 16:00:00+00:00

6、Reference method

References to data:

CHEN Lin, TANG Jiaxuan. Numerical simulation map of the influence of thermal state of overlying continental plate on subduction dynamics. A Big Earth Data Platform for Three Poles, doi:10.11888/Geo.tpdc.2715202021

References to articles:

唐嘉萱, 陈林, 孟庆任, 武国利. (2020). 上覆大陆板块热状态对俯冲动力学的影响: 二维热力学模拟. 中国科学: 地球科学, 50(10), 1424–1444, doi: 10.1360/SSTe-2019-0283

Tang, J., Chen, L., Meng, Q., & Wu, G. (2020). The effects of the thermal state of overriding continental plate on subduction dynamics: Two-dimensional
thermal-mechanical modeling. Science China Earth Sciences, 63(10), 1519–1539, https://doi.org/10.1007/s11430-019-9624-1

7、Supporting project information

The deep process and resource effect of major geological events in Yanshan period

8、Data resource provider

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