

## Research Advances

## Discovery of Ophiolitic Mélange in the North Region of Geji County, Northwest Tibet and Its Zircon U-Pb Age

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### Objective

The Bangong Co–Nujiang River suture zone is the great boundary between the Lhasa and Qiangtang terranes in the Tibetan Plateau. A series of major scientific issues are still controversial at present such as the subduction polarity and evolutionary process of this suture (Wei Shaogang et al., 2017). A new ophiolitic mélange (Nage–Zuolege) has been discovered in the northern region of Geji County during geological mapping at a scale of 50000 since 2016. Its extension direction is basically east-west direction, and the overall extension is greater than 55 km long, and the width is 3–6 km. It is composed of matrix and tectonic slices. The rock slices are mainly composed of serpentinite peridotites, serpentinitized gabbros, altered gabbros, diabases, (andalitic) basalts, andesitic porphyrite, dacite porphyry, altered diorite, quartz diorite and siliceous rock. The nature and geochronology of this ophiolitic mélange will have important implications for the answer to the subduction polarity, oceanic basin scales, and ocean-continent collision closure processes of the Bangong Co–Nujiang River Tethy Ocean.

### Methods

A suit of ~200 kg of the serpentinitized peridotites were collected to select zircon particles at the Laboratory of Hebei Institute of Surveying and Mapping of Geology. Most zircon grains under binocular microscope occur as colorless or light grey, translucent, round or lath shape and no zoning textures crystals, with some exhibiting anomalous figurations likely due to abrasion. More than 60 zircon grains were selected for isotopic geochronological measurements.

Zircon grains were mounted in epoxy discs and were

then polished down to expose their cores. Backscattered electron (BSE) and cathodoluminescence (CL) images were obtained at the Electron Microprobe Laboratory of the Beijing SHRIMP Ion Microprobe Centre in order to select proper measuring spots in zircons. U-Pb zircon analyses were undertaken on a SHRIMP-II instrument at the Beijing SHRIMP Centre (National Science and Technology Infrastructure), Chinese Academy of Geological Sciences. All measured points of error are 1 $\sigma$ . Weighted average ages of the <sup>206</sup>Pb/<sup>238</sup>U used have a confidence level of 95%. The details of the analytical procedure can be found in Chu et al. (2006).

### Results

Zircon grains from the peridotite sample are small, 60–100  $\mu$ m in length. CL images show that the majority of the zircons, without zoning textures, light grey and round or lath shape, which indicate representative basic magmatic origin zircons. The U and Th contents for the eight measuring spots are 97–2114  $\mu$ g/g and 79–485  $\mu$ g/g, respectively, with conspicuously variable Th/U ratios >0.1 (0.24–1.15), and their Th and U contents also show a well positive correlation. Zircon SHRIMP U-Pb data of the eight measuring spots for the peridotite indicate the <sup>206</sup>Pb/<sup>238</sup>U range from 147.4 Ma to 159.4 Ma, and their SHRIMP U-Pb concordance diagrams display a weighted mean <sup>206</sup>Pb/<sup>238</sup>U age of 152 $\pm$ 3 Ma (2 $\sigma$ , MSWD=1.9). All spots are distributed closely along the concordance diagrams and reliable, and thus the age of 152 $\pm$ 3 Ma represents the crystallization age of the peridotite. In the northern margin of the Lhasa terrane and Geji region, the Jurassic arc-related magmatism and volcanic rocks have also been reported along the Shiquan river ophiolite belt (Zheng Youye et al., 2006; Wang et al., 2017).

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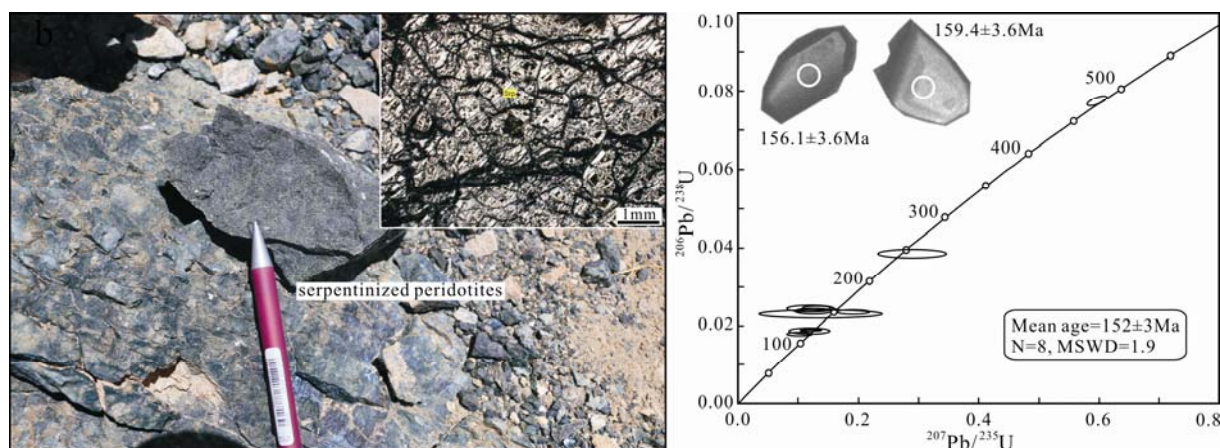


Fig. 1. Photos and U-Pb dating age of the serpentinized peridotites in the study area.

## Conclusion

This newly discovered ophiolitic mélange zone in northern Geji County show that the study area have existed an E-W extended ocean basin. This ocean basin represented by this discovered ophiolitic mélange is likely connected with the ocean basin represented by the Shiquanhe ophiolitic mélange to the west. The zircon U-Pb SHRIMP  $^{206}\text{Pb}/^{238}\text{U}$  age of  $152 \pm 3$  Ma represents the basic magma formation time in the study area. The southern boundary of the Bangong Co-Nujiang suture zone is likely to be different with the previously considered and needs to be moved south to this location.

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## References

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## Appendix 1 SHRIMP zircon U-Pb data for the peridotite in the Nage-Zuolege ophiolitic mélange zone

Spot	$^{206}\text{Pb}^a$ (ppm)	$^{206}\text{Pb}^b$ (%)	U (ppm)	Th (ppm)	$^{232}\text{Th}/^{238}\text{U}$	$^{207}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$ (%)	$^{207}\text{Pb}/^{235}\text{U}$	$\pm 1\sigma$ (%)	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 1\sigma$ (%)	$t_{206/238}$ (Ma)
1	4.75	2.51	220	151	0.71	0.0353	20	0.119	20	0.02450	1.9	156.1±3.0
2	1.96	2.05	97	79	0.84	0.043	49	0.137	49	0.02313	3.2	147.4±4.7
3	2.3	0.64	142	108	0.79	0.0503	11	0.130	12	0.01868	2.4	119.3±2.9
4	8.11	1.05	399	426	1.10	0.0445	8.0	0.144	8.1	0.02340	1.4	149.1±2.0
5	5.83	1.30	282	236	0.87	0.0401	19	0.132	19	0.02380	2.4	151.6±3.6
6	2.73	--	130	115	0.92	0.076	14	0.261	14	0.02503	2.3	159.4±3.6
7	7.61	1.25	465	382	0.85	0.0429	15	0.111	15	0.01879	1.6	120.0±1.9
8	3.12	0.02	155	129	0.86	0.0593	8.6	0.191	8.8	0.02334	1.9	148.7±2.8
9	15.7	0.18	769	381	0.51	0.0466	3.8	0.1529	4.0	0.02379	1.2	151.6±1.8
10	2.91	1.85	185	179	1.00	0.0403	12	0.100	12	0.01800	1.7	115.0±2.0
11	7.07	1.41	331	368	1.15	0.0387	13	0.131	13	0.02451	1.5	156.1±2.3
12	65.7	0.16	986	80	0.08	0.05583	1.3	0.596	1.7	0.07748	1.1	481.1±5.2
13	12.1	4.37	342	13	0.04	0.036	34	0.194	34	0.03951	2.1	249.8±5.2

Pb<sup>a</sup> and Pb<sup>b</sup> indicate the radiogenic and common portions, respectively.