

( ) ( )

( )

\*

*m-rahgoshay@sbu.ac.ir* :

\*

( / / : / / : )

( )

(Melt Mush)

MgO# Cr

Davoudzadeh )

(1972

Knipper *et al.* )

(*al.* 1986, Stocklin 1974, Gansser 1955

)

( )

(Cpx-bearing harzburgite

Nicolas 1989, Hopkinson & Roberts )

(1996, Roberts *et al.* 1993, Mascle *et al.* 1991

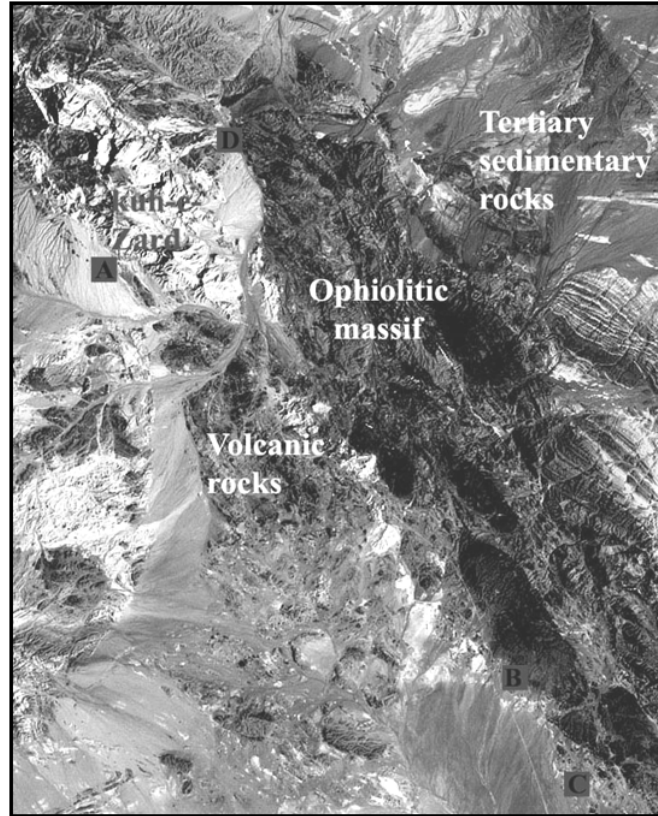
(Davoudzadeh 1972)

Lagabbielle )

(& Cotton 1984, Lagabbielle & Cannat 1990

Cannat *et al.* 1995, Gaherty )

(*et al.* 2004, Alt & Shanks 2003



A-D

( )

( ) (Substratum)  
Euphotide

( A)

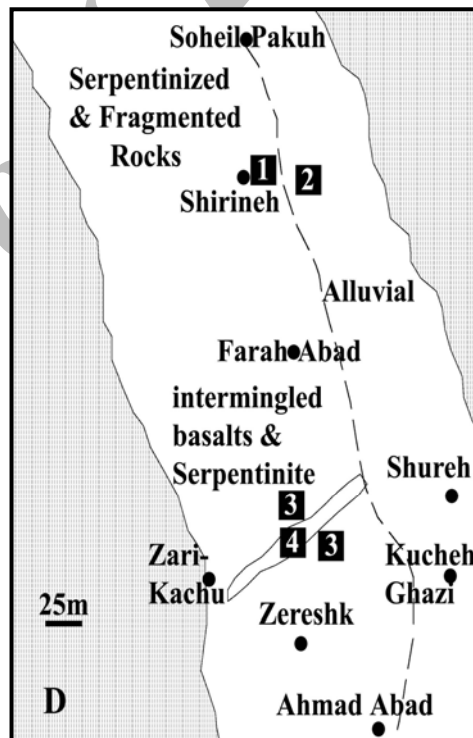
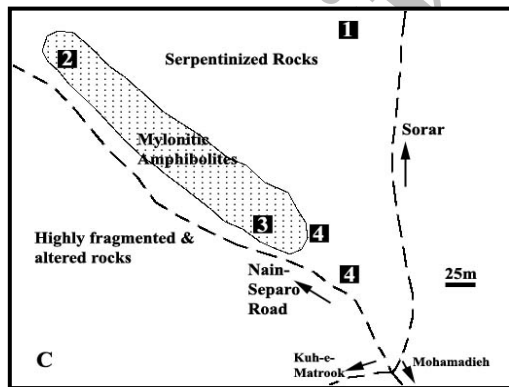
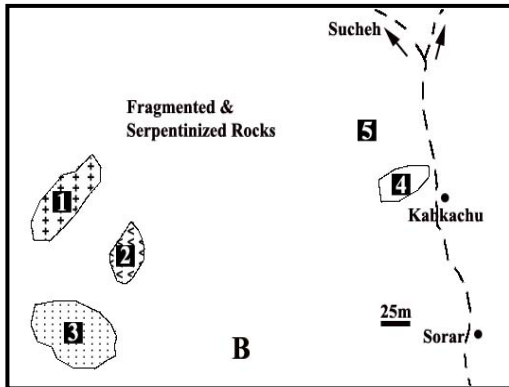
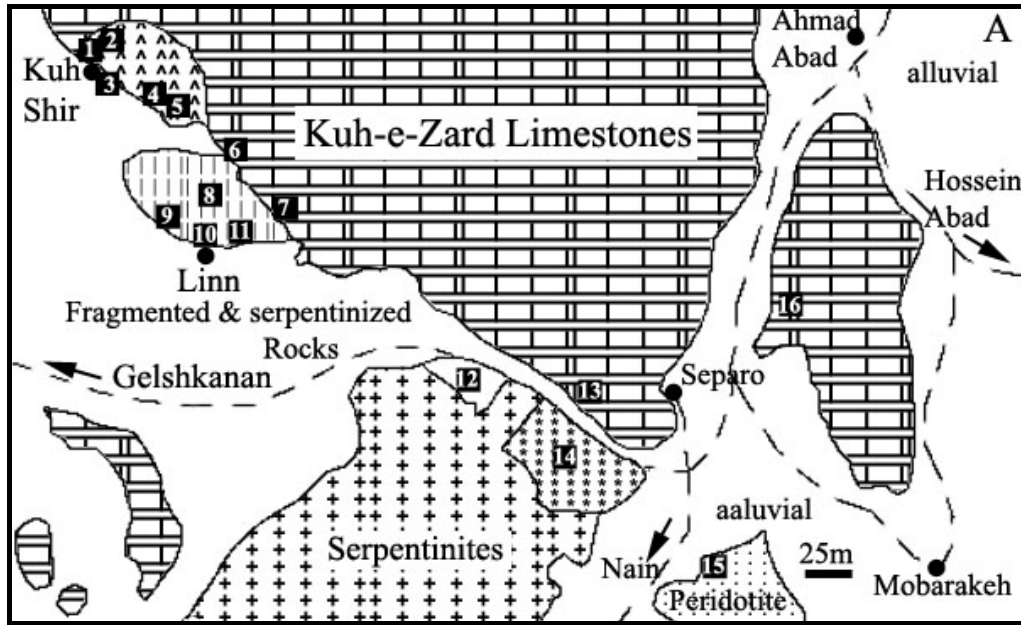
(CYAGORII 1984)

P-T  
(Plurifacial)

(Miyashiro 1994)

( )





A

B

C

D

( D )

( )

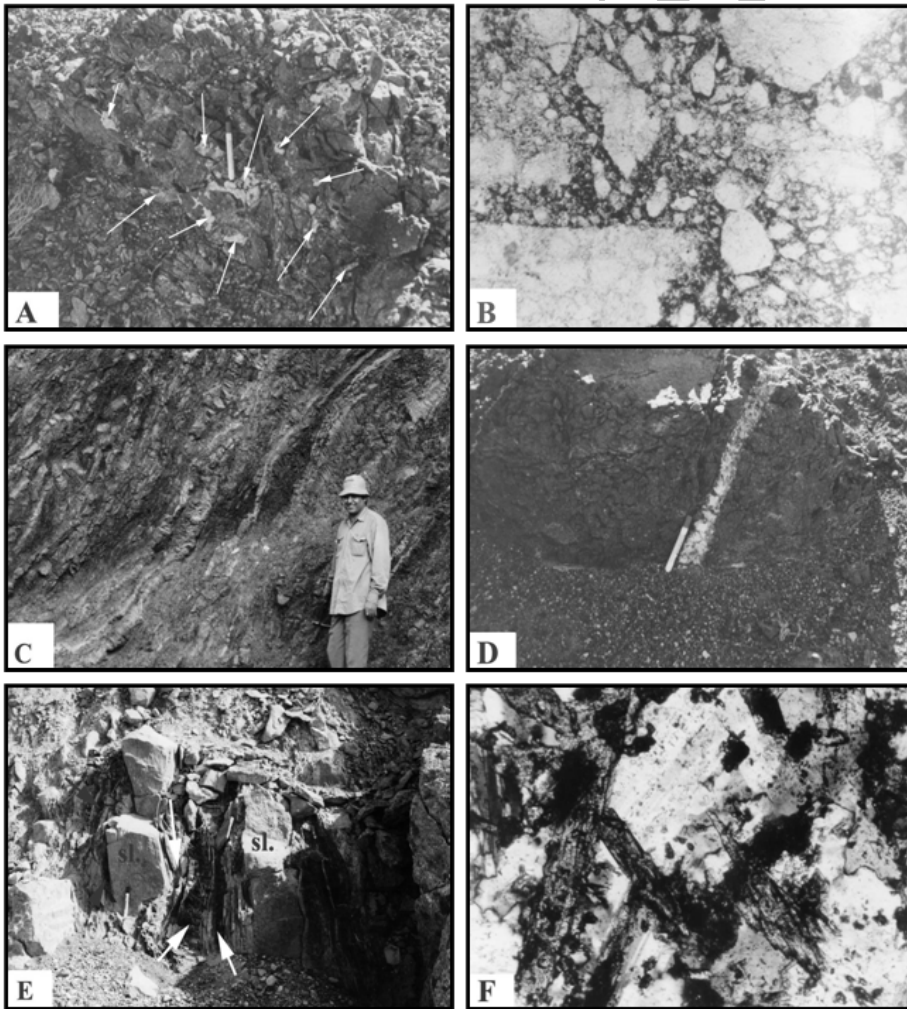
(Hydrofracturing)

( )

(Nicolas 1989)

( E )

( A )



(Slump Structures)

E .

B F

C .

D .

( )

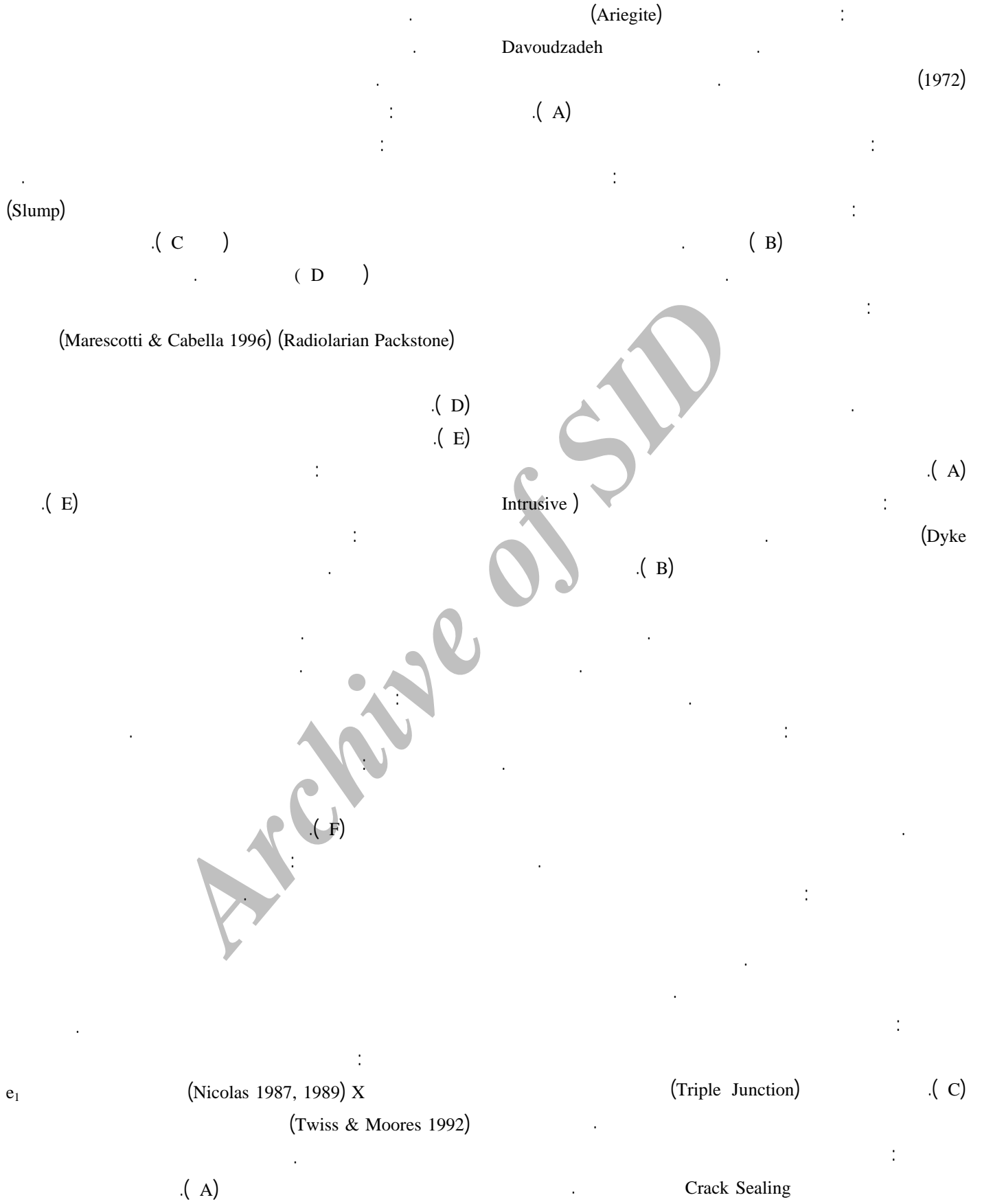
F .(sl.)

B .

( )

A

( )



Archive of SID

(Drury & Urai 1990)

$\phi$

S LS

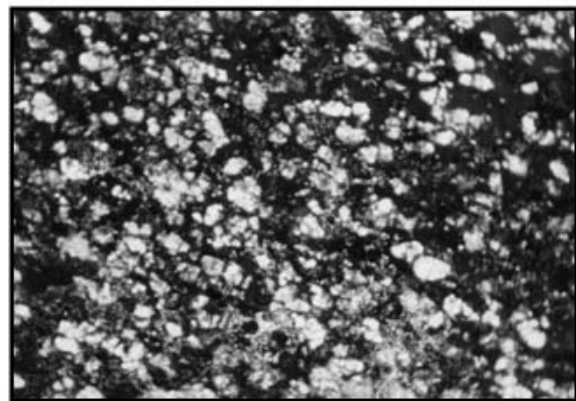
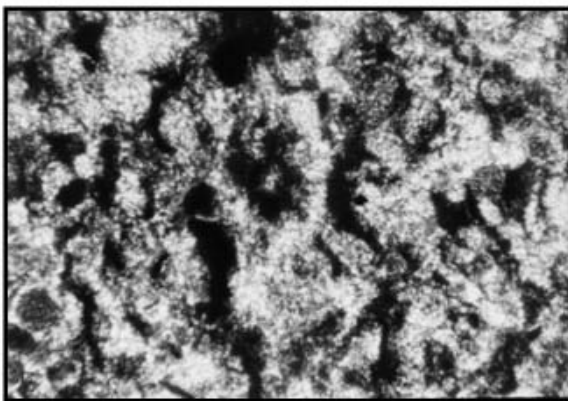
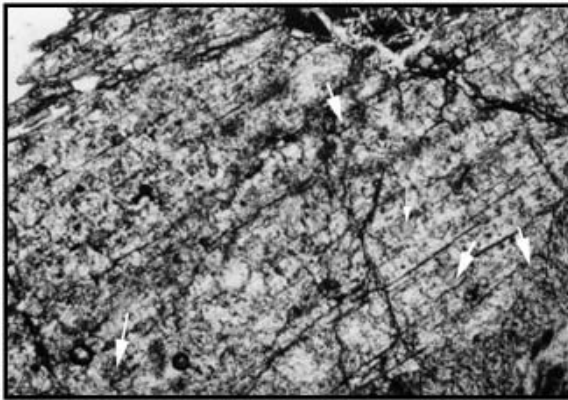
S/C

(Serrated)

Migration)

(Boundary Recrystallization

(Bulging)



C.( )

B.( )

A

(chr.)

D.

F.

E.

A

Stretching )

(Lination

$\sigma$

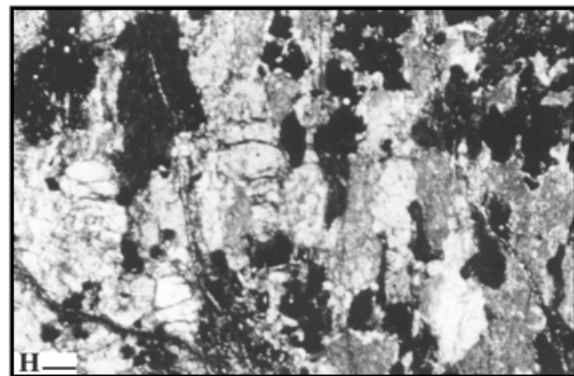
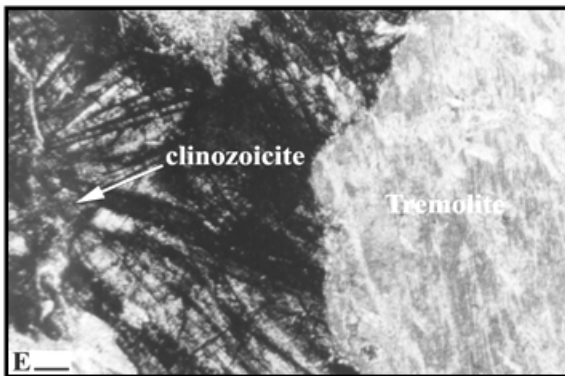
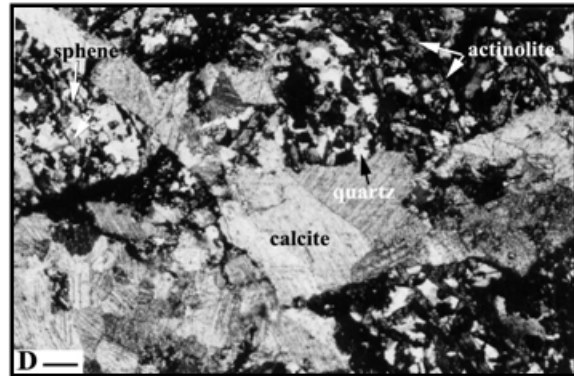
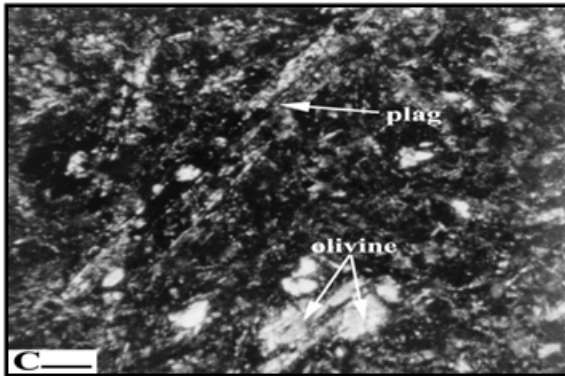
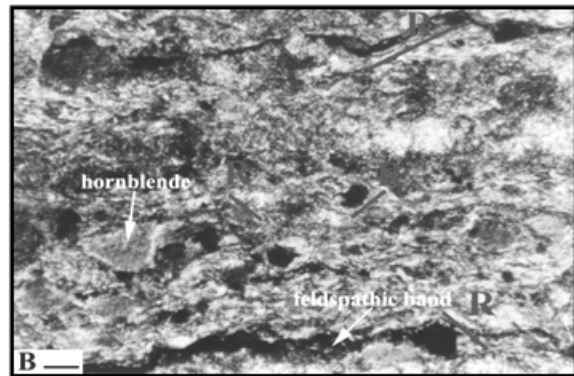
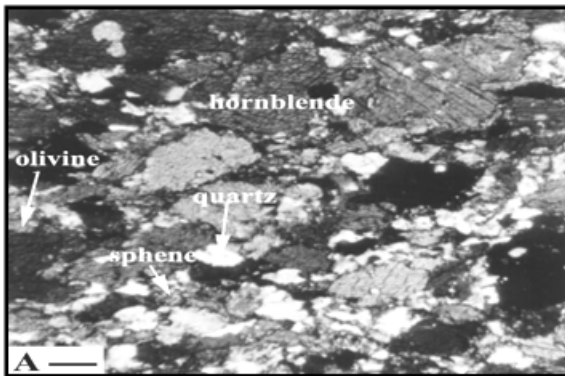
( D )

(Anthitethic) R' (Synthetic) R

( B )

(Twin Gliding)

( B )



B. A  
 C. R' R  $\sigma$   
 E. D.  
 H.



Cusp (Nicolas 1989; Jin *et al.* 1994)

( D)

( C) (Subgrain Rotation Recrystallization)

Oblate ) ( )

Oblong ) (Porphyroclastic (Boudier 1978) (Porphyroclastic (R` R)

( b ) ( F) ( )

( Finite Strain Ellipsoid )

( A)

( c) ( X )

(Skrotzki 2001) (Grain Shape Foliation) GSF

(Passchier & Trouw 1996)

( B) ( E)

( E) (Boundary Migration Recrystallization)

(Fluidal Ultramylonite) ( F)

$\delta$

( B) (Pressure Fringers) ( F)

(  $\lambda=550\text{nm}$  )

C

(Shear) ( E)

)

Jog (

( E)

(Cannat & Seyler 1995)

(Subgrains)

Dislocation Walls

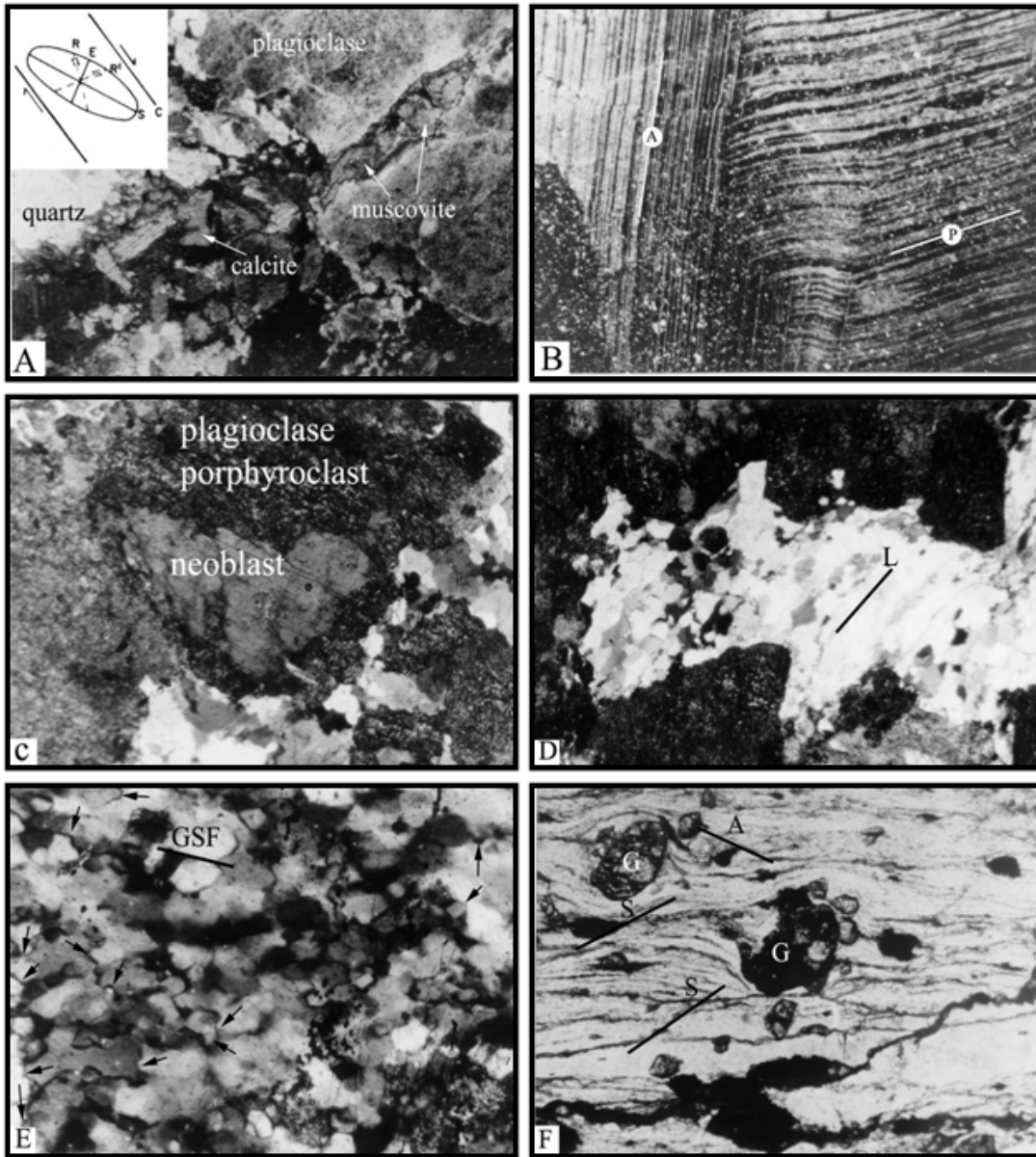
( )

( C )

( D )

(Gnos & Nicolas 1996)

Dislocation Creep



( P ) ( A )

B .

A -

(GSF)

E .

D .

C .

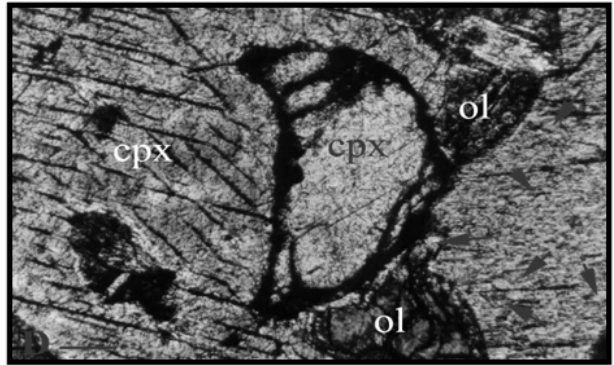
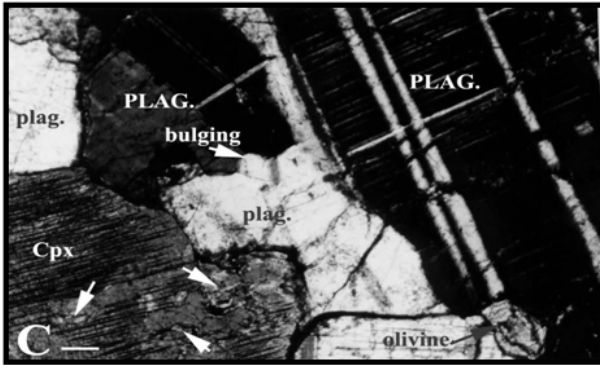
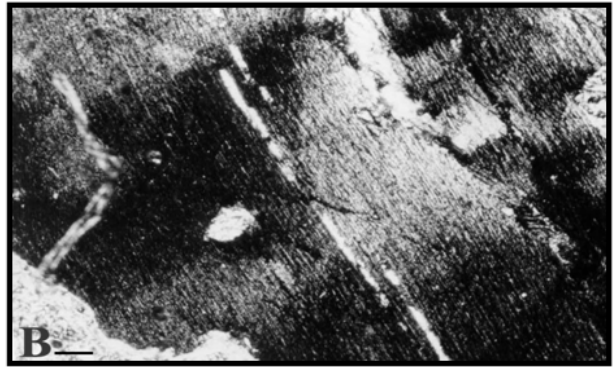
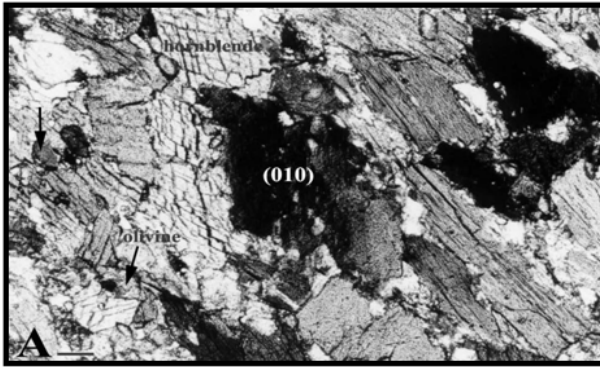
F . ( )

(Bulging)

( A ) ( S )

( G )

, E B



B.

(010)

(Subgrain)

A

( )

(PLAG)

C.

(plag)

( )

Lobate

D.

( )

Archive of Science

Rf /φ

Ramsay (1967), Dunnet

Lisle (1977) (1969)

Chew (2003) Lisle (1985), Mulchrone & Meere (2001)

(Nicolas 1992 Ildefonse 1987)

( )

( )

:(Mineral Preferred Orientation)

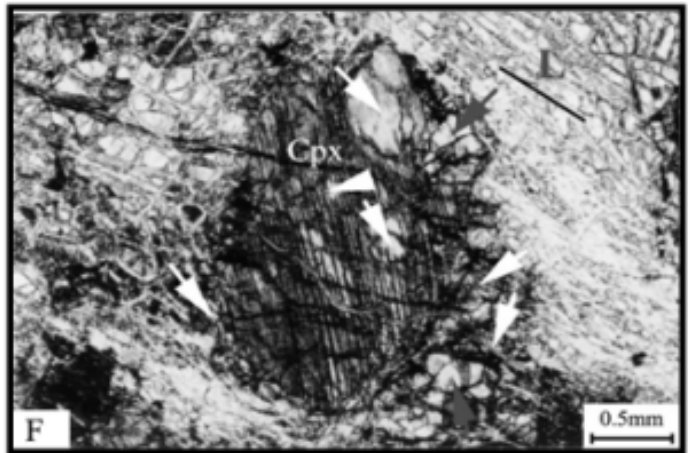
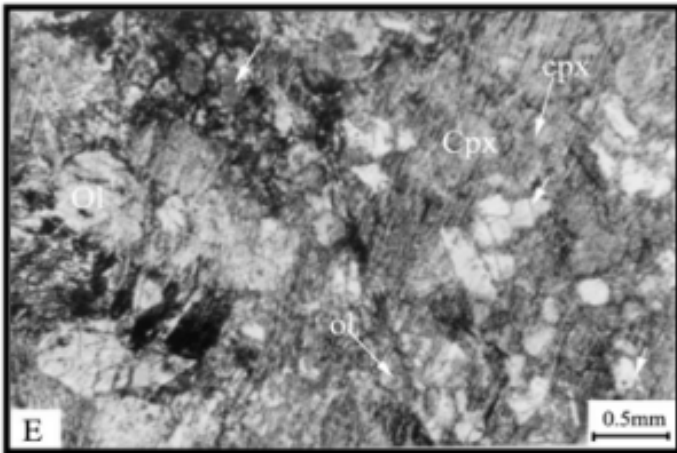
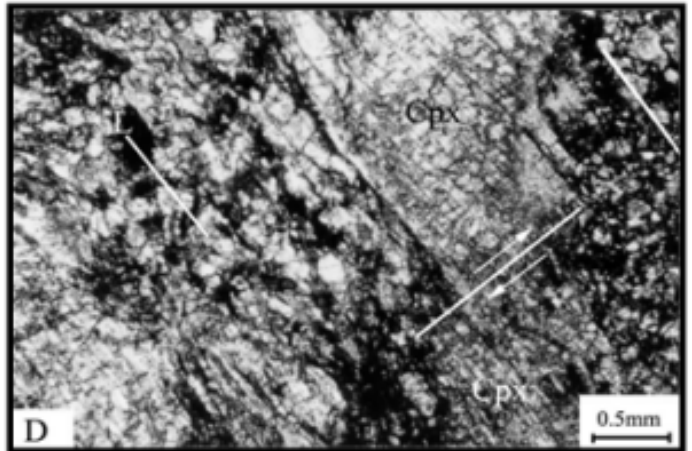
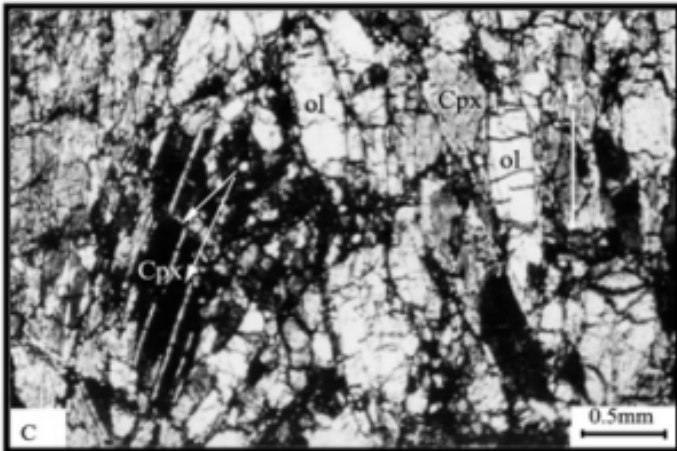
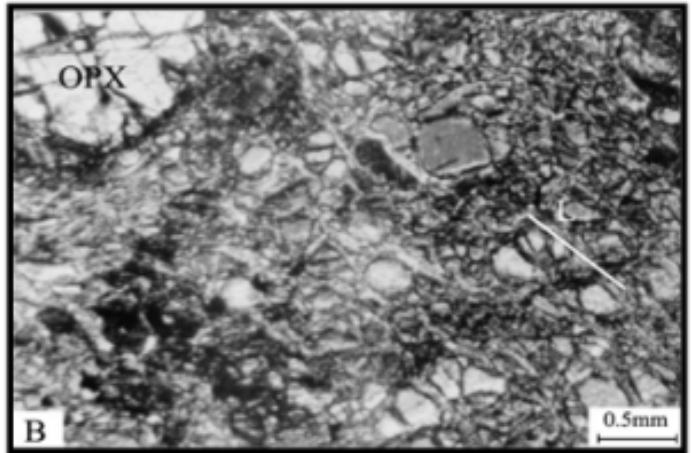
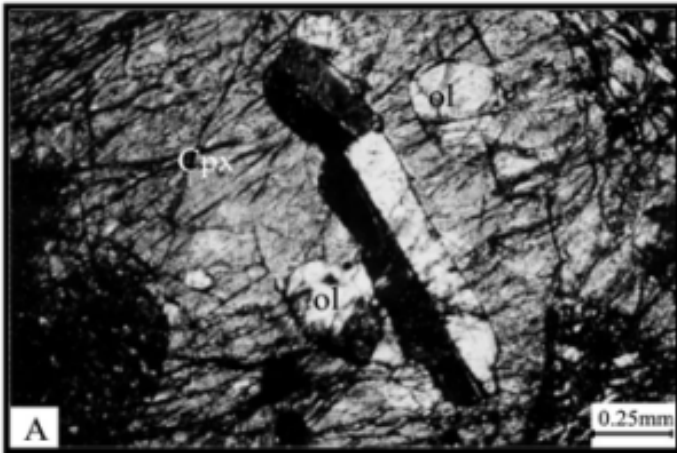
)

Turner & )

(Weiss 1963

(Shape Preferred Orientation) SPO

(Lattice Preferred Orientation) LPO



A -

B.

C.

D. ( )

E.

( )

( )

(L: ),

( )

F.

( )

(Embayment)

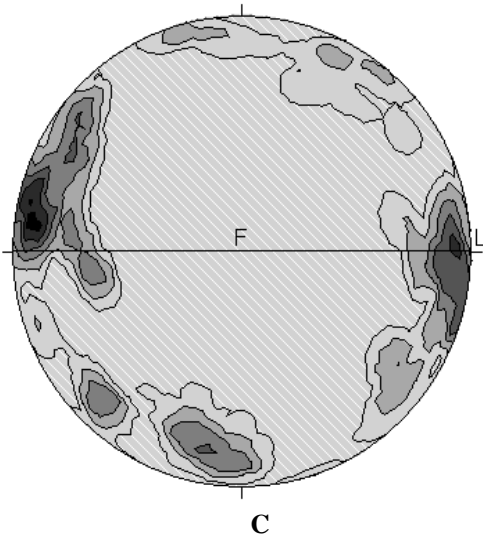
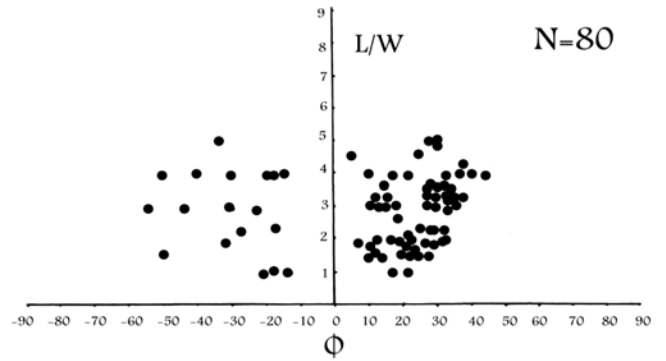
( a )

(Mainprice *et al.* 1986)

Linker *et al.*)

$\beta$  C

(*al.* 1984)



L F

C

C

$\alpha = Y$

U-Stage  
(Equal Area)

U-Stage ( $\gamma$   $\beta$ )

$\beta = Z, \gamma = X$

$\alpha = Y$

( )

Shelley

U-Stage

Kerr (1977) Paschier & Throw (1996) (1995)

Nicolas & Poirier (1976) Turner & Weiss (1963)

( )

C

U-stage

[0001]

C

(Nicolas 1989, Nicolas & Poirier 1976 )

( )

TEM X

<a>

C

(100)

(Dislocation Walls)

( )

Cold Working

(Non-Coaxial)

C

Raleigh ) (Pencil Gliding) {0k1}[100]

1968, Ave Lallemand & Carter 1970, Nicolas *et al.* 1971,

(Mercier & Nicolas 1975

C

C

(C-Slip) C

( )

( )

[100](010)

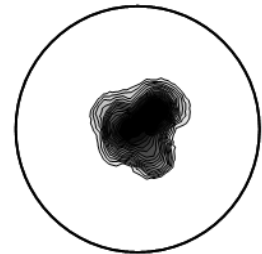
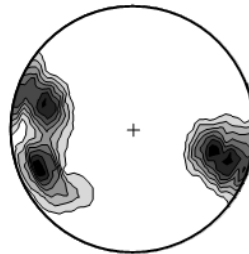
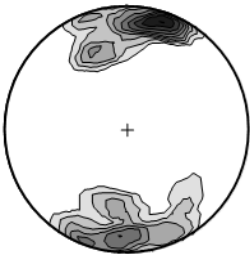
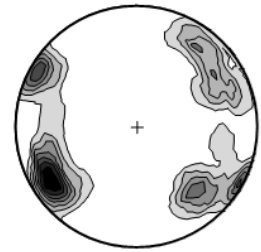
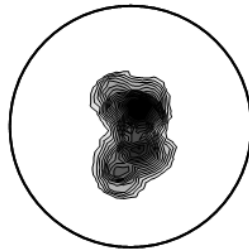
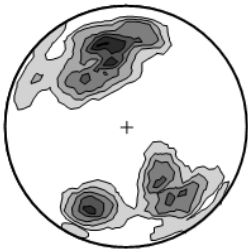
$\text{TiO}_2$  V  
 $\text{Ti}$  ( )  
 $\text{MgO}\#$   $\text{TiO}_2$  )  
 ( )  
 Cr  
 ( )

$\text{FeO}\#$

$\text{TiO}_2$

Mg Cr Ni

Sr Rb Ba Zr K Ca Al Ti



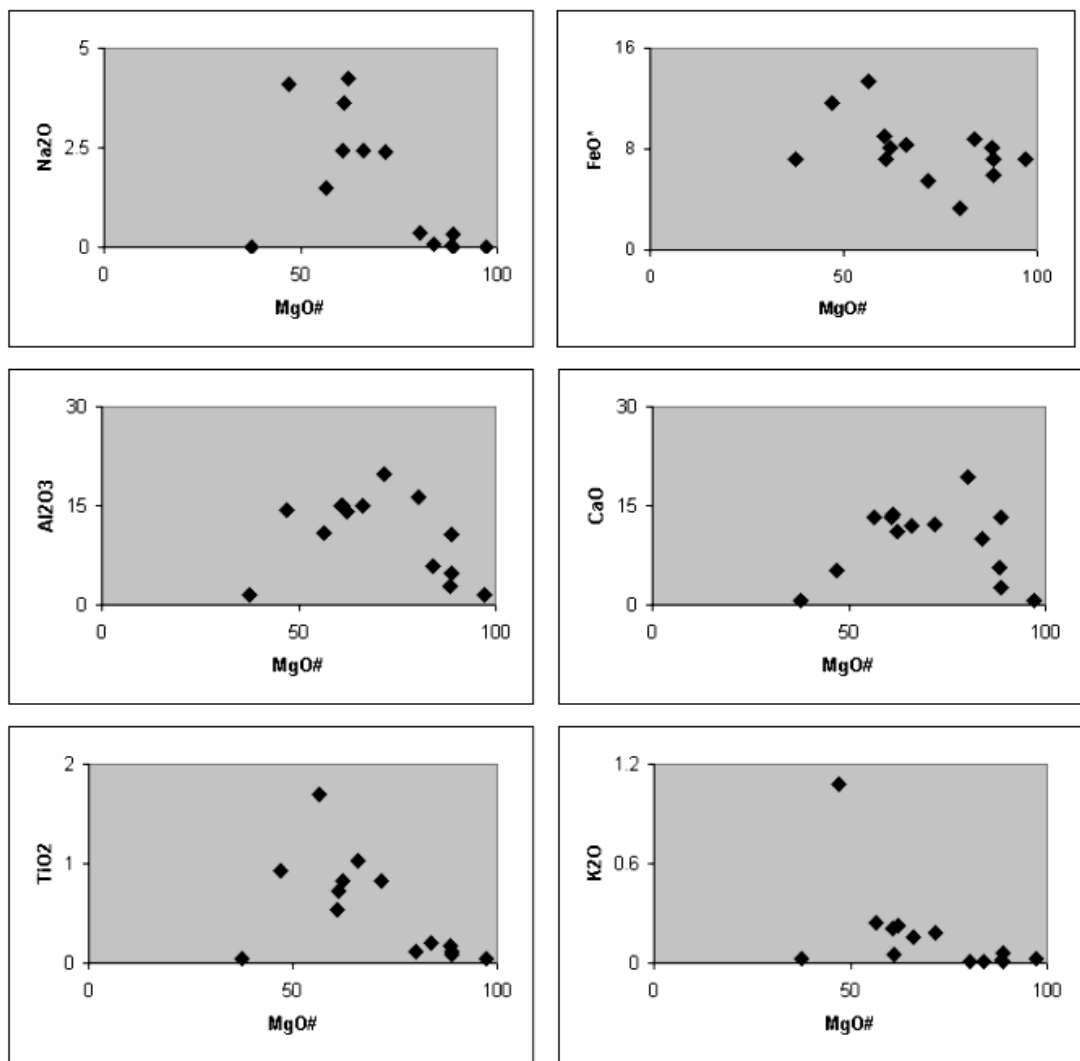
$\gamma$   $\beta$ ,  $\alpha$

$Z$   $Y$ ,  $X$

ZEISS Leo (SEM)

DSM940A

(Rhodium)



MgO#

(1972) Davoudzadeh

,Serp.

,Lherz

,Gab.Imp.

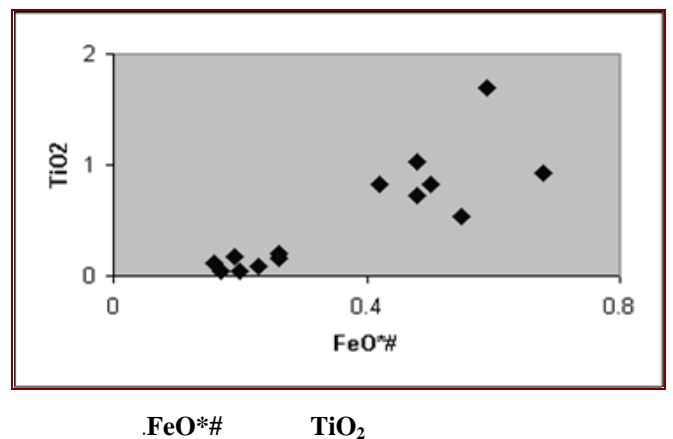
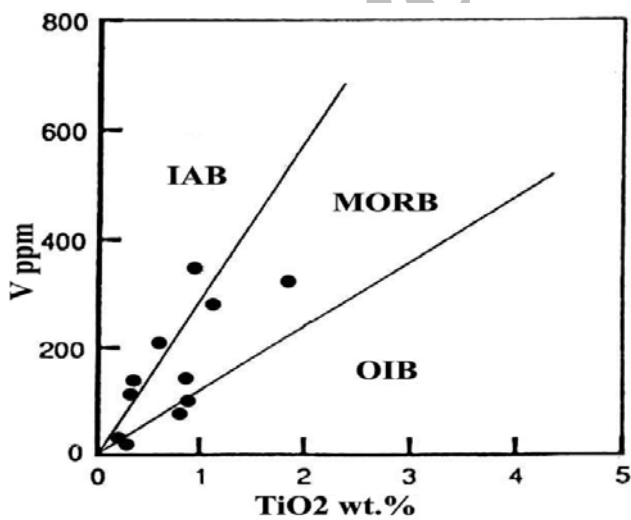
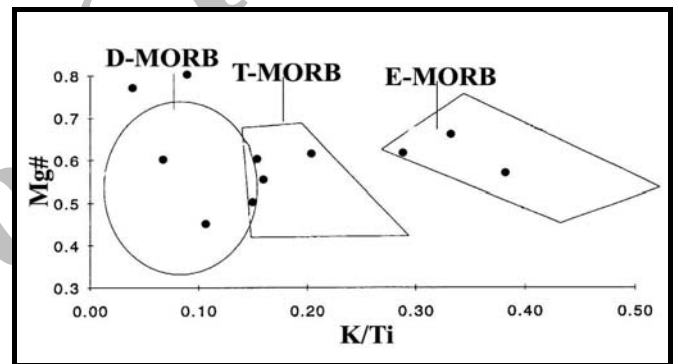
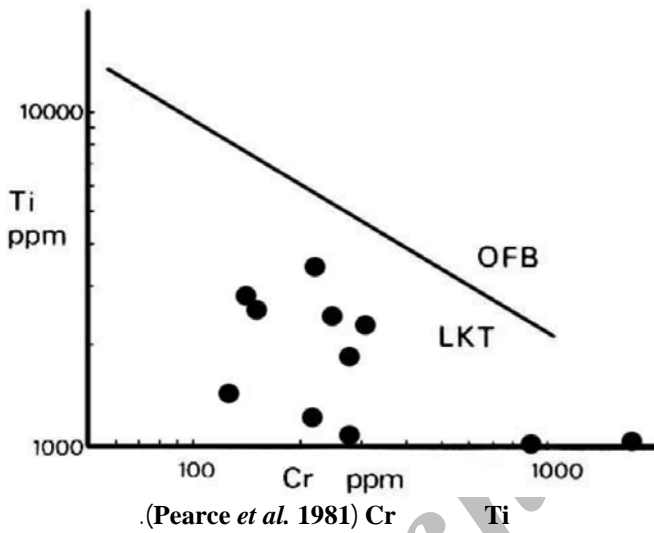
,G.D.

,Harz

No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Name	Basalt	Gabbro	Gab. Imp.	Basalt	Harz.	Basalt	Gabbro	Gabbro	G.D.	Diabase	Basalt	Serp.	Lherz
SiO <sub>2</sub>	44.8	46	45.9	47.5	35.28	48.51	48.7	48.7	48.2	49.7	47.93	35.3	41.4
TiO <sub>2</sub>	0.72	0.115	0.09	0.83	0.05	0.53	0.2	0.18	1.03	0.93	1.7	0.05	0.12
Al <sub>2</sub> O <sub>3</sub>	15.1	16.4	10.6	14.1	1.55	14.94	5.83	2.89	14.9	14.26	10.86	1.55	4.7
Fe <sub>2</sub> O <sub>3</sub>	2.16	1.01	3.4	3.32	6.1	2.98	2.63	2.52	2.93	4.89	4.4	6.1	2.5
FeO	5.04	2.31	2.55	4.98	1.1	6.05	6.13	5.62	5.43	6.72	8.94	1.1	4.74
MnO	0.14	0.093	0.13	0.15	0.07	0.13	0.15	0.16	0.15	0.32	0.18	0.07	0.08
MgO	7.9	9.4	20	8.2	37.6	7.59	24.9	33.7	9	5.53	9.41	37.6	37.2
CaO	13.6	19.4	13.2	11	0.56	13.25	10	5.58	11.9	5.17	13.33	0.56	2.65
Na <sub>2</sub> O	3.62	0.35	0.33	4.25	-	2.42	0.07	0.03	2.42	4.11	1.49	-	-
K <sub>2</sub> O	0.048	0.013	0.0089	0.23	0.031	0.21	0.01	0.02	0.16	1.08	0.24	0.03	0.06
P <sub>2</sub> O <sub>5</sub>	0.069	0.0017	0.0026	0.071	0.03	-	-	-	-	-	-	0.03	0.02
Cr	398.86	957.95	2463.3	444.76	-	518	336	419	304	24	191	-	-
Ni	85.65	67.57	502.89	94.29	-	143	852	153	152	148	161	-	-
L.O.I	6.11	3.95	2.89	4.6	15.21	3.29	0.38	0.5	4.07	7.48	3.25	17.05	7.3

(MA) (GA)  
 .SEM (PY)

Rock	GA	GA	MA	MA	PY	PY
Mineral	garnet	amphibole	amphibole	amphibole	chlorite	Cpx
O	67.44	42.28	46.11	55.95	46.89	48.28
Na	0.81	2.33	2.37	3.22	0.6	0.24
Mg	1.21	3.57	1.9	8.12	16.26	9.87
Al	4.82	8.67	10.99	4.57	1.86	1.88
Si	12.5	15.05	22.56	22.14	24.38	23.6
Ca	1.66	5.36	16.09	6	2.55	12.77
Ti	2.18					
V	0.04					
Cr	0.15					
Fe	8.88	23.89			7.47	3.37
Co	0.62					
Cu	0.07	1.06				
K		0.02				
Total	100.38	102.23	100.02	100	100.01	100.01





( )

(Sole)

(Intrusive dikes)

)

(Indigenous dikes)

)

(

(Nicolas 1989)

( )

Nicolas 1989; Nicolas & )

(Subgrains)

(Prinzhofer 1983; Jin *et al.* 1994

(Melt Mush)

Prinzhofer & Nicolas Cannat 1985 )

)

Cannat & Cannat *et al.* 1990 Karson & Dick 1983 1980

(

(Seyler 1995

( )

( )

(Meurer & Gee 2002)

( a )

( )

Detachment Faults

( )

)

(

( )

Westphal *et al.* Soffel *et al.* 1996 Davoudzadeh 1981 )

,[(Thomas *et al.* 2000)

.(1986

Babaei *et al.* (2001)

Stress or Shear )

(Localization

Rahgoshay & )

(Berberian 1983)

.(Shafaii 2003

Nicolas )

Jaroslow *et al.* 1996; Dijkstra *et* )

(& Poirier 1976

(*al.* 2002

(Simple Shear)

( )

Cannat *et al.* 1991a, )

.(b

TiO<sub>2</sub>

MgO#

/ ) TiO<sub>2</sub>

( % / )

MgO# ( % /

MgO# Cr

CaO

)

.(Berberian & King 1981)

(

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