Supplement: Parameters of conducted numerical experiments

Model [Figure]	**Upper crust**		**Lower crust**		**Dry mantle**		**Wet mantle**		**Plate ages, Myr**		**Initial weak zone[j], km**	**Water percolation, cm/yr**	**Amount of hydrated rocks atop the slab, km[b]**	**Porous (connate) fluid**		**Dynamics of subduction**						
	C*, *MPa	**sinφ**	***C*, *MPa***	**sinφ**	***C*, *MPa***	**sinφ**	***C*, *MPa***	**sinφ**	**Left**	**Right**				**z_{por}, km**	**wt %**	**One-sided, Myr**	**Two-sided, Myr**	**Stops at, Myr**	**Trench retreat, km**			
																			5 Myr	**10 Myr**	**15 Myr**	**20 Myr**
1 (wacg)	1	0	1	0.1	1	0.6	1	0	10	70	50x40	3	4.8	50	0.5	0-23	no	no	566	930	1291	1596
2 (waci)	1	0	1	0.1	1	0.6	1	0	10	70	50x40	10	4.8	25	0.5	0-20	no	20	718	870	896	907
3 (wacj)	1	0	1	0.1	1	0.1	1	0	10	70	50x40	no	2.8	-	-	0-1 12-31	1-12	no	518	704	1069	1426
4 (wacl)	1	0	1	0.1	1	0.6	1	0	10	70	50x40	3	4.8	100	0.5	0-16	no	no	475	723	1100	-
5 (wacm)	1	0	1	0.1	1	0.6	1	0	10	70	50x40	3	4.8	25	0.5	0-18	no	no	641	948	1208	-
6 (wacn)	1	0	1	0.1	1	0.6	1	0	10	70	50x40	3	4.8	75	0.5	0-11	no	11	508	547	544	541
7(wacp)	1	0	1	0.1	1	0.6	1	0	10	70	50x40	3	4.8	100	0.1	0-10	no	10	566	609	594	-
8(wacq)	1	0	1	0.1	1	0.6	1	0	10	70	50x40	3	4.8	-	0	0-12	no	10	493	508	508	509
9(wacw)	1	0.6	1	0.6	1	0.6	1	0	1	70	50x40[c]	no	0.8	-	-	0-14	no	14	216	243	252	-
10(wacy)[d]	1	0.6	1	0.6	1	0.6	1	0	1	70	50x40[c]	no	0.8	-	-	0-15	no	15	432	529	562	562
11(wacz)[d]	1	0.6	1	0.6	1	0.6	1	0	1	70	50x40[c]	3	2.8	25	0.5	0-15	no	15	363	445	465	470
12(wadb)	1	0	1	0.6	1	0.6	1	0	1	70[e]	50x40[c]	no	2.8	-	-	0-2, 5-20	2-5	20	602	645	661	667
13(wadc)	1	0.6	1	0.6	1	0.6	1	0	1	70[e]	50x40[c]	3	2.8	25	0.5	0-15	no	15	456	475	506	509
14(wadd)	1	0.6	1	0.6	1	0.6	1	0	1	70[e]	50x40[c]	no	0.8	-	-	0-4	no	4	242	243	244	244
15(wade)[f]	1	0.6	1	0.6	1	0.6	1	0	1	70[e]	50x40[c]	3	2.8	25	0.5	0-24	no	no	491	689	758	768
16(wadf)[f]	1	0.6	1	0.6	1	0.6	1	0	1	70	50x40[c]	3	2.8	25	0.5	0-17	no		488	768	990	-
17(wadg)[d]	1	0.6	1	0.6	1	0.6	1	0	1	70	50x20[c]	no	0.4	-	-	0-15	no	15	352	398	417	421
18(wadh)[d]	1	0.1	1	0.1	1	0.1	1	0	1	70	50x20[c]	no	0.4	-	-	0-32	no	32	410	495	545	572
19(wadi)[d]	1	0.6	1	0.6	1	0.6	1	0	1	70[e]	50x20[c]	no	0.4	-	-	0-15	no	15	355	390	399	401
20(wadj)[d]	1	0.1	1	0.1	1	0.1	1	0	1	70[e]	50x20[c]	no	0.4	-	-	0-1, 3-4, 18-19, 33-34	1-3, 4-18, 19-33	no	407	482	572	734
21(wadk)[dg]	1	0.6	1	0.6	1	0.6	1	0	1	70	20x20[c]	no	0.16	-	-	0-15	no	15	286	333	351	352
22(wadl)[dg] [Fig. 3]	**1**	**0.1**	**1**	**0.1**	**1**	**0.1**	**1**	**0**	**1**	**70**	**20x20[c]**	**no**	0.16	-	-	**0-2**	**2-39**	**no**	**388**	**488**	**542**	**603**
23(wadm)[dg]	1	0.6	1	0.6	1	0.6	1	0	1	70[e]	20x20[c]	no	0.16	-	-	0-14	no	14	347	368	375	375
24(wadn)[dg]	1	0.1	1	0.1	1	0.1	1	0	1	70[e]	20x20[c]	no	0.16	-	-	0-2	2-22	no	413	572	810	1055

25(wadp)[dg]	1	0.6	1	0.6	1	0.6	1	0	1	40[e]	no	no	0	-	-	no	no	-	-	-	-	-
26(wadq)[dg]	1	0.6	1	0.6	1	0.6	1	0	1	40[e]	no	no	0	-	-	no	no	-	-	-	-	-
27(wadr)[dg]	1	0.6	1	0.6	1	0.6	1	0	0.1	40[e]	no	no	0	-	-	no	no	-	-	-	-	-
28(wads)[dg]	1	0.6	1	0.6	1	0.6	1	0	0.1	40	no	no	0	-	-	no	no	-	-	-	-	-
29(wadt)[dg]	1	0.6	1	0.6	1	0.6	1	0	0.1	70[e]	no	no	0	-	-	no	no	-	-	-	-	-
30(wadu)[dg]	1	0.6	1	0.6	1	0.6	1	0	0.1	70	no	no	0	-	-	no	no	-	-	-	-	-
31(wadv)[dg]	1	0.1	1	0.1	1	0.1	1	0	0.1	40[e]	no	no	0	-	-	0-3	3-17	17	202	219	233	-
32(wadw)[dg]	1	0.1	1	0.1	1	0.1	1	0	0.1	40	no	no	0	-	-	0-6	6-11	11	240	263	275	279
33(wadx)[dg]	1	0.3	1	0.3	1	0.3	1	0	10^{-3}	80[e]	no	no	0	-	-	0-1	no	1	147	-	-	-
34(wady)[dg]	1	0.3	1	0.3	1	0.3	1	0	10^{-3}	80	no	no	0	-	-	0-1	no	1	136	-	-	-
35(waea)[dg]	1	0.6	1	0.6	1	0.6	1	0	10^{-3}	80[e]	no	no	0	-	-	0-1	no	1	101	-	-	-
36(waeb)[dg]	1	0.6	1	0.6	1	0.6	1	0	10^{-3}	80	no	no	0	-	-	0-1	no	1	118	-	-	-
37(waec)	1	0.6	1	0.6	1	0.6	1	0	10^{-3}	80[e]	no	3	0	25	0.5	0-1	no	1	121	-	-	-
38(waed)[g]	1	0.1	1	0.1	1	0.1	1	0	0.1	40[e]	no	no	0	-	-	0-2	2-19	19	202	212	225	230
39(waeg)[g]	1	0.15	1	0.15	1	0.15	1	0	0.1	40[e]	no	no	0	-	-	0-1	no	1	78	-	-	-
40(waeh)[g]	1	0.15	1	0.15	1	0.15	1	0	0.1	80[e]	no	no	0	-	-	0-3	no	3	130	130	130	130
41(waei)[g]	1	0.12	1	0.12	1	0.12	1	0	0.1	80[e]	no	no	0	-	-	0-2	2-14	14	221	264	275	275
42(waej)[g]	1	0.1	1	0.1	1	0.1	1	0	0.1	40	no	no	0	-	-	0-10	10-12	12	233	257	265	270
43(wafa)[g]	1	0.1	1	0.1	1	0.1	1	0	1	70	20x20[c]	no	0.16	-	-	0-5	5-11	11	304	319	327	332
44(wafb)[g]	1	0	1	0.1	1	0.1	1	0	1	70	20x20[c]	no	2.16	-	-	0-38	no	no	623	996	1258	1299
45(wafc)	1	0	1	0.1	1	0.1	1	0	1	70	20x20[c]	3	4.16	25	0.5	0-5, 7-20	5-7	no	719	917	1243	1616
46(wafd)[g]	1	0.15	1	0.15	1	0.15	1	0	1	70	20x20[c]	no	0.16	-	-	0-8	8-10	10	288	311	315	317
47(wafe)[g]	1	0.2	1	0.2	1	0.2	1	0	1	70	20x20[c]	no	0.16	-	-	0-14	no	14	255	284	293	295
48(waff)[g]	1	0.3	1	0.3	1	0.3	1	0	1	70	20x20[c]	no	0.16	-	-	0-10	no	10	217	231	238	246
49(wafg)[g]	1	0.1	1	0.1	1	0.1	1	0	0.1	60[e]	no	no	0	-	-	0-1	1-11	11	260	275	282	288
50(wafl)[g]	1	0.1	1	0.1	1	0.1	1	0	0.2	90	no	no	0	-	-	0-1	1-13	13	267	310	320	325
51(wafm)[g]	1	0	1	0.1	1	0.1	1	0	0.2	90	no	no	2	-	-	0-2, 14-15, 24-25	2-14, 15-24, 25-31	no	541	741	1104	1408
52(wafn)	1	0	1	0.1	1	0.1	1	0	0.2	90	no	0	2	25	0.5	0-2, 18-19, 26-27, 28-29	2-18, 19-26, 27-28, 29-31	no	514	689	835	1247
53(wafo)	1	0	1	0.1	1	0.1	1	0	0.2	90	no	0	2	∞[i]	0.5	0-3, 17-18, 25-26, 30-31	3-17, 18-25, 26-30	no	507	674	853	1266
54(wafp)[g]	1	0.1	1	0.1	1	0.1	1	0	0.1	30[e]	no	no	0	-	-	0-2	2-11	11	162	176	178	179

55(wafq)	1	0	1	0.1	1	0.1	1	0	0.2	90	no	3	4	∞[i]	0.5	0-17	no	no	802	1184	1667	-
56(wafr)	1	0	1	0.3	1	0.3	1	0	1	70	20x20[c]	3	4.16	25	0.5	0-8, 12-28	8-12	no	618	795	852	985
57(wafs) [Fig. 4]	**1**	**0**	**1**	**0.6**	**1**	**0.6**	**1**	**0**	**1**	**70**	**20x20[c]**	**3**	4.16	**25**	**0.5**	**0-2, 3-24**	**2-3**	**no**	**603**	**797**	**986**	**1163**
58(waft)	1	0	1	0.6	1	0.6	1	0	1	70	20x20[c]	1	2.16	25	0.5	0-2, 3-37	2-3	no	429	506	658	787
59(wafu)	1	0	1	0.6	1	0.6	1	0	1	70	20x20[c]	0.3	2.16	25	0.5	0-0.5, 4-19	0.5-4	no	377	421	487	-
60(wafv)	1	0	1	0.6	1	0.6	1	0	1	70	20x20[c]	0.1	2.16	25	0.5	0-0.5, 3-26	0.5-3	no	384	487	629	823
61(wafw)	1	0	1	0.6	1	0.6	1	0	1	70	20x20[c]	0.03	2.16	25	0.5	0-0.5, 5-23	0.5-5	no	363	419	549	707
62(wafx)	1	0	1	0.6	1	0.6	1	0	1	70	20x20[c]	0.01	2.16	25	0.5	0-0.5, 4-25	0.5-4	no	383	497	633	787
63(wafy)	3	0	3	0.6	3	0.6	3	0	3	70	20x20[c]	3	4.16	25	0.5	0-20	no	20	621	891	969	979
64(wagb)[k]	3	0.1	3	0.6	3	0.6	3	0	3	70	20x20[c]	3	4.16	25	2	0-20	no	20	621	809	878	895
64(wagc)[k]	1	0.1	1	0.6	1	0.6	1	0	1	70	20x20[c]	3	4.16	25	2	0-3, 7-30	3-7	30	550	590	670	702
66(wagd)[k]	3	0.1	3	0.6	3	0.6	3	0	3	70	20x20[c]	3	4.16	100	2	0-2, 4-20	2-4	no	455	670	914	-
67(wage)[k]	1	0.1	1	0.6	1	0.6	1	0	1	70	20x20[c]	3	4.16	100	2	0-0.2, 0.8-17	0.2-0.8	no	587	968	1413	-
68(wagf)[k]	3	0.1	3	0.6	3	0.6	3	0	3	70	20x20[c]	3	4.16	50	2	0-28	no	no	537	788	940	1056
69(wagg)[k]	1	0.1	1	0.6	1	0.6	1	0	1	70	20x20[c]	3	4.16	50	2	0-0.2, 0.7-27	0.2-0.7	no	532	851	1241	1463
70(wagh)[k]	3	0.1	3	0.6	3	0.6	3	0	3	70	20x20[c]	3	4.16	∞[i]	2	0-8	8-12	12	631	705	705	705
71(wagi)[k]	1	0.1	1	0.6	1	0.6	1	0	1	70	20x20[c]	3	4.16	∞[i]	2	0-16	no	16	648	846	930	-

[b] bulk volume of weak ($\sin\varphi=0$) hydrated rocks (initial weak zone, upper crust and hydrated mantle) normalized to the entire surface of the slab (km = km^3 per 1 km^2 of slab surface).

[c] wedge-like 50 km wide weak zone in the crust above the right plate (Fig. 2 A)

[d] no free surface tracing, subducted water markers are converted to sediments at $z \geq 20$ km.

[e] right slab is initially detached from the right boundary by linearly decreasing its age to 1 yr in 2500-3000 km interval.

[f] 0.1 MPa stress limit in the top weak layer (air, water).

[g] melting of the crust is not included to the model.

[i] porous fluid content is independent of depth and linearly decreases to 0% with temperature increasing from 0 to 700°C.

[j] plastic rheology of initial weak zone was taken equivalent to wet mantle.

[k] porous fluid is present in the upper oceanic crust only, $\sin(\varphi)=0$ condition is used locally in the areas with moving porous fluid (the presence of the moving fluid is detected on the basis of water marker method, Eq. 1).