Supporting Information for "Core-mantle boundary topography and its relation to the viscosity structure of the lowermost mantle"

Björn H. Heyn[a,*], Clinton P. Conrad[a], Reidar G. Trønnes[a,b]

[a] *Centre for Earth Evolution and Dynamics (CEED), University of Oslo, Norway*
[b] *Natural History Museum, University of Oslo, Norway*

Contents

1. Tables S1 to S2

Introduction

This supporting information provides the data used to create Fig. 6 (Table S1) and Fig. 7 (Table S2). Values for all modelled combinations of buoyancy number B, thermal viscosity contrast $\eta_{\Delta T}$, and compositional viscosity contrast η_C, are calculated between the given characteristic points of the predicted short-scale topography, and are given in km. In Table S1, topography values have been averaged over the whole model time, while the minimum and maximum values of relative topography in Table S2 have been averaged over the number of plume cycles we observe.

*Corresponding author at: Centre for Earth Evolution and Dynamics (CEED), University of Oslo, Sem Sælands vei 2A, 0371 Oslo, Norway

Email address: b.h.heyn@geo.uio.no (Björn H. Heyn)

Table S1: Time-averaged relative topography data displayed in Fig. 6. Abbreviations used here are: plume-side plateau (PSP), circum-pile depression (CPD), pile-edge maximum (PEM). All topography values are in km.

B	$\eta_{\Delta T}$	η_C	**PSP-CDP**	**PEM-CDP**	**PEM-PSP**
0.6	330	1	1.01	-0.46	-1.47
0.6	330	2	0.98	0.70	-0.28
0.6	330	3	1.13	1.50	0.37
0.6	330	5	1.31	2.40	1.09
0.6	330	8	1.47	3.09	1.62
0.6	330	10	1.54	3.36	1.82
0.6	330	15	1.67	3.70	2.03
0.6	330	20	1.73	3.84	2.11
0.6	330	50	1.93	4.17	2.24
0.6	330	100	2.08	4.41	2.33
0.8	2.3	1	1.26	-0.62	-1.88
0.8	2.3	2	1.23	0.79	-0.44
0.8	2.3	3	1.45	1.78	0.33
0.8	2.3	5	1.66	2.80	1.14
0.8	2.3	8	1.87	3.58	1.71
0.8	2.3	10	1.96	3.88	1.92
0.8	2.3	15	2.11	4.34	2.23
0.8	2.3	20	2.20	4.58	2.38
0.8	2.3	50	2.44	5.15	2.71
0.8	2.3	100	2.58	5.47	2.89
0.8	330	1	1.19	-0.57	-1.76
0.8	330	2	1.10	0.57	-0.53
0.8	330	3	1.27	1.35	0.08
0.8	330	5	1.51	2.27	0.76
0.8	330	8	1.68	2.94	1.26
0.8	330	10	1.74	3.17	1.43
0.8	330	15	1.85	3.48	1.63
0.8	330	20	1.90	3.64	1.74
0.8	330	50	2.09	4.09	2.00
0.8	330	100	2.21	4.39	2.18

Table S1: continued

B	$\eta_{\Delta T}$	η_C	**PSP-CDP**	**PEM-CDP**	**PEM-PSP**
0.8	1700	1	1.14	-0.55	-1.69
0.8	1700	2	1.10	0.60	-0.50
0.8	1700	3	1.28	1.37	0.09
0.8	1700	5	1.47	2.22	0.75
0.8	1700	8	1.61	2.78	1.17
0.8	1700	10	1.68	3.00	1.32
0.8	1700	15	1.76	3.27	1.51
0.8	1700	20	1.83	3.43	1.60
0.8	1700	50	2.00	3.85	1.85
0.8	1700	100	2.11	4.14	2.03
0.8	7500	1	1.11	-0.52	-1.63
0.8	7500	2	1.08	0.61	-0.47
0.8	7500	3	1.26	1.34	0.08
0.8	7500	5	1.44	2.12	0.68
0.8	7500	8	1.58	2.68	1.10
0.8	7500	10	1.63	2.89	1.26
0.8	7500	15	1.73	3.19	1.46
0.8	7500	20	1.79	3.35	1.56
0.8	7500	50	1.94	3.70	1.76
0.8	7500	100	2.05	3.95	1.90
1.0	330	1	1.24	-0.64	-1.88
1.0	330	2	1.21	0.55	-0.66
1.0	330	3	1.40	1.36	-0.04
1.0	330	5	1.62	2.23	0.61
1.0	330	8	1.77	2.81	1.04
1.0	330	10	1.85	3.05	1.20
1.0	330	15	1.94	3.35	1.41
1.0	330	20	2.00	3.49	1.49
1.0	330	50	2.20	4.03	1.83
1.0	330	100	2.31	4.40	2.09

Table S2: Averaged maximum and minimum values of relative topography observed during the plume cycle, as displayed in Fig. 7. Abbreviations for characteristic topography points used here are: plume-side plateau (PSP), circum-pile depression (CPD), pile-edge maximum (PEM). All topography values are in km.

B	$\eta_{\Delta T}$	η_C	**PSP-CDP**		**PEM-CDP**		**PEM-PSP**	
			max	**min**	**max**	**min**	**max**	**min**
0.6	330	1	1.25	0.76	-0.43	-0.50	-1.21	-1.73
0.6	330	2	1.31	0.72	1.35	0.24	0.11	-0.62
0.6	330	3	1.64	0.85	2.67	0.77	1.19	-0.22
0.6	330	5	2.05	0.87	4.38	1.23	2.39	0.17
0.6	330	8	2.49	0.86	5.35	1.45	3.23	0.40
0.6	330	10	2.65	0.94	5.75	1.56	3.46	0.51
0.6	330	15	3.06	0.81	6.48	1.67	3.75	0.68
0.6	330	20	3.19	0.80	6.79	1.74	3.84	0.77
0.6	330	50	3.63	0.81	7.57	1.86	4.09	0.94
0.6	330	100	3.90	0.86	8.10	1.94	4.30	1.00
0.8	2.3	1	1.51	0.99	-0.58	-0.66	-1.59	-2.15
0.8	2.3	2	1.61	0.86	1.37	0.30	-0.04	-0.80
0.8	2.3	3	1.97	1.04	2.87	0.90	1.11	-0.33
0.8	2.3	5	2.41	1.10	4.46	1.46	2.30	0.14
0.8	2.3	8	2.80	1.13	5.57	1.92	3.05	0.55
0.8	2.3	10	2.98	1.14	6.04	2.07	3.32	0.70
0.8	2.3	15	3.28	1.18	6.69	2.34	3.67	0.94
0.8	2.3	20	3.46	1.21	7.09	2.47	3.89	1.06
0.8	2.3	50	3.93	1.27	8.11	2.68	4.36	1.29
0.8	2.3	100	4.18	1.32	8.71	2.79	4.68	1.34
0.8	330	1	1.40	1.01	-0.53	-0.61	-1.58	-2.00
0.8	330	2	1.37	0.81	1.23	0.06	-0.17	-0.78
0.8	330	3	1.69	0.93	2.48	0.62	0.73	-0.39
0.8	330	5	2.13	1.08	3.73	1.20	1.77	0.00
0.8	330	8	2.60	1.07	4.97	1.41	2.61	0.20
0.8	330	10	2.79	1.06	5.45	1.51	2.89	0.29
0.8	330	15	3.15	1.01	6.19	1.60	3.22	0.44
0.8	330	20	3.36	0.99	6.57	1.66	3.39	0.54
0.8	330	50	3.81	0.99	7.56	1.82	3.83	0.74
0.8	330	100	4.03	1.01	8.16	1.94	4.21	0.84

Table S2: continued

B	$\eta_{\Delta T}$	η_C	**PSP-CDP**		**PEM-CDP**		**PEM-PSP**	
			max	**min**	**max**	**min**	**max**	**min**
0.8	1700	1	1.35	0.98	-0.51	-0.61	-1.51	-1.93
0.8	1700	2	1.41	0.83	1.24	0.09	-0.12	-0.85
0.8	1700	3	1.74	0.93	2.49	0.55	0.84	-0.47
0.8	1700	5	2.16	1.01	3.91	0.99	1.92	-0.13
0.8	1700	8	2.62	1.02	4.98	1.29	2.61	0.14
0.8	1700	10	2.80	1.06	5.39	1.50	2.82	0.25
0.8	1700	15	3.13	1.02	6.03	1.61	3.09	0.47
0.8	1700	20	3.28	1.01	6.38	1.69	3.25	0.56
0.8	1700	50	3.73	1.00	7.35	1.84	3.71	0.76
0.8	1700	100	3.99	1.03	8.08	1.92	4.16	0.84
0.8	7500	1	1.24	0.93	-0.48	-0.56	-1.46	-1.76
0.8	7500	2	1.33	0.89	1.14	0.20	-0.13	-0.74
0.8	7500	3	1.65	0.97	2.29	0.68	0.74	-0.37
0.8	7500	5	2.03	1.08	3.60	1.14	1.70	-0.01
0.8	7500	8	2.44	1.11	4.61	1.46	2.37	0.24
0.8	7500	10	2.59	1.12	5.02	1.56	2.61	0.35
0.8	7500	15	2.90	1.08	5.68	1.76	2.94	0.54
0.8	7500	20	3.11	1.06	6.05	1.83	3.09	0.64
0.8	7500	50	3.53	1.02	6.89	1.88	3.44	0.82
0.8	7500	100	3.74	1.03	7.39	1.93	3.71	0.88
1.0	330	1	1.36	1.04	-0.59	-0.69	-1.65	-2.04
1.0	330	2	1.47	1.02	1.06	0.11	-0.35	-0.97
1.0	330	3	1.76	1.11	2.23	0.62	0.54	-0.55
1.0	330	5	2.21	1.20	3.66	1.12	1.56	-0.16
1.0	330	8	2.64	1.19	4.74	1.40	2.25	0.08
1.0	330	10	2.87	1.20	5.21	1.54	2.50	0.20
1.0	330	15	3.15	1.16	5.81	1.65	2.81	0.38
1.0	330	20	3.35	1.14	6.20	1.69	2.96	0.45
1.0	330	50	3.78	1.15	7.25	1.94	3.54	0.71
1.0	330	100	4.03	1.15	8.03	2.05	4.05	0.84