

NADİR TOPRAK ELEMENTLERİ

NTE genellikle 2 gruba ayrılmaktadır.

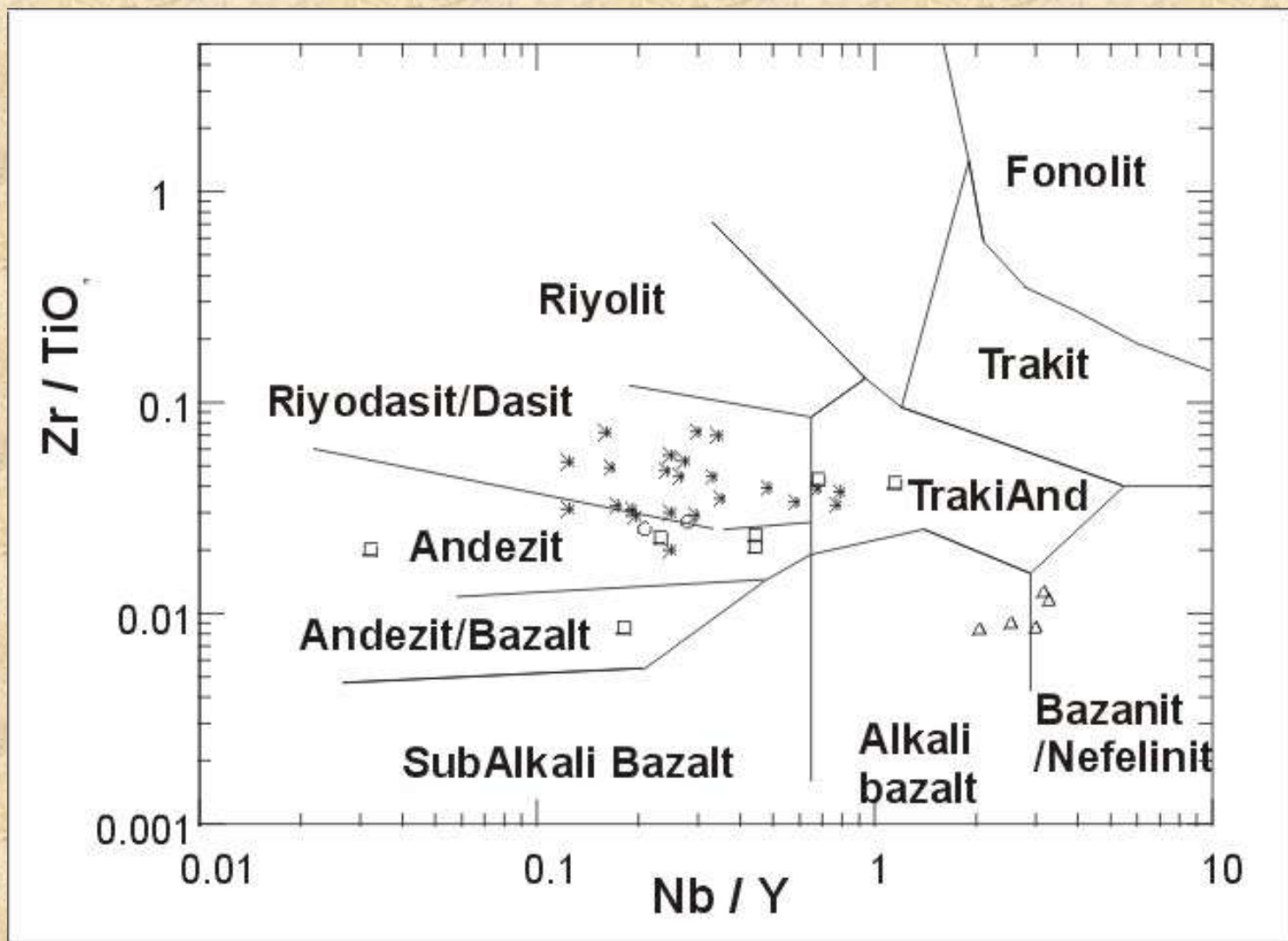
- Düşük atom numaralarına sahip La(57)'dan Sm(62)'a kadar olup **Hafif (light) NTE (LREE)**
- Yüksek atom numaralarına sahip Gd(64)'den Lu(71)'kadar olan **Ağır (Heavy) NTE (HREE)** şeklinde sınıflandırılmaktadır.

Nadir toprak elementleri kayaç ve minerallerin kökenlerinin bulunmasında ve toplu halde gösterdikleri değişimler ile jeolojik olayların kimyasal açıdan yorumlanabilmesi için önemlidir.

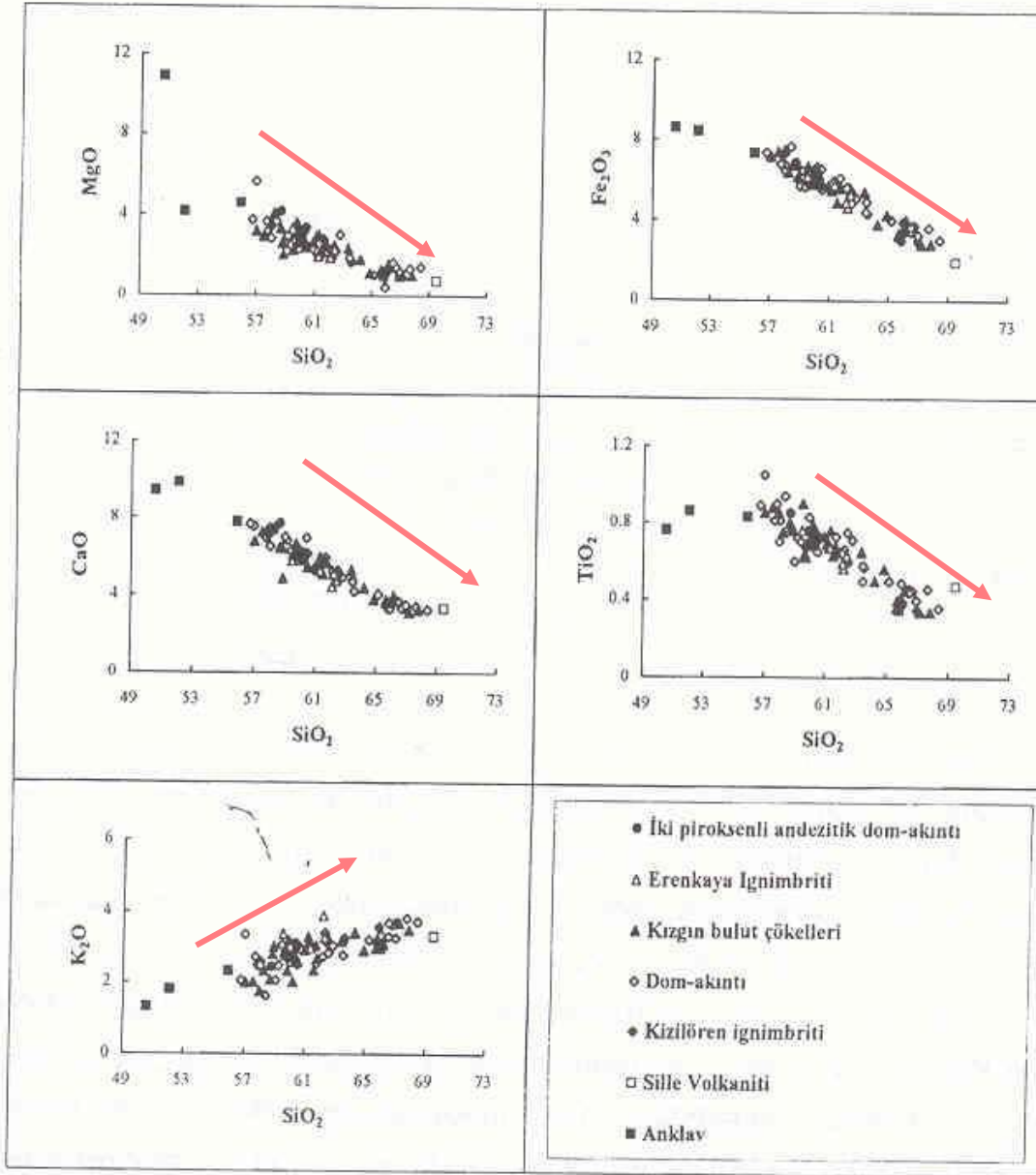
Granat, ortopiroksen, klinopiroksen ve olivin daha çok ağır nadir toprak elementleri, feldispatlar ve apatit ise hafif nadir toprak elementlerini yapılarına alırlar.

	1A																		8A	
1	1 <u>H</u>	2A												3A	4A	5A	6A	7A	2 <u>He</u>	
2	3 <u>Li</u>	4 <u>Be</u>												5 <u>B</u>	6 <u>C</u>	7 <u>N</u>	8 <u>O</u>	9 <u>F</u>	10 <u>Ne</u>	
3	11 <u>Na</u>	12 <u>Mg</u>		3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	13 <u>Al</u>	14 <u>Si</u>	15 <u>P</u>	16 <u>S</u>	17 <u>Cl</u>	18 <u>Ar</u>	
4	19 <u>K</u>	20 <u>Ca</u>		21 <u>Sc</u>	22 <u>Ti</u>	23 <u>V</u>	24 <u>Cr</u>	25 <u>Mn</u>	26 <u>Fe</u>	27 <u>Co</u>	28 <u>Ni</u>	29 <u>Cu</u>	30 <u>Zn</u>	31 <u>Ga</u>	32 <u>Ge</u>	33 <u>As</u>	34 <u>Se</u>	35 <u>Br</u>	36 <u>Kr</u>	
5	37 <u>Rb</u>	38 <u>Sr</u>		39 <u>Y</u>	40 <u>Zr</u>	41 <u>Nb</u>	42 <u>Mo</u>	43 <u>Tc</u>	44 <u>Ru</u>	45 <u>Rh</u>	46 <u>Pd</u>	47 <u>Ag</u>	48 <u>Cd</u>	49 <u>In</u>	50 <u>Sn</u>	51 <u>Sb</u>	52 <u>Te</u>	53 <u>I</u>	54 <u>Xe</u>	
6	55 <u>Cs</u>	56 <u>Ba</u>	*	71 <u>Lu</u>	72 <u>Hf</u>	73 <u>Ta</u>	74 <u>W</u>	75 <u>Re</u>	76 <u>Os</u>	77 <u>Ir</u>	78 <u>Pt</u>	79 <u>Au</u>	80 <u>Hg</u>	81 <u>Tl</u>	82 <u>Pb</u>	83 <u>Bi</u>	84 <u>Po</u>	85 <u>At</u>	86 <u>Rn</u>	
7	87 <u>Fr</u>	88 <u>Ra</u>	**	10 3 <u>Lr</u>	10 4 <u>Rf</u>	10 5 <u>Db</u>	10 6 <u>Sg</u>	10 7 <u>Bh</u>	10 8 <u>Hs</u>	10 9 <u>Mt</u>	110 <u>Uun</u>	111 <u>Uuu</u>	112 <u>Uub</u>	11 3 <u>Uut</u>	114 <u>Uuq</u>	115 <u>Uup</u>	116 <u>Uuh</u>	117 <u>Uus</u>	11 8 <u>Uuo</u>	
*Lantanitler				*	57 <u>La</u>	58 <u>Ce</u>	59 <u>Pr</u>	60 <u>Nd</u>	61 <u>Pm</u>	62 <u>Sm</u>	63 <u>Eu</u>	64 <u>Gd</u>	65 <u>Tb</u>	66 <u>Dy</u>	67 <u>Ho</u>	68 <u>Er</u>	69 <u>Tm</u>	70 <u>Yb</u>		
**Aktanitler				**	89 <u>Ac</u>	90 <u>Th</u>	91 <u>Pa</u>	92 <u>U</u>	93 <u>Np</u>	94 <u>Pu</u>	95 <u>Am</u>	96 <u>Cm</u>	97 <u>Bk</u>	98 <u>Cf</u>	99 <u>Es</u>	100 <u>Fm</u>	101 <u>Md</u>	102 <u>No</u>		

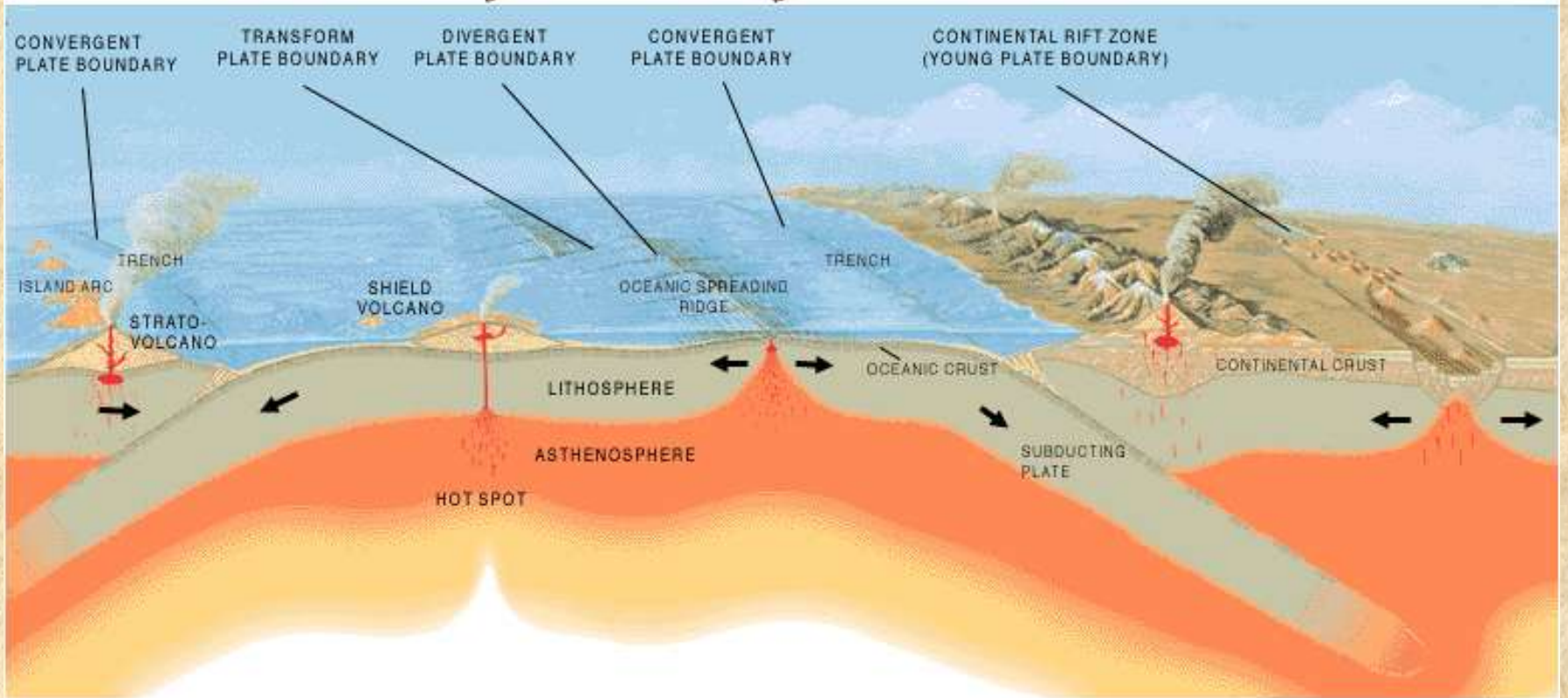
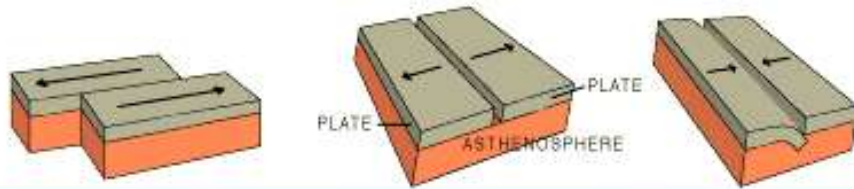
* Nadir toprak elementleri



DEĞİŞİM DİYAGRAMLARI (Harker Diyagramları)



**Konya bölgesi
volkanik kayalarina
ait major element
(MgO, Al₂O₃, CaO, TiO₂
ve K₂O)-SiO₂ deęişim
diyagramları (Temel
vd. 1998)**



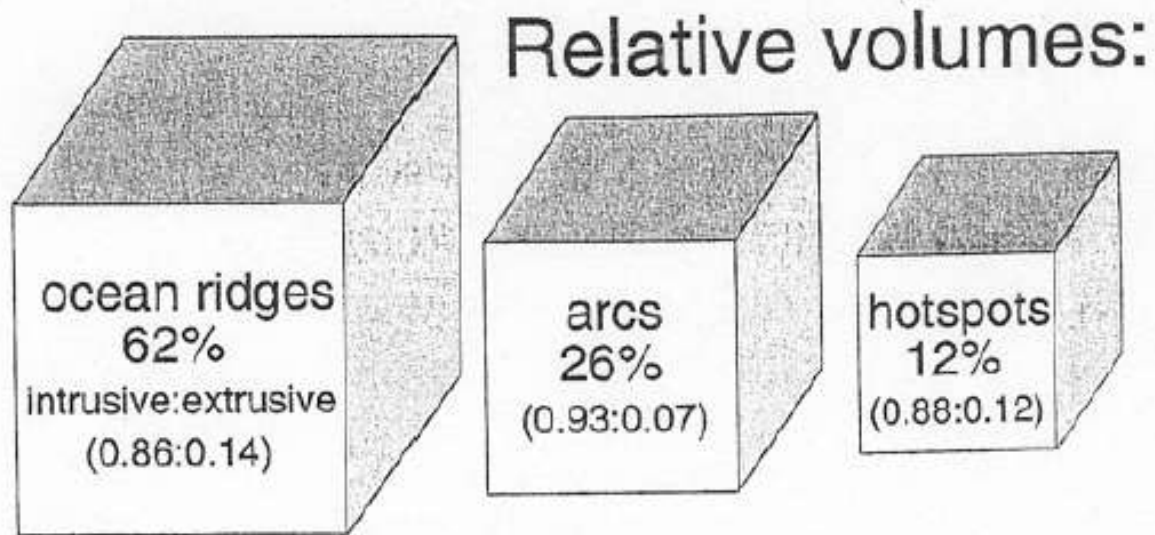


FIGURE 4 Relative volumes of magma produced at different environments. [Data from Fisher and Schmincke, 1984.]

Yay (Ark) Volkanizması

Okyanus kabuğunda bazalt
Kıta kabuğunda andezit, dasit, riyolit

Kıtasal Rift Magmatizması

Bazalt, riyolit, alkali kayalar

Okyanusal Rift Magmatizması

Bazalt, gabro ultramafik kayalar

Yay (Ark) Plütonizması

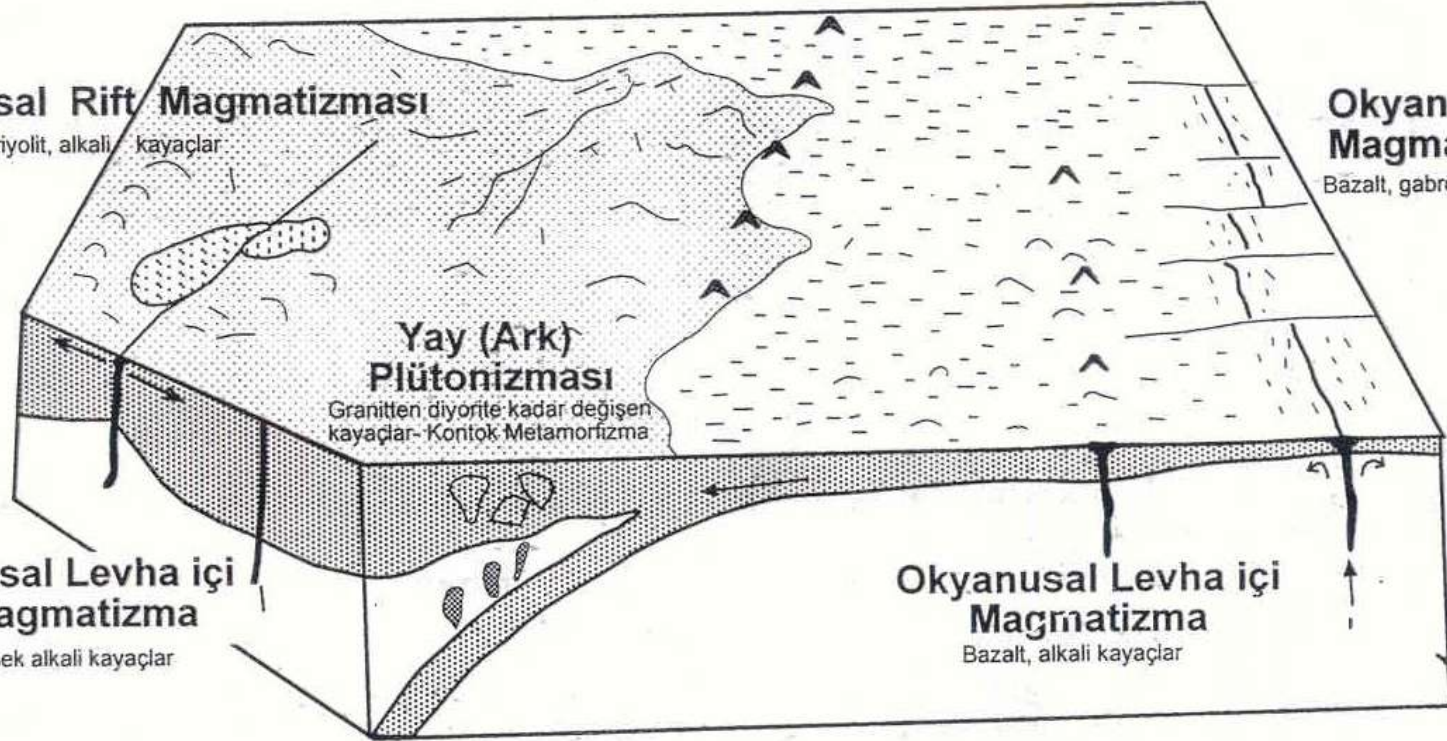
Granitten diyorite kadar değişen
kayalar- Kontakt Metamorfizma

Kıtasal Levha içi Magmatizma

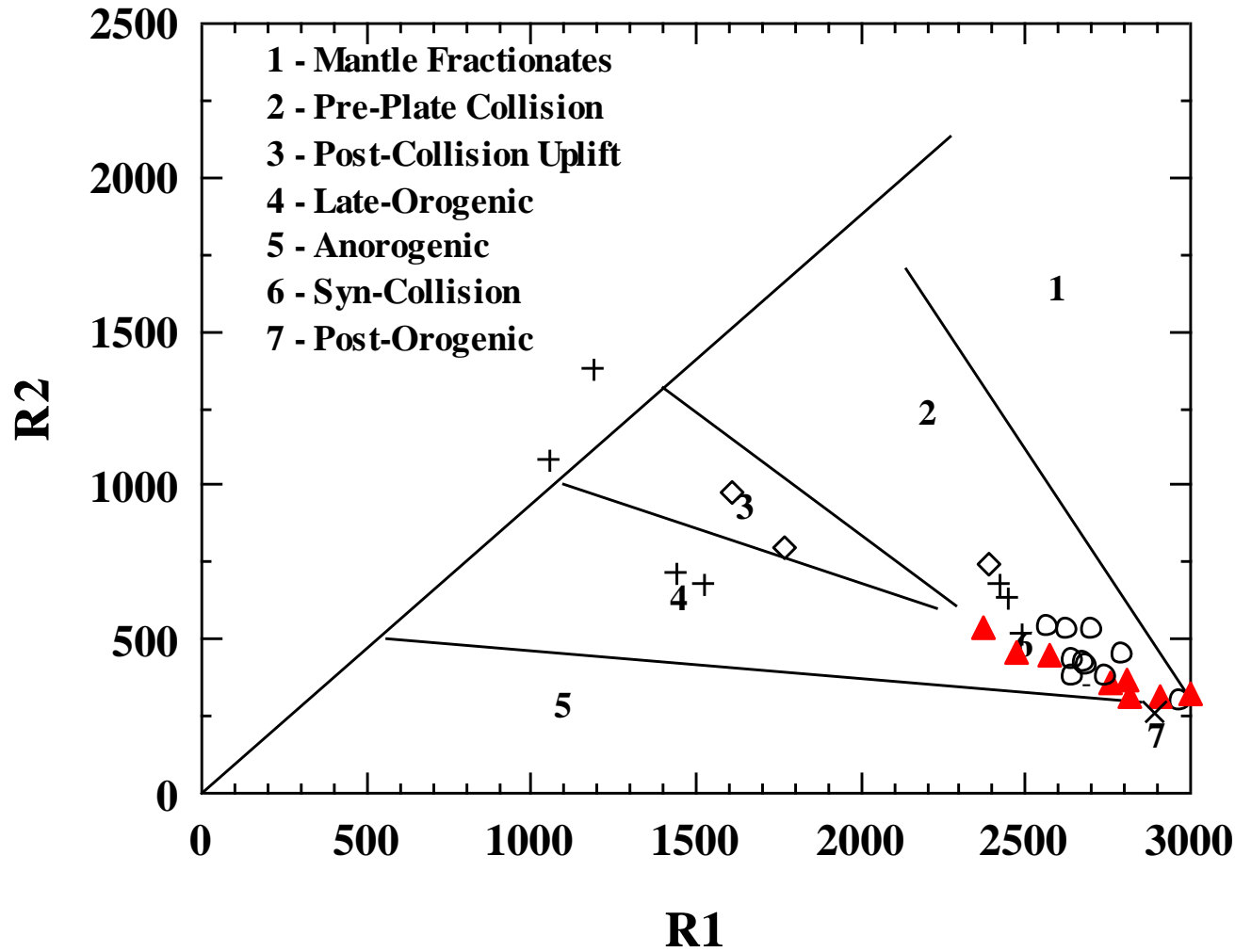
Yüksek alkali kayalar

Okyanusal Levha içi Magmatizma

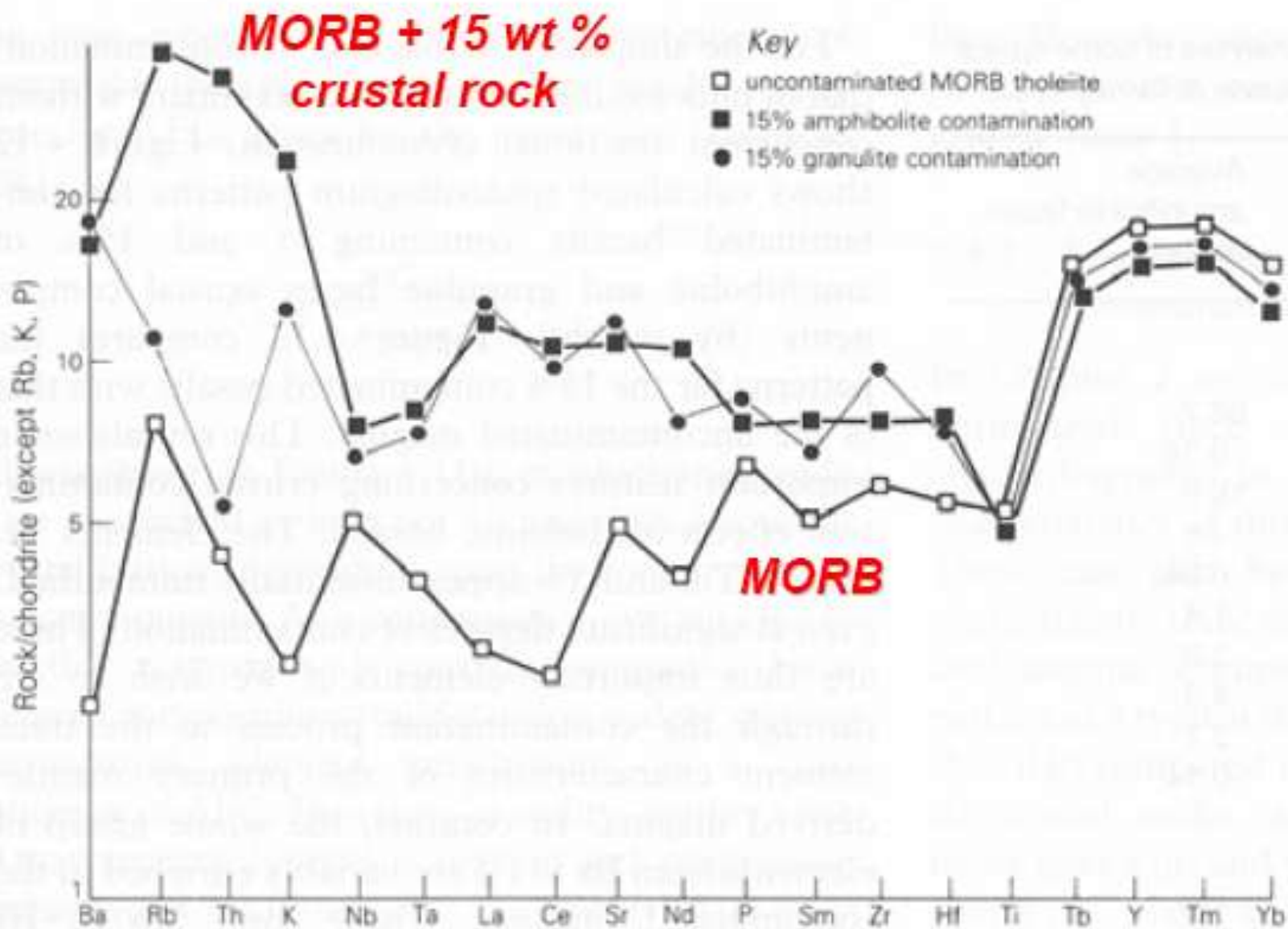
Bazalt, alkali kayalar

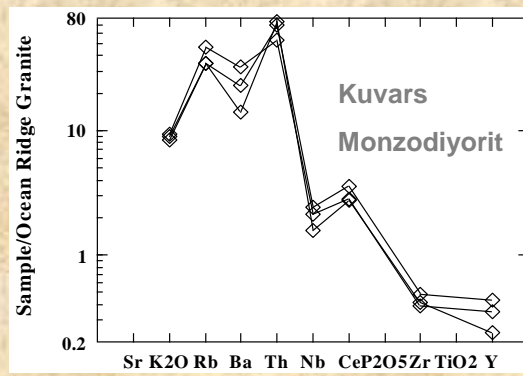
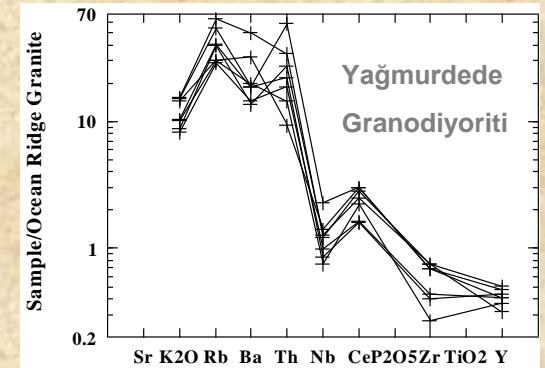
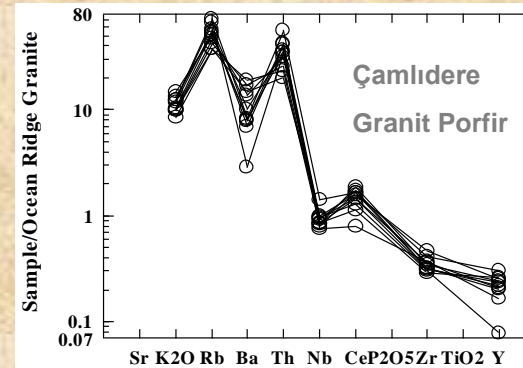
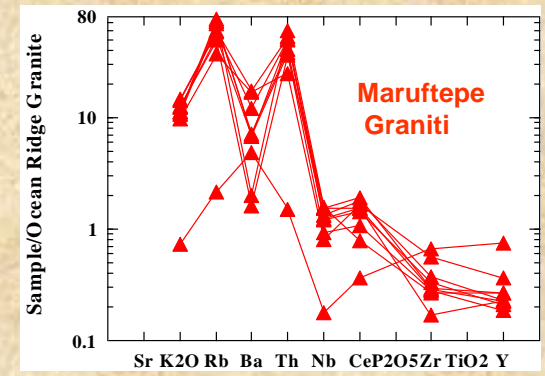
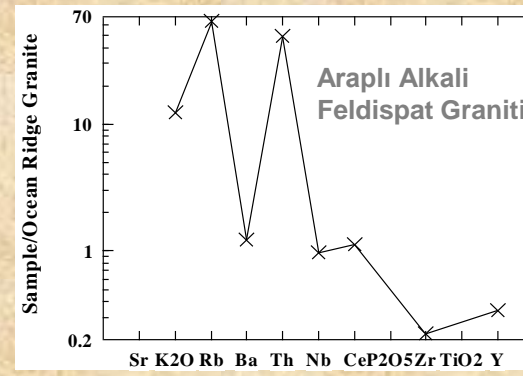
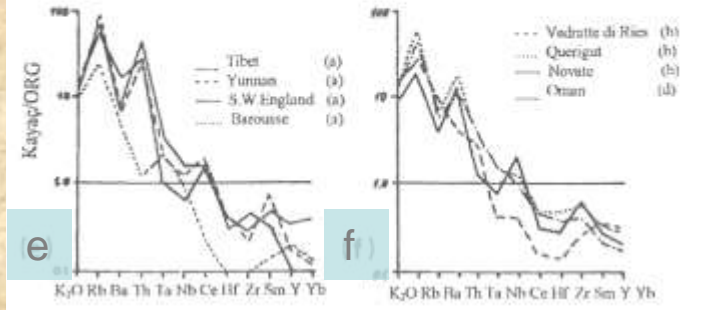
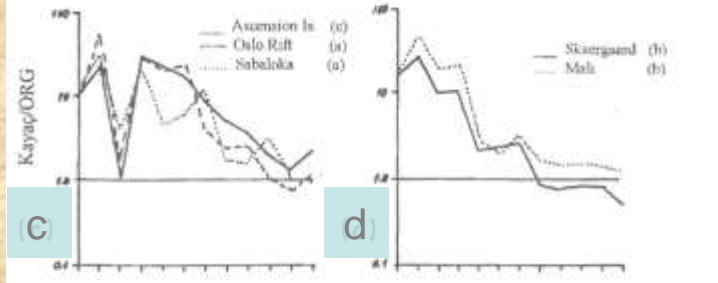
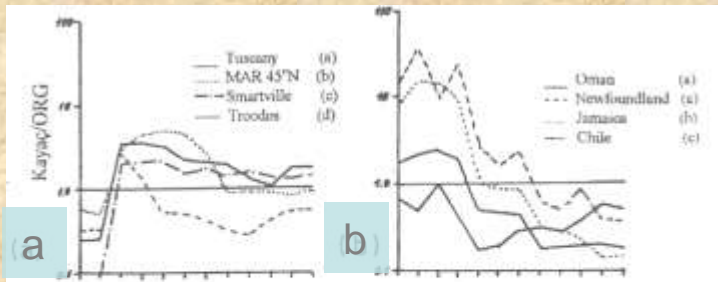


Levha tektoniği ilkelerine göre magmatik faaliyetlerin konumu



Balışeyh Granitoidinin R1-R2 diyagramındaki dağılımı (Batchelor ve Bowden, 1985). 1.Manto fraksiyonlaşması, 2.Çarpışma öncesi, 3.Çarpışma sonrası, 4.Geç orojenik, 5.Anorojenik, 6.Çarpışma sırası, 7.Orojenez sonrası

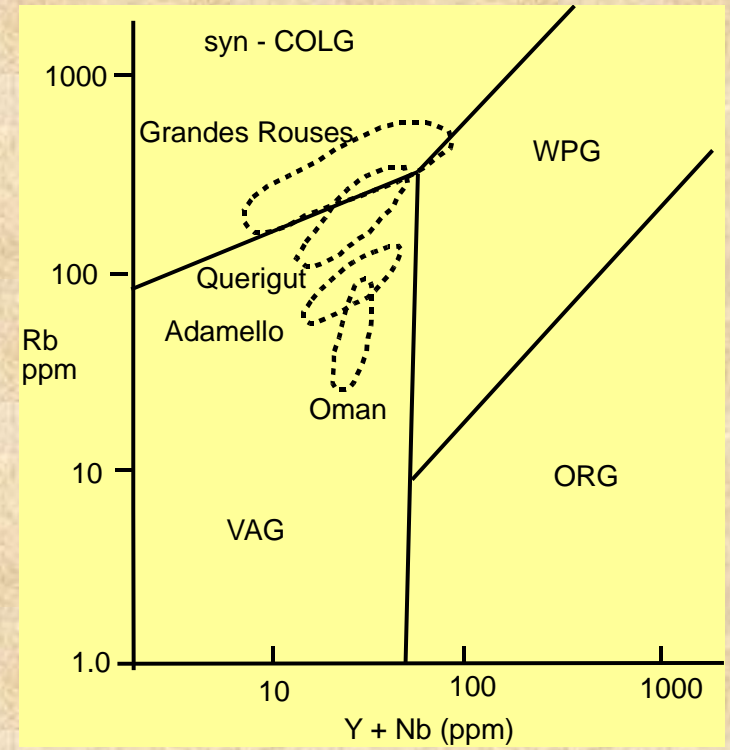
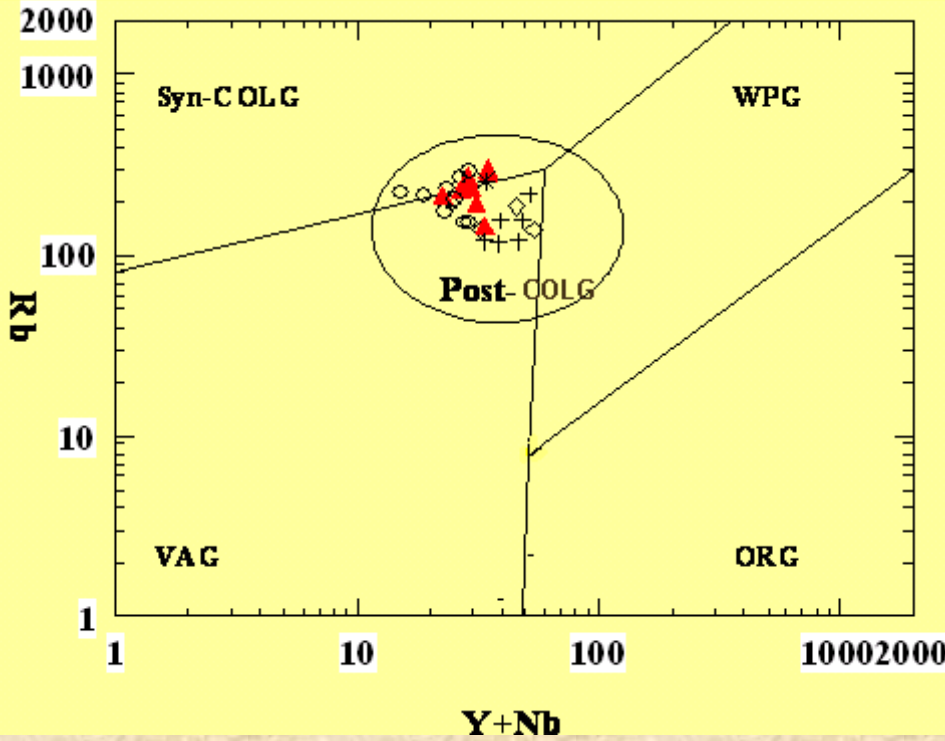




- Açıklamalar**
- Çamlıdere Granit Porfir
 - × Araplı Alkali Feldispat Graniti
 - ▲ Maruftepe Graniti
 - + Yağmurdede Granodiyoriti
 - ◇ Gölyeri Biyotit-Hornblend Kuvars Monzodiyoriti

- a) Okyanus sırtı granitoidleri
- b) Volkanik yay granitoidleri
- c) Levha-içi granitoidleri
- d) İnceltmiş kıtasal litosfere sokulum yapan granitler
- e) Çarpışma ile eşyaşlı granitler
- f) Çarpışma sonrası granitler

Balışeyh Granitoidlerinin okyanus sırtı granitlere (ORG) göre normalleştirilmiş iz element dağılım desenleri (Pearce 1984' den alınmıştır).



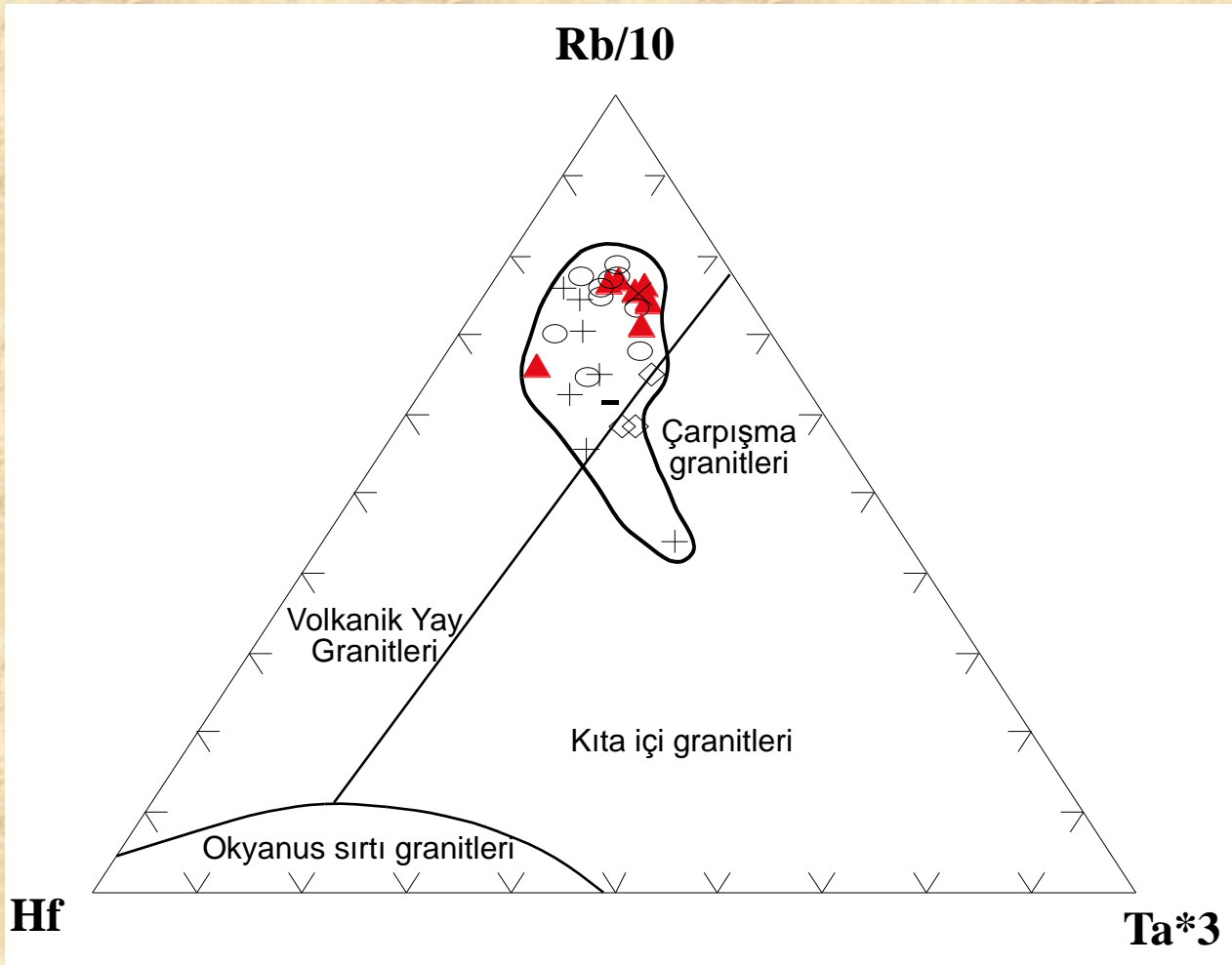
Balıseyh Granitoidinin Rb-(Y-Nb) diyagramı üzerindeki dağılımları. (Pearce, 1996)

Rb-(Y-Nb) diyagramındaki bazı çarpışma sonrası granitlerin dağılımı.

- VAG** : Volkanik yay granitleri,
syn-COLG : Çarpışmayla eş zamanlı granitler
Post-COLG: Çarpışma sonrası granitleri
WPG : Levha içi granitleri
ORG : Okyanus sırtı granitleri,

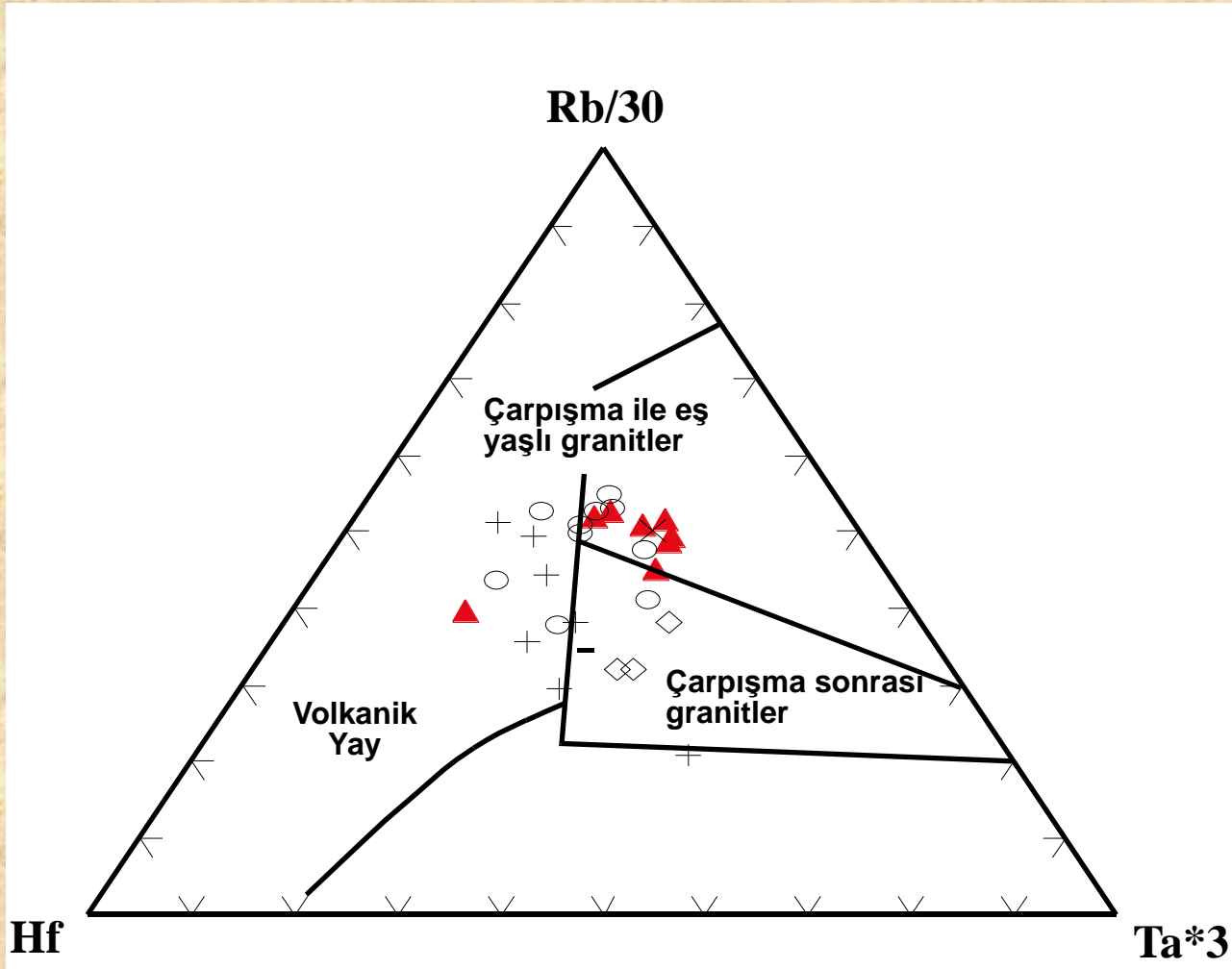
Açıklamalar

- Çamlıdere Granit Porfir
- × Araplı Alkali Feldispat Graniti
- ▲ Maruftepe Graniti
- + Yağmurdede Granodiyoriti
- ◇ Gölyeri Biotit-Hornblend Kuvars Monzodiyoriti



Açıklamalar	
○	Çamlıdere Granit Porfir
×	Araplı Alkali Feldispat Graniti
▲	Maruftepe Graniti
+	Yağmurdede Granodiyoriti
◇	Gölyeri Biotit-Hornblend Kuvarts Monzodiyoriti

**Rb/10-Hf-Ta*3
değerlerinin
tektonik
yerleşim
diyagramı
(Harris, 1986)**



Açıklamalar

- Çamlıdere Granit Porfir
- × Araçlı Alkali Feldispat Graniti
- ▲ Maruftepe Graniti
- + Yağmurdede Granodiyoriti
- ◇ Gölyeri Biotit-Hornblend Kuvars Monzodiyoriti

Rb/30-Hf-Ta*3
değerleri
kullanılarak
yapılan tektonik
yerleşim
diyagramı
(Harris, 1986)

Table 4.5 Chondrite values used in normalizing REE (concentrations in ppm)

Analytical method	Wakita	Haskin	Masuda	Nakamura	Evensen	Boynton	T & M	Primitive mantle value
Chondrite(s) analysed: (Ref.)	Composite (1)	Composite (2)	Leedeey (3)	Composite (4)	Avg.CI (5)	Avg.CI (6)	Avg. CI (7)	(8)
La	0.340	0.330	0.3780	0.3290	0.244 60	0.3100	0.3670	0.7080
Ce	0.910	0.880	0.9760	0.8650	0.637 90	0.8080	0.9570	1.8330
Pr	0.121	0.112			0.096 37	0.1220	0.1370	0.2780
Nd	0.640	0.600	0.7160	0.6300	0.473 80	0.6000	0.7110	1.3660
Sm	0.195	0.181	0.2300	0.2030	0.154 00	0.1950	0.2310	0.4440
Eu	0.073	0.069	0.0866	0.0770	0.058 02	0.0735	0.0870	0.1680
Gd	0.260	0.249	0.3110	0.2760	0.204 30	0.2590	0.3060	0.5950
Tb	0.047	0.047			0.037 45	0.0474	0.0580	0.1080
Dy	0.300		0.3900	0.3430	0.254 10	0.3220	0.3810	0.7370
Ho	0.078	0.070			0.056 70	0.0718	0.0851	0.1630
Er	0.020	0.200	0.2550	0.2250	0.166 00	0.2100	0.2490	0.4790
Tm	0.032	0.030			0.025 61	0.0324	0.0356	0.0740
Yb	0.220	0.200	0.2490	0.2200	0.016 51	0.2090	0.2480	0.0480
Lu	0.034	0.034	0.0387	0.0339	0.025 39	0.0322	0.0381	0.0737
Y							2.1000	

- (1) Wakita *et al.* (1971): composite of 12 chondrites.
- (2) Haskin *et al.* (1968): composite of nine chondrites.
- (3) Masuda *et al.* (1973): Leedeey chondrite.
- (4) Nakamura (1974).
- (5) Evensen *et al.* (1978): average of C1 chondrites.
- (6) Boynton (1984).
- (7) Taylor and McLennan (1985): 1.5 x values of Evensen [column (5)].
- (8) McDonough *et al.* (1991).

