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Forearc basins: Types, geometries, and relationships to subduction zone dynamics

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Below, I provide one figure, one table, and references cited that supplement the article entitled "Forearc basins: Types, geometries, and relationships to subduction zone dynamics" published on *Geological Society of America Bulletin*.

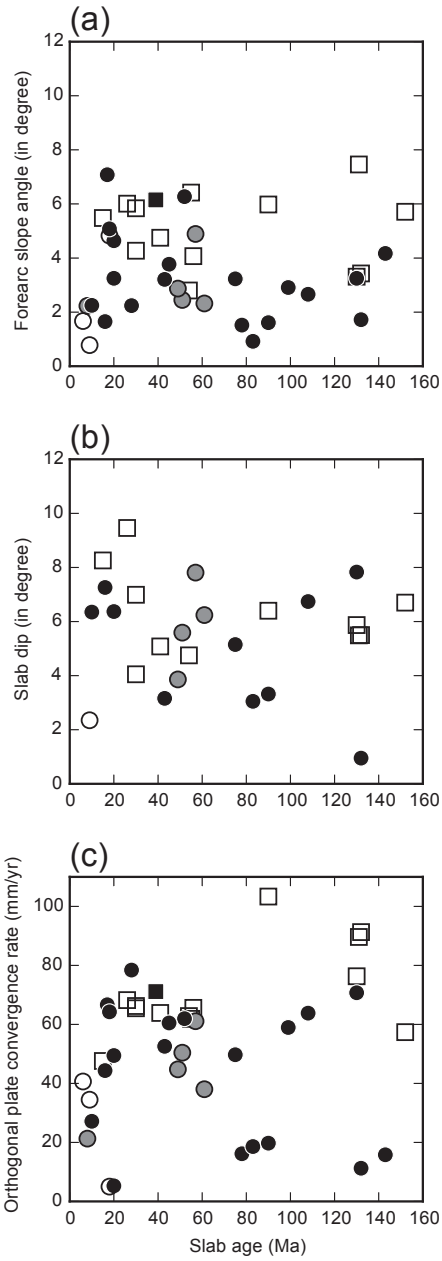

Figure S1: Slab age versus forearc slope (α), slab dip (β), and orthogonal velocity of oceanic plate subduction (V_{orth}). No clear relationship could not be found among these diagrams. Symbols are as in Figure 9.

Table S1: List of modern forearc basins analyzed in this study.

No.	Subduction zone	Basin name	Location		Subducting plate											Trench	Outer wedge						Forearc basin				References
			Longitude (°E)	Latitude (°N)	Oceanic* plate	V^* (mm/y)	Φ^* (°)	V^*_{orth} (mm/y)	V^*_{para} (mm/y)	$\beta_1^\dagger$ (°)	$\beta_2^\dagger$ (°)	$\beta^\dagger$ (°)	$\beta^\S_{125\ km}$ (°)	Age# (My)	T_{trench} (km)	Overriding* plate	W_{wedge} (km)	$\alpha_1^\dagger$ (°)	$\alpha_2^\dagger$ (°)	$\alpha^\dagger$ (°)	$\theta^\dagger$ (°)	T_{basin} (km)	W_{basin} (km)	Type**	Basal age	
1	N. Sumatra	Aceh Basin	94.5	5	IN	52	47	38.0	35.5	3.5	7.2	6.2	33.0	61	5.7	BU	147.9	7.4	0.4	2.3	8.6	2.9	41.7	nA	E. Miocene	[8, 16, 31, 62, 70, 94, 98]
2		Simeulue Basin	95.5	3.5	IN	53	72	50.4	16.4	5.4	5.6	5.6	31.0	51	5.4	BU	102.5	6.9	1.2	2.5	8.0	3.1	59.5	nA	E. Miocene	[9, 96]
3		Simeulue Basin	97	2.5	CP	54	56	44.8	30.2	6.6	2.2	3.9	29.0	49	4.0	SU	101.4	4.9	1.8	2.9	6.7	5.2	89	nA	E. Miocene	[8, 44, 65, 95, 97]
4	S. Sumatra	Enggano Basin	102	−4.5	CP	58	59	49.7	29.9	5.8	4.7	5.1	28.0	75	1.1	SU	95.1	4.4	2.4	3.2	8.4	6.1	114	cA	M. Miocene	[47, 63, 97]
5		Mentawai Basin	103	−6		59	88	59.0	2.1	—	—	—	27.0	99	1.2		95.2	6.2	1.5	2.9	—	4.0	140	cA	E. Miocene	[90]
6	W. Java	—	107	−8.2	AU	65.5	77	63.8	14.7	5.8	8.2	6.7	26.0	108	1.8	SU	108.2	4.4	1.6	2.7	9.4	3.6	70	eE–cA‡	Oligocene	[48]
7	E. Java	Lombok Basin	116	−10	AU	71	85	70.7	6.2	5.1	10.2	7.8	28.0	130	0.5	SU	71.8	5.4	1.5	3.2	11.1	3.5	89	eE–cA‡	L. Eocene	[59, 80, 110]
8	NE Japan	—	146	42.5	PA	91	57	76.3	49.6	4.7	6.3	5.9	27.0	130	0.8	OK	48.7	4.1	2.9	3.3	9.2	2.4	75	eE	Miocene	[43, 72, 73, 76, 91]
9		—	143.5	39.75	PA	92	77	89.6	20.7	4.8	5.7	5.5	23.0	131	0.3	OK	22.7	7.2	7.6	7.5	13.0	2.0	157	eE	M–L. Miocene	[2, 74, 77, 106, 113]
10		—	142.75	38	PA	93	79	91.3	17.7	10.2	3.9	5.5	24.0	132	1.1	OK	49.9	5.8	3.3	3.4	8.9	2.1	183	eE	M–L. Miocene	[42, 84, 119]
11	SW Japan	Kumano Basin	136.5	33.5	PS	57.1	60	49.5	28.6	7.2	6.1	6.4	19.0	20	1.6	AM	26.1	10.0	2.8	4.6	11.0	2.0	70.4	cA	Pliocene	[5, 28, 36, 39, 45, 67, 68, 78, 82, 104]
12	Mariana	—	146.5	15	PA	60	73	57.4	17.5	5.0	7.3	6.7	35.0	152	0.5	MA	36.0	7.7	4.9	5.7	12.4	1.0	128	eE	Eocene–Oligocene	[15, 75]
13	Manila	N. Luzon Trough	119.8	17.6	SU	82	73	78.4	24.0	—	—	—	26.0	28	1.7	PS	43.8	11.1	0.3	2.2	—	1.8	31.7	cA	M. Miocene	[3, 38, 56]
14		W. Luzon Trough	119.6	15.5	SU	70.5	71	66.7	23.0	—	—	—	37.0	17	0.9	SU	20.4	10.4	6.8	7.1	—	2.5	42.3	eE–cA‡	M. Miocene	[3, 38, 56]
15		W. Luzon Trough	119.6	14.7	SU	65.7	78	64.3	13.7	—	—	—	38.0	18	0.8	SU	27.9	10.5	3.4	5.1	—	3.5	52.5	eE–cA‡	M. Miocene	[3, 38, 56]
16	C. Aleutian	Atka Basin	−174	51.4	PA	72.6	57.3	61.1	39.2	7.1	8.5	7.8	36.0	57	1.0	NA	31.0	3.6	6.0	4.9	12.7	3.3	74.6	nA	E. Pliocene	[88, 86, 92, 93]
17	E. Aleutian	Unimak Basin	-164	53.3	PA	67.5	76.4	65.6	15.9	—	—	—	32.0	56	2.5	NA	20.1	14.9	0.0	4.1	—	4.2	119.0	eE	M–L. Miocene	[14, 120, 117]
18		Sanak Basin	−160.5	54.3	PA	65.5	70.9	61.9	21.4	—	—	—	29.0	55	0.9	NA	16.3	9.9	5.6	6.4	—	4.2	123.8	eE	M–L. Miocene	[14]
19		Shumagin Basin	−158	55.5	PA	63.7	80.5	62.8	10.5	3.1	8.4	4.7	27.0	54	0.8	NA	34.9	3.3	3.2	2.8	7.5	2.1	77.3	eE	M–L. Miocene	[13, 14, 57, 109, 87, 120]
20	W. Alaska	Tugidak Basin	−156	56.5	PA	62.3	83.9	61.9	6.6	3.6	—	—	25.0	52	1.8	NA	37.1	5.9	7.7	6.3	—	4.9	153.3	cA	M–L. Miocene	[29, 111, 79]
21		Albatross Basin	−153.5	56.2	PA	61.3	80.7	60.5	9.9	4.0	—	—	23.0	45	2.8	NA	48.9	3.9	4.3	3.8	—	5.1	69.2	cA	M–L. Miocene	[115, 116, 111]
22		Stevenson Basin	−149	58.5	PA	58	65	52.6	24.5	2.0	4.0	3.2	17.0	43	2.3	NA	66.3	4.2	2.5	3.2	6.4	6.4	152	cA	M. Miocene	[111, 69, 79, 114, 112, 122]
23	N. Cascadia	Tofino Basin	−126	49	JF	41	82.5	40.6	5.4	—	—	—	18.0	6	1.5	NA	42.2	12.3	0.9	1.7	—	2.5	59.9	eA	L. Eocene	[26, 27, 40, 41, 102]
24	C. Cascadia	Willapa Basin	−125	46.8	JF	37.4	67.2	34.5	14.5	1.4	3.0	2.3	15.0	9	3.1	NA	50.0	1.4	0.2	0.8	3.1	2.5	40	eA	L. Eocene	[10, 30, 66, 100]
25		Newport Basin	−124.7	45	JF	34.1	52.8	27.2	20.6	5.1	7.3	6.3	14.0	10	3.7	NA	48.1	3.3	1.7	2.3	8.6	6.0	80	cA	L. Eocene	[32, 99, 100, 108]
26	S. Cascadia	Eel River Basin	−124.7	41.6	JF	29.4	46.4	21.3	20.3	—	—	—	—	8	1.4	NA	58.2	4.5	0.5	2.2	—	2.1	123	nA	L. Miocene	[37]
27	C. America	Sandino Basin	-86.5	11.5	CO	75.3	65	68.2	31.8	4.7	12.0	9.5	32.0	26	0.5	CA	46.8	8.5	5.6	6.0	15.5	10.0	83	cA–eE‡	L. Cretaceous	[64, 83, 103, 105]
28	Greater Antilles	San Pedro Basin	−69.5	18	CA	19.8	53	15.8	11.9	—	—	—	37.0	143	0.3	CA	58.5	6.4	3.5	4.2	—	3.0	63	cA	M. Miocene	[34, 33, 35]
29	Lesser Antilles	—	−60.75	16.75	SA	18.3	62	16.2	8.6	—	—	—	38.0	78	0.5	CA	67.9	3.1	1.1	1.5	—	3.0	68	cA	—	[51, 52]
30		—	−60	16	SA	18.6	89	18.6	0.3	1.8	4.5	3.1	38.0	83	1.4	CA	121.6	1.5	0.6	0.9	4.0	6.3	59	cA	—	[121, 46]
31		Tobago Basin	−60.3	12.7	SA	19.8	86	19.8	1.4	3.0	3.5	3.3	33.0	90	5.7	CA	186.6	1.3	1.7	1.6	4.9	9.0	173	cA	M. Eocene	[1, 101, 107]
32	Colombian–Caribbean	San Jorge Basin	−77	9	CA	11.9	71	11.3	3.9	0.1	2.2	0.9	29.0	132	4.9	ND	123.8	3.5	0.6	1.7	2.7	4.7	148	cA	M. Eocene	[12, 60]
33	Ecuador–Colombia	Manglares Basin	−79.5	1.5	NZ	52.1	66	47.6	21.2	7.6	8.8	8.3	21.0	15	4.2	ND	22.2	11.3	3.7	5.5	13.7	2.9	69	eE‡–cA	M. Eocene	[22, 21, 61]
34		Tumaco Basin	−78.8	1.3	NZ	52.3	58	44.4	27.7	6.4	8.1	7.3	21.0	16	3.5	ND	115.7	4.3	1.3	1.6	8.9	12.9	73	eE–cA‡	L. Oligocene	[11, 58]
35	Peru	Salaverry Basin	−79.5	−8.5	NZ	67.2	77	65.5	15.1	4.3	3.9	4.0	11.0	30	1.0	SA	74.6	6.0	3.8	4.3	8.3	2.9	180	eE	Eocene?	[118]
36		Lima Basin	−78	−11.5	NZ	68.9	68	63.9	25.8	4.8	5.2	5.1	12.0	41	0.4	SA	41.6	8.3	2.8	4.8	9.8	1.6	98	eE	M. Miocene	[19, 49]
37	C. Chile	Valparaiso Basin	−72.2	−32.7	NZ	74	74	71.1	20.4	—	—	—	12.0	39	0.4	SA	30.4	13.9	3.9	6.1	—	2.7	69	cE	Pliocene?	[54, 25]
38		Arauco Basin	−73.7	−38.2	NZ	73.7	64	66.2	32.3	4.8	7.9	7.0	24.5	30	2.2	SA	33.1	6.1	5.8	5.8	12.8	1.7	60	eE‡–cA	L. Cretaceous	[6, 7, 23, 50]
39	S. Chile	—	−73.5	−54.5	AN	7.5	42	5.0	5.6	3.7	—	—	58.0	18	4.4	SC	23.4	7.3	2.7	4.8	—	1.7	25	eA	Oligocene–Miocene	[81, 85]
40		—	−72	−55.5	AN	7.1	48	5.3	4.8	0.6	—	—	—	20	3.2	SC	44.6	8.2	1.5	3.3	—	3.1	26	cA	Oligocene–Miocene	[81, 85]
41	Tonga–Kermadec	—	−176	−23	PA	107.5	74	103.3	29.6	3.9	9.3	6.4	—	90	1.0	TO	74.6	6.2	5.8	6.0	12.4	5.4	90	eE	M. Eocene	[17, 18, 24, 55]

* Names, relative motion (V) and azimuth of the subducting plate come from [4]. Obliquity (Φ, angle between azimuths of the subducting plate direction and the trench), orthogonal (V_{orth}) and parallel (V_{para}) components of plate subduction velocities were calculated by using V and azimuth of relative plate motion [4], and direction of the trench.

† β_1, β_2, and β are slab dips beneath frontal prism, middle prism and outer wedge, respectively. α_1, α_2, and α are forearc slopes of frontal prism, middle prism, and outer wedge (average slope between trench and outer arc high), respectively. θ is the taper angle ($\alpha+\beta$). Calculations were based on the outlines of seismic profiles.

§ $\beta_{125\ km}$ is defined as a mean slab dip of the subducting plate between trench and 125 km depth. All data were based on [53].

\# Ages of the oceanic plates were derived from [71].

** Abbreviations of forearc types: cA, compressional accretionary (AC); eA, extensional AC; eE, extensional non-AC; cE, compressional non-AC. If two types are hyphenated, the former is previous process, and the latter is present one.

‡ The dominant process in the long-term evolution and the type classified in Figure 3 and higher.

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