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Title of article Paleosubduction geometries inferred from Cretaceous and Tertiary magmatic patterns in southwestern North America

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TABLE 3

REFERENCE LIST FOR CHEMICAL AND AGE DATA USED IN COMPILATION OF TABLE 2

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Central California Batholith; Guadalupe Complex	Best (1963)	Curtis and others (1958)	
Salinian Block; Bodega Head-Point Keyes	Ross (1972)	Evernden and Kistler (1970)	92 and 80 m.y. K-Ar. ages of Everndern and Kistler are probably cooling ages; The true age of the granitic rocks is probably similar to those of the western part of the Peninsular Ranges - the suggestion of Armstrong and Suppe (1973); i.e. 121? to 104 m.y.?
Salinian Block; Montara Mountain	Ross (1972)	Evernden and Kistler (1970)	87 m.y. K-Ar age is probably a cooling age; see above comment.
Central California batholith; Shaver Sequence	Bateman and Dodge (1970)	Evernden and Kistler (1970)	$K_{57.5}$ index for Shaver sequence was taken from $K_2O/A:O_2$ plot, Figure 5, Batemen and Dodge (1970).
Salinian Block; Ben Lomond	Ross (1972)	Evernden and Kistler (1970)	71 m.y. K-Ar age is probably a cooling age; see also Bodega Head comment.
Salinian Block; Santa Lucia Range	Compton (1966); Ross (1972); Pearson and others (1967)	Curtis and others (1958); Hutton (1959); Compton (1966); Evernden and Kistler (1970)	110 m.y. Rb-Sr isochron (Evernden and Kistler 1970) and Th-Pb 106 m.y. age (Hutton, 1959) suggest 5 70-78 m.y. K-Ar ages (Curtis and others, 1958; Compton, 1966; Evernden and Kistler, 1970) are cooling ages only and not emplacement ages; see also Bodega Head comment.
Salinian Block; Gabilan Range	Ross (1972)	Curtis and others (1958); Evernden and Kistler (1970)	80 and 84 m.y. K-Ar ages are probably cooling ages; see Santa Lucia and Bodega Head comments.
Northwest Southern California Batholith	Miller (1937); Miller (1946); Larsen (1948)	Larsen and others (1958); Bushee and others (1963); Earl (1965); Banks and Silver (1966); Herzog and others (1960); Evernden and Kistler (1970); Reynolds (1957); Krummenacher and others (1975)	Chemical data for this area came from the gabbro bearing belt north of the international border (see Fig. 1 of Krummenacher and others, 1975). 120 to 105 m.y. age assignment is based on 109, 119 and 120 m.y. U-Pb ages for granitic rocks at Crestmore, Woodson Mt., and Mt. Rubidoux, respectively (Banks and Silver, 1966.

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Southwest Southern California Batholith	Gastil and others (1975)	Silver and others (1963); Silver and others (1969); Krummenacher and others (1975); Larsen and others (1958); Bushee and others (1963)	Chemical data for this area came from the gabbro-bearing belt on the west side of the batholith south of the international border 120 to 105 m.y. age assignment 117, and 115 m.y. U-Pb ages (Silver and others 1963) and geologic similarity with 120 to 109 m.y. rocks to the northwest.
Southern California; Libre	Ross (1972)	Evernden and Kistler (1970)	71 m.y. K-Ar age is probably a cooling age; rocks are questionably assigned to the 120 to 105 m.y. age range based on geologic analogy with rocks to the north and south.
Eastern Southern California Batholith	Hirschi and Quervain (1927-1933); Miller (1946); Morton and others (1969); Gastil and others (1975)	Larsen and others (1958); Bushee and others (1963); Evernden and Kistler (1970); Estavillo and Rogers (1970); Krummenacher and Gastil (1970); Armstrong and Suppe (1973); Krummenacher and others (1975); Silver and others (1969)	Chemical data for this region was composited from the east edge of the peninsular batholith east of the gabbro belt (refer to Fig. 2 of Krummenacher and others, 1975). 105 to 90 m.y. age assignment conforms with 94, 96, and 98 m.y. U-Pb age dates (Silver and others, 1969; and Krummenacher and others, 1975).
Central California Batholith; John Muir and Tuolume Sequences	Bateman and Dodge (1970)	Evernden and Kistler (1970); Kistler and others (1965); Curtis and others (1958); Jaffe and others (1959)	$K_{57.5}$ value from John Muir and Tuolume intrusive sequences taken from Fig. 5 of Batemen and Dodge (1970); 90 to 79 m.y. age assignment taken from Evernden and Kistler (1970).
Mojave Block; Cedar Springs	Ross (1972)	Armstrong and Suppe (1973); Evernden and Kistler (1970	82 - 72 m.y. age is based on 78, 81, 72, and 70 K-Ar biotite ages and a 73 m.y. K-Ar hornblende age. Age is questionably interpreted as an emplacement age range.
Mojave Block; Southeast California	Miller (1946); Richmond (1965)	Armstrong and Suppe (1973);	Locations of chemical analyses by Miller (1946) were matched with K-Ar dated localities by Armstrong and Suppe (1973) and it is not entirely clear that all of the chemically analyzed samples are from the plutons dated by Armstrong and Suppe (1973).

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Salero - Meadow Valley Volcanics, SE Arizona	Drewes (1971); Simons (1972)	Drewes (1971); Simons (1972); Marvin and others (1973)	80 to 72 m.y. age assignment based on 73 m.y. K-Ar biotite age for upper welded tuff member of Salero volcanics (Drewes, 1971) and a 72 m.y. K-Ar biotite from a rhyolite tuff within Trachandesite of Meadow Valley (Simons, 1972). Lower dacite and exotic block members are undated but conformably rest on Fort Crittenden Formation which has a fossil date of Santonian to Maestrictian. Thus, the overlying "dacitic volcanics" are probably no older than 80 m.y.
Tucson and Roskruge Mountains, SE Arizona	Damon (1967); Bolin (1976); Dewhurst (1976); Rehrig unpub. data	Bikerman and Damon (1966); Bikerman (1967)	Chemical data composited from Amole granite (72-76 m.y.) Cat Mt. rhyolite (72 m.y.) Roskruge Volcanics (71-75 m.y.) and Roadside Formation.
Williamson Canyon Volcanics, SE Arizona	Koski (1978); Keith, Nielsen, Barrett, Rehrig, unpub. data	Koski (1978); Keith and Damon unpub. data	Rocks related to Williamson Canyon volcanics have three dates ranging from 80-74 m.y. Volcanics are intruded by probable 72-70 m.y. calcalkaline intrusions.
SE Arizona Composite (Fig. 4A)			Fig. 4A is composited from the three entrees and is outlined by the southeast rectangular area on Fig. 2.
Ajo, SW Arizona	Gilluly (1946); Graybeal (1972); Laine (1974); Dewhurst (1976)	McDowell (1971)	Chemical data is from the composite Cornelia pluton.
Hidalgo Volcanics, SW New Mexico (Fig. 4D)	Lasky (1947); Jones and others (1967)	McDowell (1971); Marvin and others (in press)	70? to 60? m.y. age was originally based on stratigraphic considerations and is now supported by 58, 67, and 70 m.y. fission track ages (Marvin and others, in press). Chemical analysis from type area in Little Hatchet Mountains is from a rock which probably correlates with the above rocks. Andesite breccias and probable comagmatic syenodiorite intrusion of the Santa Rita region (Jones and others, 1967) were considered Hidalgo equivalents and are intruded by the Pinos Altos stock with K-Ar biotite ages of 69 and 73 m.y. (McDowell, 1971).

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Santa Rita Mountains, SE Arizona	Schrader (1915); Bolin (1976); Drewes (1976)	Damon and Mauger (1966); Marvin and others (1973); Drewes (1976)	Chemical data was composited from Elephant Head Quartz Monzonite, Madera Canyon Granodiorite, and Josephine Canyon Diorite plutons.
Tucson, Silver Bell, and Roskruge Mountains, SE Arizona	Dewhurst (1976); Banks and others (1972)	Bikerman and Damon (1966); Bikerman (1967); Mauger and others (1965); Banks and others (1978)	Chemical data was composited from Shorts Ranch andesite (57 m.y.); Biotite rhyolite of Tucson Mountains (61 m.y.); Cocoraque Butte pluton (69 m.y.) in Roskruge Mountains; and Silver Bell quartz monzonite (67 m.y.) of the Silver Bell Mountains.
Ray, SE Arizona	Ransome (1919, 1923); Banks and others (1972)	Schmidt (1971); Banks and others (1972); Banks and Stuckless (1973)	Chemical data was composited from Tortilla quartz diorite (69-71 m.y.); Troy Granodiorite (69-71 m.y.) Granite Mountain Porphyry (60-62 m.y.); Teapot Mountain Porphyry (60-63m.y.); and various dike rocks (62-67 m.y.).
SE Arizona Plutons Composite (Fig. 4B)	Chemical data for areas not separately treated are outlined below. Data for the Globe-Miami Superior area are from Puckett, 1970, for the Silver King Quartz diorite, Ransome (1919) and Graybeal (1972) for the Schultze Granite, Ransome (1919), Peterson and others (1951), and Laine (1974) for the Lost Gulch Quartz Monsonite, and Laine (1974) for the granite Porphyry at Castle Dome. Data for the Texas Canyon area (also not treated) are from Bolin (1976) for the Texas Canyon Quartz Monzonite.	Radiometric data for areas not separately treated are outlined below. Data for the Globe-Miami Superior area are from Creasey and Kistler (1962) for the 62 m.y. Castle Dome pluton. Livingston and others, (1968) for the 64 m.y. Lost Gulch Quartz monzonite; Creasey and Kistler (1962), Livingston and others, (1967), and McDowell (1971) for the 58 to 62 m.y. Schultze granite. Data for the Texas Canyon area are from Livingston and others (1967) and Marvin and others (1973) for the 48-54 m.y. Texas Canyon Quartz Monzonite. Data for the Tombstone District are from Creasey and Kistler (1962) for the 72 m.y. Schieffelin Granodiorite and Marvin and others (1973) for 72 m.y. Uncle Sam Porphyry.	Chemical data composited from all SE Arizona plutons within rectangle outline in Fig. 2A. These include plutons in the Santa Rita Mountains; Tucson, Silver Bell, and Roskruge Mountains; Ray area; Mammoth-Copper Creek area; Patagonia Mountains; Sierrita Mountains; Christmas area; Texas Canyon area; and the Tombstone district.

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
SE Arizona Plutons Composite (continued)	Data for the Tombstone district are from Butler and others (1938) and Gilluly (1956) for the Uncle Sam Porphyry and Butler and others (1938) and Dewhurst (1976) for the Schieffelin Granodiorite.		
Mammoth-Copper Creek, SE Arizona	Simons (1964); Dewhurst (1976); Creasey (1965)	Creasey and Kistler (1962); Rose and Cook (1965)	Chemical data was composited from Copper Creek Granodiorite (68 m.y.) and granodiorite at San Manuel (67 to 69 m.y.).
Patagonia Mountains, SE Arizona	Schrader (1915); Grabeal (1972); and Dewhurst (1976)	Damon and Mauger (1966); Marvin and others (1973)	Chemical data was taken from the composite Patagonia granodiorite pluton (58 to 64 m.y.).
Sierrita Mountains, SE Arizona	Hillman (1970) and Laine (1974)	Cooper (1973); Creasey and Kistler (1962); Damon and Mauger (1966); Shafiqullah and Langlois (in press)	Chemical data was composited from the Quartz diorite (67 m.y.) and quartz monzonite porphyry (54-56 m.y.) intrusions at the Sierrita-Esperanza Mine.
Christmas Area, SE Arizona	Koski (1978); Keith, Rehrig, Barrett, and Nielsen, unpub. data	Creasey and Kistler (1962); Koski (1978); Keith and Damon, unpub. data	Chemical data was composited from the Granite Basin laccolith (71 m.y.?); MacDonald Stock (68 m.y.?); microdiorite (70 m.y.?); Ash Creek Stock (61 m.y.); and various dikes (61 to 71 m.y.).
SE Arizona Composite (Fig. 4B)	See above entrees	See above entrees	Chemical data was composited from all chemical data for 71 to 53 m.y. plutons and volcanics within the rectangular outline on Fig. 2A, i.e. Santa Rita Mountains; Tucson, Silver Bell, and Roskruge Mountains; Ray area; Globe-Miami-Superior area; Texas Canyon area; Tombstone district; Mammoth-Copper Creek area; Patagonia Mountains; Sierrita Mountains; and Christmas area.

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR [illegible] AND OTHER AGE DATA	COMMENTS
Front Range, Colorado (Figure 4C)	Cross (1886); Emmons and others (1896); Clarke (1904); Bastin and Hill (1917); Emmons and others (1927); Lovering and Goddard (1938); Walstrom (1940)	Hart (1960); Evernden and others (1964); Pearson and others (1962); Scott (1972); McDowell (1971); Marvin and Naeser (1974)	Chemical data was composited from Panda porphyry (70 m.y.), Audubon-Albion stock (66 m.y.), Caribou stock (63 m.y.), Iron Dike, Denver Formation (64 to 65 m.y.), Table Mt. basalt, and Valmont dike. All al the above fall in the early 1-3 magmatic stages of Lovering and Goddard (1938).
Dos Cabezas Mountains; SE Arizona	Dewhurst (1976)	Erickson (1968, 1969)	Chemical data was composited from Silver Camp stock (62 m.y.), Cowboy stock (59 m.y.), and Maverick stock (56 m.y.).
Safford, SE Arizona	Bolin (1976)	Damon and Mauger (1966); Robinson and Cook (1966)	Chemical data was composited from fresh to partially altered (see Dewhurst, 1976, p. 37-38 for discussion of sample selection) rocks of the Lone Star quartz diorite and San Juan stocks (62 - 58 m.y.), dacite -rhyolite dikes and plugs, and the Safford andesite (pre 62 m.y.; probably 65 to 62 m.y.).
SE New Mexico Composite (Figure 4D)	Lasky (1947); Jones and others (1967)	Schwartz (1959); McDowell (1971)	Chemical data composited from the Santa Rita quadrangle (see below) and diorite sills, monzonite at old Hachita, and Sylvanite composite pluton described by Lasky (1947).
Ute Mountains, Colorado	Ekren and Houser (1965)	Armstrong (1969)	84 m.y. impure plagioclase date is probably too old; 65 to 70 m.y. maximum age is more in accord with stratigraphic relations. Chemical data is composited from numerous laccolithic intrusions throughout the Ute Mountains reported on by Ekren and Houser (1965).
Santa - Rita, New Mexico	Schmidt (1939); Ker and others (1950); Jones and others (1967); Laine (1974)	Schwartz (1959); McDowell (1971)	Chemical data composited from quartz diorite porphyry sills (59 m.y.), Hanover - Fierro pluton (57-58 m.y.); Santa Rita stock (56-59 m.y.); Copper Flat pluton, granodiorite quartz monzonite, and rhyodacite porphyry dikes (post - 56 m.y.).

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Ouray - La Plata, Southwest New Mexico	Cross and others (1899); Reeside, (1924); Burbank (1936); Dickinson and others (1968)	Dickinson and others (1968); Armstrong (1969); Marvin and Naeser (1974)	Chemical data composited from cluster in La Plata Mountains (single K-Ar biotite age of 65 m.y.), Spruce Ridge dike (67 m.y.), Rhyodacite tuff breccia (70 m.y.), and Diorite porphyry (49 m.y. K-Ar date on altered mafic minerals). Four fission track dates (43-58 m.y.) and one K-Ar date (64 m.y. on biotite) from similar rocks in the Rico Dome were used as control. Also, one chemical analysis from an andesite pebble in the McDermott Formation (paleontologically dated as late Cretaceous early Tertiary) was used (Reeside, 1924). La Plata data are more alkalic than data from Ouray.
Front Range, Colorado (Figure 4C)	Ransome (1911); Emmons and others (1927; Lovering and Goddard (1938); Cross (1886)	Pearson and others (1962); McDowell (1971); Lovering and Goddard (1938)	Chemical data composited from 4,5,and 6 age plutons (Lovering and Goddard, 1938) in the Leadville and Breckenridge districts; most of the chemistry is from plutons which pre-date the 64 m.y. Lincoln porphyry (Pearson and others, 1962) assuming that the relative age sequence of the intrusions follows that outlined by Lovering and Goddard (1938). Additional data (11 points) from the Tarryall district (Muilenberg, 1925) and Kokomo (Tenmile) district Bergendahl and Koschmann, 1971) do not substantially alter the $K_{57.5}$ value. Chemical data from poorly dated plutons on the east-side of the Front Range (relative ages 4-11 of Lovering and Goddard, 1938) yield a $K_{57.5}$ value of about 2.4 (data from Ball, 1908 and Lovering and Goddard, 1938).
Morenci, SE Arizona	Lindgren (1905); Laine (1974); Dewhurst (1976)	McDowell (1971); Bennett (1975)	Chemical data was composited from monzonite and diorite porphyries (Lindgren, 1905), and quartz monzonite.
Palm Park (Bell Top Fromation), Southwest New Mexico	Clemons (1975)	Clemons (1975); Bassett and others (1963)	Chemical data was composited from volcanics within the Bell Top Formation (39-36 m.y.)

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR AND OTHER AGE DATA	COMMENTS
Black Range, Southwest New Mexico	Kuellmer (1954); Jicha (1954); Elston (1957; Ericksen and others (1970); Fodor (1975); unpub. compil. of Mogollon-Datil Province igneous rocks by W.E. Elston, Dept. of Geol., Univ. of New Mexico, Albuquerque, NM 87131	Burke and others (1963); Weber and Bassett (1963); Elston and others (1973)	Chemical data was composited from analyses of the Kneeling Nun Tuff (33 m.y.); andesite of Mimbres River (39-33 m.y.); Alum Mountain Formation or andesite of Aspen Canyon (29-30 m.y.), rhyolite of Rocky Canyon (~26 m.y.), Bear Springs basalt (27-30 m.y.), Razorback Formation (~29 m.y.); Rubio Peak Formation (36 to 37 m.y.), Swartz Rhyolite (26 m.y.), Pollack Quartz Latite (~33 m.y.?).
Mogollon Datil Volcanics, SW New Mexico Composite	Kuellmer (1954); Jicha (1954); Elston (1957); Ericksen and others (1970); Rhodes (1976a, 1976b); Fodor (1975); Smith (1976); Fodor Rhodes and Smith (1976); unpub. compil. of Mogollon-Datil Province igneous rocks by W.E. Elston	Burke and others (1963); Weber and Bassett (1963); Smith (1970); Chapin (1971); McDowell (1971); Strangway and others (1974); Ratte and Gaskill (1975); Smith and others (1976)	Chemical data was composited from all rocks above plus Bearwallow Mountain Formation (~21 m.y.), tuff of Cox Canyon, John Kerr Peak Quartz latite (~21 m.y.) Hells Mesa Rhyolite (29-32 m.y.); Railroad Canyon rhyolite (23 m.y.), Apache Spring Quartz Latite (27 m.y.), Fanney Rhyolite (27 m.y.), Bloodgood Canyon Rhyolite (26 m.y.), Jerky Mountain rhyolite (23-26 m.y.), Taylor Creek Rhyolite (24 m.y.), rhyolite of Diamond Creek; $K_{57.5}$ value constructed from K_2O/SiO_2 plot in Figure 12 of Elston and others (1976).
Blue Range, E. Central Arizona	Ratte and others (1969); Berry (1976)	Damon (1968); Ratte and others (1969); Strangway and others (1976)	Chemical data was composited from northern ash flow tuff of the Blue Range Primitive Area (25 m.y.?), Pyroxene-hornblende andesite unite of the Blue Range Primitive area (37-25 m.y.), andesites of the Black Jack Canyon area south of Clifton, Arizona, and the Clifton Andesites (37-25 m.y.), quartz latite rhyolite complex of the Blue Range Primitive area which includes the rhyolites of the Red Mt. caldera complex (37-25 m.y.).

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Terlingua Intrusions, SW Texas	Lonsdale (1940)	Wilson and others (1968); Dasch and others (1969)	Chemical data composited from alkaline igneous rocks in the Solitario Complex. These rocks intrude upper Cretaceous strata. Eocene-Oligocene age fix is based on correlation with nearby alkaline volcanics in the Davis Mountains (42-30? m.y.).
Davis Mountains, West Texas	Goldich and Elms (1949); Erickson (1953)	Wilson and others (1968); Dasch and others (1969)	Chemical data composited from Rawls basalt flow, LaMota gabbo, Rawls trachybasalt porphyry, LaMota syenite, Cottonwood Spring basalt, and various other unnamed alkaline lava flows and intrusions (many of which are peralkaline). Age assignment is based on correlation of Davis Mountain volcanics with those of the Vieja Group (8 K-Ar dates ranging from 40 to 32 m.y. reported on by Wilson and others, 1968).
Organ Mountains, SW New Mexico	Lindgren and others (1910); Dunham (1935)	Kottlowski and others (1969)	Chemical data composited from Solidad rhyolite and 27-32 m.y. quartz monzonite intrusions in the Organ Mountains.
Trans Pecos, West Texas	Barker and others (1977)	Barker and others (1977)	Chemical data composited from numerous 36-31 m.y. intrusions in the northern Trans Pecos alkaline magmatic province.
Black Range, New Mexico (Fig. 4F)	Kuellmer (1954); Jicha (1954); Elston (1957); Ericksen and others (1970); Fodor (1975, 1976); Elston, unpub. compil.	Ericksen and others (1970); Elston and others (1973)	Chemical data was composited from the Bearwallow Mountain Formation (21 m.y.); Taylor Creek rhyolite (24 m.y.), Railroad Canyon rhyolite (23 m.y.), and rhyolite of Diamond Creek.
Superstition Mountains, SE Arizona	Fodor (1969); Stuckless (1969); Sheridan and others (1970); Malone (1972); Stuckless and O'Neil (1973); Juneson (1976); Hillier (1978); Peterson (1961); Bohmer (1965)	Damon (1969); Stuckless and Sheridan (1971); Theodore and others (1978)	Chemical data was composited from Latite of Government Well (29 m.y.), Geronomo Head Formation (16-22 m.y.), and Superstition Formation (15-24 m.y.). additional 28 analyses of the Latite of Government Well (Hillier, 1978) do not alter the $K_{57.5}$ value.
Sierra Blanca Mountains, New Mexico	Giles and Thompson (1972)	Giles and Thompson (1972)	Chemical data compiled from composite Three Rivers stock (26 m.y.).

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Galiuro Mountains, SE Arizona	Simons (1963), 1964); Creasey and Krieger (1978)	Johnson and Todd (1973); Creasey and Krieger (1978)	Chemical data composited from various volcanic members within Galiuro Volcanics (22-28 m.y.).
Tucson - Roskruge Mountains, SE Arizona	Precious (1968); Eastwood (1970)	Bikerman and Damon (1966); Bikerman (1967); Precious (1968); Shafiqullah and others (in press)	Chemical data composited from 28-25 m.y. volcanics in northern Tucson Mountains (Safford Tuff, Contzen Pass unit, upper andesite unit, and Safford dacite neck), 28-23 m.y. volcanics in Tumamoc Hill area, east-central Tucson Mountains, and 28 to 23 m.y. volcanics in the Del Bac Hills, southern Tucson Mountains, and flows within a 23-24 m.y. andesite sequence in the southern Roskruge Mountains.
Chocolate Mountains, SE California	Crowe (1978)	Olmsted and others (1973); Crowe (1978)	Chemical data composited from 32-23 m.y. volcanic rocks in the Picacho area of the Chocolate Mountains.
Cloudburst, Formation, SE Arizona	Creasey (1967); Keith and Rehrig, unpub. data	Krieger (1968); Johnson and Todd (1973); Shafiqullah and others (in press)	Chemical data composited from the volcanic member of the lower Cloudburst Formation.
Tucson - Picacho - Roskruge Mountains; Samaniego Hills, SE Arizona	Eastwood (1970); Shafiqullah and others (1976); Banks and others	Eastwood (1970); Shafiqullah and others (1976); Banks and others (1978)	Chemical data composited from 23-22 m.y. volcanics at Picacho Peak, 15-22 m.y. volcanics in Samaniego Hills; 22 m.y. trachyandesites in the Silver Bell Mountains.
Morro Rock - Islay Hill - Cambria, Southern California	Ernst and Hall (1974)	Hall and others (1966); Turner (1970); Turner and others (1970); Ernst and Hall (1974)	Chemical data composited from Morro Rock - Islay Hill igneous complex and Cambria Felsite (22-27 m.y.).
Vulture Mountains, SW Arizona	Rehrig, Damon, and Shafiqullah unpublished data	Rehrig, Damon, and Shafiqullah, unpublished data	Chemical data composited from 22 to 16 m.y. volcanic units in the Vulture Mountains.
Lake Mead, NW Arizona - Southern Nevada	(1962); Longwell (1963); Anderson (1978)	Damon (1965, 1966, 1967, 1968); Armstrong (1970); Anderson and others (1972)	Chemical data composited from Patsy Mine volcanics (19-15 m.y.), Tuff of Bridge Spring (14.5 m.y.), and Mount Davis Volcanics (13-14.5 m.y.).

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Ajo, SW Arizona	Gilluly (1946); Jones (1974)	Jones (1974); Eberly and Stanley (1978)	Chemical data composited from Childs Latite (older than 17 m.y.) and Batamote Andesite (15 m.y.).
Cady Mountains, SE California	Glazner (1976)	Armstrong and Higgins (1973)	$K_{57.5}$ value extrapolated from K_{60} value reported by Glazner (1976) for volcanics in the Cady Mountains.
Oatman, West Arizona	Ransome (1923); Wells (1937); Thorson (1971)	Thorson (1971)	Chemical data composited from the Esperanza Trachyte, Oatman andesite (chemically a shoshonite), Gold Road Latite (18 m.y.), Antelope Quartz Latite (19 m.y.), Cottonwood rhyolite, Flag Spring and Meadow Creek Trachytes, Moss porphyry (10.4 m.y.), and latite dikes. The above volcanics post-date Moss porphyry (22.6 m.y.). 10.4 m.y. date on Moss porphyry may be slightly young if it correlates with numerous intrusions to the north with 11 K-Ar dates between 12.5 and 16.9 m.y. (Armstrong, 1970)
Jacumba, SE California	Hawkins (1970)	Hawkins (1970)	
Northeast Baja California	Gastil and others (1971); Gastil and others (1975)	Gastil and others (1971); Gastil and others (1975)	Chemical data composited from six rocks of 19-13 m.y. age within the Gulf of California subprovince as defined by Gastil and others (1975).
Catalina Island, Southern California	Vedder, J.G., Howell, D.G., and Forman, J.A., unpublished manuscript (4th draft) entitled "Miocene rocks and their relation to older strata and basement, Santa Catalina Island, California."	Vedder, J.G., Howell, D.G., and Forman, J.A., unpublished manuscript (4th draft) entitled "Miocene rocks and their relation to older strata and basement, Santa Catalina Island, California."	Chemical data composited from 19-12 m.y. intrusive and extrusive rocks.
Santa Cruz Island, Southern California	Higgins (1973); Crowe and others (1976)	Turner (1970); Crowe and others (1976)	Chemical data composited from 20-15 m.y. Santa Cruz volcanics.

LOCATION	REFERENCES FOR CHEMICAL DATA	REFERENCES FOR RADIOMETRIC AND OTHER AGE DATA	COMMENTS
Tijuana-Ensenada, Baja California	Hawkins (1970); Gastil and others (1975)	Minch (1967); Hawkins (1970); Gastil and others (1975)	Chemical analyses composited from the Rosarito beach formation (14-17 m.y.).
Obispo Tuff, Southern California	Ernst and Hall (1974)	Hall and others (1966); Turner (1970); Ernst and Hall (1974)	
Santa Monica Mountains	Higgins (1976)	Blackerby (1965); Turner (1970); Higgins (1976)	Chemical analyses composited from the Conejo volcanics.
Glendora Volcanics	Shelton (1975); Higgins (1976)	Shelton (1955); Yerkes and others (1965); Turner (1970)	12-15 m.y. age determined from fossil data and calibrated to the Miocene radiometric time scale of Turner (1970).

Notes for Table 3

1. Radiometric age ranges for emplacement of igneous rocks were assigned according to the guidelines outlined below:

   1) Emplacement ages of mesozonal plutons (those of the coastal batholiths in California) were assigned in accord with the following priority scheme: U-Pb zircon ages over Rb-Sr whole rock isochrons over concordant K-Ar hornblende-biotite pairs. Single K-Ar biotite ages from such plutons are invariably cooling ages only and were not used as emplacement ages.

   2) Emplacement ages of epizonal plutons (those in eastern Arizona, New Mexico, West Texas, and Colorado) were assigned on the basis of concordant K-Ar biotite-hornblende pairs, concordant K-Ar biotite and fission-track sphene, zircon, or apatite ages, or single K-Ar biotites with greater than 5% potassium. Hornblendes from such plutons were often older and therefore contain inferred excess argon (for example, the hornblendes from the Ray area, southeast Arizona; see Banks and others, 1972).

   3) Extrusion ages of volcanic rocks were assigned on the basis of concordant K-Ar biotite, hornblende, plagioclase, or sanidine pairs; concordant fission-track apatite, sphene or zircon pairs; or combinations of concordant K-Ar and fission-track ages. Single K-Ar or fission track ages were used if stratigraphic and paleontologic contraints were met.

2. Chemical data was selected according to the criteria outlined below:

   1) Analyses with less than 95% or greater than 105% total oxides were rejected.

   2) Analyses with volatile contents (where data was available) of greater than 3.25% were rejected.

   3) Analyses of altered rocks were rejected. Petrography of analysed samples was scanned for sericitization of feldspars, chloritization or oxidation of the mafic mineralogy and secondary carbonates. Where no data on alteration was available, samples were assumed to be fresh (or else about 50% of the data would have been rejected).

   4) Partial analyses were used if sample was in accord with above guidelines.

3. Differentiation lines for the K_2O/SiO_2 plots were drawn in accord with the following methodology and contraints:

   1) Differentiation lines were fit to the data by inspection ("visual regression").

   2) For suites of rocks where data was not available at 57.5% silica, differentiation lines were extrapolated to $K_{57.5}$ if a clear trend existed in the data to within 2.5% silica of $K_{57.5}$; i.e. if good differentiation lines existed to 55% SiO_2 for silica deficient suites or 60% SiO_2 for silica rich suites. If those conditions were not met the data was rejected.

   3) It was commonly found that wide variations in potassium occured in suites above 65% SiO_2 (particularly rhyolites). These points were generally ignored in construction of the regression lines if the majority of data formed a good linear fit in other parts of the diagram at those silica levels (Figure 4A is typical). For variation diagrams where a "shotgun" effect was present above 65% SiO_2, differentiation lines were fit to the K_2O/SiO_2 data below 65% SiO_2 (Fig. 4F is an example).

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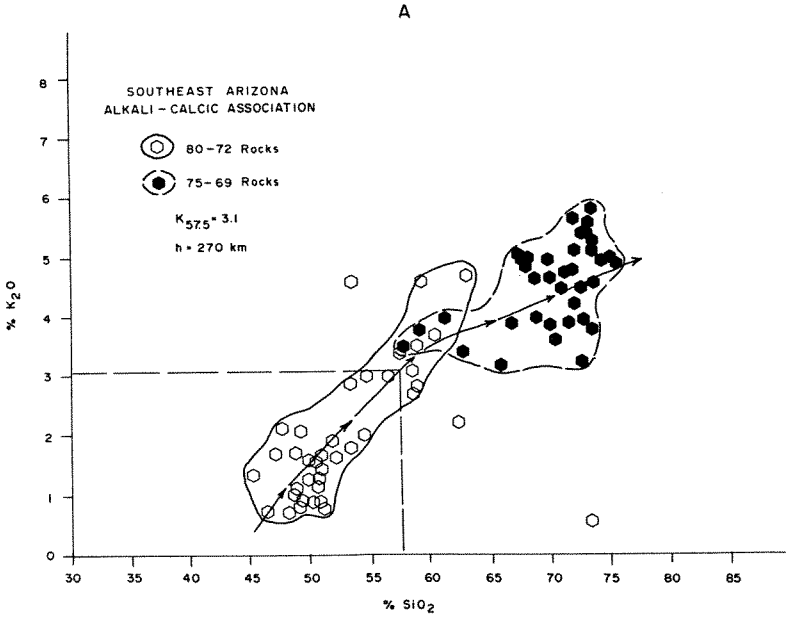
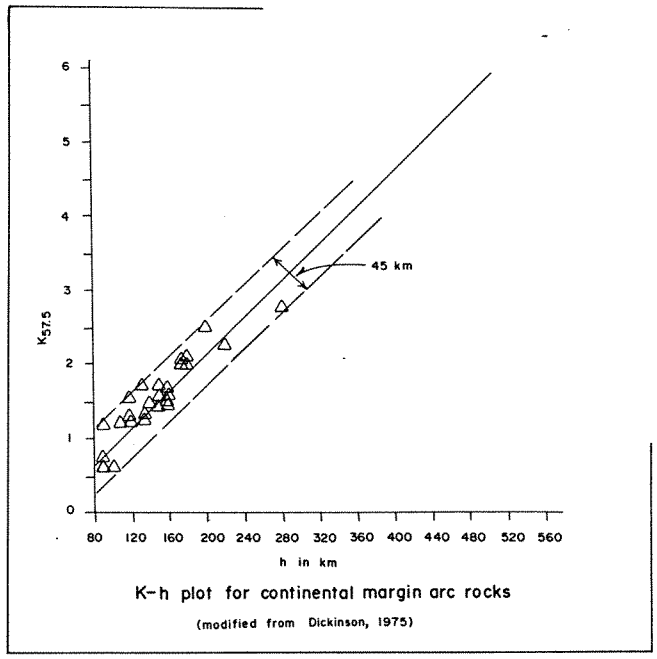
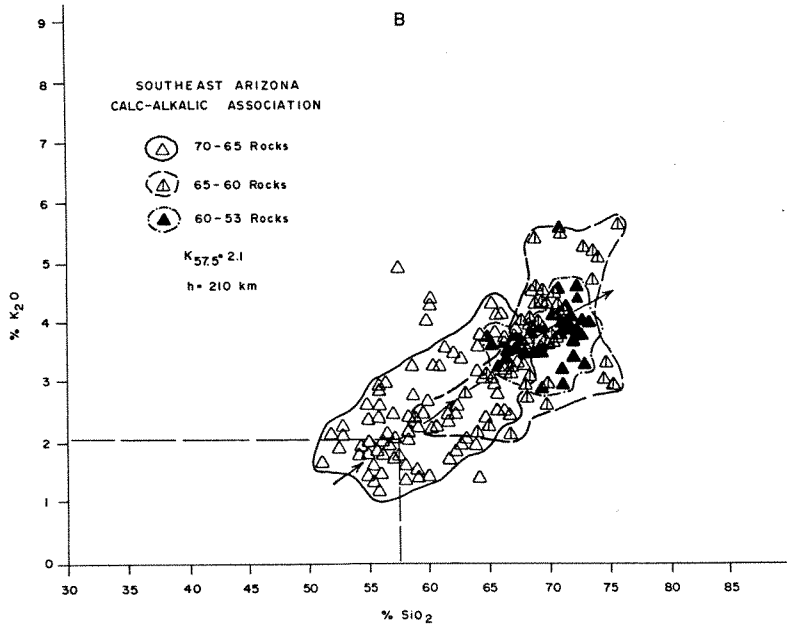
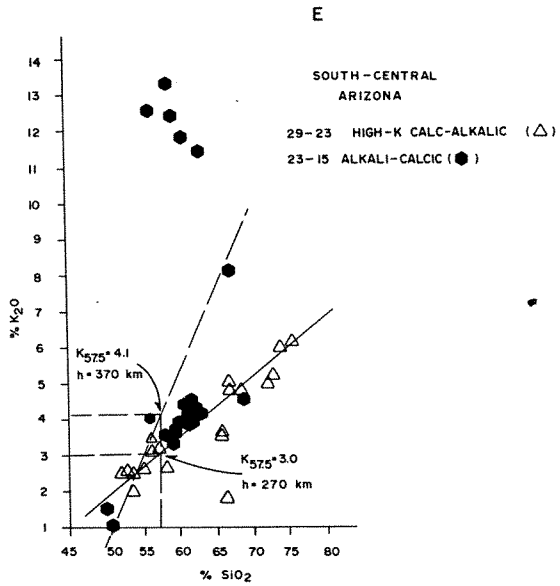
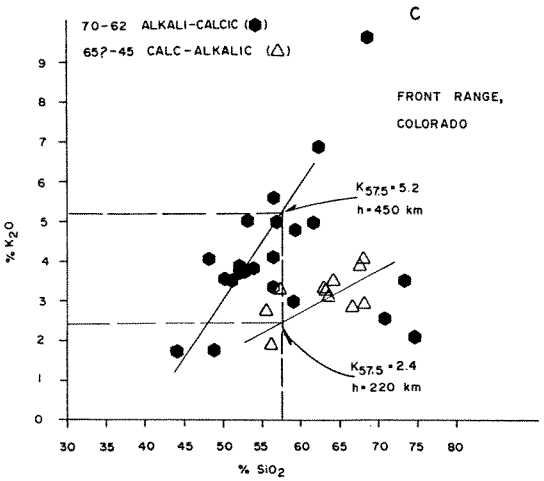
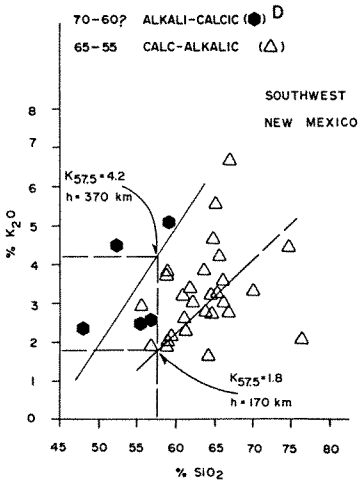
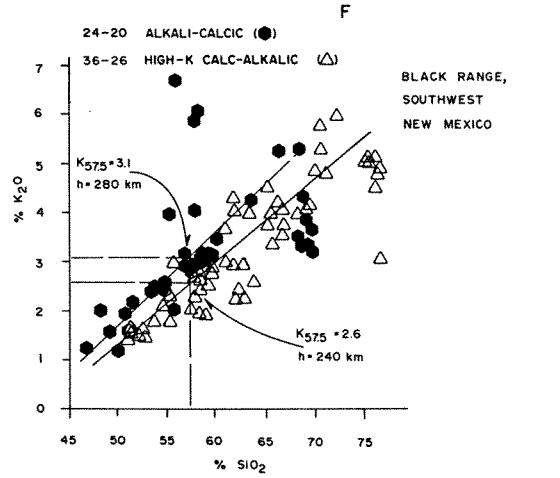
Figure 4. Harker K_2O/SiO_2 variation diagrams for selected localities in southwestern United States. Figure 4A and 4B includes chemical data gathered from many sources for many localities within southeast Arizona; see Figure 2A for location. In Figure 4E, south-central Arizona analyses are from Tucson, Roskruge, and Picacho Mountain, and Samaniego Hills. Inset shows control data from Dickinson (1975) for $K_{57.5}$ values derived in this analysis.

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Fig 4