

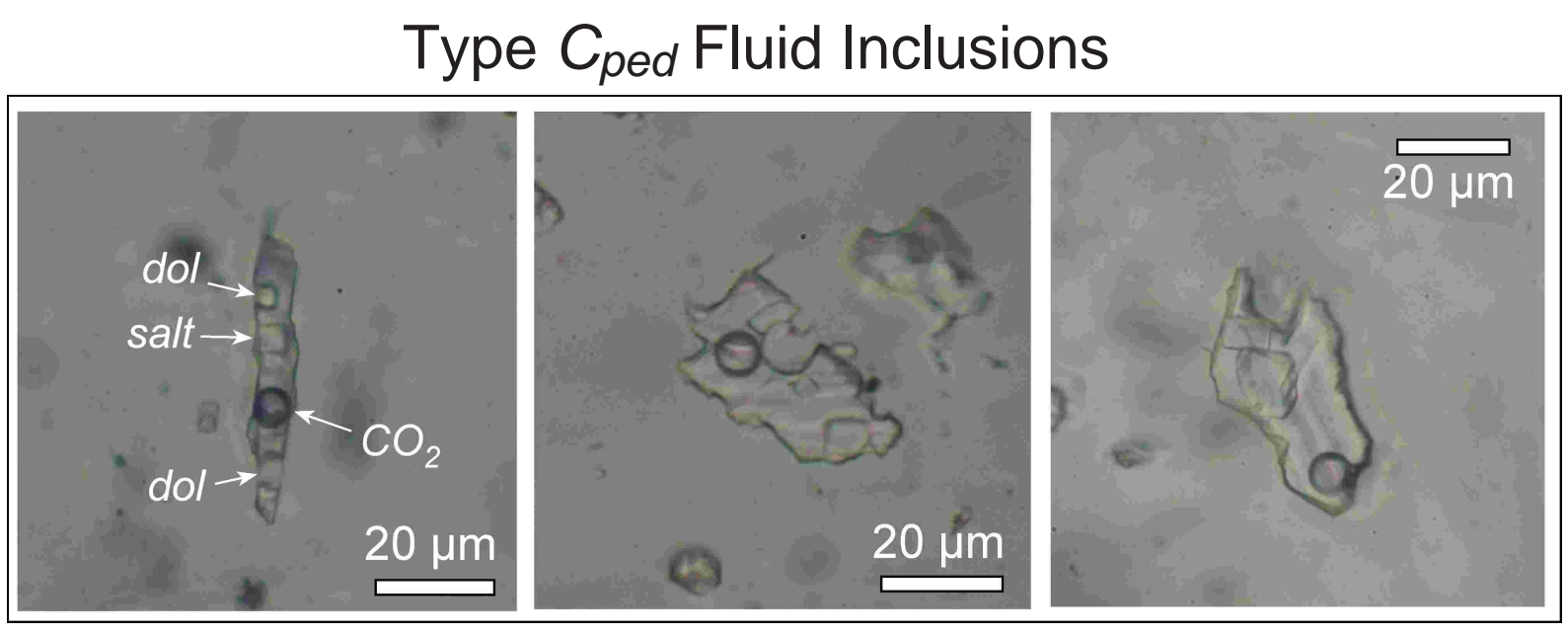
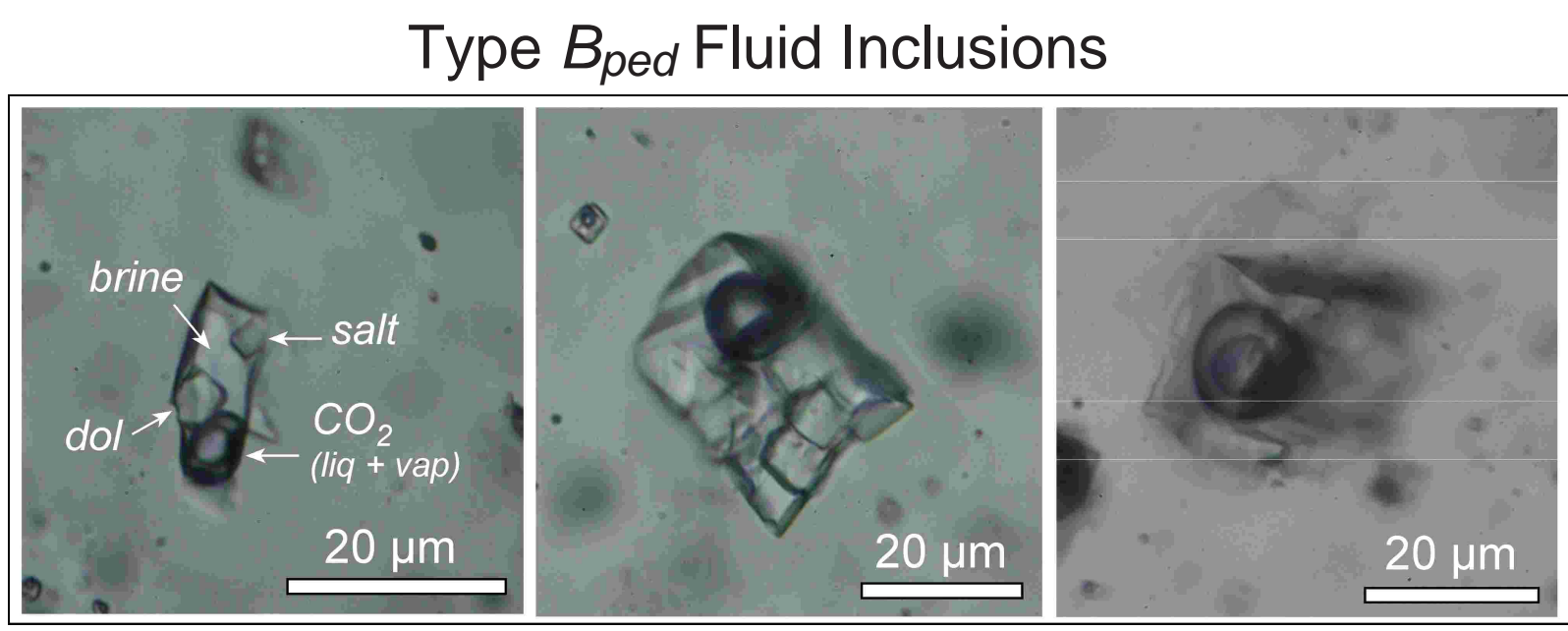
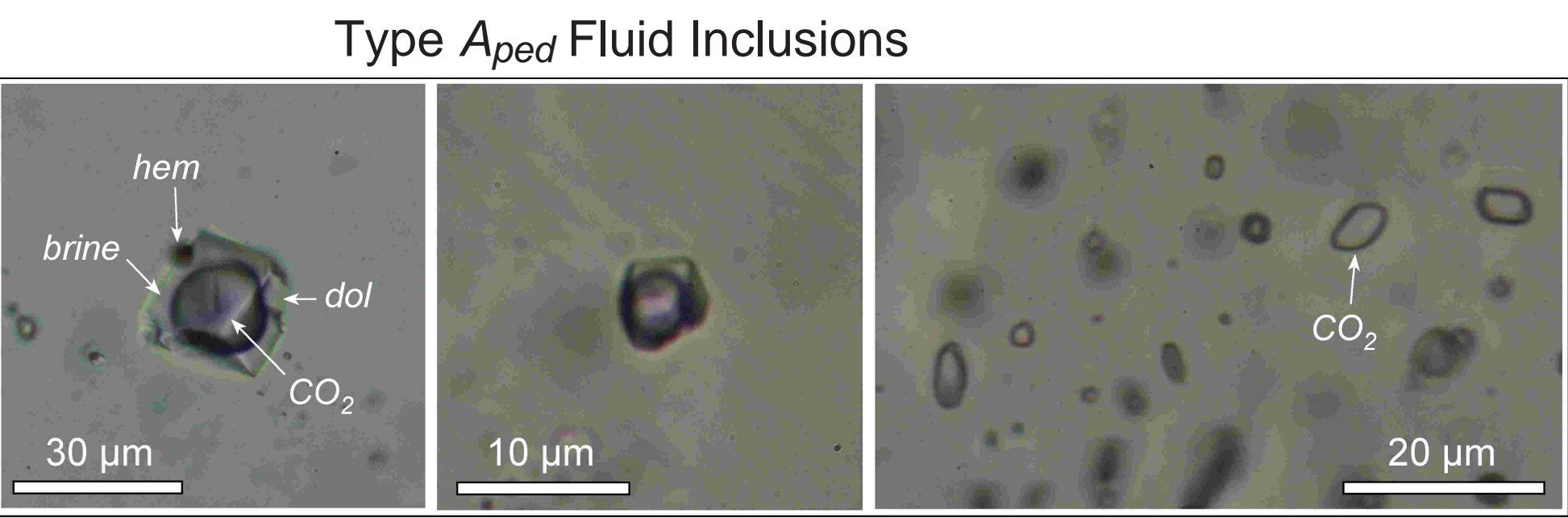
The origin of sparry magnesite deposits of Brumado (Bahia, Brazil) -

Ronald J. Bakker, Resource Mineralogy, Montanuniversity Leoben
Johann G. Raith, Resource Mineralogy, Montanuniversity Leoben
Elizabeth Hauzinger, Subsurface Engineering, Montanuniversity Leoben
Walter Prochaska, Österreichisches Archäologisches Institut, ÖAW
Christian Stranzl, RHI Magnesita

evidence from fluid inclusions

objects of interest

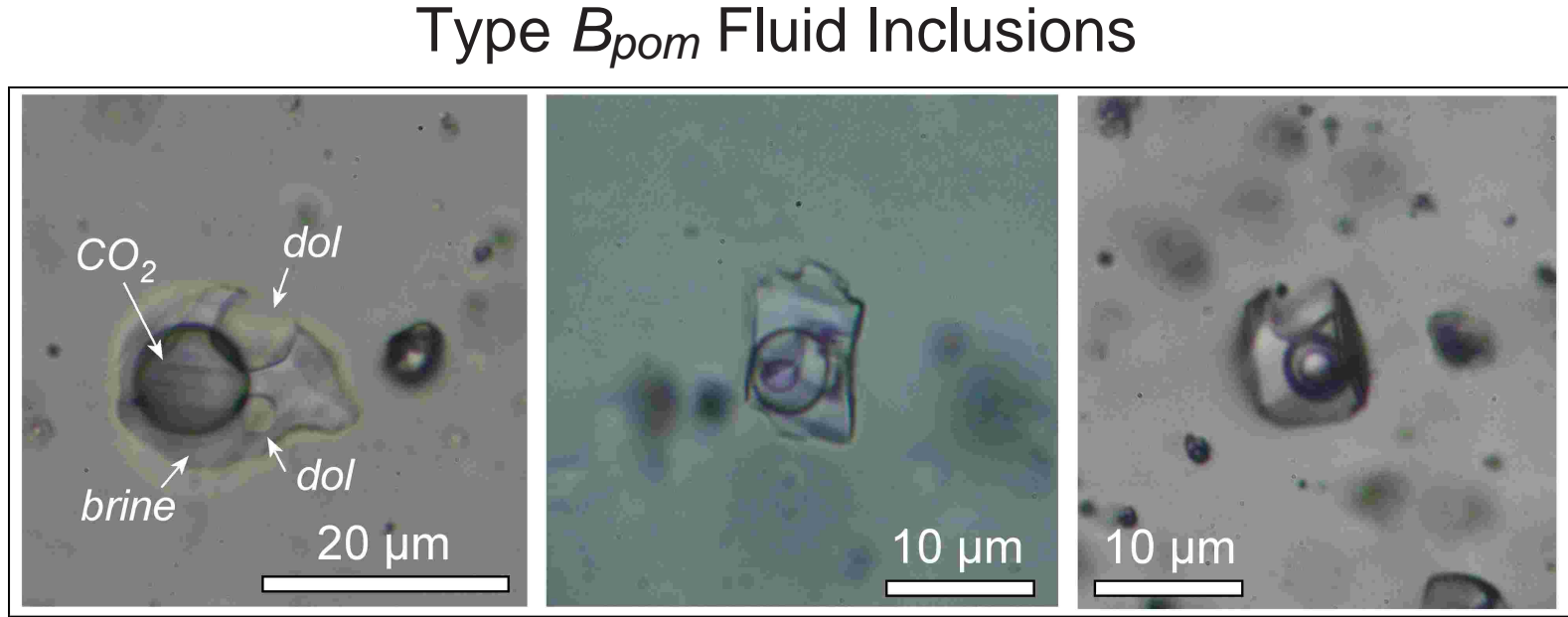
fluid inclusions in magnesite



Samples:

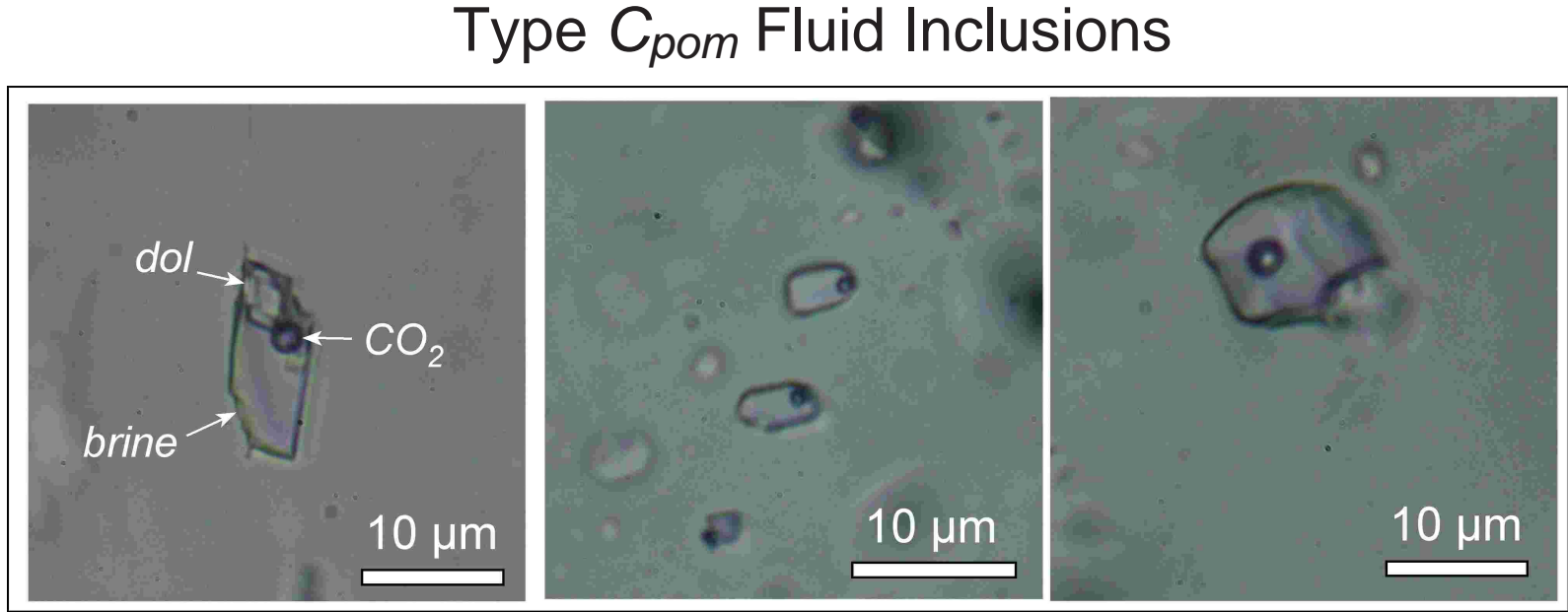
Pedra Preta Magnesite Mine
(A_{ped} , B_{ped} , C_{ped})

Pomba Magnesite Mine
(B_{pom} , C_{pom})

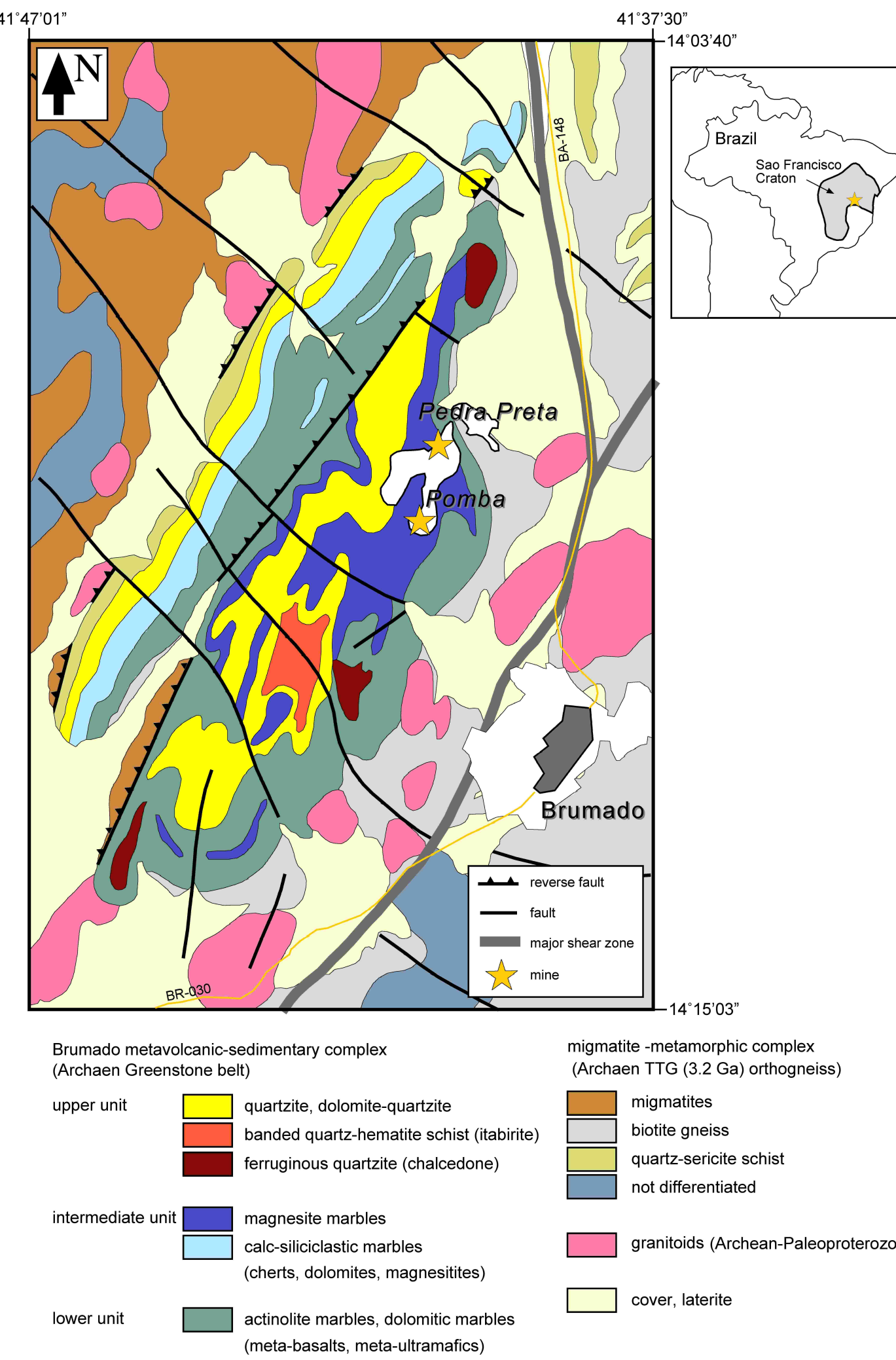


Brumado Greenstone Belt
Meso-Archean (3.2-2.7 Ga)

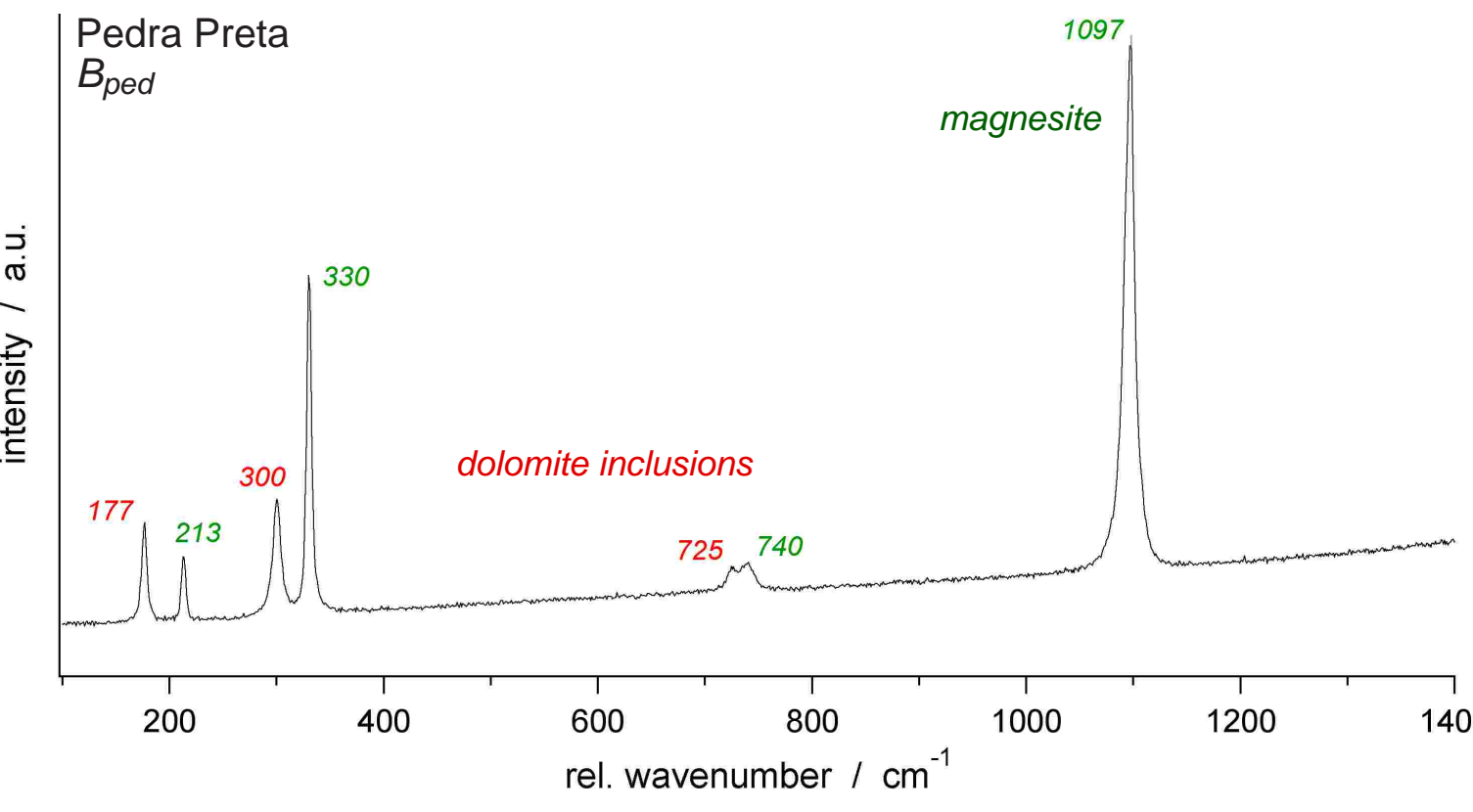
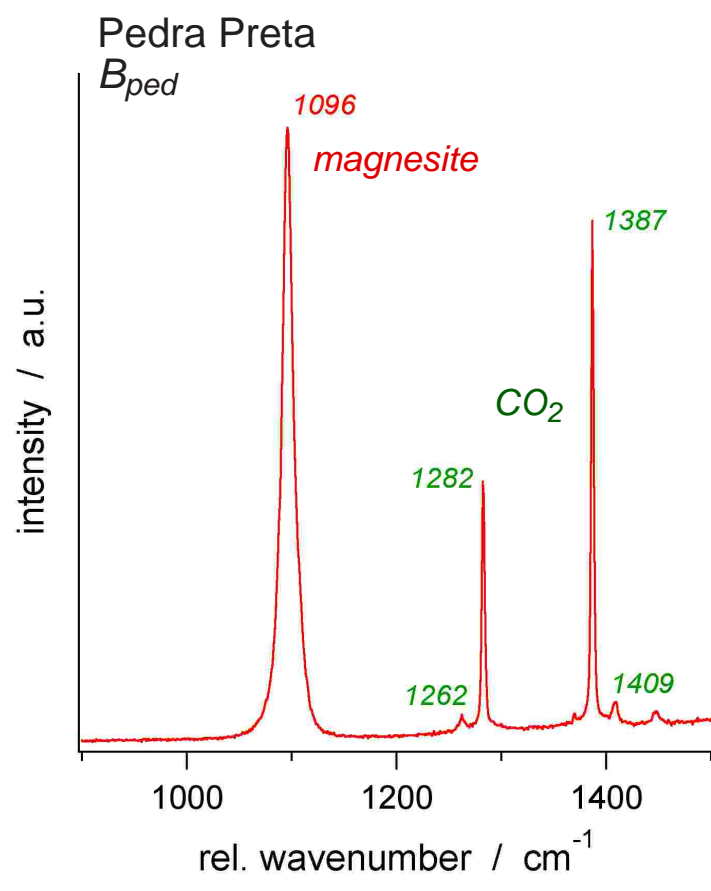
Greenschist to
Amphibolite facies



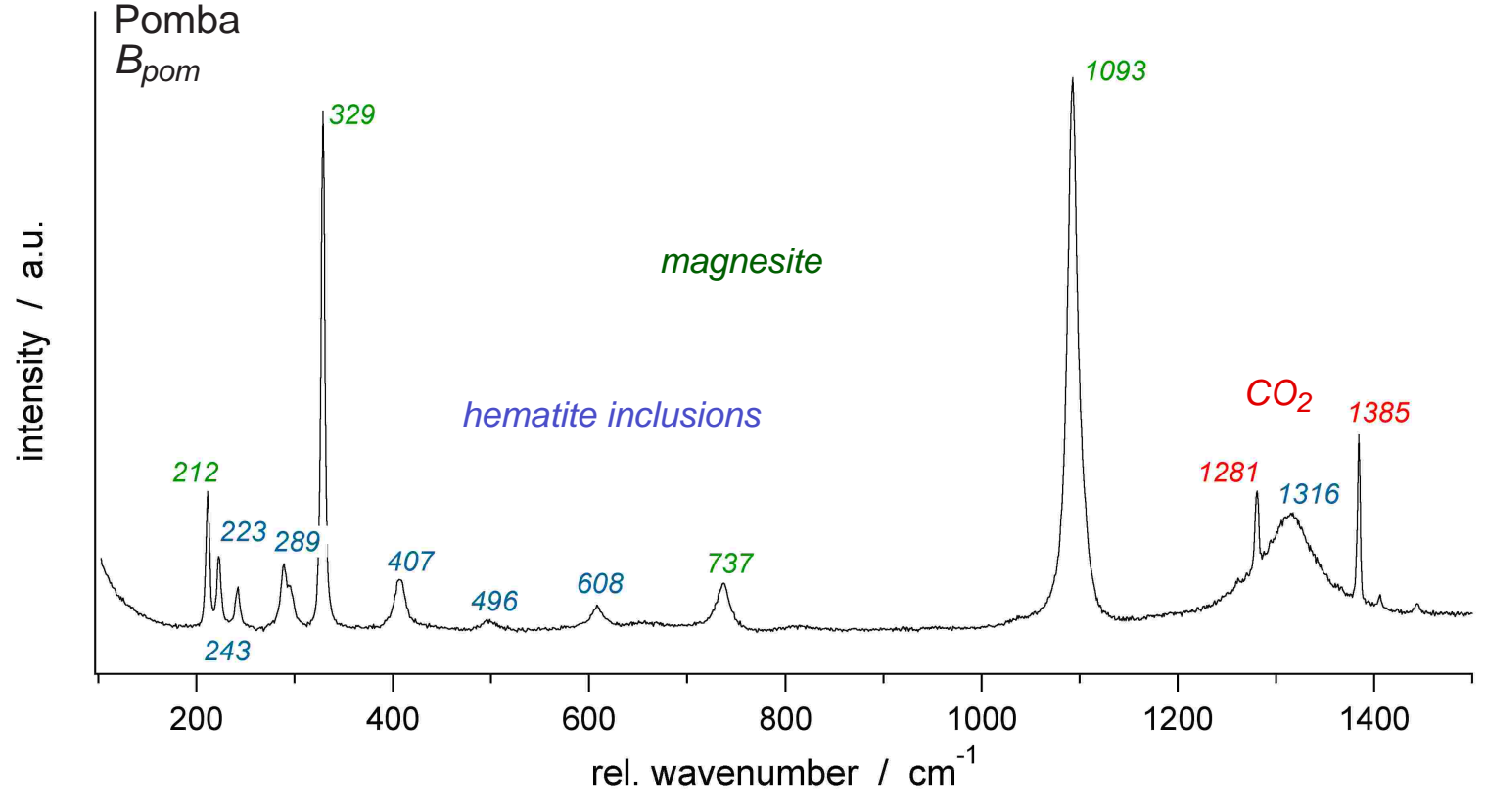
geological settings



Raman spectroscopy

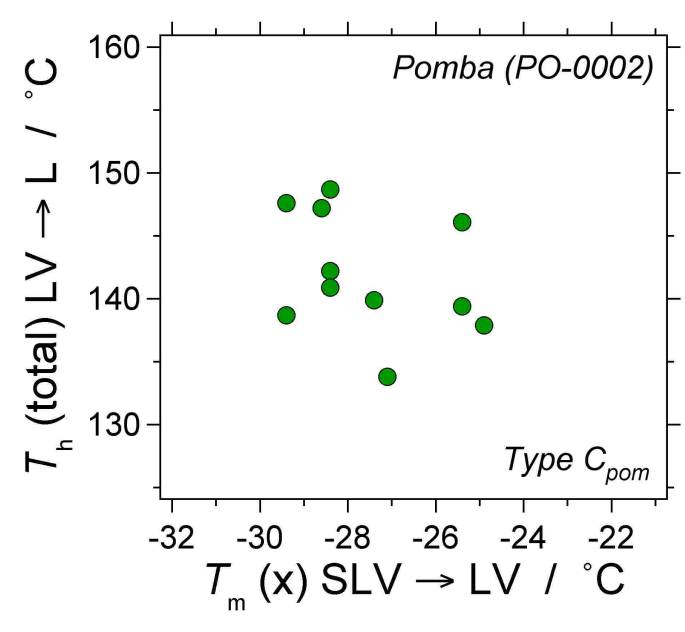
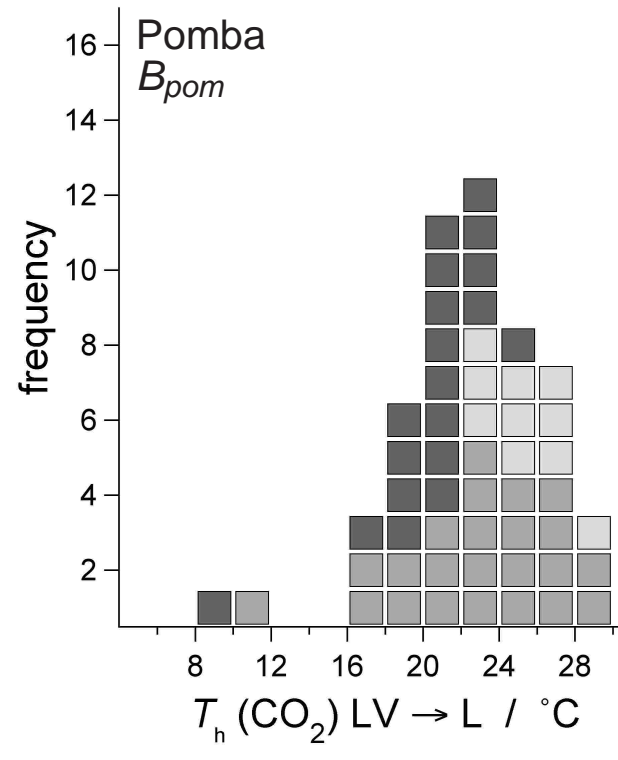
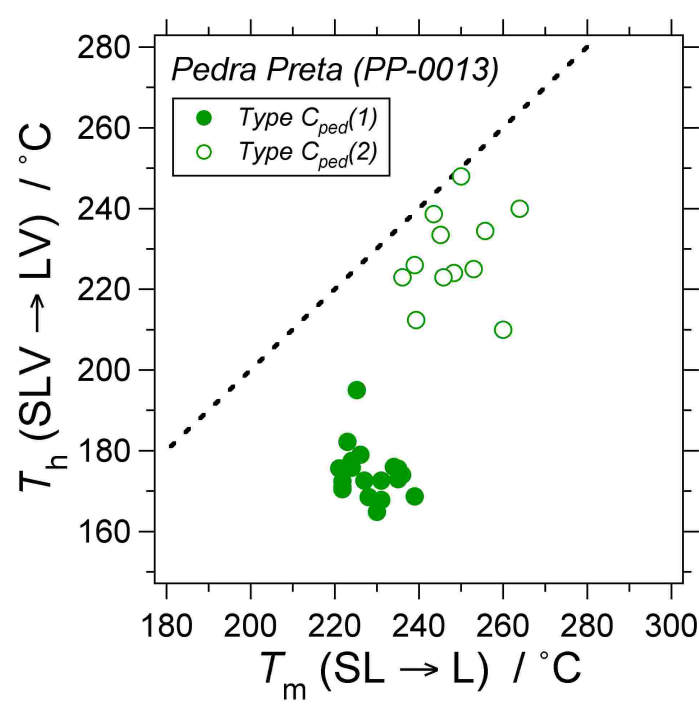
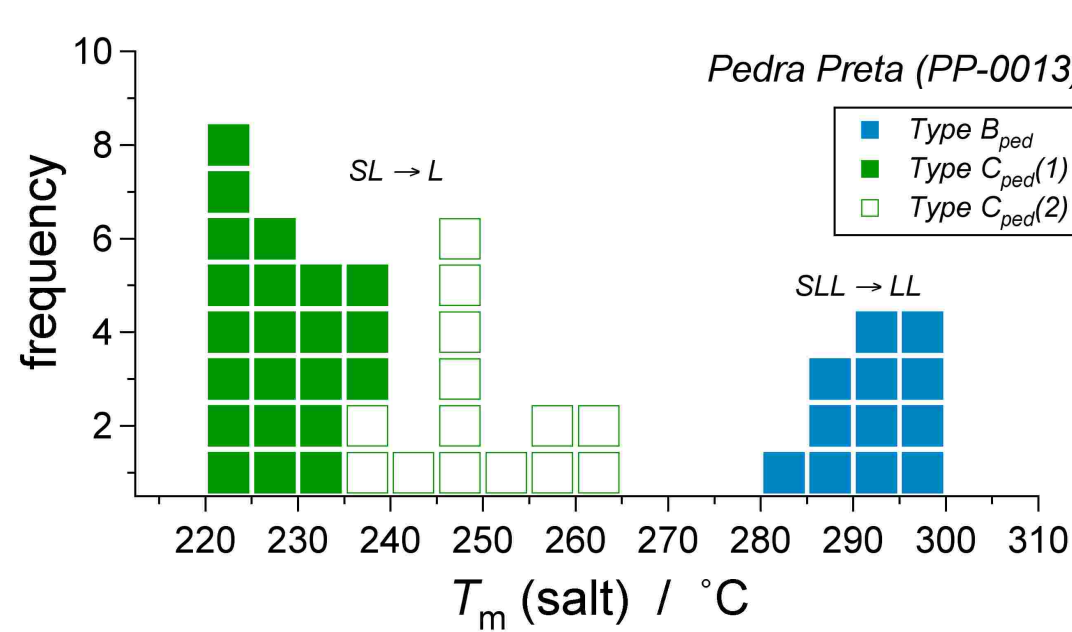


solid inclusions in Pedra Preta samples: dolomite, hematite (minor: clinocllore, rutile, turmaline, barite)



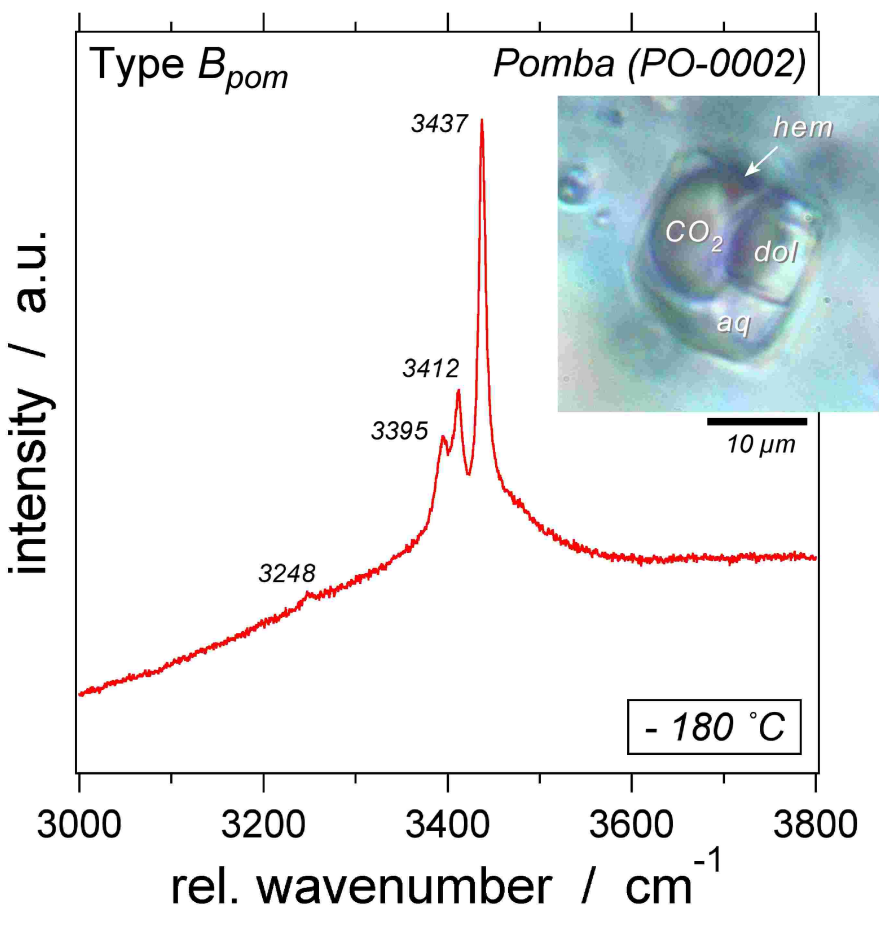
Solid inclusions in Pomba samples: dolomite, hematite

Microthermometry

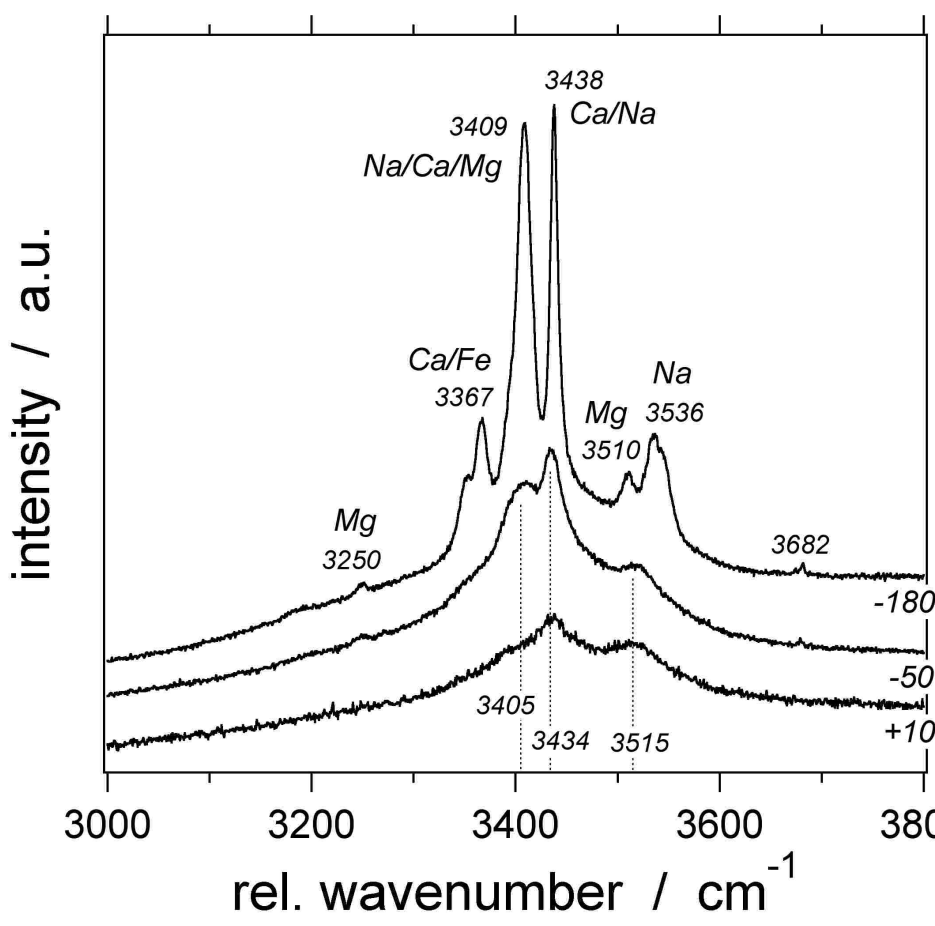


general trend: lower volume fractions of CO_2 phase correspond to higher homogenization temperatures of CO_2 (lower densities)

cryo-Raman spectroscopy



antarcticite spectrum
 $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$



complex salt-hydrate spectrum

Ion-chromatography

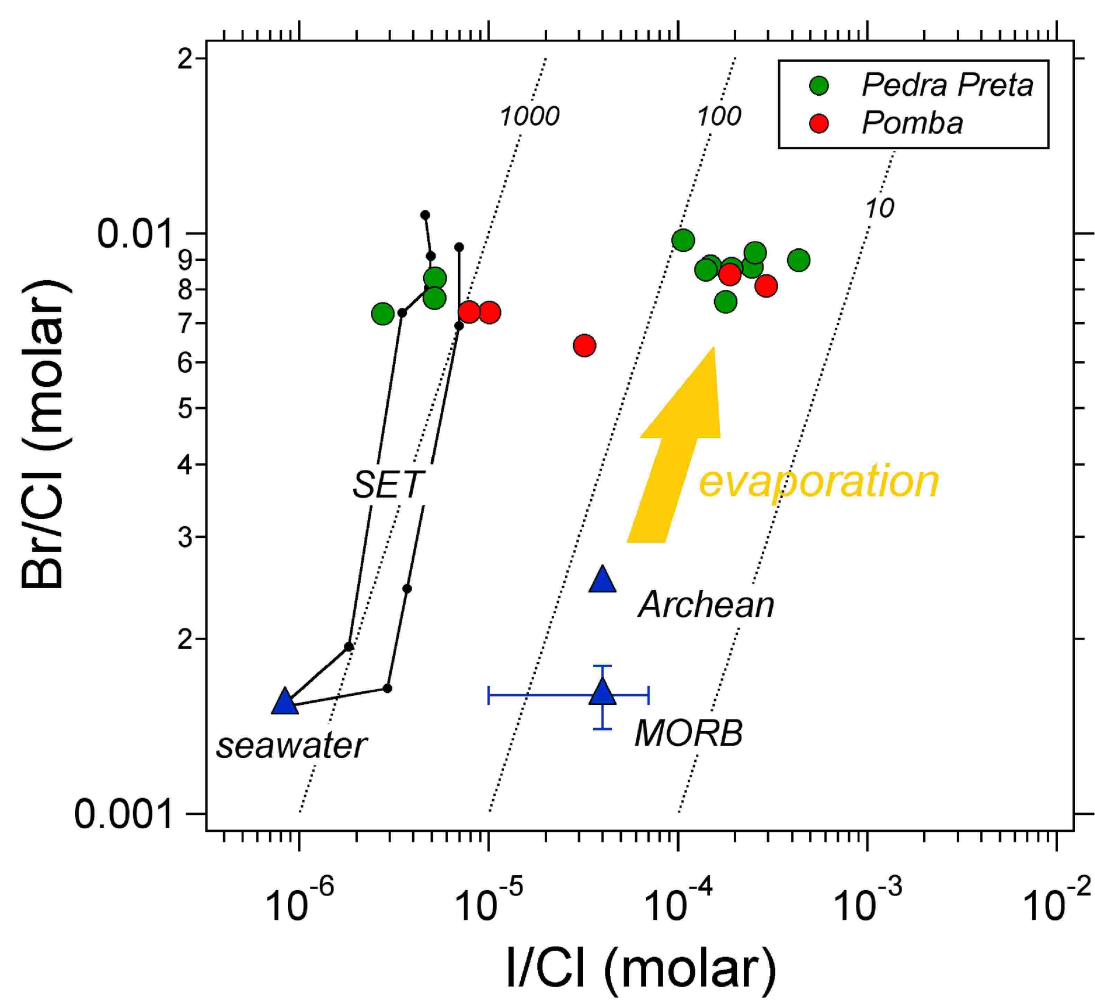
Sample	Na/K	Na/Li	Na/Br	Cl/Br	I/Br	Br/Cl
Pedra Preta						
PP-0001	4.6	12.6	24	113	0.0168	0.0088
PP-0004	3.6	9.9	16	103	0.0110	0.0097
PP-0005	6.6	15.3	35	116	0.0163	0.0086
PP-0007 (red)	5.8	21.6	38	132	0.0236	0.0076
PP-0007 (white)	4.9	15.4	27	119	0.0006	0.0084
PP-0008	6.4	20.4	31	138	0.0004	0.0073
PP-0010	12.0	20.8	29	110	0.0479	0.0090
PP-0013	7.0	17.8	38	130	0.0007	0.0077
PP-0014	5.2	16.0	30	115	0.0282	0.0087
PP-0017	3.9	9.6	17	108	0.0277	0.0093
PP-0019	4.3	9.7	22	114	0.0220	0.0087
Pomba						
PO-0001	3.2	20.0	24	134	0.0013	0.0073
PO-0002	3.5	19.3	19	136	0.0011	0.0073
PO-0005	2.4	12.1	14	117	0.0220	0.0085
PO-0008	2.9	22.3	22	154	0.0050	0.0064
PO-0009	2.6	7.3	27	123	0.0361	0.0081

Na/K geothermometry: Pedra Preta 250 °C
Pomba 320 °C

Na/Li geothermometry: 350 °C

contaminated values: mixing of A_{ped} , B_{ped} , C_{ped}

affected by metamorphism



triple - halogen analyses (Cl - Br - I):

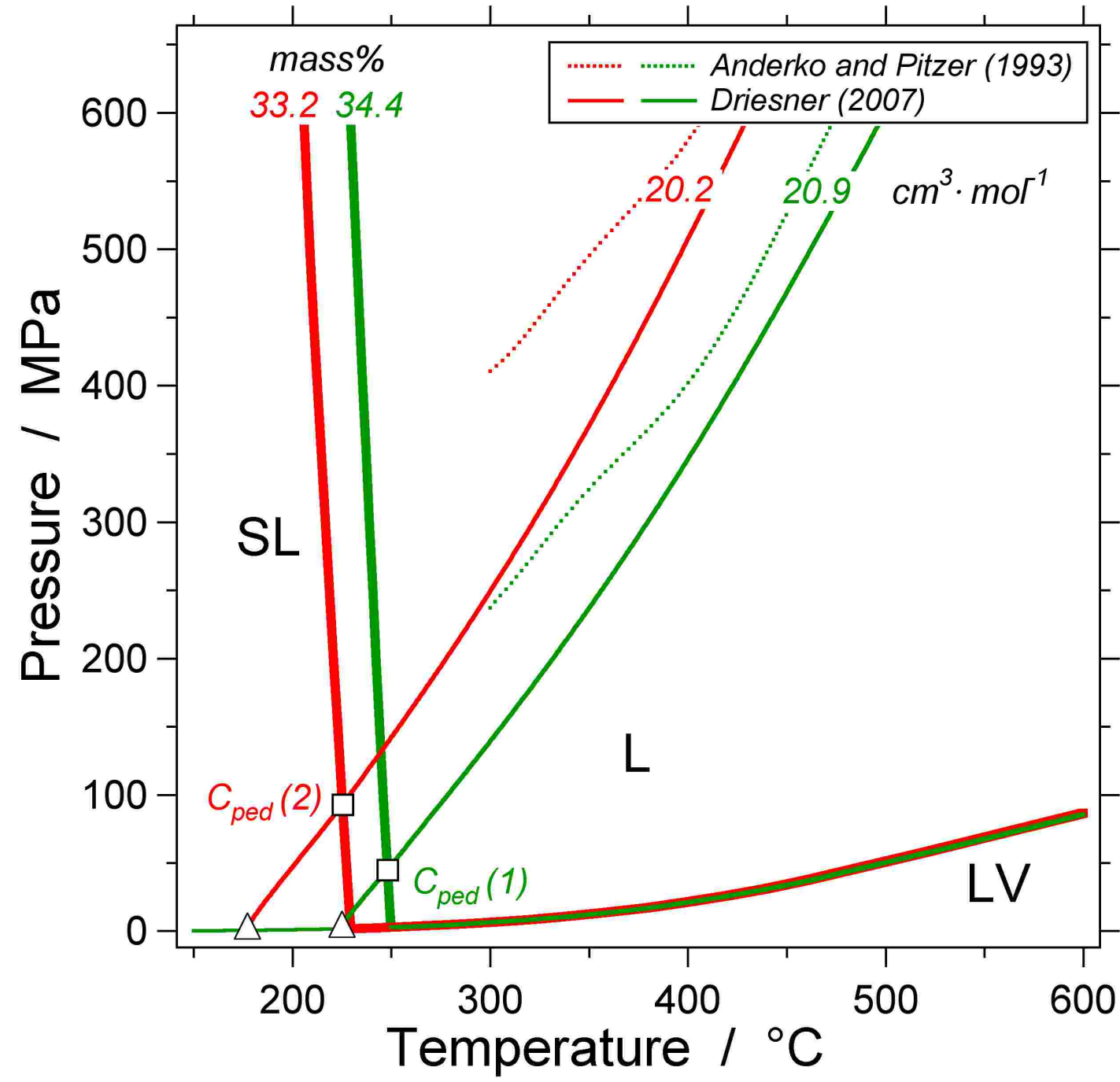
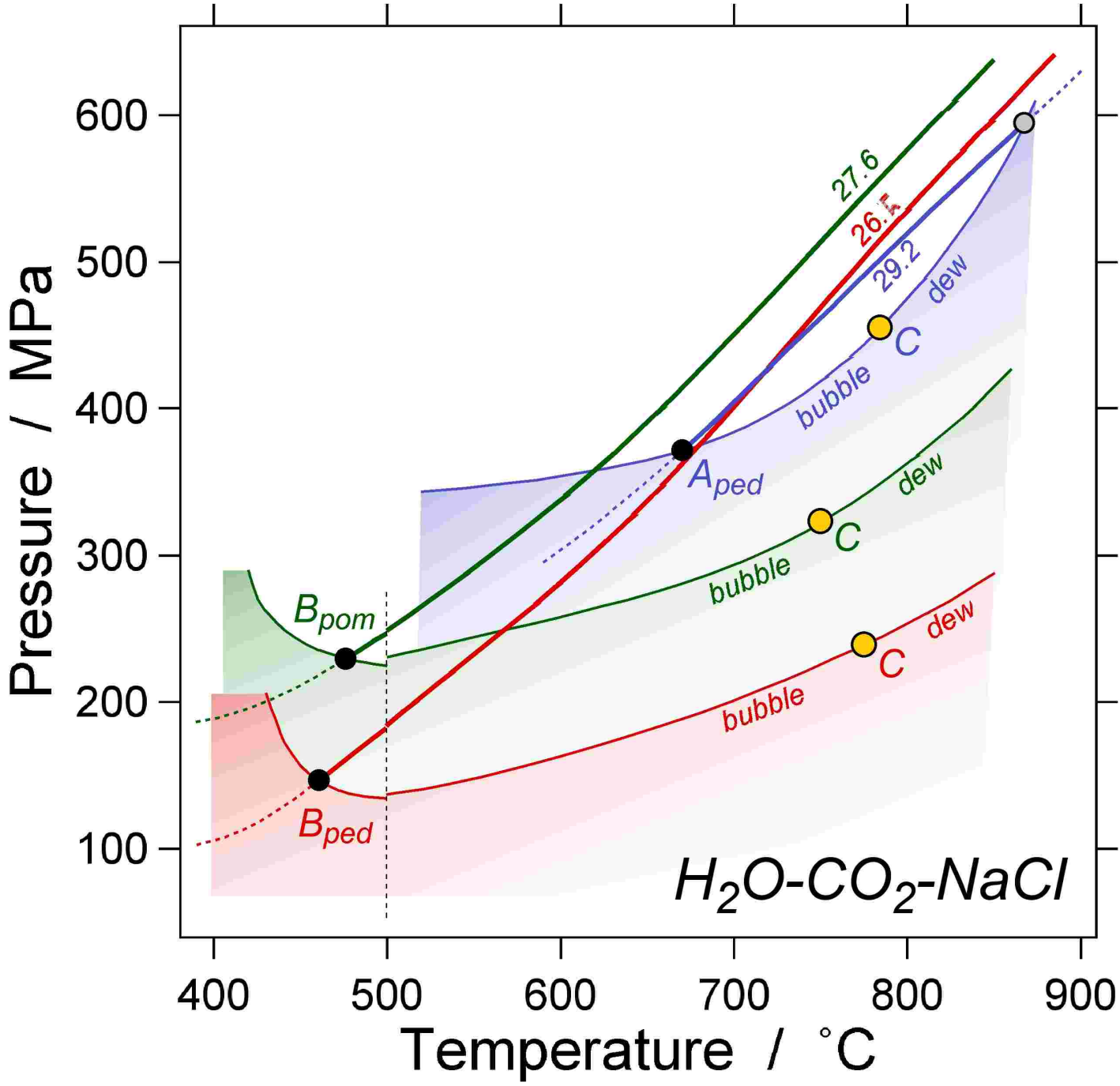
origin of fluid salinity = Bittern (evaporation of Archean seawater)

highly enriched in KCl , MgCl_2 and Mg_2SO_4

not affected by metamorphism

Trapping Conditions

equivalent H_2O - CO_2 - NaCl fluid system



Pedra Preta

A_{ped}

minimum trapping conditions 670 °C - 371 MPa (Amphibolite facies)

B_{ped}

coinciding isochores: similar conditions, less CO_2
massive deposition of magnesite consumes large amounts of CO_2

C_{ped}

CO_2 nearly completely consumed
entrapment around 250 °C and 100 MPa

Pomba

B_{pom} , C_{pom}

entrapment at lower temperature conditions