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Paleomagnetism and Suspect Terranes of the North American Cordillera

EXPLANATION

A pair of vectors is shown for each study:

= expected direction calculated from North American reference poles in Irving, E. & Irving, G.A., (1982). Vector azimuth = declination, vector length is arbitrary.

= observed direction. Vector azimuth = declination, vector length reflects inclination and is scaled relative to the expected direction vector length. Too shallow inclinations are shown as a longer vector, too steep as a shorter vector. 1mm in length = 2° difference in inclination. (Ex: if an expected inclination was 40° and the observed was 30°, then the observed direction vector would be 5mm longer than the expected direction vector.)

Symbols next to each vector pair indicate:

XX, first number, keyed to table below
XXX second number is approximate age in million years
"C" indicates statistically concordant direction in either rotation Cr, flattening Cf, or both Crf.

Multiple observed direction vectors at some localities (e.g. 15) represent multiple studies on rocks of very similar age from a small geographic area but with directions too divergent to average.

Except for footnoted entries, a northern hemisphere origin is assumed in calculating the concordance/discordance statistics.

Volcanic Assemblages

Sedimentary Assemblages

Plutonic Assemblages

NO.	TERRANE Study	AGE (m.y.)	λ_s	Øs	D_o	I_o	α_{95}	Ref. Pole Age	D_x	I_x	A_{95}	R±ΔR	F±ΔF	REFERENCE
1	KJf Cantwell Basin	Paleocene	63.6	149.2	142.3	-85.5	10	60	168.9	-80.5	[illegible]	26.6±15.9	5.0±10.4	Hillhouse & Gromme,(1982)
14	LCL.1 Lake Clark	138±10	60.4	154.5	316	26	6.8	140	304.7	79.9	16	11.3±55.7	53.9±11.1	Stone et. al.,(1982)
14	LCL.5 Lake Clark	139±10	60.3	154.3	328	-30	18.2	140	125.0	-79.9	16	-157.0±59.1	49.9±20.2	Stone et. al.,(1982)
14	LCL.6 Lake Clark	140±10	60.3	154.3	309	-3	6.4	140	125.0	-79.9	16	-176.0±55.6	76.9±10.8	Stone et. al,(1982)
2	WRANGELLIA - Alaska WRG.3-WRG.4.5 (mean)	165±10	61.5	142.8	313.1	38.7	12.7	170	336.1	68.7	11	-23.0±24.4	30.0±14.8	Stone et. al.,(1982)
3	Wrangell Mountains	Middle Triassic	61.5	142.5	74.0	-20.3	5.9	220	141.5	-56.7	5	-67.5±8.9	36.4±7.6	Hillhouse,(1977)
4	Clearwater Mountains	Middle Triassic	63	147	138.4	-32.4	11.3	220	138.0	-59.0	5	-0.4±14.9	26.6±12.2	Hillhouse & Gromme, (1981)
5	MNT. 1.3 Mentasta Mountain	215 ±10	62.9	144.0	79	-3	11.7	220	139.9	-58.1	5	119.1±13.4	61.1±12.6	Stone et. al.,(1982)
6	Vancouver - Queen Charlotte Is. East Sooke Gabbro	40±	48.4	123.7	329.9	64.2	4.2	40	351.3	67.5	4	-21.4±11.5	3.3±5.1	Symons, (1974)
7	Masset Formation	62±	53.7	132.5	26	78	6	70	336.9	76.7	7	49.1±34.4	-1.3±7.2	Hicken & Irving, (1977)
8	Island Intrusions	159±10	49.6	125.5	1.9	73.9	6.0	160	335.7	58.6	19	26.2±33.3	-15.3±18.3	Symons, (1971)
9	Karmutsen Formation	Middle Triassic	50.0	125.5	8	-33	6	220	157.2	-45.4	5	-149.2±9.1	12.4±8.6	Yole & Irving, (1980)
10	Oregon Columbia Plateau Basalt	13 - 16	45.5	118.5	5.5	64.2	2.1	20	357.6	63.0	3	7.9±6.4	-1.2±3.2	Watkins & Baksi, (1974)
11	Clarno Formation	40±	44.6	120.4	5.5	64.4	5.5	40	351.8	64.4	4	13.7±14.1	0.0±6.3	Beck et. al., (in prep.)
12	Blue Mountains Plutons	130-140	45.0	118.0	30	63	10	140	326.0	63.0	16	64.0±32.0	0.0±16.4	Wilson & Cox, (1980)
13	Seven Devils Arc	Late Triassic	45.0	117.0	293.4	35.8	17.1	210	346.4	36.7	5	-53.0±21.9	0.9±18.6	Hillhouse et. al., (1982)
15	PENINSULAR PVL.1 Pavlov Bay	55±5	55.5	161.4	230	-62	7.5	60	176.2	-76.5	5	53.8±19.9	14.5±8.0	Stone & Packer, (1977)
15	PVL.2 Pavlov Bay	56±5	55.5	161.4	197	-66	8.2	60	176.2	-76.5	5	20.8±23.6	10.5±8.7	Stone & Packer, (1977)
15	CNB.4 Canoe Bay	57±5	55.5	161.3	195	-55	9.6	60	176.2	-76.5	5	18.8±20.5	21.5±10.0	Stone & Packer,(1977)
16	MAT.1.5 Matanuska V.	60±5	61.8	148.5	179	-39	7.6	60	169.6	-79.6	5	9.4±17.6	40.6±8.1	Stone et. al., (1982)
17	CNB.1 Canoe Bay	68±5	55.1	161.9	316	52	12.5	70	353.2	80.1	7	-37.2±29.9	28.1±13.1	Stone & Packer, (1977)
18	CHG.1.2 Chignik Lg.	80±3	56.2	158.8	41	29	13.6	80	342.4	83.6	7	58.6±37.3	54.6±14.1	Packer, (1972)
19	TXD.5 Tuxedni Bay	148±2	59.9	152.9	85	74	6	150	313.1	73.9	17	131.9±42.2	-0.1±12.1	Packer & Stone, (1974)
19	TXD.8 Tuxedni Bay	149±2	60.0	152.7	67	51	11.6	150	313.0	73.9	17	114.0±40.4	22.9±15.6	Packer & Stone, (1974)
19	TXD.9 Tuxedni Bay	150±2	60.1	152.6	88	32	15.1	150	312.9	73.9	17	135.1±40.0	41.9±18.4	Packer & Stone, (1974)
20	CHL.2 Chignik Lake	151±10	56.3	158.8	62	61	13.5	150	317.3	72.3	17	104.7±43.7	11.3±17.3	Packer & Stone, (1974)
20	CHL.5 Chignik Lake	153±10	56.3	158.8	81	39	16.6	150	317.3	72.3	17	123.7±39.4	33.3±19.8	Packer & Stone, (1974)
21	TXD.7 Tuxedni Bay	160±2	59.9	152.7	73	48	5.6	160	322.4	71.4	19	110.6±36.6	23.4±13.6	Packer & Stone, (1974)
21	TXD.4 Tuxedni Bay	167±5	60.2	152.6	71	66	15.8	170	333.8	69.3	11	97.2±45.9	3.3±17.5	Packer & Stone, (1974)
21	TXD.2 Tuxedni Bay	170±5	60.2	152.7	238	49	12.7	170	333.8	69.3	11	-95.8±26.9	20.3±14.8	Packer, (1972)
22	SLD.1 Seldovia Bay	185±10	59.4	151.7	259	24	13.1	180	333.6	65.9	8	-74.6±18.8	41.9±14.4	Stone et. al., (1982)
22	SLD. 2 Seldovia Bay	186±10	59.4	151.7	248	-11	18.6	180	153.6	-65.9	8	94.4±22.5	54.9±19.5	Stone et. al., (1982)
23	SHP.5 Talkeetna Mtn.	187±10	61.7	147.7	107	-8	19.0	180	154.2	-66.7	8	-47.2±22.8	58.7±19.9	Stone et. al., (1982)
23	SHP.X Sheep Mtn.	188±10	61.9	147.5	55	34	8.6	180	333.8	66.9	8	81.2±16.2	32.9±10.4	Stone et. al., (1982)
24	CHUGACH NRC Narrow Cape	15±3	57.5	152.3	170	-68	5.9	20	176.3	-72.4	3	-6.3±16.9	4.4±6.2	Stone et. al., (1982)
25	KOD.3 Kodiak Island	48±7	57.5	152.3	136	-37	13.8	50	173.9	-76.9	4	-37.9±19.8	39.9±14.0	Stone et. al., (1982)
26	KOD.2-SHM.1-SHM.2 (mean)	73±10	56.0	157.0	136	-23	7.2	70	168.9	-80.4	7	-32.9±23.7	56.9±8.1	Stone et. al., (1982)
27	PRINCE WILLIAM Kodiak Island	~64	57.0	153.0	351.4	61.4	6.5	60	353.0	77.1	5	-1.6±18.3	15.7±7.1	Plumley et. al. (1982)
28	ALEXANDER - Admiralty Hound Island Volcanics	Late Triassic	56.9	133.9	234.4	64.7	11.0	210	336.5	54.5	5	-102.1±27.2	-10.2±12.1	Hillhouse & Gromme, (1980)
	Craig Klawak-Peratrovich Fms.	Carboniferous	55.5	133.2	289	35	19		300.0	47.5		-11	12.5	Van Der Voo et. al., (1980)
29	Port Refugio Fm.-Wadleigh Ls.	Middle-Late Devonian	55.3	133.2	285	28	14	360	314.2	49.1	5	-29.2±16.9	21.1±15.1	Van Der Voo et. al., (1980)
30	Descon Fm.	Ordovician-Silurian	55.5	133.4	295	14	8	440	304.1	34.3	9	-9±12.6	20.3±15.7	Van Der Voo et. al., (1980)
31	STIKINIA Topley Intrusions	139±4	54.0	125.0	332.5	63.3	9.1	140	318.4	70.3	16	14.1±35.0	7.0±14.1	Symons, (1973)
32	Hazelton Group	Toarcian	55.6	126.4	359	55	16	180	344.1	59.0	8	14.9±30.6	4.0±17.5	Monger & Irving, (1980)
33	Hazelton Group	Sinemurian	55.8	126.6	242	56	18	190	341.5	54.9	5	-99.5±34.1	-1.1±18.7	Monger & Irving, (1980)
34	Takla Group (mean)	200-210	56.6	126.4	288.8	41.0	9.3	210	340.3	52.6	5	-51.5±13.7	11.6±10.7	Monger & Irving, (1980)
35	QUESNELLIA Copper Mtn. Intrusions	194±8	49.3	120.6	25.9	57.5	6.5	190	345.2	46.9	5	40.7±13.4	-10.6±8.9	Symons, (1973)
36	Guichon Batholith	198±8	50.5	121.0	20.4	50.6	10.4	200	344.0	44.8	4	36.4±17.1	-5.8±11.6	Symons, (1971)
37	COAST PLUTONIC COMPLEX Eocene Plutons (N&S average)	~47	53.7	128.7	358	76	5	50	349.5	73.4	4	8.5±22.5	-2.6±5.6	Symons, (1977a)
38	Cretaceous Plutons (N&S)	64±8-74±15	53.5	129.0	26	67	7	70	335.9	76.1	7	50.1±24.2	9.1±8.1	Symons, (1977a)
39	Cretaceous Plutons (central)	64±8-74±15	53.5	129.0	336	59	8	70	335.9	76.1	7	0.1±22.4	17.1±9.0	Symons, (1977a)
40	Stephens Is. & Cptn. Cove Plutons	105±10	53.5	130.0	18	58	5	110	324.4	76.7	6	53.6±17.0	18.7±6.1	Symons, (1977b)
41	Gil Island Diorite	136±3	53.2	129.3	29	50	17	140	318.4	71.0	16	70.6±39.7	21.0±20.0	Symons, (1977b)
42	Howe Sound Plutons	94±6	49.5	123.2	350.8	65.2	7.9	100	323.3	73.0	10	27.5±27.3	7.8±10.1	Symons, (1973
43	PACIFIC NORTHWEST (undiff.) Western Cascades (Calif.)	15-35	41.9	122.5	7.8	59.4	5.2	30	354.6	61.2	3	13.2±11.0	1.8±5.8	Craig et. al., (in press)
44	Western Cascades (Oregon)	20-30	43	122	20.7	70.1	11	30	354.5	62.0	3	26.2±34.3	-8.1±11.3	Magill & Cox, (1981)
45	Northern Cascades Plutons	20-40	48.5	121.5	352.5	64.9	6	30	354.0	66.3	3	-1.5±15.0	1.4±6.4	Beck et. al., (1982)
46	Ohanapecosh Volcanics	31-37	46.5	121.5	27.0	63.5	4.5	40	351.5	65.9	4	35.5±11.8	2.4±5.4	Bates et. al., (1981)
47	Goble Volcanics	32-45	46.0	122.5	18.5	57.5	4.3	40	351.6	65.6	4	26.9±10.0	8.1±5.3	Beck & Burr, (1979)
48	Oregon Coast Range	~33	44.5	123.7	39.0	56.0	8.4	30	354.4	63.4	3	44.6±15.7	7.4±8.7	Beck & Plumley, (1980)
49	Yachats Basalt	36.6±3.6	44.2	124.0	46	64	14	40	352.0	64.4	4	54.0±34.0	0.4±14.3	Simpson & Cox ,(1977)
50	Oregon Coast Range	~40	44.9	123.7	44.5	62.0	12.5	40	351.8	64.9	4	52.7±28.1	2.9±12.9	Beck & Plumley, (1980)
51	Siletz River Volcanics	~55	44.6	123.6	63	61	6	50	350.9	67.0	4	72.1±13.9	6.0±6.7	Simpson & Cox, . (1977)
52	Tillamook Volcanics	44.3±.6	45.7	123.5	35.5	64.2	7.0	40	351.7	65.5	4	43.8±17.3	1.3±7.6	Magill et. al., (1981)
53	Tyee-Flournoy Formations	~50	44.0	123.7	59	63	8	50	351.0	66.6	4	68.0±18.9	3.6±8.5	Simpson & Cox, (1977)
54	Crescent Volcanics	~50	47.7	122.7	176.5	-66.5	8.6	50	170.1	-69.1	4	6.4±23.0	2.6±9.0	Beck & Engebretson, (1982)
55	Black Hills	53.1±2	47.0	123.1	16.3	67.3	5.1	50	350.3	68.7	4	26.0±14.8	1.4±5.8	Globerman et. al.,(1982)
56	Mt. Stuart Batholith	~88	47.6	120.9	10.0	45.5	4.9	90	325.1	72.0	4	44.9±10.2	26.5±5.5	Beck et. al., (1981)
57	SIERRA NEVADA Kinnick Formation	15-20	35.2	118.3	353.7	63.7	5.9	20	357.9	53.6	3	-4.2±13.9	-10.1±6.7	Kanter & Mc Williams, (1982)
58	Bear Valley Springs Pluton	80-86	35.2	118.5	22	56	5.6	90	332.7	63.7	4	49.3±11.6	7.7±6.4	Kanter & Mc Williams, (1982)
59	Yosemite-Sonora Pass Plutons	83-90	38.4	119.9	5.6	73.3	9.6	90	331.3	66.3	4	34.3±36.0	-7.0±10.1	Gromme & Merril, (1965)
60	FOOTHILLS Guadalupe Mtns - Bucks Bath.	129-142	39.0	121.0	310.4	68.4	9.5	140	328.7	59.8	16	-18.3±34.1	-8.6±17.0	Gromme et. al., (1967)
61	"FRANCISCAN" Morro Rock - Islay Hill	22-26.5	35.3	120.7	48.7	40.9	16.5	30	355.1	55.0	3	53.6±22.4	14.1±16.8	Greenhaus & Cox, (1979)
62	Laytonville Limestone (LL2)[1]	95-98	39.7	123.5	229.5	-31.8	10.7	100	330.9	67.6	10	-101.4±20.3	99.4±12.9	Alvarez et. al., (1980)
63	Stanley Mountain Terrane [2]	160-5	35.1	120.2	41	-27	8	160	160.4	-42.3	19	-119.4±22.8	15.3±26.3	McWilliams & Howell, (1982)
64	TRANSVERSE RANGES (CA) Santa Monica Mtns.-Anacapa Is.	13.1-16.1	34.2	119.0	67.7	41.4	5.4	20	357.9	52.6	3	69.8±8.1	11.2±6.3	Kamerling & Luyendyk, (1979)
65	MOJAVE DESERT Barstow Basin Volcanics	13.5-18.9	35.2	117.2	332.1	45.0	14.0	20	357.9	53.6	3	-25.8±20.3	8.6±14.3	Burke et. al., (in press)
66	SOUTHERN CA BATHOLITH	110±10	33.5	117.0	3.0	49.5	5.0	110	335.9	61.5	6	27.1±11.2	12.0±7.1	Teissere & Beck, (1973)
67	CABORCA El Antimonio Formation	195±10	30.7	112.5	350.0	33.8	12.1	200	9.2	10.2	4	-19.2±15.2	-23.6±14.4	Kluger-Cohen et. al., (1981)
68	SIERRA MADRE OCCIDENTAL Durango-Mazatlan Volcanics	23.5-31.5	24.0	105.0	340.3	38.3	7.5	30	355.7	40.6	3	-15.4±10.1	2.3±8.5	Nairn et. al., (1975)
69	COAHUILA Diffunta Group	Maestrichtian	25.8	101.5	325.0	39.1	9.4	70	342.7	49.8	7	-17.7±14.6	10.7±12.3	Nairn, (1976)
70	SIERRA MADRE Cuesta del Cura Formation	Albian-Cenomanian	23.8	99.2	345.1	43.5	2.8	100	334.7	45.5	10	10.4±11.9	2.0±12.7	Gose et. al., (1982)
71	Zuloaga Formation (avg.)	Oxfordian	23.8	99.2	356.9	40.3	3.7	160	346.6	16.6	19	10.3±19.8	-23.7±35.9	Gose et. al.,(1982)
72	OAXACA Oaxaca Limestones	95-105	16.6	97.0	348.7	23.0	6.6	100	336.0	35.4	10	12.7±12.8	12.4±16.4	Urrutia-Fucugauchi, (1981b)
73	MAYA [1] Grupera-Paso Hondo Fms.	Wolfcampian-Leonardian	15.5	92.2	177.3	1.0	13.4	270	160	41.6	4	17.3±14.1	-40.6±14.4	Gose & Sanchez-Barreda, (1981)
74	TRANS-MEXICAN VOLCANIC BELT Jantetelco-Tepexco	15-20	18.7	98.8	301.2	27.1	10.7	20	358.7	31.7	3	-57.5±12.4	4.6±11.7	Urrutia-Fucugauchi, (1981a)
75	Rio Grande de Santiago	4.7-9.3	20.8	103.3	349.8	34.8	12.9	10	359.1	34.5	3	-9.3±16.1	-0.3±13.7	Watkins et. al., (1971)
76	"SONOMIA" Luning Formation	Karnian-Norian	38.9	117.6	2.7	39.0	11.2	210	346.6	27.5	5	16.1±15.4	-11.5±14.0	Kluger-Cohen, (1981)

note: data for entry 77 is in text.

No. - number on map, λs - site latitude, Øs - site longitude (west), Do - observed declination, Io - observed inclination, α95 - 1/2 angle of 95% confidence oval, Ref. Pole Age - reference pole age in million years, Dx - expected declination, Ix - expected inclination, A95 - 1/2 angle of 95% confidence circle, R±ΔR - rotation value of Beck, (1980) +R→clockwise, F±ΔF - flattening value of Beck, (1980) +F→too shallow.

[1] Evidence for southern hemisphere origin.

[2] Authors suggest southern hemisphere origin which would yield R±ΔR = 50.6±22.8, F±ΔF = 69.3±26.3

TECTONOSTRATIGRAPHIC TERRANES

A - Alisitos, Aa - Alexander (Admiralty), ACr - Alexander (Craig), Am - Angayucham, An - Alexander (Annette), BR - Bridge River, C - Chugach, Ca - Caborca, Cc - Cache Creek, Ch - Chihuahua, Co - Coahuila, D - Dillinger, E - Endicott, EA - Eastern Assemblages, Fh - Foothills, Fr - Franciscan, G - Guerrero, Gc - Golconda, I - Innoko, J - Juarez, K - Cretaceous sediments, KJf - deformed upper Mesozoic flysch, Kl - Klamath, Kv - Cretaceous volcanics, M - Methow-Tyaughton, Ma - Maya, Mi - Mixteca, MM - McCoy Mountain, Nf - Nixon Fork, Ns - North Slope, O - Oaxaca, P - Peninsular, Pc - Porcupine, PW - Prince William, Qn - Quesnellia, R - Ruby, RM - Roberts Mountain, S - Salinia, Se - Seward, SM - Sierra Madre, SO - Sur-Obispo, So - Sonomia, St - Stikinia, TA - Tracy Arm, Tg - Togiak, Tu - Taku, V - Vizcaino, W - Wrangellia, Xo - Xolapa, Yn - Yukon, YT - Yukon Tanana

Terrane boundaries and names taken from Jones, D.L., et. al.,(1981), Berg, H.C., Jones, D.L. & Coney, P.J., (1980), Coney, P.J., (1981), Campa, M.F. & Coney, P.J., (in press), Blake, M.C., Howell, D.G. & Jones, D.L., (pers. comm.), Monger, J.W.H., (pers. comm.), and Silberling, N.J. (pers. comm.)

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