

## Research Advances

## A Report of the Newly Discovered Cu–Ni Ore Deposit in the West of East Tianshan, North Xinjiang, China

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### Objective

The Early Permian mafic–ultramafic intrusions (298–270 Ma, Mao et al., 2008), which are widely distributed in different tectonic domains in North Xinjiang, host magmatic sulfide ore deposits, making North Xinjiang the second most important region for Ni resources in China. The bulk of Cu–Ni ore deposits in East Tianshan, making up a large portion of Ni resources in North Xinjiang, were concentrated in the east of East Tianshan (the Huangshan–Jing'erquan region) (Feng Yanqing, et al., 2017), while no any analogue was discovered in the west of East Tianshan until the Lubei Cu–Ni (Co) ore deposit (90°21'E, 42°10'N) was identified by Xinjiang Geological Survey in 2014. The Lubei Cu–Ni (Co) ore deposit is a medium- to large-sized deposit with Ni and Cu grades in the range 0.2%–7.76% and 0.2%–2.30%, respectively. This work has initiated the prospection for a large-sized Cu–Ni ore deposit in the west of East Tianshan.

### Method

The Lubei Cu–Ni (Co) ore deposit was found during the follow-up of a geochemical anomaly by Xinjiang Geological Survey in 2014. Subsequently, many exploratory trenches and six drill-holes were operated to reveal the extension, dipping, thickness of the Cu–Ni orebodies and the characteristics of primary ores in the Lubei ore district. 1:10,000 geological mapping was carried out in the Lubei ore district between 2014 and 2016. Zircon U–Pb dating was undertaken on the hornblende gabbro to constrained the geological setting for these mafic–ultramafic intrusions.

### Results

Three mafic–ultramafic intrusions (i.e., the Lubei mafic–ultramafic complex, the Mid-gabbro and the Yunhai hornblende-gabbro) were identified in the Lubei ore district (Fig. 1). The Lubei complex covers area of 0.6 km<sup>2</sup>, with a length of ~2 km and maximum width of ~600 m. It is nearly elliptical at the surface with its long axis striking NEE, tapering to the east and west, and dipping to the south at 30°–50°, roughly consistent with the dip of country-rock strata. The Lubei complex contains few gabbro or hornblende-gabbro blocks and extensive ultramafic phases that is characterized by lateral zonation, with hornblende peridotite in the south, lherzolite and harzburgite in the center, and plagioclase hornblendite in the north. The Yunhai hornblende gabbro is located 1 km north of the Lubei complex and is also elliptical in plan view with its long axis striking SEE. It is ~1.3 km long and 0.9 km wide, with an area of 1.1 km<sup>2</sup>, and intrudes pyroclastic rocks of the Xiaorequanzi Formation. The Mid-gabbro intrusion is located adjacent to the southern margin of the Yunhai hornblende gabbro and is 400 m long (E–W) and 300 m wide (N–S) (Fig. 1).

Seven oxidized Cu–Ni ore bodies have been identified on the surface in the Lubei ore district (Fig. 1), and further exploration is under way. The Ni-2, -3, -4, and -5 ore bodies are hosted by gabbro, and are deemed uneconomic on the basis of presently available exploration data. The oxidized economic Ni-1 orebody is hosted in the Lubei Complex while the oxidized economic Ni-6 orebody occurs at the contact between the Yunhai hornblende gabbro and pyroclastic rocks of the Xiaorequanzi Formation. Primary Cu–Ni ores, including densely and sparsely disseminated and semi-massive ores, occurs as stratabound in the harzburgite and plagioclase hornblendite within the Lubei complex.

LA-ICP-MS U–Pb zircon dating yielded a weighted-mean <sup>206</sup>Pb/<sup>238</sup>U age of 287.9±1.6 Ma (95% confidence,

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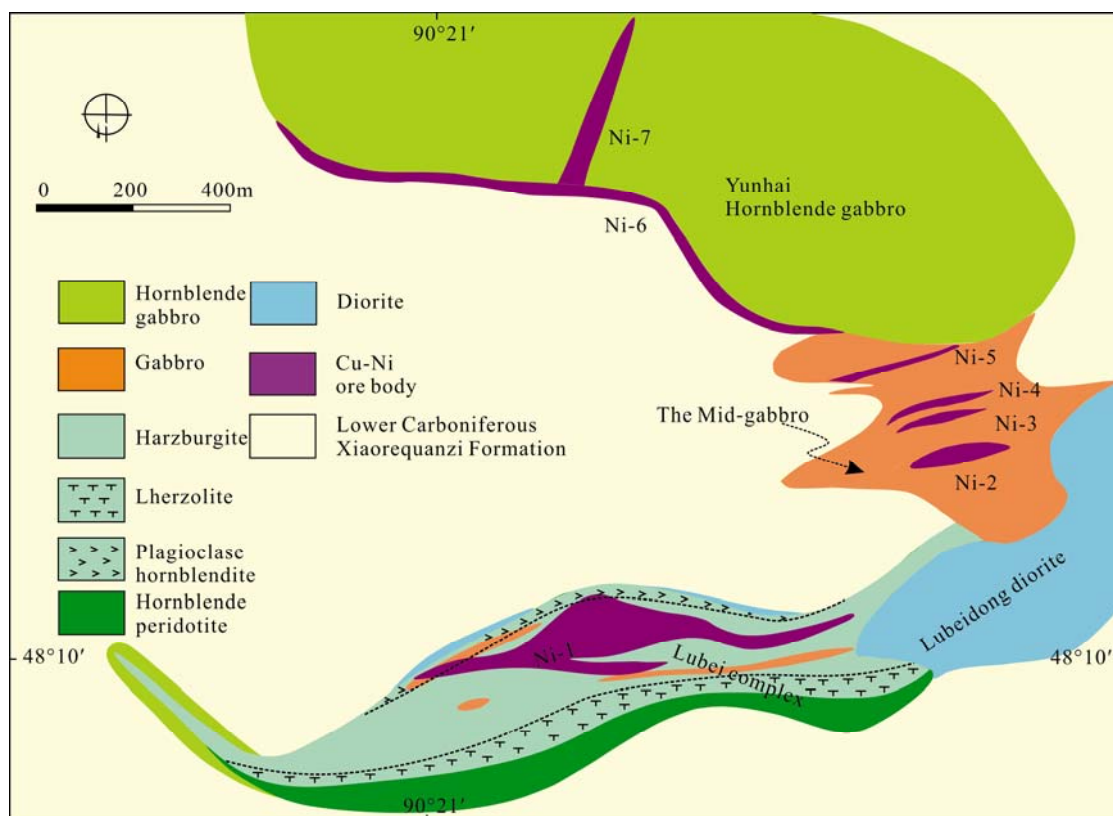


Fig. 1. Simplified geological map of the Lubei Cu–Ni ore district, showing the distribution of lithology and oxidized Cu–Ni ore bodies.

$n=29$ ,  $MSWD=1.9$ ) for hornblende gabbro in the Lubei ore district. This indicates that these mafic–ultramafic intrusions in the Lubei ore district are contemporaneous with the early Permian mafic–ultramafic intrusions in North Xinjiang, which formed in a post-collision extensional tectonic-setting.

## Conclusion

The newly discovered Lubei Cu–Ni sulfide-bearing mafic–ultramafic intrusions are the western extension of the Huangshan–Jing'erquan mafic–ultramafic intrusions in the east of East Tianshan. The Lubei Cu–Ni ore deposit has a magmatic origin and is hosted by mafic-ultramafic intrusions, contemporaneous with the analogues widely distributed in North Xinjiang. These intrusions formed in a post-collision extensional tectonic-setting. It is likely that current exploration will reveal a large Cu–Ni ore deposit

in the west of East Tianshan.

## Acknowledgements

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## References

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