China University of Geosciences

Center for Global Tectonics

Annual Newsletter and Field Meeting Announcement

CUGW Center for Global Tectonics

Feb. 1, 2016

Wuhan, China

Another year has passed, and we have finished our teaching, projects, reports, meetings, etc. Here in China it is time of the Spring Festival, or Chinese New Year, so the campus is quiet as the snow falls. Below is our annual newsletter for 2015, highlighting progress in the Center for Global Tectonics on research, new hires, meetings, the new laboratory construction, and publications. Importantly we also include an announcement for our Annual Summer Field Meeting, which this year will be in Turkey from May 23-June 1. Please see the attached announcement and reply as soon as possible because we can only accommodate 30 people on the field excursion, which promises to be an exciting and diverse trip.

Looking forward to seeing you all in 2016,

Tim Kusky

Director, Center for Global Tectonics

Research Highlights

Researchers in the center mainly focused on the three research topics this year: (1) Precambrian tectonic evolution; (2) Accretionary-collision orogenic belts and ophiolites; (3) Tibet Plateau tectonics. Principal members in the center have published 25 papers from 2014 to 2015 including 3 papers in T1 journals and 10 papers in T2 journals. There have been 15 new research projects funded in the center this year.

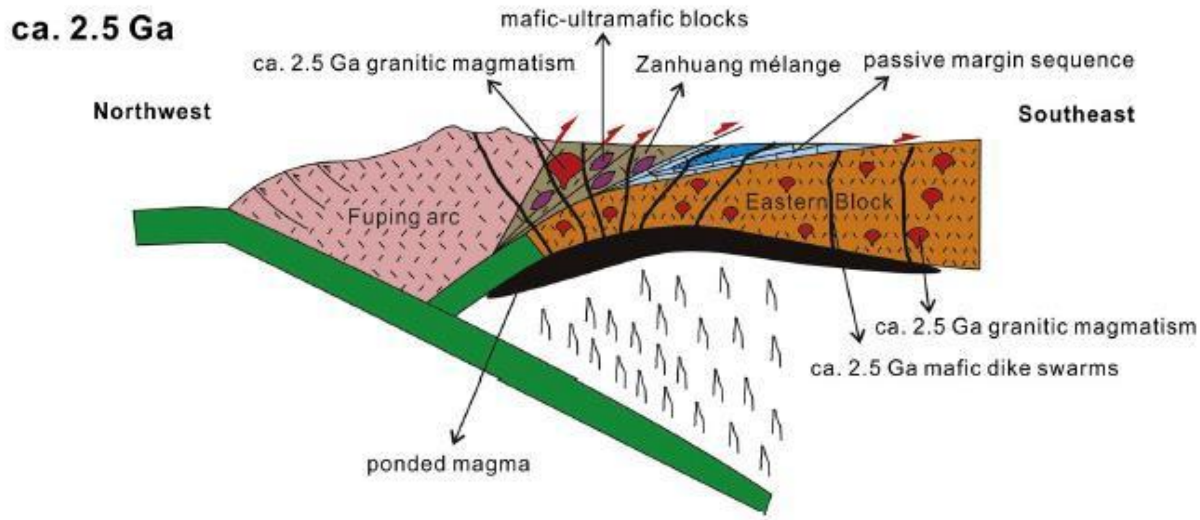
Topic 1: Precambrian tectonic evolution

1.1 Main research contents and progress

1.1.1 Precambrian tectonic evolution of North China Craton

The North China craton consists of the Eastern Block, Western Block, and the intervening Central Orogenic belt which contains at least two sutures. Significant progress was made on the easternmost circa 2.5 Ga Zanhuang-Zunhua suture, focused mainly on the structural relationships of different geological units, ages of plutons intruded into mélange associated with opening and closing of an Archean ocean along this belt, and petrogenesis of the Archean intrusive rocks that cut the mélange. We proposed that the Eastern Block and an arc terrane (Fuping terrane) in the COB collided prior to 2.5 Ga, forming the extensive mélange belt. A subduction polarity reversal event followed the arc-continent collision, causing additional deformation and forming the intrusive rocks that cut across the mélange and parts of the Eastern Block. The ocean that remained open behind the Fuping arc closed sometime between 2.4 and 2.1 Ga, causing additional deformation and amalgamating the Eastern and Western Blocks. From 1.9-1.85 Ga the craton experienced a craton wide granulite facies event. We relate this to a continent-continent collision on the north margin of the craton, probably related to when the North China Craton collided with the Columbia (Nuna) Supercontinent. These research results have been published in ***Lithos*** (2 papers, T2). We also initiated research on the Dengfeng greenstone belt and proposed that the sedimentary-volcanic rocks in the greenstone belt may represent a Neoarchean subduction-accretionary complex correlative with the Zanhuang Complex. The research results have been published in ***Precambrian Research*** (1 paper, T2).

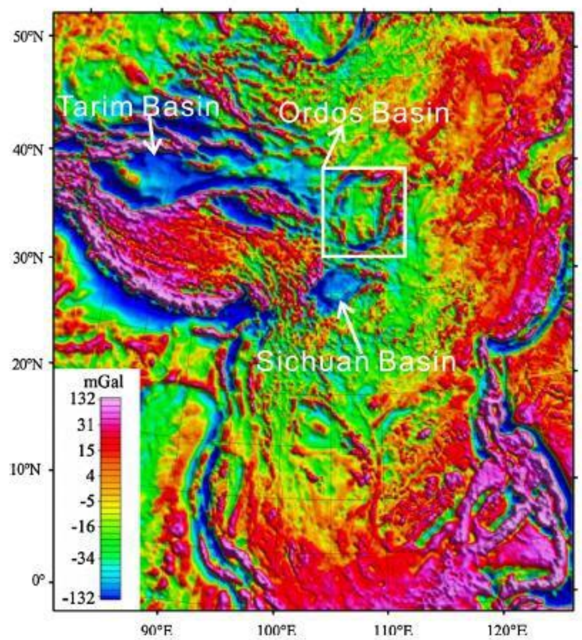
Contact: Wang Junpeng, Deng Hao



Model of interpreted geodynamic origin of the ca. 2.5 Ga magmatic event in the Central Orogenic Belt of the NCC. A new east-dipping reversed subduction happened at 2.5 Ga, following the collision between the Eastern Block of the NCC and the intra-oceanic arc terrane to the west. This east-dipping subduction polarity reversal event results in the melting of the enriched mantle, and then gives rise to the formation of the ca. 2.5 Ga mafic dikes and granites (including the Wangjiazhuang granite) of the Eastern Block.

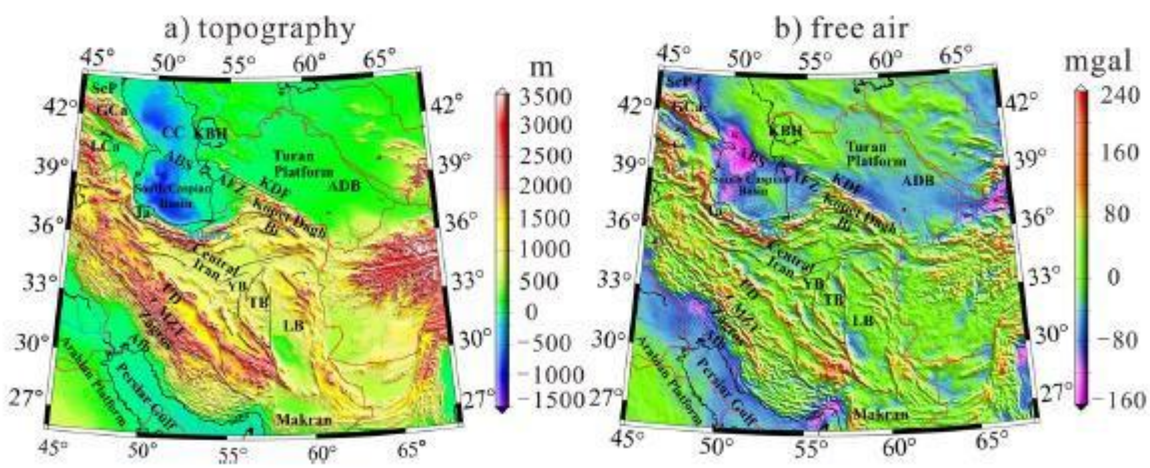
In addition, Kusky and Mooney (U.S. Geological Survey) studied the geological and geophysical characters of Ordos Block and found S-wave anomalies at different depths, in common with the Sichuan and Tarim Basins that are also underlain by cratonic crust. Seismic velocity sections show that the Ordos Block has thick crust, with the Moho deeper than 40 km. It is underlain by a denser lower crustal body with seismic velocities of 7.1 km/s which is characteristic of oceanic plateaus globally. Comparisons were made directly with the southern Caspian Sea, another trapped oceanic plateau in an orogenic belt, and the Wrangellia terrane, an oceanic plateau accreted to western North America. We proposed an hypothesis that the Ordos Basin had an origin as an oceanic plateau that accreted to the NCC, and later experienced different episodes of differentiation associated with later subduction and collisions. The formation of cratonic lithosphere by accretion of oceanic plateaus may be one mechanism to create stable cratons. These research results have been published in ***Earth and Planetary Science Letters*** (1 paper, T1).

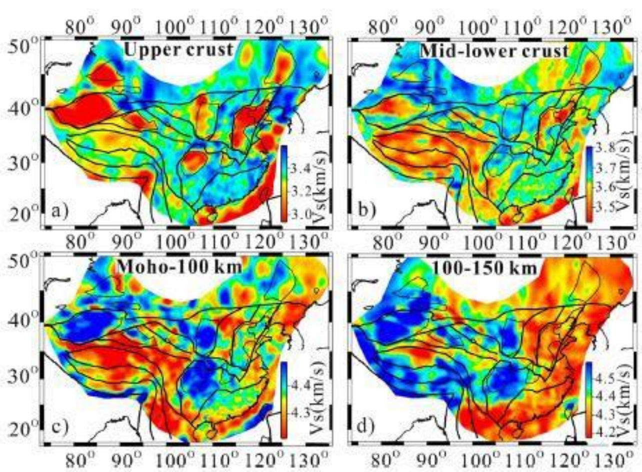
Contact: Tim Kusky, Walter Mooney



Map of free-air gravity anomalies in SE Asia (modified from Yang and Liang, 2011).

Topography and free-air gravity maps of the southern Caspian Sea and surrounding regions. Data to generate the topographic map is from the National Geophysical Data Center (NGDC; http:/ /www.ngdc .noaa .gov/) and the free air anomaly was calculated via the International Centre for Global Earth Models (ICGEM; http:/ /icgem .gfz-potsdam .de /ICGEM /ICGEM .html). Both maps were drawn using GMT (Generic Mapping Tools) software.





S-wave anomalies at different depths (modified from Bao et al., 2015). The Ordos Craton has a clear high-S-wave anomaly, in common with the Sichuan and Tarim Basins that are also underlain by cratonic crust. Panels a, b, c and d correspond to the depths upper crust (panel a), mid-lower crust (panel b), Moho-100 km (panel c), and 100–150 km below surface (panel d).

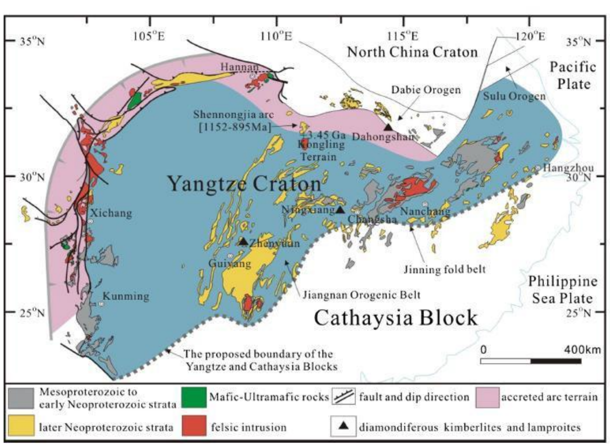
1.1.2 Precambrian tectonic evolution of the Yangtze Craton and Cathaysia Orogen

We documented Neoproterozoic (0.94-0.93 Ga) metamorphic events for the first time in the Miaowan ophiolite on the northern margin of the Yangtze craton, which provides important evidence for the final amalgamation of the basement of the Yangtze craton. We identified two stages of metabasite- ultrabasic rocks in the Miaowan ophiolitic complex; latest Mesoproterozoic (1.12-1.1 Ga) and Neoproterozoic (1.0-0.97 Ga), formed in different tectonic settings. In Cenxi, southeast Guangxi, early Paleozoic ophiolite remnants and high-Mg basaltic andesite and andesite has been recognized, which provides crucial evidence for the existence of Paleozoic ocean crust subduction-accretionary and collision-orogenesis in the Cathaysian terranes.

We studied the Archean-Paleoproterozoic high-grade metamorphic rocks in the core of the Huangling dome, the northern margin of Yangtze craton through detailed geological mapping, geochronology and geochemical methods. We found that the Paleoproterozoic mafic-ultramafic rocks in the volcano-sedimentary sequence formed in an arc environment above a subduction zone and we proposed that records of a Paleoproterozoic subduction-collision event are preserved in the Huangling dome on the northern margin of Yangtze craton. This research paper is about to be submitted to an international SCI journal (T2).

In addition, we describe the field relationships on the basis of geological mapping, then present detailed and systematic geochemical, geochronology and Sm-Nd isotopic investigations on these mafic-ultramafic rocks in the Jiangnan orogenic belt (JOB) between the Yangtze craton and Cathaysian terranes in South China. Geochemical signatures suggest that those rocks formed in an extensional arc environment, and the subduction may have continued to ca. 750 Ma in the western JOB, implying that the amalgamation event between the Yangtze craton and Cathaysian terranes was later than 750 Ma. This research has been published in ***Gondwana Research*** (T2).

Contact: Peng Songbai



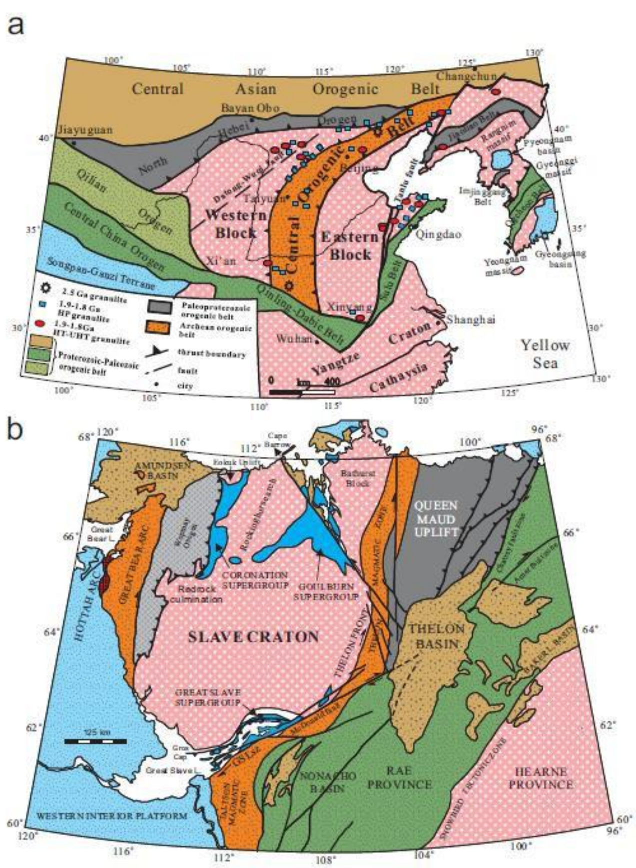
Map of the Yangtze craton showing areas discussed.

1.1.3 Comparative study of the North China Craton (NCC) and other cratons around the world

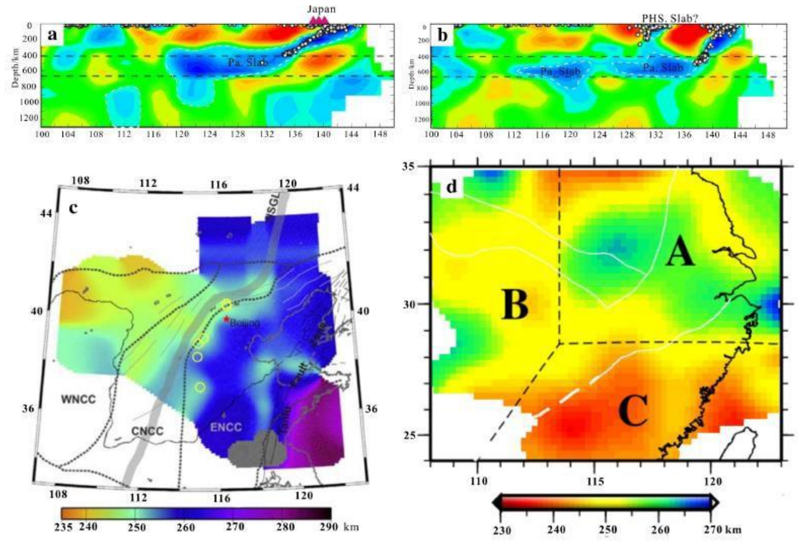
The presence or absence of a thick lithospheric root beneath the Yangtze Craton has been debated. We integrated and analyzed existing geological, geophysical and geochemical data for the first time and the results indicate that the Yangtze Craton has lost the eastern half of its root, much like the North China craton. The processes of destruction can be divided into Neo-proterozoic and Mesozoic stages. The major decratonization occurred in the Mesozoic, which is closely related to the subduction and rolling back of the Pacific Plate. Results have been published in ***Tectonophysics***(T2).

After comprehensive and comparative analysis of the Yilgarn Craton, Superior Craton and NCC, it has been proposed that the lithospheric thinning at the edges of cratons is a common phenomenon, related to the effects of orogenic events on cratonic margins. In addition, a comparison of the NCC with cratons that have lost parts of their roots via impingement by mantle plumes (Tanzania, North Atlantic) shows that plumes can interact with the Mid-lithospheric discontinuity, aiding in large-scale foundering of SCLM. A review paper on this is in review. Other related results have been published in ***Canadian Journal of Earth Sciences*** (T4).

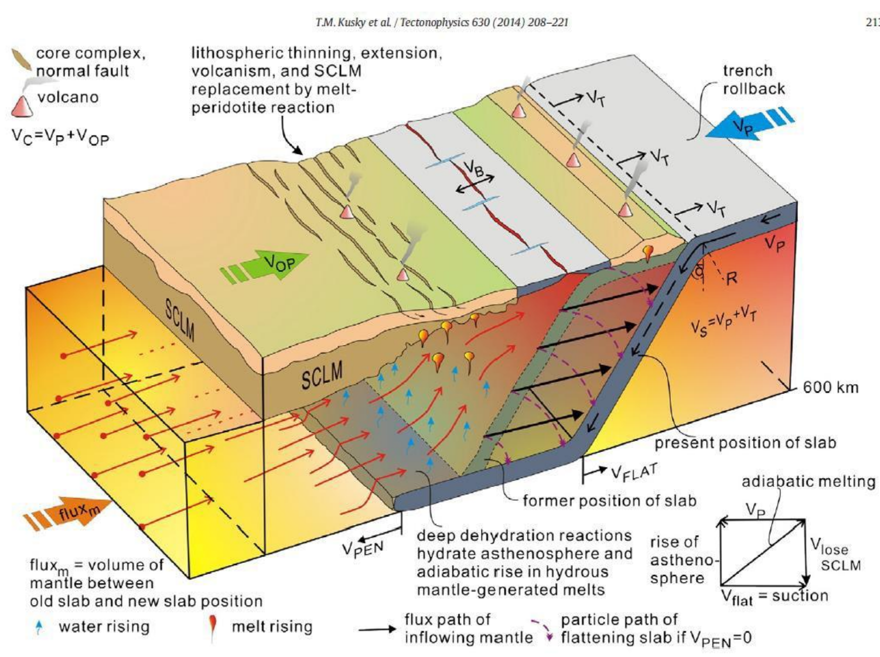
Contact: Tim Kusky, Xiaoyong Li, Zhengshen Wang



(a) Simplified tectonic map of the NCC and surrounding orogenic belts (modified from Kusky and Li 2003, Zhai et al. 2010, and Kusky 2011). Note that the craton is divided into two main blocks (Eastern and Western) by the COB. Note that known Archean granulites are confined to the COB, but that the ca. 1.9–1.8 Ga granulites are concentrated in a belt along the northern margin of the craton south of the North Hebei Orogenic Belt, and on the Shandong Peninsula. (b) Simplified tectonic map of the Slave craton (drawn after Hoffman 1989b) and its relationships to surrounding orogens and basins. Note that the Slave craton is much smaller than the NCC. HP, high pressure; HT, high temperature; UHT, ultra-high temperature; GSLsz, Great Slave Lake shear zone.



P-wave velocity perturbations along two different vertical profiles (a, b) and the distribution of the mantle transition thickness of the Yangtze and North China cratons (c, d). (a), (b) are P wave velocity perturbations profiles along 37°N and 31°N latitude, respectively (Modified from Huang and Zhao, 2006, with permissions); (c) Distribution of the mantle transition thickness of the NCC (Chen and Ai, 2009, with permissions); (d) Distribution of the mantle transition thickness of the Yangtze craton (Modified from Huang et al., 2014a, with permissions). The red in a and b represents the slow velocities while the blue represents the fast velocities. The fast velocities outline the flat-lying slabs beneath Eastern Asia. The areas with blue in c and d are characterized by thick mantle transition zone (N250 km) while the areas with red are characterized by thin mantle transition zone (b250 km).



New comprehensive model for craton destruction through flat slab dehydration, slab rollback, mantle influx, melt-generation, and melt SCLM peridotite reaction.

1.2 Scientific research projects

We have three National Natural Science Fund Projects (41572203; 41172069; 41372075) this year about Precambrian tectonic evolution.

1.3 Research papers

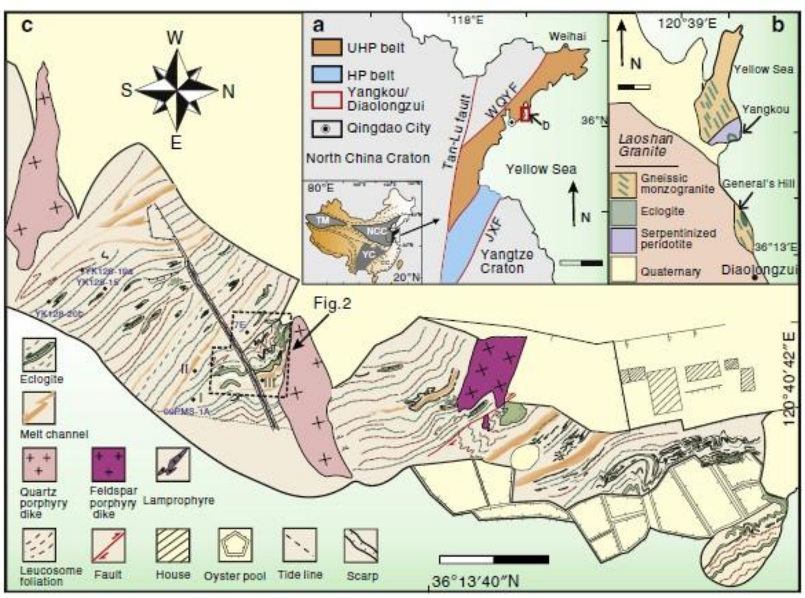
We have published 1 paper in T1 journal, 5 papers in T2 journals, 1 paper in T3 journal and 3 papers in T4 journals during 2014-2015 about this research direction.

Topic 2: Accretionary-collision orogenic belts and ophiolites

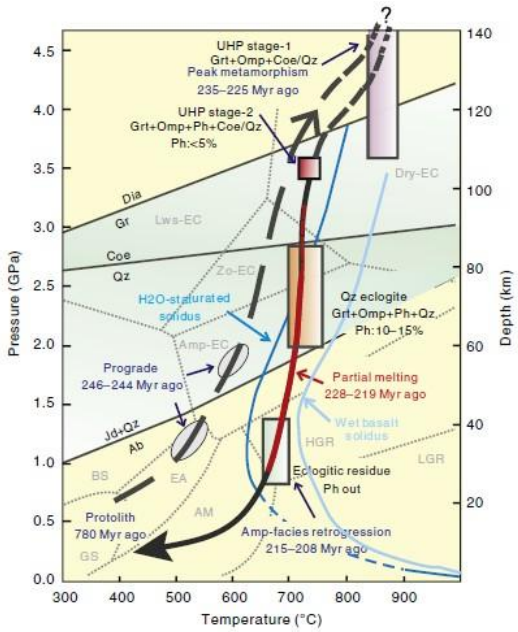
2.1 Main research contents and progress

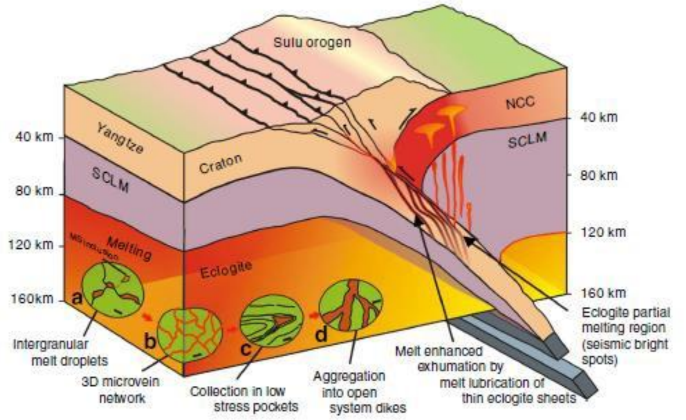
2.1.1 Migmatite in subduction-collision orogenic belts and partial melting

We have been investigating the structural and metamorphic effects of deep continental subduction in the Sulu orogeny, in particular, focusing on evidence for partial melting of eclogites in subduction zones. This research made a breakthrough in 2014 and was published in ***Nature Communications*** (T1). Results show that deeply subducted eclogite in the Mesozoic Sulu orogen were subducted to >120 km depth at 230 Myr ago, then partially melted during their early retrograde path to the surface 228–219 Myr ago. This contribution represents the first documented example of field, petrographic, microstructural, geochemical and geochronological evidence in the world for partial melting of deeply-subducted eclogite.



Geological map of Yangkou bay and General's Hill. *(a) Simplified geological map of the Sulu orogen and its location in China. Scale bar, 100 m at 50-m intervals. (b) Geological map of Mt. Laoshan and the structural setting of Yangkou Bay and General's Hill. Scale bar, 1 km at 0.5 km intervals. (c) Map of continuously exposed coastal outcrops at General's Hill. Scale bar, 30 m at 15–m intervals. Our detailed 1:1,500 scale mapping delineates strongly foliated and complexly folded retrogressed eclogite, cut by channels of dominantly felsic leucosome. The most weakly retrogressed part of the eclogite body consists of strongly foliated isoclinally folded eclogitic gneiss, interlayered with foliated felsic leucosome and retrogressed eclogite (now garnet-bearing amphibolite). In other places the eclogite is preserved as sheared boudins with leucosome and quartz veins in pressure shadows of the eclogitic boudins. Mapping by L. Wang, T. Kusky, S. J. Wang, J. P. Wang and Y. Ding.*





A) ***P–T–t path of the UHP eclogite and eclogitic residue in the Yangkou and General's Hill area, Sulu Belt.*** *Eclogite from UHP stage-1contains no phengite; however, phengite in eclogite from UHP stage-2 to quartz eclogite facies rises to 5–15%. These three types of eclogite samples were taken from Yangkou Bay, eclogitic residue sample is taken from General's Hill. Our P–T estimation is based on the geobarometer of Waters & Martin and the geothermometers of Ravna and Green & Hellman. AM, amphibolites facies; Amp-EC, amphibole eclogite facies; BS, blueschist facies; Dry-EC, dry eclogite facies;EA, epidote amphibolites facies; GS, greenschist facies; HGR, high-pressure granulite facies; LGR, low-pressure granulite facies; Lws-EC, lawsonite eclogite facies; Zo-EC zoisite eclogite facies.*

B) ***Model showing partial melting of subducted eclogite and how melt channels aid exhumation, feed crustal lavas and make seismic bright spots.*** *The elliptical insets a–d represent the progressive different stages and scales of partial melting of eclogite and melt segregation during exhumation..Eclogite begins partial melting by initial melt droplets forming along grain boundaries (a, scale bar, 50 mm), which then coalesce into 4–10 m wide intergranular veinlets (b, scale bar, 1 cm), which then move along foliation planes and extensional shear zones, eventually forming larger melt pockets in low-stress zones such as fold hinges between units with different rheologies (c, scale bar, 10 cm). Melts in these pockets then merge through interaction of melting and deformation, enhancing deformation in these zones, forming melt channels consisting of 50% melt and 50% residual eclogite (d, scale bar,1 m). Where these melt channels merge melts escape and form metre-scale dikes that may interact with melts derived from the gneisses and transport magma to higher lithospheric levels. SCLM, subcontinental lithospheric mantle; NCC, North China Craton.*

This year we will focus on the relationship between the partial melting of the ultrahigh pressure rocks in Sulu orogen and its deformation and metamorphism, and its geodynamic significance. Moreover, we will cooperate with two overseas deputy directors of the center, Professor M. Brown from University of Maryland, and Professor Ali Polat from University of Windsor. Through joint training of doctoral students and international cooperation, some achievements has been made:

(1) We identified five types of barite from the prograde-peak-retrograde metamorphic stages in the eclogite which occurred during partial melting, and discussed the melt/liquid environment of the eclogite system during continental deep subduction. The research paper has been accepted by SCI journal ***American Mineralogists*** (T2) and will be published in March 2016.

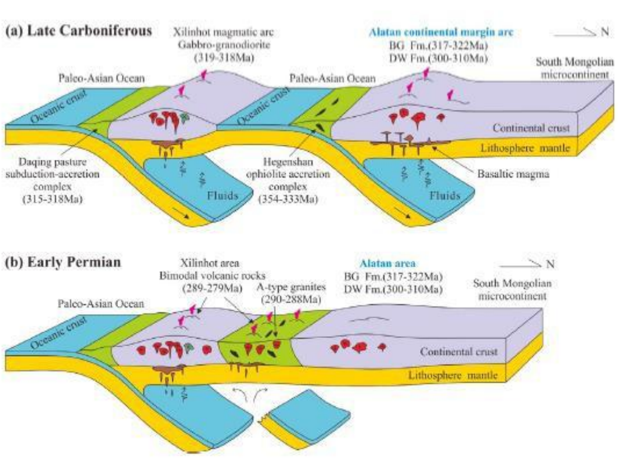
(2) Professor Ali Polat, the deputy director of the overseas of Center for Global Tectonics, and Associate Professor Wang Lu summarized the style of deformation and generation of felsic rocks on outcrop scales in the Archean craton of West Greenland and the Mesozoic Sulu orogenic belt of eastern China, and found that they are similar, suggesting that the mechanism of continental crust formation in the Archean and Phanerozoic is similar. This research paper has been published in ***Tectonophysics*** (T2).

(3) Data collection has almost been finished and we have begun to write two papers to provide key evidence about where the melting and fluid came.

2.1.2 Central Asian Orogenic Belt

We examined a suite of late Carboniferous volcanic rocks from the northern part of the Xing'an–Mongolia Orogenic Belt (XMOB). The late Carboniferous volcanic rocks have geochemical characteristics similar to those of the continental arc rocks which indicate the northward subduction of the Paleo Asian Ocean may have continued to the late Carboniferous. The volcanic association of this study together with the early Permian post-collisional magmatic rocks suggests that a tectonic transition from subduction-related continental margin arc volcanism to post-collisional magmatism occurred in the northern XMOB between the late Carboniferous and the early Permian.

Contact; Fu Dong

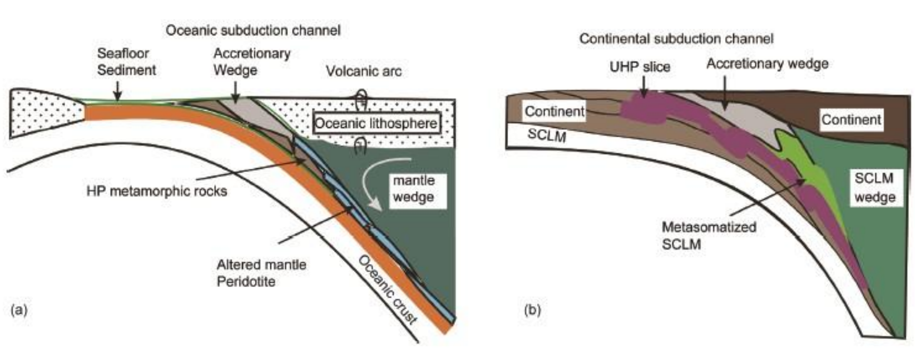


Simplified tectonic evolution and petrogenetic model of the central Inner Mongolia between late Carboniferous and early Permian, the age of Xilinhot gabbro and granodiorite is from Zhou et al. (2014), the age of Daqing pasture subduction–accretion complex is from Liu et al. (2013), and the age of Hegenshan ophiolite complex is from Jian et al. (2012).

2.1.3 Partial melting and crust-mantle interaction in subduction channels: Constraints from experimental petrology

It is proposed in the subduction channel model that the plate interface interaction is a basic mechanism for the mass and energy exchange between Earth's surface and interior. The significant difference in composition and nature between continental lithosphere and oceanic lithosphere inevitably leads to variations in deep physical and chemical processes as well as crust-mantle interaction products in these two settings. Many studies of experimental petrology have provided constraints on the potential partial melting and crust-mantle interaction in oceanic subduction channels for silicate and carbonate rocks. The partial melts of mafic and felsic compositions are adakitic or non-adakitic granitic melts depending on melting pressure or depth. A trivial amount of CO_2 can lower significantly the melting temperature of peridotites and lead to pronounced enrichment of incompatible elements in carbonate melt. The silica saturated or unsaturated melts can react with mantle-wedge peridotites in subduction channels to generate complex products. However, the existing experiments are mostly dedicated to island arc settings above oceanic subduction zones rather than dehydration melting above continental subduction zones. It is crucial to conduct high pressure and high temperature experiments to investigate all possible reactions between peridotites and crustal materials and their derivatives under the conditions responsible for the slab-mantle interface in continental subduction channels. Experimental results, combined with natural observations, are possible to elucidate the processes of metamorphic dehydration, partial melting and mantle metasomatism in continental subduction channels. These research results have been published in ***Science China Earth Sciences*** (1 paper, T3).

Contact: Junfeng Zhang

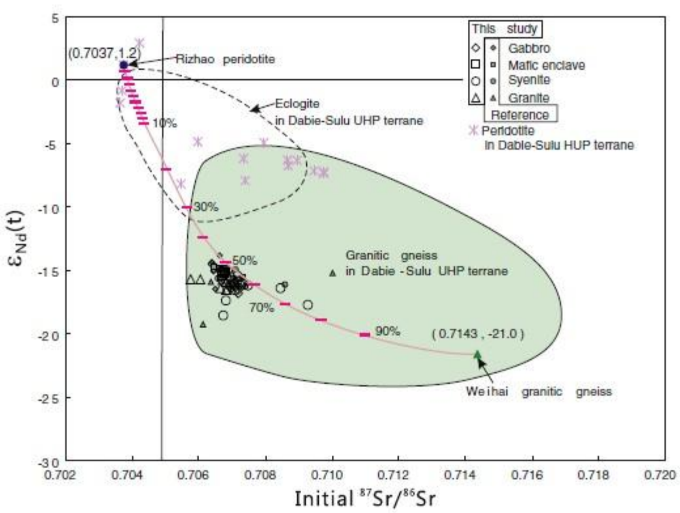


Schematic diagrams of oceanic and continental subduction channels (after Guillot et al. (2009) and Zheng (2012)). (a) The oceanic subduction channels are thin (<1 km to >10 km) and characterized by high temperature, low viscosity, high water fugacity and syn-subduction dehydration partial melting. (b) The continental subduction channels are thick (>5 km to >30 km) and characterized by low temperature, high viscosity, low water fugacity and syn-exhumation or post-collisional magmatism.

2.1.4 Crust-mantle interaction in the continental subduction-collision zone

In the past years, we mainly focused on research about crust-mantle interaction along continental subduction zones, especially about deeply subducted continental crust and we choose the Late Triassic alkaline complex in the Sulu UHP terrane as an example. Our studies suggest a crust-mantle interaction along the continental subduction interface as follows: (1) hydrous felsic melts from partial melting of subducted continental crust during its exhumation and metasomatized the overlying mantle wedge to form a K-rich and amphibole-bearing mantle; (2) partial melting of the enriched lithospheric mantle generated the Late Triassic alkaline complex under a post-collisional setting; and (3) the alkaline magma experienced subsequent fractional crystallization mainly dominated by olivine, clinopyroxene, plagioclase and alkali feldspar. These research results have been published in ***Gondwana Research*** (1 paper, T2).

Contact: Haijin Xu



Sr and Nd isotopic compositions of the Shidao alkaline complex. Initial Sr and Nd isotopic ratios were calculated at 210Ma. Data sources: the referenced Shidao alkaline rocks are from Gao et al. (2004), Yang et al. (2005), Chen and Jiang (2011) and Zhao et al. (2012); eclogites and granitic gneisses in the Dabie–Sulu UHP terrane are from Jahn (1998), Li et al. (2000), Ma et al. (2000), Tang et al. (2008), Xu et al. (2008) and Song et al. (2014a); and mantle wedge peridorites in Dabie–Sulu HUP terrane are from Yang and Jahn (2000), Zhang et al. (2000)and references therein.

2.1.5 Middle-Palaeozoic Guangxi movement in south China (460-400) and genesis of intraplate orogeny

We studied the magmatic petrology, metamorphism and detrital zircon geochronology data related to the intraplate deformation of south China, combined with our existing research results on the orogenesis between Cambrian and Ordovician in south China. We proposed a model of intraplate deformation in south China: During Cambrian to Ordovician, south China collided with the western margin of Australia and this event caused the tectonic stress of the accretionary orogen from the east edge of Australia to propagate northward. The tectonic stress mainly was concentrated in the Alice Springs orogenic belt, central Australia and the Nanhua basin in south

China, and eventually led to the reversal of the basin, which caused the intraplate deformation of south China and the intraplate orogeny of Alice Springs. These research results have been accepted by ***American Journal of Science*** (1 paper, T2).

Contact: Yajun Xu

2.2 Scientific research projects

We have six Projects and one 973 subject this year about this research direction.

2.3 Research papers

We have published 1 paper in T1 journal and 4 papers in T2 journals during 2014-2015. (See attachment)

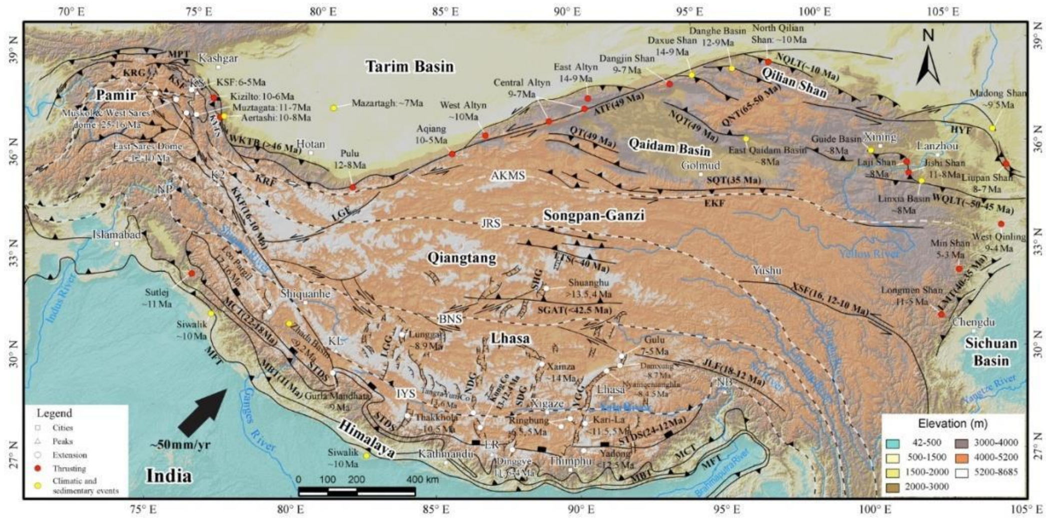
Topic 3: Tibetan Plateau Tectonics

3.1 Main research contents and progress

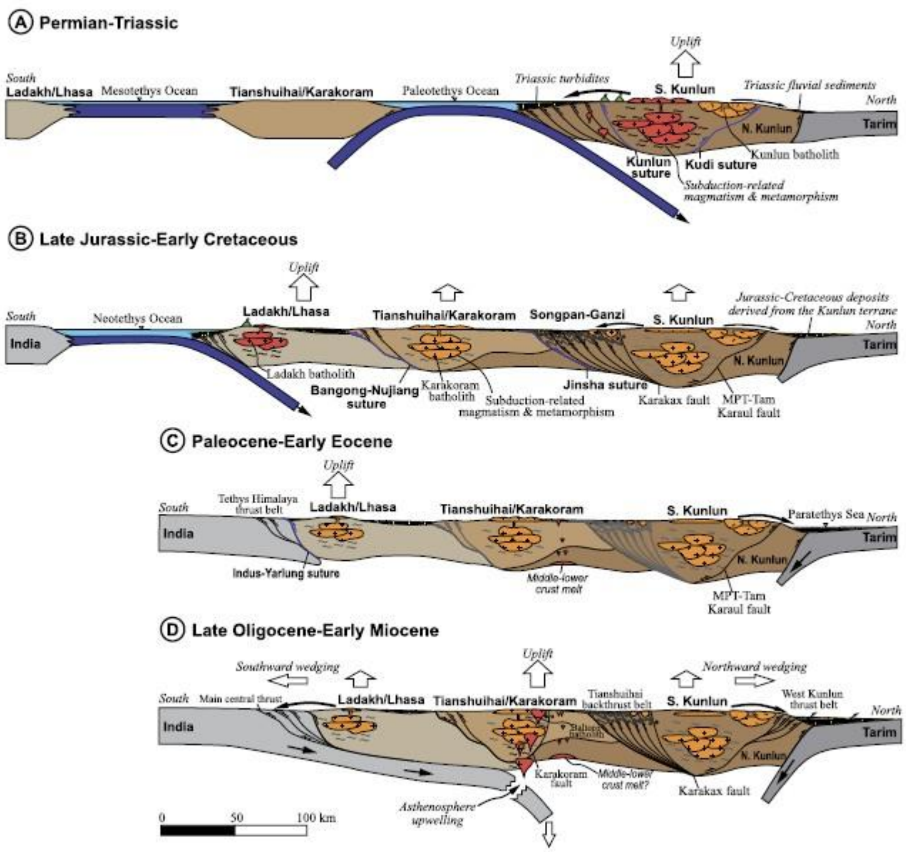
Much of the Tibetan Plateau's current high topography and crustal thickness have been commonly assumed to be a product of collision and convergence between the Indian and Eurasian plates since ~55-50 Ma. However, a growing body of evidence implies considerable pre-collision crustal shortening and surface uplift across the plateau, and minor exhumation in the plateau interior since 45 Ma. So far, how such pre-existing crustal and topographic features before the collision of the Indian and Asian plates shape the Cenozoic plateau is not well understood. Decoding mountain building processes of the Tibetan Plateau and their geodynamics requires documenting long-term orogenic scale uplift and exhumation histories. Many areas of the orogen have well documented cooling histories constrained by dense thermochronologic datasets, such as the southern and eastern plateau margins. In contrast, the exhumation histories of the northwestern plateau margin, in particular the West Kunlun Mountains, remain poorly constrained so far, due to scarce thermochronologic data in this vast region of remote mountains. As such, the onset of plateau formation in northwestern Tibet remains largely disputed, ranging from 46 Ma to 4.5 Ma. This study presents a comprehensive dataset of zircon U-Pb and fission-track double-dating results from Cenozoic synorogenic sediment successions in the foreland basin of the West Kunlun ranges. We thus propose that the West Kunlun Mountains are a long-lived topographic unit, dating back to Triassic-Early Jurassic times, and have experienced

Middle-Late Mesozoic to Early Cenozoic rejuvenation and Late Oligocene-Miocene expansion. This research result has been published in ***Earth and Planetary Science Letters*** (T1).

Contact: Kai Cao



Topographic map of the Tibetan plateau showing major faults with timing of activity.



A four-stage scenario for the tectonic evolution of northwestern Tibet during (A) Permian–Triassic, (B) Late Jurassic–Early Cretaceous, (C) Paleocene–Early Eocene and (D) Late Oligocene–Early Miocene, respectively, with a focus on the West Kunlun Mts. and adjacent Tarim Basin.

3.2 Scientific research projects

This research direction was funded by the Geological Survey Project of China (3 projects), the National Natural Science Foundation of China (2 projects).

3.3 Research papers

We have published 1 paper in T1 journal and 1 paper in T2 journal during 2014-2015. (See attachment).

Progress in Building Labs

1. **EPMA**: bidding is complete, and the winner is…..JEOL!! We have purchased the JEOL JXA-8230, and installation will begin in July 2016.

   Person in charge: Timothy Kusky

   Site: Main building 106

2. **Fission track instrument**: Preliminary feasibility study is complete.

   Person in charge: Wang Guocan

   Site: Main building 108

3. **CL and microscope**: Preliminary investigation of sample analysis quality is complete.

   Person in charge: Wang Lu

   Site: Main building 106

2015 Summer Field Meeting Report

1. International Symposium on New Theories and Approaches to Global Tectonics

The first plenary meeting, called International Symposium on "New Theories and Approaches to Global Tectonics" was successfully held from June 1-4, 2015. The meeting included a whole day indoor meeting at CUG Wuhan, with more than 130 members attending (including many famous geoscientists, such as Michael Brown, Walter Mooney, Paul Robinson, Fabio Capitano, Dave Yuen, Brian Windley, Erdin Bozkurt, Zhi Wang, Huawei Zhou, Ni Sidao, and Shiguo Wu), and a 3 days field trip to the Proterozoic Miaowan ophiolite in the Huangling anticline of the Yangtze craton and Cryogenian-Ediacaran stratigraphic section in the Three Gorges area. The meeting was completed successfully and had a good influence in related research and communications.

President Wang Yanxin opening the meeting.

Participants of the Proterozoic Miaowan ophiolite field trip.

Participants of the International Symposium.

“全球大地构造新理论与方法”国际研讨会

International Symposium on New Theories and Approaches to Global Tectonics

Center for Global Tectonics

会议地点

报告时间	报告学者	报告题目
8:00-9:00		Opening Ceremony， leader's speech and photo section
9:00-9:20		**Michael Brown** (Univ. of Maryland) Archean Metamorphism and Geodynamics
		Walter Mooney (USGS) Continental rifting and mantle dynamics
		Tim Kusky (CUG Wuhan) A billion years of subduction recorded in ocean plate stratigraphy
		Junfeng Zhang (CUG Wuhan) CPO induced seismic velocit
10:20-10:35		
10:35-10:55		**Guocan Wang** (CUG Wuhan) Tectonic Emplacement of th
		Dong Shuwen (CAGS) Results of Recent Seismic Profiles in the Yangtze Craton
		Dave Yuen (Univ. of Minnesota) Can many large earthquakes drive True Polar Wander over geological times?
:15-14:00		
		and tectonic evolution
15:20-15:35		Tea
15:35-15:55		**Lu Wang** (CUG Wuhan) Partially Melted UHP Eclogites from the Sulu Belt,China
		Erdin Bozkurt (Middle East Technical University in Anka Temporal and spatial relationships between migmatizat
		Wang Zhi (South China Sea Marine Study Institution,CAS) Seismic velocity and thermal structure imaging behind the Japan Trench
		Sidao Ni (Institute of Geology and Geophysics ,CAS) Persistent and Localized microseismic source, a new type of geodynamic process
		Larry Brown (Cornell University) Sub-Moho Reflectors, Mantle Faults and Lithospheric Rheology

全球大地构造中心宣

2. Co-host the second International Workshop on Tethyan Orogenesis and Metallogeny in Asia (IWTOMA) and Silk Road Higher Education Cooperation Forum

The CGT was a co-organizer, from October 16-18, 2015, for the second International Workshop on Tethyan Orogenesis and Metallogeny in Asia (IWTOMA) and Silk Road Higher Education Cooperation Forum. More than 170 delegates from over 30 countries attended the meeting, including the Zhang Guowei who is academician of Chinese Academy of Sciences, Jiang Boming who is academician of Taiwan Academia Sinica, Julian Pearce, Jeremy Richards, Walter Mooney, and other famous geologist and nearly 20 Chinese National Outstanding Youth Fund winners and more than 20 foreign Chancellor’s or Presidents of their Universities. The meeting takes "Science Links Silk Road, the Youth Lead the Future" as the theme, including three sections of the Tethyan orogenisis and mineralization, the Silk Road University Presidents and Silk Road Youth Leaders Forum. Except for the main session on Tethyan Orogenesis and Metallogeny, 8 parallel sessions related to geosciences were held. A field excursion was carried out after the conference. One vice professor of the center, Wang Lu, was one of the field trip leaders, and participated in writing the guide book. The director of the Centre, Professor Kusky invited three internationally renowned scholars to give keynote reports, or be session convener and special guest speakers.

3. Organize short-term courses

From November 21-23, 2015, CGT invited Professor Wei Chunjing who is metamorphic petrology expert from Earth and Space Sciences department of Peking University to give a practical short-term training course about mineral equilibrium, phase diagrams, and thermobarometric calculations. First Professor Wei introduced the basic principles of drawing phase diagrams and then combined with the applications of phase equilibrium pseudosection in the Precambrian tectonic evolution of North China Craton, metamorphic petrology studies of West Tianshan Mountains and Dabie orogenic UHP belt. His talks showed the important role of phase equilibrium pseudosection in studying orogenic belt evolution and metamorphic geology. The learning environment was active, and students asked questions enthusiastically. Students said the short course was very exciting and broadened their horizons and deepened their understanding of metamorphic rocks.

Talent Introduction (New Hires)

Ali Polat (Prof.)-Changjiang Scholar Chair Professor (3 mos. per year contract). Specialties, Precambrian Tectonics and Geochemistry.

Cao Shuyun (Prof.)-Young 1000 Talents Program, Organization Department of the CPC Central Committee. Microstructural Fabrics and Geodynamics.

Vincent Soustelle (Prof.)- Young 1000 Talent Program, Organization Department of the CPC Central Committee. Relations between Melting and Deformation Processes.

Wu Xiang (Prof.)-Hundred-Talent Program, Experimental Petrology and Mineral Physics.

Members Awards and News

Ali Polat: Changjiang Scholar Award, Part time

Wang Lu: Silk Hammer Award, Chinese Geological Survey

Vincent Soustelle: Young 1000 Talents Award

Cao Shuyun: Young 1000 Talents Award

Wu Xiang: 100 Talents Award (Hubei Province)

Tim Kusky: Appointed to Editorial Boards of Lithosphere (GSA) and Geodynamica Acta (Taylor and Francis)

Zhang Junfeng: awarded the National high level talent special support program.

Wang Lu: (Associate Prof.):awarded the “Tengfei Plan” of CUG.

Xu Yajun: (Associate Prof.): awarded the “Tengfei Plan” of CUG.

2015 Student Exchanges

Zhengsheng Wang, (from CUG to Melbourne, host: Fabio Capitanio)

Junpeng Wang (from CUG to UCLA, host: An Yin)

Deng Hao (from CUG to Univ. of Windsor, host: Ali Polat)

New Members of the Center for Global Tectonics

Chengdu Univ. of Science and Technology (Zhongquan Li)

Univ. of Texas, Austin (Bob Stern)

Middle East Technical University, Ankara (Erdin Bozkurt)

Cukurova University, Turkey (Osman Parlak)

University of Chinese Academy of Sciences (Chunming Wu)

Istanbul Technical University (Oguus Gogus)

Institute of Geodesy and Geophysics, Chinese Academy of Sciences, Wuhan (Ni Sidao)

Cornell University (Larry Cathles)

Visiting Lecture Series

June 25, Ali Polat, Univ of Windsor, "*Archean Anorthosite Petrogenesis: A Case Study on the 2.97 Ga Fiskenæsset Layered Intrusion, West Greenland*"

Nov. 19, An Yin, UCLA*"A Folded Himalayan-Orogen Model for the Development of the Paleoproterozoic Limpopo Orogenic Belt in South Africa"*

Nov. 20, An Yin, UCLA, *"Wonders of the Icy Worlds in the Outer Solar System"*

Citing the Center in Your Publications

When listing the center as one of your affiliations (please do if the research is associated with work you do here, whether you are primarily located here at CUG, or one of our affiliated members), the School of Earth Sciences asks that we list the affiliation as follows:

Center for Global Tectonics, School of Earth Sciences, China University of Geosciences, Wuhan 430074, China

New Publications Listing CGT as Primary or Subsidiary Affiliation

1. Xu, Y.J., Cawood, P.A., and Du, Y.S., 2016, Intraplate Orogenesis in Response to Gondwana Assembly: Kwangsian Orogeny, South China.in press, **American Journal of Science**, in press.

2. Wang, S.J., Wang, L., Brown, M., Feng, P. Multi-stage barite crystallization in partially melted UHP eclogite from the Sulu belt, China. **American Mineralogist**, vol. 101, 2016, DOI: http://dx.doi.org/10.2138/am-2016-5384.

3. Kusky, T.M., and Xiao, W.J., 2015, Preface to “Comparative tectonic and dynamic analysis of cratons, orogens, basins, and metallogeny: A Special Volume to honor the career of Brian F. Windley”, **Tectonophysics** 662, p. 1-6, http://dx.doi.org/10.1016/j.tecto.2015.09.026.

4. Polat, A., Wang, L., and Appel, P.W.U., 2015, A review of structural patterns and melting processes in the Archean craton of West Greenland: Evidence for crustal growth at convergent plate margins as opposed to non-uniformitarian models, **Tectonophysics** 662, 67-94. doi:10.1016/j.tecto.2015.04.006

5. Cao, K., Wang, G.C., Bernet, M., van der Beek, P., and Zhang, K.X., 2015, Exhumation history of the West Kunlun Mountains, northwestern Tibet: Evidence for a long-lived, rejuvenated orogeny, **Earth and Planetary Science Letters** 432, 391-403. http://dx.doi.org/10.1016/j.epsl.2015.10.033

6. Zhang, J.F., Wang, C.G., Xu, H.J., Wang, C., and Xu, W.L., 2015, Partial melting and crust-mantle interaction in subduction channels: Constraints from experimental petrology, **Science China: Earth Sciences** 58, 1700-1712. doi: 10.1007/s11430-015-5186-3.

7. Xu, H.J., Zhang, J.F., Wang, Y.F., and Liu, W.L., 2015, Late Triassic alkaline complex in the Sulu UHP terrane: Implication for post-colisional magmatism and subsequent fractional crystallization, **Gondwana Research**, http://dx.doi.org/10.1016/j.gr.2015.05.017

8. Zhang, Y.Z., Replumaz, A., Wang, G.C., LeLoup, P.H., Gautheron, C., Bernet, M., van der Beek, P., Paquette, J.L., Wang, A., Zhang, K.X., Chevalier, M.L., and Li, H.B., 2015, Timing and rate of exhumation along the Litang fault system, implication for fault reorganization in southeast Tibet, **Tectonics**, 10.1002/2014TC003671

9. Kusky, T.M., and Mooney, W., 2015, Is the Ordos Basin floored by a trapped oceanic plateau? **Earth and Planetary Science Letters**, 429, 197-204, http://dx.doi.org/10.1016/j.epsl.2015.07.069

10. Ishwar-Kumar, C., Sajeev, K., Windley, B.F., Kusky, T.M., Feng, P., Ratheesh-Kumar, R.T., Huang, Y., Zhang, Y., Razakamanana, T., Yagi, K., and Itaya, T., in press, 2015, Evolution of high-pressure mafic granulites and pelitic gneisses from NE Madagascar: Tectonic implications, In: Kusky, T.M., and Xiao, W.J., (eds.),“Comparative tectonic and dynamic analysis of cratons, orogens, basins, and metallogeny: A Special Volume to honor the career of Brian F. Windley”,**Tectonophysics**, v. 662, p. 219-242. doi: 10.1016/j.tecto.2015.07.019.

11. Deng, H., Kusky, T., Polat, A., Wang, L., Li, Yunxiu, Wang, J.P, Geochronology and geochemistry of Neoarchean plutonic and volcanic rocks in the Denfeng granite-greenstone belt, North China Craton: implications for geodynamic evolution, **Precambrian Research**, v. 275, 241-264, doi:10.1016/j.precamres.2016.01.024

12. Lin, M.S., Peng, S.B., Polat, A., Kusky, T.M., Jiang, X.F., Wang, Q., and Hao, D., 2015, Geochemistry, petrogenesis and tectonic setting of Neoproterozoic mafic-ultramafic rocks from the western Jiangnan orogen, **Gondwana Research**, doi:10.1016/j.gr.2015.05.015.

13. Fu, D., Huang, B., Peng, S.B., Kusky, T.M., Zhou, W.X., and Ge, M.C., 2015, Geochronology and geochemistry of Late Carboniferous volcanic rocks from northern Inner Mongolia, North China: Petrogenesis and tectonic implications, **Gondwana Research**, http://dx.doi.org/10.1016/j.gr.2015.08.007

14. Wang, X., Zhu, P.M., Kusky, T.M.*, Li, X.Y., and Wang, Z.S., 2015, Dynamic cause of marginal lithospheric thinning and implications for craton destruction: Comparison of the North China, Superior and Yilgarn cratons, **Canadian Journal of Earth Sciences**, 52, 1-21 (page number not final)doi:10.1139/cjes-2015-0110.

15. Li, X.Y., Zhu, P.M., Kusky, T.M.*, Gu, Y., Wang, X., Xu, Z.W., Yuan, Y.F., Wang, Z.S., and Fu, J.M., 2015, Has the Yangtze craton lost its root? A comparison between the North China and Yangtze cratons, **Tectonophysics 655**, p. 1-14, doi:10.1016/j.tecto.2015.04.008.

16. Wang, J.P., Kusky, T.M.*, Wang, L., Polat, A., and Deng, H., 2015, A Neoarchean subduction polarity reversal event in the North China craton, **Lithos** 220-223, p. 133-146, doi:10.1016/j.lithos.2015.01.029.

17. Zhan, Y., Hou, G.T., Kusky, T.M., and Gregg, P.M., 2015, Stress development in heterogenetic lithosphere: Insights into earthquake processes in the New Madrid Seismic Zone, **Tectonophysics**, doi:10.1016/j.tecto.2016.01.016.

18. Zhang, Y.J., Kusky, T.M.*, Wang, L., Li, J.W., Feng, P., Huang, Y., and Giddens, R., 2015, Occurrence of gold in hydrothermal pyrite, western Taupo Volcanic Zone, New Zealand, **Geodynamica Acta**, DOI: 10.1080/09853111.2015.1113024, To link to this article: http://dx.doi.org/10.1080/09853111.2015.1113024.

19. Huang, Lei, Liu, Chi-yang, and Kusky, T.M., 2015, Cenozoic evolution of the Tan-Lu fault zone (East China)- Constraints from seismic data, **Gondwana Research,** 28, 1079-1095, doi:10.1016/j.gr.2014.09.005.

20. Wang, L., Kusky, T.M., Polat, A., Wang, S.J., Jiang, X.F., Zong, K.Q., Wang, J.P., Deng, H., and Fu, J.M., 2014, Partial melting of deeply subducted eclogite from the Sulu orogen in China, **Nature Communications** 5, article no. 5604,DOI: 10.1038/ncomms6604.

21. Cao, K., Xu, Y.D., Wang, G.C., Zhang, K.X., van der Beek, P., Wang, C.W., Jiang, S.S., and Bershaw, J., 2014, Neogene source-to-sink relations between the Pamir and Tarim Basin: Insights from stratigraphy, detrital zircon geochronology, and whole-rock geochemistry, The Journal of Geology, 122(4), 433-545. http://www.jstor.org/stable/10.1086/676478"

22. Deng, H., Kusky, T.M.*, Polat, A., Wang, J.P., Wang, L., Fu, J.M., Wang, Z.S., and Yuan, Y, 2014, Geochronology, mantle source composition and geodynamic constraints on the origin of Neoarchean mafic dikes in the Zanhuang Complex, Central Orogenic Belt, North China Craton, **Lithos** 205, 350-378, DOI: 10.1016/j.lithos.2014.07.011

23. Kusky, T.M., Windley, B.F., Wang., L., Wang, Z.S., Li, X.Y., and Zhu, P.M., 2014, Flat slab subduction, trench suction, and craton destruction: Comparison of the North China, Wyoming, and Brazilian cratons, **Tectonophysics,** 630, 208-221.http://dx.doi.org/10.1016/j.tecto.2014.05.028

Announcement for June 2016 Summer Field Meeting in Ankara-Istanbul, Turkey

see attached flier about May 23-June 1 Meeting and Field Excursion in Turkey

Other Activities Planned for 2016-2017

Short Courses:

Spring 2016

Thermodynamic Modelling in Earth Sciences with emphasis on crustal rocks
(intended for MSc and PhD students – everybody welcome)
Instructor: Evangelos Moulas, E.T.H, Switzerland, and CUG Center for Global Tectonics
Date: tbd (depending on visa), around March 2016

Despite the relative limited conditions where the crustal rocks are found, metamorphic reactions and the creation of new mineral assemblages are of primary importance for the rheological and geophysical properties of the crust. This short course provides an introduction to the most common applications of thermodynamics to earth science. Particular emphasis will be given on the study of crustal rocks. The aim of the short course is to bring together students from different disciplines (geophysics, tectonics, structural geology, petrology & numerical modeling) and present in a unified manner the basis of thermodynamic models and the most up to date tools for the computation of thermodynamic equilibria.

More specifically, we will discuss:

1. Thermodynamic databases
2. Free energy of mineral phases and its relation to physical properties
3. Minimization of Gibbs free energy and stable assemblages
4. Calculation of densities and seismic velocities of complex rock systems
5. Thermobarometry (optional – depending on the number of petrology students)
6. Effect of mineral assemblages on the mechanical properties of the crust
7. Relation between mechanics and thermodynamic equilibrium
8. Introduction to Local Thermodynamic Equilibrium (optional – depending on time)

Fall 2016

November 2016

Evolution of the Lithosphere: From the Early Earth to Modern Processes

Course Leaders: Alfred Kroner, Walter Mooney, An Yin

Spring 2017

June 2017

To TNCO or not to TNCO? Field meeting and trip to examine the controversy over the existence (or not) of the Trans-North-China-Orogen, and the ophiolitic mélanges in the Central Orogenic Belt, with a bearing on the Tectonic evolution of the North China Craton

Low-angle detachment fault (dipping left to right), Menderes massif core complex, Turkey. Photo by Erdin Bozkurt. We will visit sites like this on the May 2016 CGT Summer Field Meeting. In Turkey.