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Supporting Information for

Oxygen fugacity evolution of the mantle lithosphere beneath the North China craton

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Additional Supporting Information (Files uploaded separately)

Introduction

This supporting information contains specific references of our research (Text S1) and histograms that show the modeled partial melting degree the Low-Mg peridotites had experienced (Figure S1). The detailed major elemental compositions for peridotite minerals (Ol, Opx, Cpx, and Sp) are listed in Dataset S1. Tables S1 to S7 compile the data for Figure 2 to 7 in the main text.

Text S1. References of peridotites referred in this study

Location (Sample Number)	Age[1](Ma)	Reference
Trans-North China Orogen		
Hannuoba (n=53)	27~14 Ma	Chen et al. (2001)
		Hu et al. (2016)
		Liu et al. (2011)
		Rudnick et al. (2004)
		Tang et al. (2007)
		Wang et al. (2014)
		Yang et al. (2008)
		Zhao et al. (2010)
Yangyuan (n=94)	35~30 Ma	Hao et al. (2012)
		Liu et al. (2011)
		Liu et al. (2012)
		Wang et al. (2014)
		Wang et al. (2019)
		Xia et al. (2013)
		Yang et al. (2018)
		Zhao et al. (2015)
Datong (n=5)	~1 Ma	Liu et al. (2011)
Fanshi (n=37)	~25 Ma	Liu et al. (2011)
		Tang et al. (2008)
		Xia et al. (2013)
Hebi (n=35)	~4 Ma	Liu et al. (2011)
		Wang et al. (2014)
		Xia et al. (2010)
		Zhao et al. (2010)
		Zheng et al. (2001)
Fushan (n=10)	~125 Ma	Liu et al. (2011)
		Xu et al. (2010)
Weichang (n=12)	23~5.2 Ma	Zou et al. (2016)
Northeast China		
Longgang (n=17)	0.68~0.05 Ma	Chen et al. (2003)
		Tang et al. (2012)
		Xu et al. (2019)
Kuandian (n=10)	~0.6 Ma	Wu et al. (2006)
Changbaishan (n=12)	19.9~2.6 Ma	Xu et al. (2019)
Fuxin	~100 Ma	Zheng et al. (2007)

(n=25)		Zou et al. (2020)
Shandong-Talu Fault Zone		
Penglai (n=20)	~8 Ma	Chu et al. (2009)
		Xia et al. (2010)
Shanwang (n=33)	~16 Ma	Chu et al. (2009)
		Zheng et al. (1998)
		Zheng et al. (2006)
Changle (n=24)	18~9 Ma	Deng et al. (2017)
		Xia et al. (2010)
Yantai (n=11)	~7.4 Ma	Hong et al. (2012)
Tianchang (n=15)	~9 Ma	Hao et al. (2016)
Junan (n=22)	~67 Ma	Li et al. (2015)
		Ying et al. (2006)
Daxizhuang (n=19)	~74 Ma	Li et al. (2015)
		Zhang et al. (2007)
		Zhao et al. (2020)
Pishikou (n=28)	~82 Ma	Li et al. (2015)
		Zhang et al. (2011)
Qixia (n=25)	~6 Ma	Rudnick et al. (2004)
		Xia et al. (2010)
		Zheng et al. (1998)
Nvshan (n=23)	~2 Ma	Wang et al. (2014)
		Xu et al. (2004)
		Yang et al. (2008)
Panshishan (n=10)	~9 Ma	Xia et al. (2010)
Lianshan (n=15)	~9 Ma	Xia et al. (2010)
Fangshan (n=13)	~9 Ma	Xia et al. (2010)
Beiyan (n=22)	18.8~10.8 Ma	Xiao et al. (2010)
Western North china Craton		
Langshan (n=7)	~89 Ma	Dai et al. (2019)
Jining (n=11)	~32 Ma	Liu et al. (2011)
Dongbahao (n=6)	23.54~20.24 Ma	Wu et al. (2017)

[1] The age of the host rocks

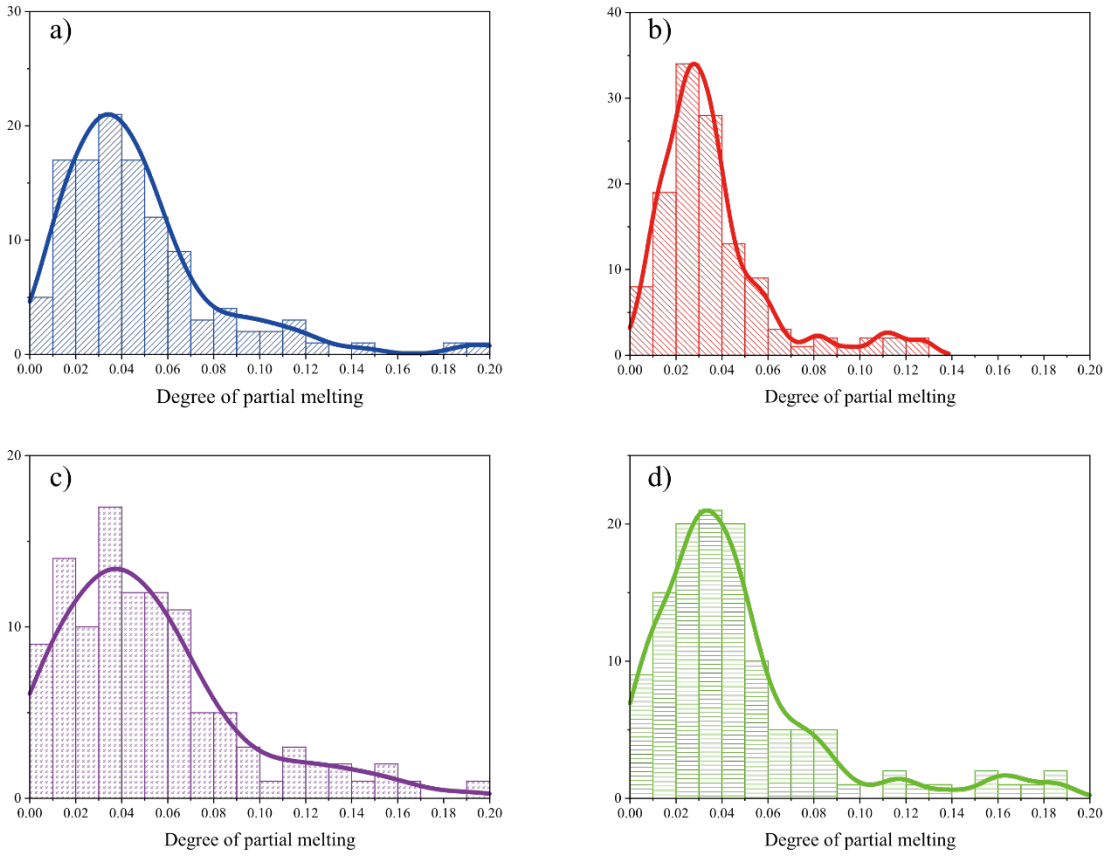

Figure S1. Histograms showing the modeled partial melting degree of the Low-Mg peridotite. a) and c) and b) and d) correspond to batch and fractional partial melting, respectively. The modeling follows the mode of Norman (1998). The initial compositions are assumed to be DMM of Workman and Hart (2005) and PM of McDonough and Sun (1995) for batch and fractional melting modeling, respectively.

Table S1. Modal abundance of Ol, Opx, Cpx, and Sp and Mg-number of peridotites from the North China Craton

Table S2. Temperature and oxygen fugacity estimations for peridotites from the North China Craton

Table S3. Oxygen fugacity of Kaapvaal, Slave, and Siberia craton

Table S4. Fluids species with oxygen fugacity ranging from ΔFMQ-1to -4 calculated via GFluids under 950 ℃ and 1.5 GPa

Table S5. Published water content of peridotite xenoliths from the North China Craton vs. the oxygen fugacity

Table S6. Partial melting degree of Low-Mg peridotites calculated via model proposed by Norman (1989) and assuming the initial composition of DMM of Workman and Hart (2005) and PM of McDonough and Sun (1995)

Table S7. Composition of primary melts derived from pMELTS simulation

Data Set S1. Major element of olivine, orthopyroxene, clinopyroxene, and spinel for each referred peridotite.