Closing: Controversies in UHP Tectonism

- maximum pressures
- maximum temperatures
- rates of exhumation
- sizes of UHP terranes

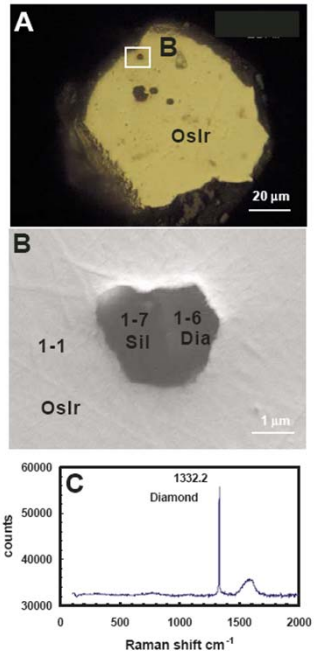
Erosion Rates

TABLE 2. Erosion rates by surface processes. Burbank (2002)

Erosion process	Location	Measured	Rate of	Reference
Bare bedrock weathering	Wind River Range, Wyo.	Cosmogenic isotope abundance	5–20 m/m.y.	Small *et al.* (1997) Bierman (1994)
Rock-to-regolith conversion	San Gabriel Mtns, Calif.	Cosmogenic isotope abundance	=350 m/m.y.	Heimsath (1999)
River incision	Indus River, Pakistan	Cosmogenic isotope abundance	5–10 km/m.y.	Burbank *et al.* (1996)
River incision	Himalayan Foreland	Deformed, dated terraces	10 mm/y	Lavé and Avouac (2000)
Bedrock landsliding	Southern Alps, New Zealand	Frequency magnitude data	5–15 km/m.y.	Hovius *et al.* (1997)
Glacial erosion	Alaska, New Zealand, Asia	Sediment volumes, reported rates	1–30 km/m.y.	Hallet *et al.* (1996)
Glacial erosion	Nanga Parbat	Glacial sediment load	5–7 mm/y	Gardner and Jones (1993)

Luobusa, Tibet

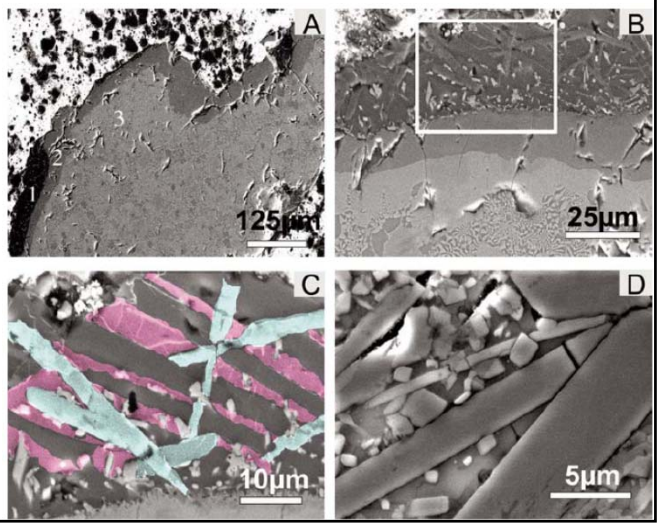
- diamonds in OsIr alloy
- coesite rimming FeTi alloy
- from chromitite



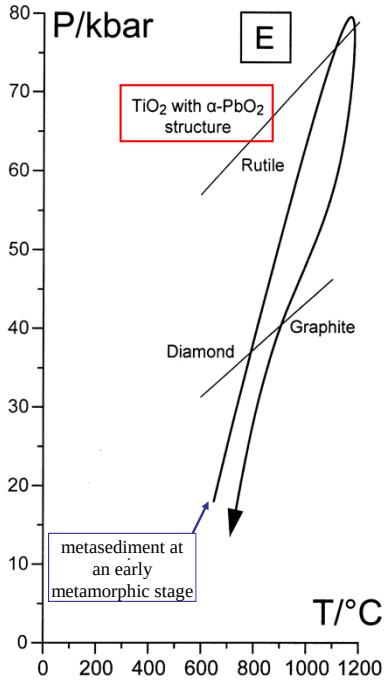
Yang et al. (2007)

Luobusa

kyanite contains <12 wt% TiO_2
coesite crystals may be stishovite pseudomorphs

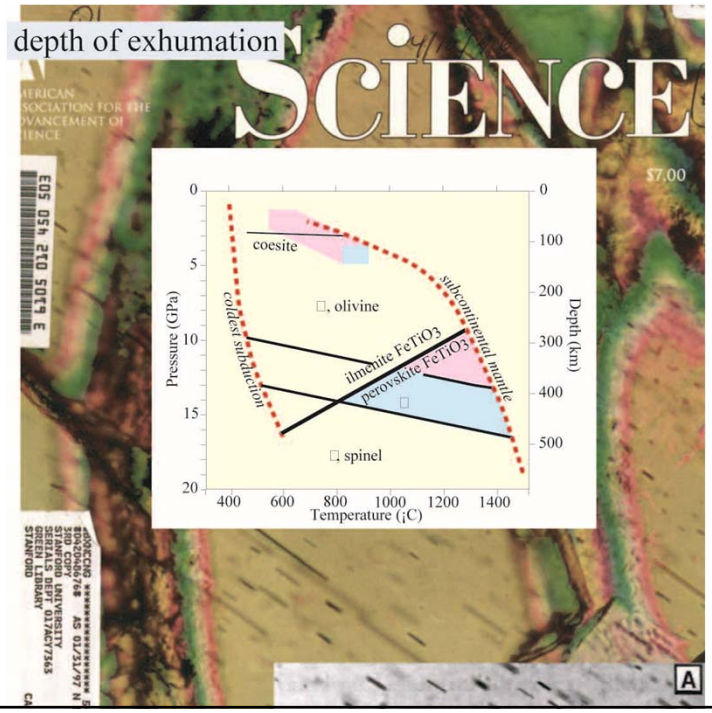


Yang et al. (2007)

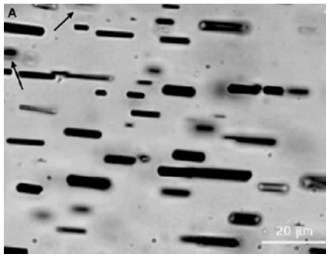


Diamond-bearing quartzofeldspathic rocks, Saidenbach Reservoir, Erzgebirge

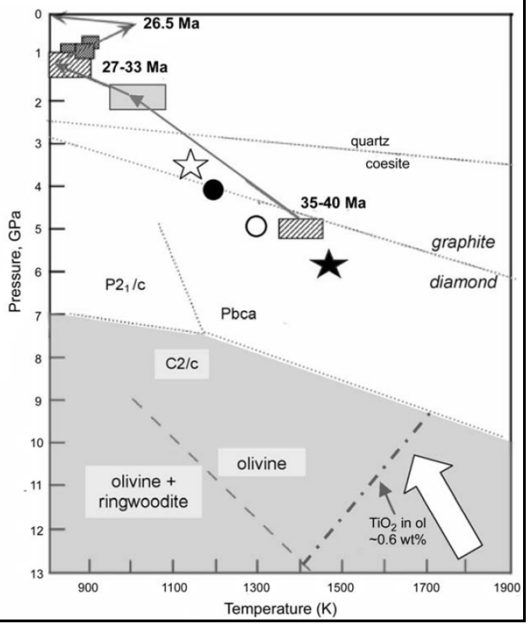
(Massonne & O'Brien, 2003)



Alpe Arami, Ti rods



defected olivine →
ilmenite + chromite



Green (2005)

Ti rods

1–3 vol% $FeTiO_3$ rods in olivine, or 0.7–2.0 wt% TiO_2 (Dobrzhinetskaya *et al.,* 1996) revised to 0.2–0.9 wt% TiO_2 (Bozhilov *et al*., 2005).

Ilmenite rods identical in size, composition & quantity to Alpe Arami, detected in Sulu (Hacker *et al.*, 1997) & Adula–Cima Lunga nappe (Risold *et al*., 1999)

highest TiO_2 content in kimberlite olivine < 0.06 wt% (Hervig *et al*., 1986)
0.11 wt% TiO_2 in olivine at 10 GPa/1400 °C (Ulmer *et al*., 1998)

TiO_2 = 0.035 wt% from EPMA measurements (Hacker *et al.,* 1997)

TiO_2 = 0.035 wt% from LA-ICP-MS (Risold *et al.,* 1996 & Reusser *et al.,* 1998)

Ti rods

3 new polymorphs of $FeTiO_3$ interpreted as intermediate between HP perovskite & ilmenite. Inferred exsolution during transformation of wadsleyite, which has high Ti solubility (Dobrzhinetskaya *et al.,* 1996)

diffraction patterns can be explained by dynamical diffraction between ilmenite & olivine matrix (Hacker *et al*., 1997)

TEM shows rods controlled by presence of humite-type layers, *i.e.*, $(Mg_2SiO_4)\cdot Mg(OH,F)_2$. In such layers up to 50 mol% MgH_2 replacement by Ti^{4+} is possible. (Risold *et al*., 1999)