

846 Appendix A Geochronology

847 A1 Rb-Sr Methods and Sample Descriptions

848 Cm-sized pieces of rock were cut out from hand samples to isolate specific fabrics
 849 corresponding to progressive stages of deformation-metamorphism as outlined in Section 4.
 850 Samples were crushed with a small hammer between sheets of paper, and ground gently with
 851 a mini metal rock crusher to separate mineral aggregates. Samples were sieved and separated
 852 by grain size. Grain size fractions 125-250 μm and 250-500 μm were frantzed to separate
 853 minerals based on magnetic susceptibility. The first pass was done with strongest magnetic
 854 setting (~ 1.8 Amperes) to remove all non-magnetics (e.g. quartz). Subsequent passes were
 855 done starting at the lowest setting where minerals started to magnetically separate (typically
 856 ~ 0.2 - 0.4 A); separates were repeatedly passed through the Frantz at increments of ~ 0.1 - 0.2
 857 A. Magnetic fractions were then cleaned by hand, by either negative or positive picking of
 858 phases of interest, including garnet, glaucophane, epidote, and white micas (and apatite and
 859 chlorite for retrograde fabrics). White mica separates were cleaned of inclusions by gently
 860 smearing them in a mortar and pestle and washing them through a sieve with ethanol.

861 SY1616 was collected from float blocks at Kini Beach immediately beneath in-place
 862 blueschist-to-eclogite facies cliff faces. The sample is representative of D_S in blueschist-
 863 eclogite lithologies. The foliation is defined by glaucophane, epidote, phengite, paragonite,
 864 and rutile, with porphyroblasts of garnet and omphacite. Glaucophane, epidote, omphacite,
 865 and phengite define the lineation. A similar rock type is shown in Figure 7A. The prograde
 866 fabric was targeted for geochronology.

867 KCS1617 was collected from Azolimnos (approximate location: $37^\circ 24'43.86''\text{N}$, 24°
 868 $57'55.42''\text{E}$). The sample records an older D_S cleavage cross-cut by the D_{T1} upright crenulation
 869 foliation. The mineral assemblage includes glaucophane, epidote, quartz, phengite, paragonite,
 870 garnet, rutile, titanite, and oxides. The D_{T1} fabric was cut out of the sample using a
 871 diamond-tipped rock saw and targeted for geochronology.

872 KCS1621 was collected from the southern side of Delfini Beach (approximate location:
 873 $37^\circ 27'14.61''\text{N}$, $24^\circ 53'51.23''\text{E}$). The sample is representative of D_{T2} . The foliation is defined
 874 by quartz, phengite, paragonite and the lineation is defined by porphyroblasts of epidote and
 875 actinolite. This sample is interbedded with quartz-rich schists that have a blue amphibole
 876 lineation decimeters to meters above and below. The greenschist-facies fabric was targeted
 877 for geochronology.

878 SY1402 was collected from Lotos (approximate location: $37^\circ 26'36.64''\text{N}$, $24^\circ 53'48.87''\text{E}$).
 879 The sample is representative of D_{T2} , during penetrative greenschist-faces deformation and
 880 transposition of older fabrics, and some rocks surpass the ductile-to-brittle transition. The
 881 sample collected for geochronology is a reaction rind at the margin of a brittlely boudinaged
 882 epidote-rich lens, and includes actinolite, chlorite, epidote, phengite, paragonite, and ap-
 883 atite. SY1644 was collected from the southern side of Delfini, very close to KCS1621. The
 884 sample is representative of D_{T2} , as rocks locally surpass the ductile-to-brittle transition.
 885 Minerals collected for geochronology were precipitated within the boudin neck of a brittlely
 886 boudinaged epidote-rich lens including actinolite, epidote, white mica, and calcite.

887 A2 Compilation of previous geochronology on Syros

888 Figure A1 and Table A2 show a compilation of published metamorphic geochronology
 889 for the island of Syros (through 2019), comprising 185 individual published ages from 16
 890 studies and 5 chronometers. Applying filters discussed in Section 6.2 to the dataset shown
 891 in Figure 3B reduces the compilation from 89 (excludes igneous zircon) to 44 data points,
 892 which are plotted in Figure 11. The refined dataset comprises 65 individual ages (some
 893 presented as weighted means) that include 44 single-grain analyses and 21 isochrons. The
 894 single-grain analyses include 6 $^{40}\text{Ar}/^{39}\text{Ar}$ white mica (Rogowitz et al., 2015; Laurent et

Sample ID and Summary	Phases defining the isochron	Initial Sr	Age	Uncertainty	MSWD	n	
SY1616: Kini omphacite-epidote blueschist	paragonite-phengite	0.7032083	53.53	0.17	1	2	
	glaucophane-phengite	0.7032228	53.29	0.17	1	2	
	omphacite-phengite	0.7032158	53.41	0.17	1	2	
	garnet-phengite	0.703212	53.47	0.21	1	2	
	epidote-garnet-phengite	0.7032199	53.34	0.15	0.91	3	
	epidote-omphacite-phengite	0.7032198	53.34	0.14	0.64	3	
	epidote-garnet-omphacite-phengite	0.7032183	53.36	0.14	0.56	4	
	glaucophane-omphacite-garnet-phengite	0.7032179	54.37	0.14	0.46	4	
	omphacite-paragonite-garnet-phengite	0.7032121	53.47	0.14	0.28	4	
	paragonite(x4)-phengite	0.7031964	53.73	0.13	1.4	5	
	** cp-glauc-omph-parag-grt ** NO PHENG	0.703221	59.07	8.57	1.7	5	
	KCS1617: Azolimnos glaucophane-mica blueschist	epidote-phengite	0.7066671	45.14	0.05	1	2
		glaucophane-phengite	0.7065696	45.61	0.1	1	2
		paragonite-phengite	0.7065964	45.48	0.05	1	2
paragonite-phengite-phengite		0.7065992	45.47	0.05	0.41	3	
glaucophane-phengite-phengite		0.7065829	45.56	0.61	8.8	3	
epidote-phengite-phengite		0.706643	45.23	0.05	0.31	3	
** glaucophane-paragonite(x4) ** NO PHENG		0.7066026	43.44	0.76	10	5	
paragonite(x4)-phengite		0.7065951	45.48	0.13	9.4	5	
8 point isochron (all data, except garnet)		0.7066036	45.43	0.04	23	8	
KCS1621: Delfini actinolite-mica greenschist		** paragonite-chlorite ** NO PHENG	0.7066492	35.64	0.39	1	2
		paragonite-chlorite-phengite	0.7066201	37.04	0.015	13	3
		** epidote-chlorite-paragonite ** NO PHENG	0.7066492	35.64	0.39	7.90E-25	3
		epidote-phengite-phengite	0.7067163	36.9	0.03	6.30E-24	3
		epidote-chlorite-phengite(x2)	0.7066195	37.06	0.02	21	4
	epidote-paragonite-phengite(x2)	0.7066498	37.02	0.02	9.8	4	
	** epidote-chlorite-paragonite(x3) ** NO PHENG	0.7066471	36.19	0.29	7.9	5	
	paragonite(x3)-phengite(x2)	0.7066348	37.05	0.014	16	5	
	chlorite-paragonite(x3)-phengite(x2)	0.7066266	37.06	0.013	16	6	
	epidote-chlorite-paragonite(x3)-phengite(x2)	0.7066266	37.06	0.013	13	7	
	8 point isochron (all data)	0.7065941	36.91	0.013	440	8	
	SY1644: Delfini mineralization in epidosite boudin neck	epidote-white mica	0.7066098	36.16	0.03	1	2
		actinolite-white mica	0.7067006	35.94	0.03	1	2
	SY1402: Lotus reaction rim around epidosite pod	apatite-phengite1	0.704965	36.49	0.01	1	2
apatite-phengite2		0.704965	35.94	0.01	1	2	
apatite-phengite3		0.704965	33.18	0.011	1	2	
apatite-phengite4		0.704966	29.43	0.014	1	2	

Table A1: Evaluating the robustness of Rb-Sr ages. Various isochrons are calculated for each sample discussed in-text, for different combinations of (assumed) co-genetic phases. MSWD values are a reflection of analytical uncertainty and the goodness of fit of all data points on a given isochron; therefore, any two-point isochron by definition has an MSWD of 1.

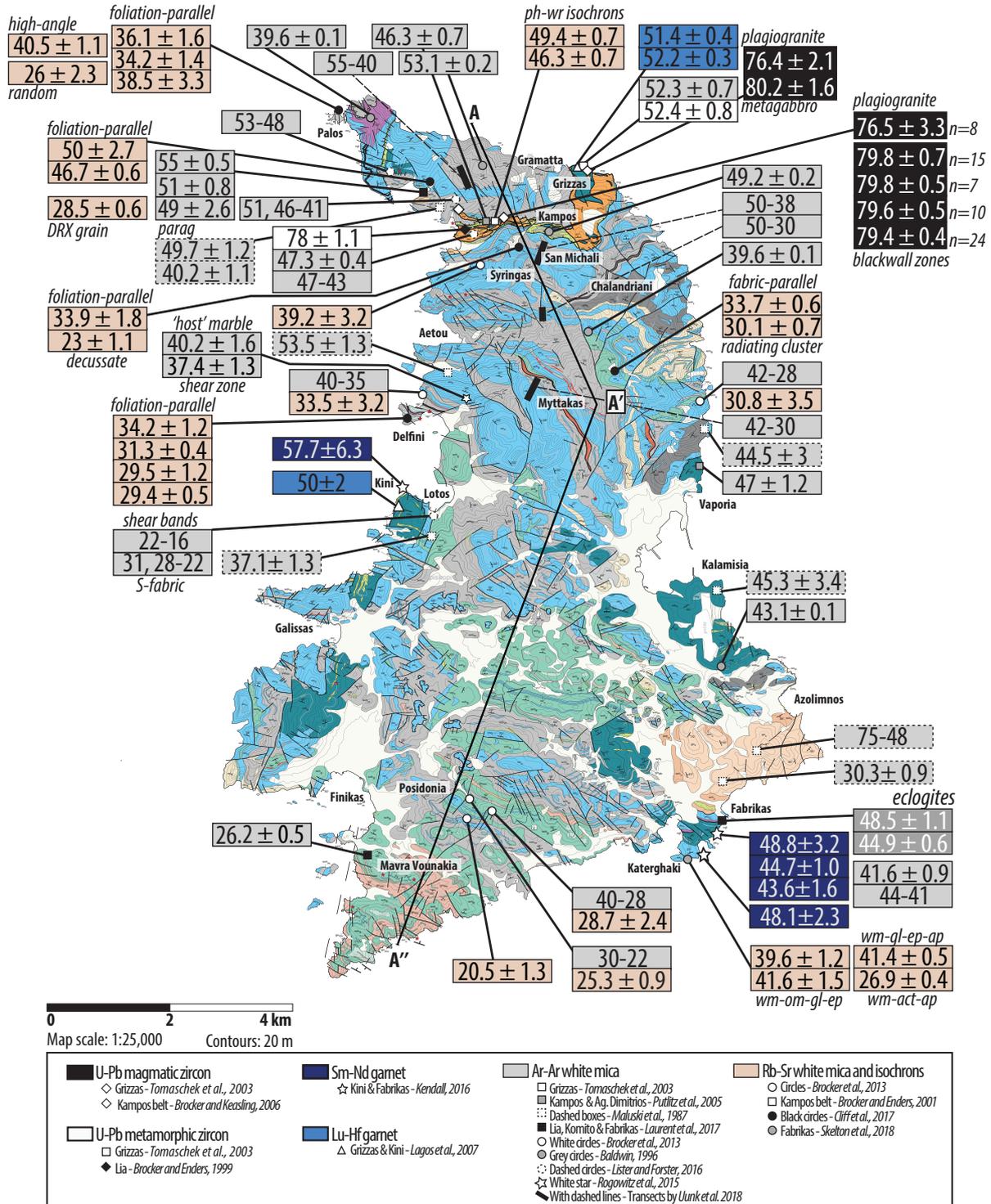


Figure A1: Compilation of the locations and ages from published metamorphic geochronology (and magmatic ages from Kampos), from references listed in grey box and discussed in Section 2. Samples are projected onto the cross-section line A-A'-A'' as shown in Figure 11. Sample locations are coded by color and shape according to citation, and box colors around reported ages correspond to different chronometers. Abbreviations for boxes with notes indicating the sample's micro-structural and/or lithologic context are as follows: DRX = dynamically recrystallized; wm=white mica, ph=phengite, om=omphacite, gl=glaucophane, ep=epidote, act=actinolie, ap=apatite, wr=whole rock.

#	Method	Closure Temp.	Sample Name and Description	GPS Coordinates*	Location	Age	Uncertainty Notes	Interpretation*	Ref.
1	U-Pb zircon	>750 C	metagabbro		Grizzas	80.2	1.6		[1]
2			meta-plagiogranite dyke		Grizzas	76.4	2.1	magnatic crystallization (protolith)	[1]
3			meta-plagiogranite breccia		Grizzas	52.4	0.8	magnatic crystallization (protolith)	[1]
4			1081 omphacite		Kampos belt	78	1	HP metamorphism	[2]
5			4017 plagiogranite in meta-gabbro	37°29.704'N, 024°54.005'E	Kampos belt	77	1	interpreted as HP met, but likely magmatic	[3]
6						76.1	1.2	oscillatory zoned zircon	[3]
7						76.6	1.3		[3]
8						76.6	1.1		[3]
9						76.9	1.1		[3]
10						75	1.2		[3]
11						76.1	1.3		[3]
12						78	1.1		[3]
					average	76.5	3.3		[3]
13			3148 Jadedite; albite + jadeite; accessories	37°29.362'N, 024°54.335'E	Kampos belt blackwall zone	80.3	0.9	oscillatory zoned zircon (likely)	[3]
14			titanite, allanite, zircon, white mica, chlorite, apatite			78.7	0.9	magnatic, or seafloor	[3]
15						80.0	0.9	metasomatism	[3]
16						78.6	0.7		[3]
17						78.2	0.8		[3]
18						80.6	0.8		[3]
19						78.6	0.7		[3]
20						79.4	0.9		[3]
21						80.7	0.7		[3]
22						79.9	0.7		[3]
23						80.6	0.7		[3]
24						79.8	0.6		[3]
25						77.3	1.4		[3]
26						80.8	0.7		[3]
27					average	82.9	2.2		[3]
					repaired weighted mean	79.8	3.8		[3]
					average	79.8	0.7		[3]
28			3149 Omphacite; omph, alb, wm, tm, chl, opaques	37°29.362'N, 024°54.335'E	Kampos belt blackwall zone	79.7	0.5	oscillatory zoned zircon (likely)	[3]
29						79.9	0.3	magnatic, or seafloor	[3]
30						78.5	0.8	metasomatism	[3]
31						78.4	0.4		[3]
32						76.7	0.5		[3]
33						79.9	1.0		[3]
34					average	77.6	1.0		[3]
					repaired weighted mean	78.7	1.8		[3]
					average	79.8	0.5		[3]
35			3151 Glaucophane; subordinate amounts of omph, rt, tm, zrc, all, wm, bt	37°29.362'N, 024°54.335'E	Kampos belt blackwall zone	78.9	0.8	oscillatory zoned zircon (likely)	[3]
36						79.9	0.8	magnatic, or seafloor	[3]
37						78.9	1.2	metasomatism	[3]
38						79.1	1.2		[3]
39						82.2	1.3		[3]
40						80.0	0.8		[3]
41						78.4	0.7		[3]
42						79.2	0.7		[3]
43						80.3	0.9		[3]
44					average	80.6	1.0		[3]
					average	79.8	3.0		[3]

Table A2: Compilation of published metamorphic geochronology for Syros Island. Data are plotted against closure temperature in Figure 3B. References: (1) Tomaschek et al. (2003), (2) Bröcker and Enders (1999), (3) Bröcker and Keasling (2006)...

83	5831 Ph-Chl-Alb-Oz-Ep-Cul-Ttn-Act schist	N 37° 28.808' E 24° 54.723'	Syringas (S. of Kampos)	39.2	3.2 ph-ep-ab-cul isochron	[6]
84	1081 Omphacitite		Kampos belt	49.4	0.7 ph-wr isochron	interpretation not provided in text; likely crystallized and/or incipient recrystallization [7]
85	1083 Omphacitite		Kampos belt	46.3	0.7 ph-wr isochron	
86	63286 - calschist, cul-ph-glc-qz-ab		Palos, Diapori	35.2	1.4 fabric-parallel phengites, 1 randomly oriented aggregate, 2 calcite	Purposefully targeted extensional blueschist- and greenschist-facies fabrics. Phengites were microdiluted from specific microstructures in calc schists and metabasites. Interpreted as "continuous deformation on a regional scale" and exhumation-related (re-)crystallization. [8]
87				37.4	0.8 <i>single phengite</i>	
88				34.4	0.8 <i>single phengite</i>	
89				37.5	1.7 <i>single phengite</i>	
90				36.1	1.6 mean of above 4 grains	[8]
				26	2.3 <i>randomly oriented phengite</i>	[8]
91	63297 - calschist, cul-ph-glc-ep-qz-ab		Palos, Diapori	35.6	0.5 4 fabric-parallel phengites, 1 grain at high angle to fabric, 3 calcite	[8]
92				32.2	0.3 <i>single phengite</i>	[8]
93				34.6	1.1 <i>single phengite</i>	[8]
94				34.4	0.5 <i>single phengite</i>	[8]
95				34.2	1.4 mean of above 4 grains	[8]
				40.5	1.1 <i>high angle phengite, wrapped by foliation-parallel phengites</i>	[8]
96	63300 - calschist, cul-ph-glc-chl-qz-ab		Palos, Diapori	41.8	2.4 fabric-parallel phengites, 1 calcite	[8]
97				37.1	0.4 <i>single phengite</i>	[8]
98				40.5	0.4 <i>single phengite</i>	[8]
99				34.4	0.5 <i>single phengite</i>	[8]
				38.5	3.3 mean of above 4 grains	[8]
100	63287a - calschist, cul-ph-grt-dol-glc-qz-ep-ttn		Grammata	52.5	0.8 6 fabric-parallel phengites, 4 calcite	[8]
101				52.1	1.1 <i>single phengite</i>	[8]
102				46.9	2.3 <i>single phengite</i>	[8]
103				48.6	0.5 <i>single phengite</i>	[8]
104	63287b			50	2.7 mean of above 4 grains	[8]
105				47.1	0.6 <i>single phengite</i>	[8]
				46.2	1.3 <i>single phengite</i>	[8]
				46.7	0.6 mean of above 2 grains	[8]
106	63287a			28.5	0.6 <i>single phengite; has fine grained recrystallized phengite next to it</i>	[8]
107	S97/234 - greenschist, ab-chl-ph-ep-qz-cul, mte glc		N. Oros Syringas		4 fabric-parallel phengites + 3 ep; 1 grain from decussate pressure shadow adjacent to garnet	[8]
108				33.6	0.4 pseudomorph	[8]
109				29.4	2.3 <i>single phengite</i>	[8]
				34	0.5 <i>single phengite</i>	[8]
				33.9	1.8 weighted mean of above 3 grains	[8]
110				23	1.1 <i>decussate phengite</i>	[8]
111	63301 - greenschist, qz-ph-chl-ab-cul-dol-ttn-af-pg		Foinikia	30.1	0.7 <i>decussate/radiating cluster at high angle to fabric; plus 2 cal + 2 ttn</i>	[8]
112				33.7	0.6 <i>composite fabric-parallel sample</i>	[8]
113	63310 - blueschist, ep-glc-ph-cul-qz-ab-ttn-tour-chl		Delfini	31.3	2 phengite composite samples 0.4 aligned with schistosity; 3 ep + 2 cal	[8]

Table A2: Continued. References: (7) Bröcker and Enders (2001), (8) Cliff et al. (2016)...

154	89645 retrograde blueschist	Central	39.6	0.1 total fusion age, gradient 34.8 to 42.4	partial loss profile and/or recrystallization after HP event	[12]
155	89649 retrograde blueschist	Aiport	43.05	0.12 total fusion age, gradient 40 to 44.2	partial loss profile and/or recrystallization after HP event	[12]
156	SY-7 phengite-rich eclogite	Kampos belt	46.3	0.7 in-situ UV-laser ablation; weighted mean laser fusion ages (n=27)	paper says prograde; could be partially reset, some ages are older (50-52)	[13]
157	SY-25 omphacite-rich meta-gabbro	Agios Dimitrios	47	1.2 in-situ UV-laser ablation; weighted mean laser fusion ages (n=30)	paper says prograde; our observations of Ag. Dim indicate this is likely recrystallization and/or neo-crystallization	[13]
158	AG10-31 garnet mica schist	37° 30.08'N, 24° 53.173'E	53-48	Δ IB + early Δ IC decussate + post- Δ IC shear zone; pheng-muscovite	All ages from [14] are interpreted as crystallization ages related to different microstructures using the 'method of asymptotes and limits'	[14]
159	AG10-14 garnet mica schist	37° 29.613'N, 24° 54.295'E	51, 46-41	Δ IB + Δ IC + post- Δ IC, older phengite component, younger muscovite component	muscovite component records Δ IC growth and post- Δ IC shearing	[14]
160	AG10-15 Δ IC white mica in boudin neck	37° 29.537'N, 24° 54.416'E	43-47	late Δ IC porphyroblastic white mica from dditional zone next to mega-boudin	muscovite component	[14]
161	AG10-16 early Δ IC decussate wm + titanite	37° 29.546'N, 24° 54.404'E	47.3	0.4 early Δ IC decussate white mica, from edge of mega-boudin		[14]
162	AG10-26S wm-qz-ab-chl-calc greenschist	37° 26.582'N, 24° 54.166'E	31, 28-22	Dominant fabric in greenschist facies older phengite component; younger muscovite schist (post- Δ ID and Δ 2)		[14]
163	AG10-26C wm-qz-ab-chl-calc greenschist	37° 26.582'N, 24° 54.166'E	16-22	Extensional shear bands cutting greenschist fabric (relict post- Δ ID + Δ 2 + post- Δ 2)	muscovite component	[14]
164	Kampos transect - graphite-rich Lws-Grt blueschists and micaschists, with intercalated calcite and siliceous layers	N. of Kampos belt		single grain fusion experiments		
165	12SR100: graphite-rich Lws-Grt-Gln micaschist, stauite gesht. Ttn+Chl	N37° 29.855', E24° 54.369'	55-48	broad uniform age		[15]
166	12SR02: graphite-rich Lws(Gps)-Grt-Gln micaschist; tm in foliation	N37° 29.856', E24° 54.220'	55-48	broad uniform age		[15]
167	12SR07: Plg+Qz+Epr+Ttn bearing marble	N37° 29.942', E24° 54.566'	52-45	wide uniform age		[15]
168	12SR03: plg-bearing marble with columnar aragonite pseudomorphs	N37° 29.827', E24° 54.628' N37° 29.821', E24° 54.744'	52-45 55-40	wide uniform age heterogeneous		[15] [15]
169	San Michalis transect - marble-schist-marble sequence, middle unit contains pyrite-bearing schists and gneisses, graphite-rich Lws-Grt-Gln micaschists and quartzitic rocks, locally with stauite greenschist overprint	S. of Kampos belt		single grain fusion experiments		
170	12SR96: Lws-Grt-Gln micaschist, stauite gesht	N37° 29.393', E24° 54.891'	49-45	narrow range		[15]
171	12SR04: Lws-Grt-Gln micaschist, stauite gesht	N37° 29.359', E24° 55.125'	48-40	heterogeneous		[15]
	12SR13b: carbonated and brecciated blueschist; Cld-Gln, Epr	N37° 29.328', E24° 55.223'	48-40	heterogeneous		[15]

Table A2: Continued. References: (13) Putilitz et al. (2005), (14) Lister and Forster (2016), (15) Umk et al. (2018).

172	12SR02: Plg-bearing marble; anagonite pseudomorphs	N37°29.395', E24°54.975'		48-40	heterogeneous	[15]
173	12SR03: Plg-bearing marble; anagonite pseudomorphs	N37°29.343', E24°54.904'		50-38	heterogeneous	[15]
174	Syringus transect 1 and 2 - intercalated schist-marble sequence; vary from felsic to Ep-blueschists to pervasively overprinted greenschists	N37°28.830', E24°53.901'	Sy1 west const. Sy2 central	48-42	narrow uniform age	[15]
175	12SR78: crumpled felsic mica schist	N37° 28.666', E24° 55.119'		38-31	intermediate	[15]
176	12SR82: calc schist; Plg+Qz+Chl 12SR81: Plg-bearing marble, anagonite pseudomorphs	N37°27.796', E24°55.147'	NE of Delfini, central	50-40	heterogeneous	[15]
177	Myrtalus transect - upper and lower marbles bookending felsic schists and gneisses and intermediate-mafic rocks ranging from <i>gr-grt</i> blueschists to pervasively overprinted greenschists	N37°27.889', E24°55.225'		40-39	narrow uniform age	[15]
178	12SR19: Plg-bearing marble 12SR16: Ep-Ab blueschist (+Grt), partial greenschist overprint	N37°27.796', E24°55.147'		40-39	narrow uniform age	[15]
179	12SR20: felsic Ab gneiss; Plg+Qz foliation, Ab porphyroblasts	N37°27.871', E24°55.199'		42-30	heterogeneous	[15]
180	12SR18b: intermediate-to-mafic Grt-Ep blueschist; Plg+Gln+Ep matrix	N37°27.841', E24°55.174'		42-30	heterogeneous	[15]
181	12SR18a: blueschist, saute greenschist; Plg+Qz matrix	N37°27.811', E24°55.171'		42-30	heterogeneous	[15]
182	12SR17: greenschist mylonite, fine-grained Act+Chl matrix, Ab blues	N37°27.798', E24°55.154'		42-30	heterogeneous	[15]
183	12SR15: siliceous marble, Ep+Plg+Qz, anagonite pseudomorphs	N37°27.808', E24°55.101'		42-30	heterogeneous	[15]
184	Calcite marble intercalated with quartz and dolon?		N. of Delfini	40.2	1.6 Sl apfu 3.4-3.6	Authors hypothesized these would be Miocene due to strong EW stretching. Interpreted Eocene ages as evidence that the phengite was not reset during Miocene deformation; our results suggest these could be D12 greenschist deformation
185	Shear zone			37.4	1.3	

Table A2: Continued. References: (16) Rogowitz et al. (2015).

895 al., 2017), 37 $^{87}\text{Rb}/^{86}\text{Sr}$ white mica (Cliff et al., 2016), and 1 U-Pb SHRIMP zircon age
 896 which is a weighted mean of 7 analyses (Tomaschek et al., 2003). The isochrons include 5
 897 Sm-Nd garnet-whole rock (Kendall, 2016), 3 Lu-Hf garnet-omphacite-whole rock (Lagos et
 898 al., 2007), 10 multi-mineral and 2 phengite-whole rock $^{87}\text{Rb}/^{86}\text{Sr}$ (Bröcker & Enders, 2001;
 899 Bröcker et al., 2013; Skelton et al., 2019), and one 10-point inverse $^{40}\text{Ar}/^{39}\text{Ar}$ (Laurent et
 900 al., 2017)). The $^{40}\text{Ar}/^{39}\text{Ar}$ ages included in the final compilation are in-situ analyses of
 901 grains in thin section (used to construct the 10-point inverse isochron), and strong plateaus
 902 from step-heating experiments of grains extracted from well-characterized microstructural
 903 domains (Laurent et al., 2017). We excluded: 1 Sm-Nd isochron with low $^{147}\text{Sm}/^{144}\text{Nd}$ ratio
 904 and potential for contamination due to the presence of an off-isochron inclusion (cf. Kendall,
 905 2016); and 50 $^{40}\text{Ar}/^{39}\text{Ar}$ ages that exhibit one or more of the complications described above
 906 (Maluski et al., 1987; Baldwin, 1996; Tomaschek et al., 2003; Putlitz et al., 2005; Bröcker
 907 et al., 2013; Lister & Forster, 2016; Laurent et al., 2017; Uunk et al., 2018).

908 Lagos et al. (2007) presented Lu-Hf garnet growth ages from meta-igneous rocks at
 909 Grizzas and Kini, showing that those blueschist-eclogite localities reached peak metamorphic
 910 conditions at 51.9 ± 1.4 Ma and 50 ± 2 Ma, respectively. New fabric ages from Kini blueschists
 911 (this study, 52.62 ± 0.64 Ma) overlap with garnet growth ages at Grizzas and Kini, and with
 912 the SHRIMP age determined by Tomaschek et al. (2003) for Grizzas metamorphic zircons.

913 Fabrikas eclogites record Sm-Nd garnet crystallization ages of $\sim 45\pm 3$ Ma (Kendall,
 914 2016). ‘Bulk’ garnet ages (48.1 ± 2.3 Ma) overlap within error with ‘rim’ ages (47.1 ± 3 Ma),
 915 providing evidence for rapid, pulsed garnet crystallization that is distinctly younger than
 916 Grizzas and Kini. Garnet growth ages are consistent with $^{40}\text{Ar}/^{39}\text{Ar}$ ages of foliation-
 917 forming white mica in Fabrikas glaucophane-bearing eclogites (48.5 ± 1.1 Ma to 44.9 ± 0.6
 918 Ma, Laurent et al. (2017)).

919 Retrograde blueschist-facies fabric ages range from ~ 50 -40 Ma, and are captured by:
 920 (1) Phengite-whole rock Rb-Sr isochrons from omphacites at Kampos (49.4 ± 0.7 Ma and
 921 46.3 ± 0.7 Ma, Bröcker and Enders (2001)) and Rb-Sr ages of micro-drilled phengites from
 922 glaucophane-bearing calcschists at Gramatta (50.5 ± 3.1 Ma and 47.3 ± 1.2 Ma, Cliff et al.
 923 (2016)); (2) A new multi-mineral Rb-Sr isochron from Azolimnos (44.71 ± 0.43 Ma, this
 924 study); (3) A Rb-Sr isochron from omphacite-blueschists (41.5 ± 1.5 Ma, Skelton et al. (2019))
 925 and $^{40}\text{Ar}/^{39}\text{Ar}$ ages of foliation-forming white mica in retrogressed Fabrikas eclogites and
 926 bluechists (44.9 ± 0.65 Ma to 40.3 ± 0.7 Ma, $n=4$, Laurent et al. (2017)).

927 Retrograde greenschist-facies fabric ages range from ~ 42 -36 Ma, and are captured by
 928 Rb-Sr multi-mineral isochrons and Rb-Sr ages of foliation-forming micro-drilled phengites
 929 from greenschists and calcschists from the following locations: (1) Palos (40.5 ± 1.1 Ma to
 930 34.2 ± 1.4 Ma, Cliff et al. (2016)); (2) Syringas (39.2 ± 3.2 Ma, Bröcker et al. (2013); 33.9 ± 1.8
 931 Ma Cliff et al. (2016)); (3) North of Delfini (33.7 ± 0.6 Ma, Cliff et al. (2016); 33.5 ± 3.2 Ma
 932 and 30.8 ± 2.9 Ma, Bröcker et al. (2013)); (4) Delfini (34.2 ± 1.3 Ma to 29.4 ± 0.5 Ma; Cliff et
 933 al. (2016); 36.47 ± 0.11 Ma, this study); (5) Fabrikas (26.9 ± 0.4 Ma, Skelton et al. (2019));
 934 and (6) Posidonia (28.7 ± 2.4 Ma, 25.4 ± 0.9 Ma, 20.5 ± 1.3 Ma, Bröcker et al. (2013)).

935 **Appendix B Electron Microprobe Techniques and Data Treatment**

936 **B1 Qualitative X-Ray Mapping**

937 Qualitative X-Ray compositional maps were acquired on the JEOL JXA-8200 electron
 938 microprobe at the University of Texas at Austin. Polished $30\ \mu\text{m}$ thin sections were analyzed
 939 using a 15 kV accelerating voltage, focused beam, 300 nA current, $6\ \mu\text{m}$ step size, and 1 ms
 940 dwell time. X-ray maps for Si, Al, Ca, Mg, Fe, Na, K, Mn, Ti, and P were collected. Post-
 941 processing to produce false color compositional maps creation was done in ImageJ software
 942 by merging element channels with assigned colors.

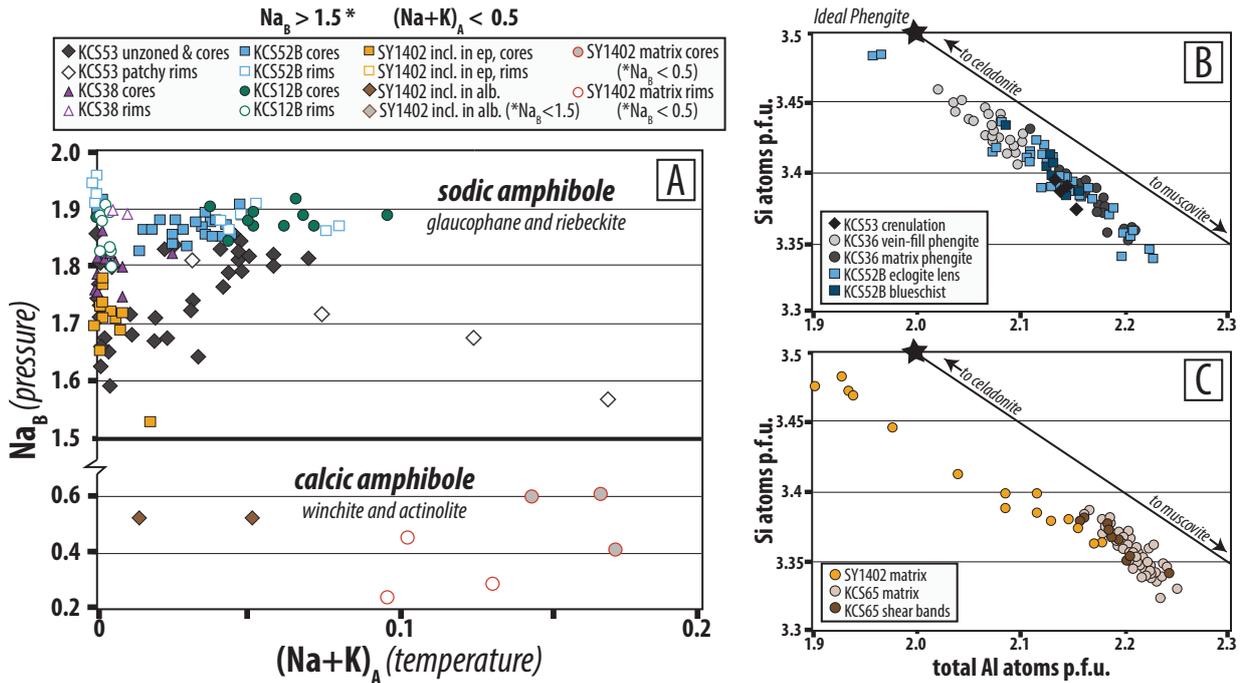


Figure B1: Quantitative EPMA results for (A) amphiboles and (B,C) white micas. (A) Na_B and $(\text{Na}+\text{K})_A$ in amphibole are qualitative indicators of pressure and temperature, respectively. Temperature is less reliable since all of these amphiboles are very ‘cold’ (i.e. crystallize at $<500^\circ$). Sodic amphiboles correspond to D_S and D_{T1} , and calcic amphiboles correspond to D_{T2} ; see text for significance of core-rim zonation and compositional trends during deformation. (B) D_S and D_{T1} white mica chemistry. Elevated Si apfu indicates HP metamorphism. (C) D_{T2} white mica chemistry. Grains cluster towards a lower Si apfu on average, which reflects more pervasive recrystallization under lower P conditions. Intergrown phengite and paragonite is common during all deformation stages. CBU samples do not contain the limiting assemblage required for Si-in-phengite geobarometry calibrated by (Massonne & Schreyer, 1987). However, they do contain other stable Fe-Mg buffering phases (e.g. epidote, amphibole), so within a given sample and between samples of similar bulk compositions, Si variability is a reasonable measure of *relative* changes in pressure, not absolute. Samples in (B) are all meta-mafics, SY1402 in (C) is meta-mafic, KCS65 in (C) is a quartz-rich mixed meta-volcanic/meta-sediment.

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B2 Quantitative Point Analyses

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Quantitative analyses were collected for representative amphiboles and micas on the JEOL JXA-8200 electron microprobe at the University of Texas at Austin. Samples were selected to cover the range of interpreted structural contexts determined during field work and microstructural analysis. Polished $30\ \mu\text{m}$ thin sections were analyzed using a 15 kV accelerating voltage, a $1\ \mu\text{m}$ beam diameter amphibole and a $10\ \mu\text{m}$ beam diameter for mica, 10 nA current, and counting time 30 s for all elements. Synthetic compounds and homogeneous minerals were used as standards, and secondary standards were analyzed throughout analytical procedures. Data were processed using the JEOL ZAF procedure.

Sample:	KCS53	n=30	KCS53	n=6	KCS53	n=4	KCS53	n=10	KCS38	n=14	KCS38	n=2	KCS52B	n=21	KCS52B	n=4	KCS52B	n=8	KCS52B	n=3
Context:	matrix cores	cren. limb cores	cren. limb rims	cren. hinges	matrix cores	matrix cores	matrix rims	matrix rims	ecl. rims	ecl. cores	ecl. rims	matrix cores	matrix cores	matrix rims	matrix rims	matrix rims	matrix rims	matrix rims	matrix rims	matrix rims
SiO2	58.71	0.54	58.67	0.32	57.09	1.04	58.60	0.18	59.25	0.22	58.87	0.30	58.54	0.49	58.07	0.20	58.53	0.33	58.03	0.42
Al2O3	11.23	0.20	11.07	0.05	11.00	0.12	11.07	0.15	11.78	0.26	11.59	0.13	10.83	0.72	10.11	0.10	11.26	0.20	10.72	0.43
K2O	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
Na2O	6.54	0.24	7.06	0.11	6.80	0.29	7.13	0.11	6.93	0.16	7.21	0.04	7.20	0.10	7.13	0.01	7.26	0.09	7.22	0.09
CaO	0.97	0.38	0.80	0.14	1.54	0.87	0.70	0.23	0.91	0.16	0.20	0.01	0.32	0.18	0.13	0.04	0.34	0.12	0.12	0.08
MnO	0.06	0.04	0.04	0.01	0.10	0.05	0.05	0.02	0.03	0.02	0.09	0.01	0.11	0.08	0.19	0.02	0.06	0.03	0.17	0.06
FeO	9.16	0.55	9.02	0.18	10.19	0.53	9.33	0.43	7.71	0.50	11.05	0.53	11.09	2.27	14.25	0.23	9.39	0.79	11.95	0.66
MgO	11.43	0.37	11.64	0.21	11.30	0.62	11.52	0.41	11.65	0.51	9.67	0.28	10.28	1.16	8.68	0.04	11.04	0.50	9.59	0.48
TiO2	0.03	0.03	0.00	0.01	0.02	0.03	0.02	0.03	0.02	0.02	0.03	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02
Cr2O3	0.02	0.02	0.02	0.02	0.00	0.00	0.02	0.02	0.01	0.02	0.00	0.00	0.01	0.02	0.03	0.01	0.02	0.02	0.00	0.01
Total	97.89	0.47	98.30	0.26	98.05	0.13	98.44	0.25	98.29	0.49	98.68	0.26	98.37	0.27	98.58	0.15	97.88	0.31	97.79	0.71
Si	7.96	0.05	7.94	0.03	7.81	0.12	7.92	0.03	7.97	0.05	8.00	0.00	7.97	0.02	7.99	0.02	7.96	0.02	7.97	0.02
Al (iv)	0.04	0.04	0.06	0.03	0.19	0.12	0.08	0.03	0.04	0.04	0.00	0.00	0.03	0.02	0.01	0.02	0.04	0.02	0.03	0.02
K (A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na (A)	0.01	0.01	0.04	0.01	0.10	0.05	0.05	0.01	0.01	0.01	0.01	0.00	0.02	0.02	0.00	0.00	0.04	0.01	0.01	0.02
Na (B)	1.71	0.06	1.81	0.02	1.70	0.12	1.82	0.03	1.80	0.04	1.89	0.00	1.88	0.04	1.90	0.00	1.88	0.02	1.91	0.04
Ca (B)	0.14	0.06	0.12	0.02	0.23	0.13	0.10	0.03	0.13	0.02	0.03	0.00	0.05	0.03	0.02	0.01	0.05	0.02	0.02	0.01
Mn (B, 2+)	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.01	0.00	0.02	0.01
Fe (B, 2+)	0.11	0.04	0.07	0.01	0.06	0.01	0.07	0.02	0.04	0.04	0.07	0.00	0.06	0.03	0.05	0.01	0.07	0.02	0.05	0.04
Fe (C, 2+)	0.91	0.06	0.82	0.05	0.91	0.09	0.83	0.08	0.81	0.09	1.16	0.05	1.02	0.19	1.32	0.04	0.89	0.09	1.11	0.05
Fe (C, 3+)	0.02	0.03	0.13	0.04	0.20	0.05	0.16	0.04	0.01	0.02	0.03	0.01	0.19	0.13	0.27	0.05	0.11	0.03	0.21	0.10
Al (C, vi)	1.75	0.05	1.70	0.03	1.58	0.10	1.69	0.04	1.83	0.02	1.85	0.01	1.71	0.09	1.63	0.03	1.76	0.03	1.71	0.04
Mg (C)	2.31	0.07	2.35	0.05	2.31	0.13	2.32	0.08	2.34	0.09	1.96	0.05	2.08	0.22	1.78	0.01	2.24	0.09	1.97	0.08
Type	<i>Glaucophane</i>	<i>Mg-Riebeckite</i>	<i>Glaucophane</i>	<i>Glaucophane</i>	<i>Glaucophane</i>	<i>Glaucophane</i>	<i>Glaucophane</i>													

Table B1: Amphibole mineral chemistry. Reported values are averages of the number of spots indicated by *n* values for each sample and micro-textural context. Uncertainties reflect the range of measured values for each micro-textural context as indicated. Cations per formula unit are calculated for ideal element partitioning for 23 Oxygen atoms.

Sample:	KCS52B n=6		KCS52B n=7		KCS12B n=11		KCS12B n=8		SY1402 n=8		SY1402 n=10		SY1402 n=1		SY1402 n=2		SY1402 n=3		SY1402 n=2	
	ps. cores	ps. rims	ps. rims	matrix cores	matrix cores	matrix rims	incl. in ep. cores	incl. in ep. rims	incl. in alb (A)	incl. in alb (B)	matrix cores	matrix rims	incl. in alb (A)	incl. in alb (B)	matrix cores	matrix rims	matrix cores	matrix rims		
SiO2	58.58	0.20	57.72	0.42	56.32	0.22	54.03	0.63	57.78	0.15	57.30	0.69	58.28	56.52	1.24	54.13	0.26	54.93	0.96	
Al2O3	11.35	0.13	10.65	0.44	10.72	0.38	4.92	1.61	8.12	0.87	8.45	1.28	8.05	2.80	0.89	3.12	0.16	2.23	0.60	
K2O	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.01	0.03	0.03	0.05	0.19	0.14	0.12	0.03	0.09	0.03	
Na2O	7.18	0.06	7.24	0.08	7.09	0.14	6.65	0.22	6.50	0.21	6.39	0.33	6.45	1.89	0.06	2.49	0.40	1.32	0.17	
CaO	0.48	0.06	0.24	0.13	0.29	0.11	0.66	0.33	0.73	0.33	0.93	0.88	1.14	8.92	0.23	8.58	0.99	10.80	0.26	
MnO	0.05	0.01	0.14	0.06	0.06	0.03	0.14	0.03	0.15	0.07	0.16	0.07	0.21	0.32	0.01	0.40	0.05	0.38	0.03	
FeO	9.08	0.27	12.51	1.43	16.93	0.49	25.10	2.03	15.28	1.08	15.55	1.60	14.41	12.24	1.06	15.64	1.74	12.16	0.79	
MgO	11.23	0.34	9.45	0.66	6.50	0.20	5.85	0.25	9.74	0.48	9.29	0.87	10.32	14.93	1.43	13.92	1.11	16.77	0.74	
TiO2	0.01	0.02	0.01	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.00	0.00	0.00	0.02	0.01	0.01	0.01	
Cr2O3	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	97.92	0.45	97.93	0.33	97.92	0.29	97.35	0.36	98.33	0.41	98.11	0.62	98.91	97.80	0.85	98.42	0.20	98.69	0.42	
Si	7.95	0.02	7.95	0.02	7.93	0.04	7.85	0.04	8.01	0.04	7.98	0.07	8.01	8.01	0.05	7.73	0.06	7.74	0.08	
Al (iv)	0.05	0.02	0.05	0.02	0.07	0.04	0.15	0.04	0.01	0.02	0.03	0.05	0.00	0.02	0.02	0.27	0.06	0.26	0.08	
K (A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.03	0.03	0.02	0.00	0.02	0.00	
Na (A)	0.03	0.01	0.04	0.03	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.02	0.10	0.02	
Na (B)	1.86	0.01	1.89	0.03	1.88	0.02	1.87	0.05	1.75	0.05	1.73	0.09	1.72	0.52	0.01	0.55	0.12	0.26	0.03	
Ca (B)	0.07	0.01	0.04	0.02	0.04	0.02	0.10	0.05	0.11	0.05	0.14	0.13	0.17	1.35	0.01	1.31	0.15	1.63	0.03	
Mn (B, 2+)	0.01	0.00	0.02	0.01	0.01	0.00	0.02	0.00	0.02	0.01	0.02	0.01	0.02	0.04	0.00	0.05	0.01	0.05	0.00	
Fe (B, 2+)	0.07	0.02	0.06	0.02	0.07	0.02	0.01	0.01	0.11	0.02	0.10	0.04	0.08	0.05	0.03	0.09	0.03	0.06	0.00	
Fe (C, 2+)	0.86	0.06	1.16	0.15	1.74	0.06	1.71	0.06	1.28	0.12	1.35	0.15	1.20	1.36	0.16	1.38	0.16	1.07	0.05	
Fe (C, 3+)	0.10	0.03	0.22	0.08	0.18	0.03	1.33	0.28	0.39	0.16	0.36	0.18	0.38	0.03	0.05	0.40	0.05	0.30	0.06	
Al (C, vi)	1.77	0.02	1.68	0.06	1.71	0.04	0.69	0.29	1.32	0.13	1.36	0.17	1.31	0.45	0.13	0.26	0.05	0.11	0.03	
Mg (C)	2.27	0.06	1.94	0.12	1.36	0.04	1.27	0.05	2.01	0.10	1.93	0.17	2.12	3.15	0.25	2.96	0.23	3.52	0.13	
Type	<i>Glaucophane</i>	<i>Glaucophane</i>	<i>Glaucophane</i>	<i>Riebeckite</i>	<i>Riebeckite</i>	<i>Riebeckite</i>	<i>Riebeckite</i>	<i>Riebeckite</i>	<i>Mg-Riebeckite</i>	<i>Mg-Riebeckite</i>	<i>Mg-Riebeckite</i>	<i>Mg-Riebeckite</i>	<i>Mg-Riebeckite</i>	<i>Winchite</i>	<i>Winchite</i>	<i>Fe-Winchite</i>	<i>Fe-Winchite</i>	<i>Actinolite</i>	<i>Actinolite</i>	

Table B1: Continued. Amphibole mineral chemistry. Reported values are averages of the number of spots indicated by *n* values for each sample and micro-textural context. Uncertainties reflect the range of measured values for each micro-textural context as indicated. Cations per formula unit are calculated for ideal element partitioning for 23 Oxygen atoms.

B3 Mineral classification and formula unit calculations

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953 Quantitative point analyses for amphiboles and white micas were converted from oxide
954 percentage to atoms per formula unit on the basis of 22O + 2OH, and 10O + 2OH Oxygen
955 atoms, respectively. Amphibole sub-groups and species were determined following recom-
956 mendations of the Commission on New Minerals Nomenclature and Classification (CNMNC)
957 of the International Mineralogical Association (IMA) (Hawthorne et al., 2012), and species
958 names follow the (Leake et al., 1997) classification scheme. Classifications did not assume
959 initial M-site³⁺/ σ M-site ratios, so ferric iron components were estimated based on charge
960 balance by adjusting valences of Fe and Mn by automatically normalizing the cations. Data
961 shown here commonly fell into the “sum Si to Ca=15”, “sum Si to Mg=13”, and “sum Si
962 to Na=15” normalization schemes (Hawthorne et al., 2012). Hydroxyl contents were not
963 estimated using OH=2-2Ti, and initial H₂O contents were not required for calculations.
964 White mica ferric iron was ignored in formula calculations.

965 Appendix C Supplemental Field Photos

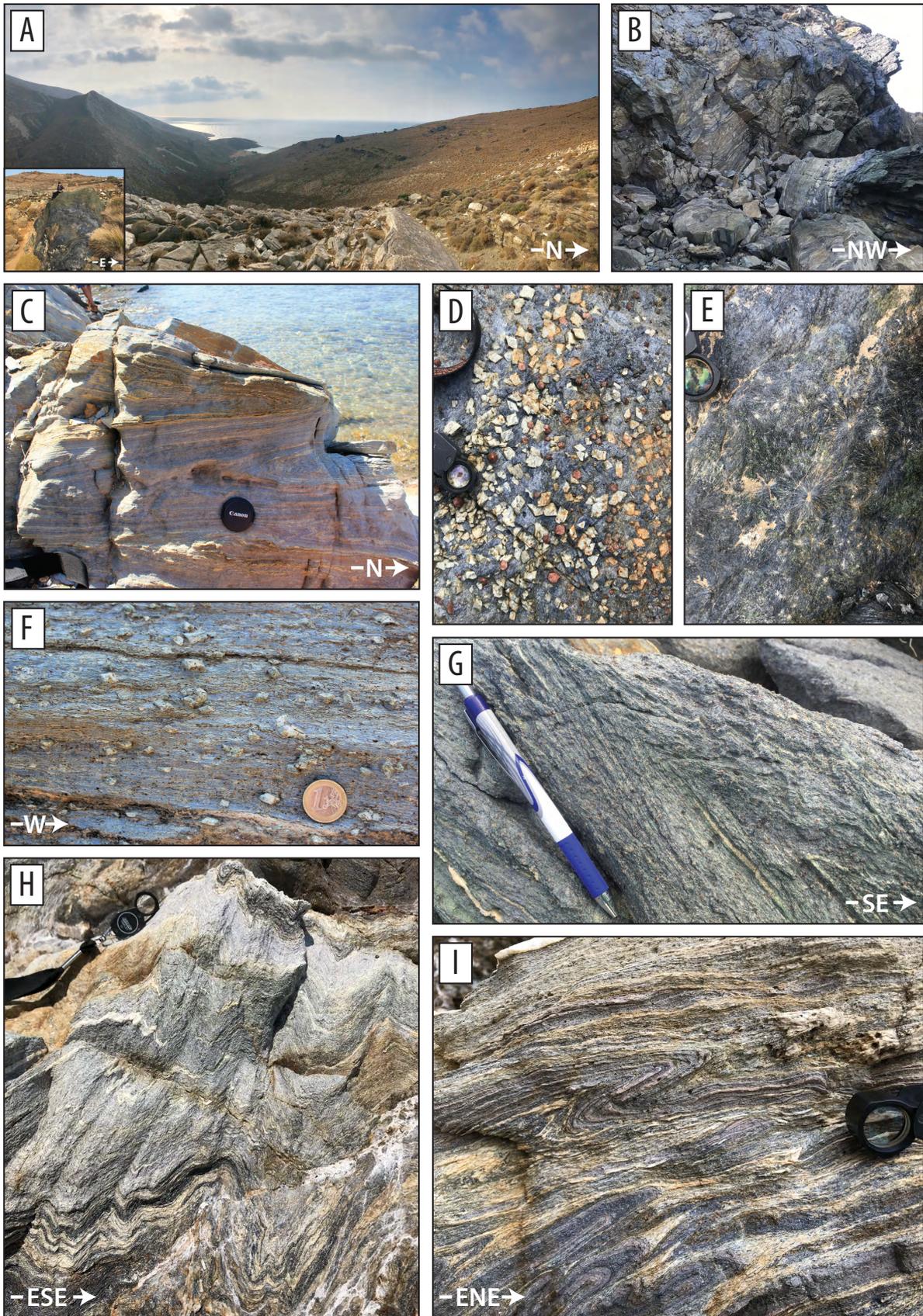


Figure C1: Caption to follow.

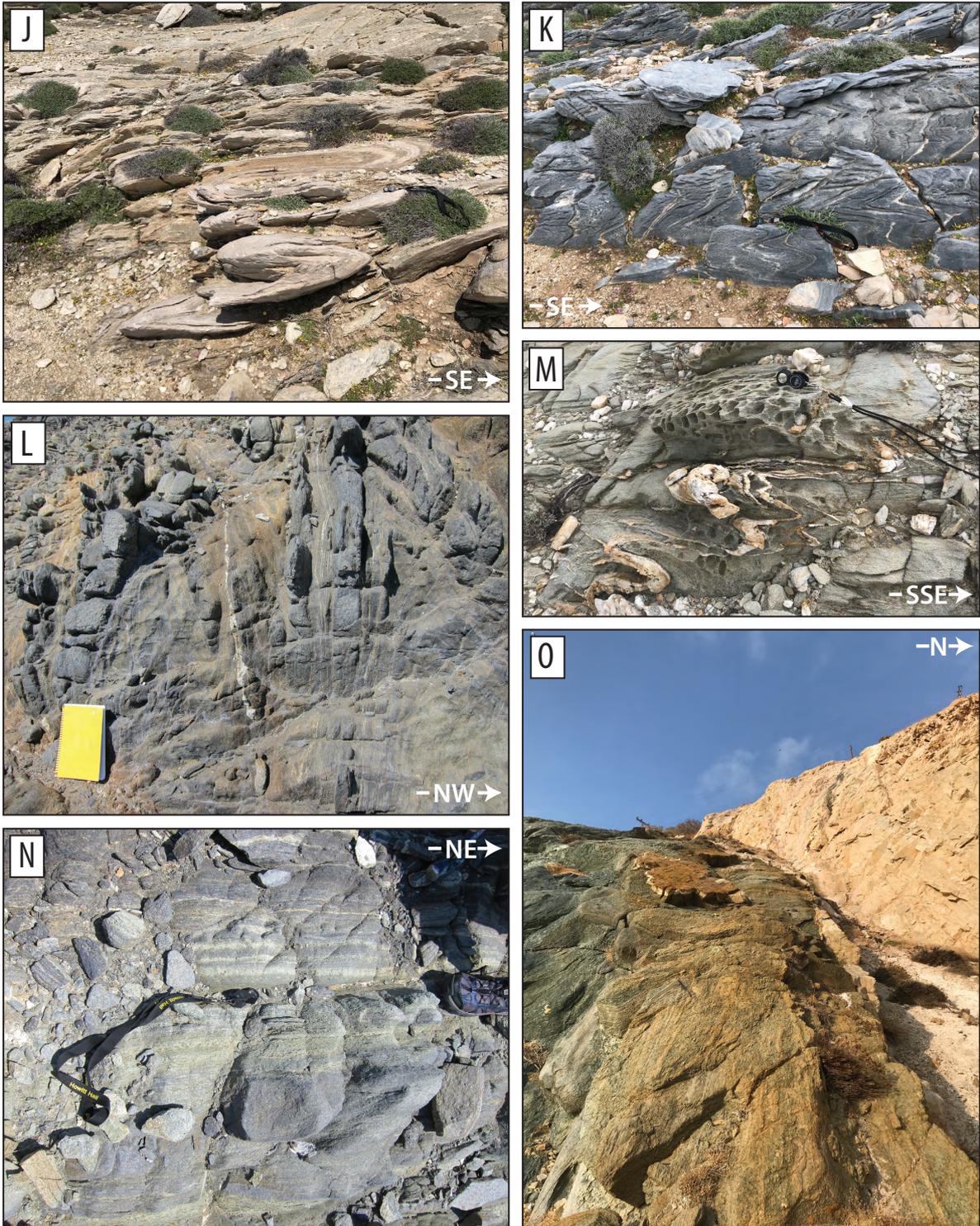


Figure C1: Caption to follow.

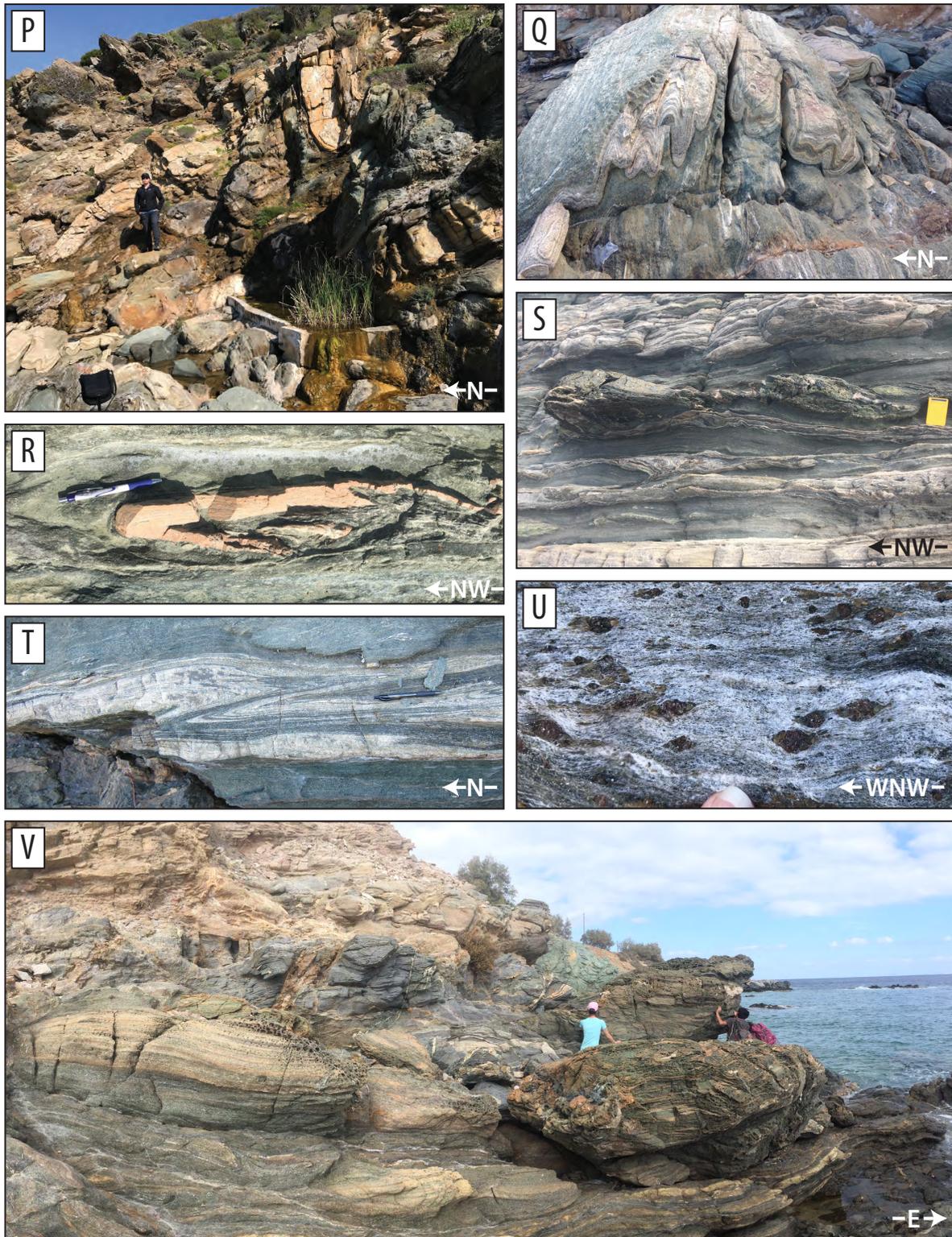


Figure C1: Caption next page.

Figure C1: (Previous pages.) Supplemental field photographs. (A) Eclogitic meta-gabbro 'blocks' pepper the Kampos Belt landscape, and are wrapped by coherent bimodal meta-volcanics (cropping out as resistant ledges in the background). Marbles in the foreground dip down towards the coastline and are structurally concordant with Belt rocks. This is a thrust contact that may have been reworked slightly during exhumation via extension, but we did not see evidence for strongly localized top-to-the-ENE shear. Inset shows example of Kampos meta-gabbro block with glaucophanite carapace. (B) Example of upright, shallowly NNE-plunging D_S folds on the shoreline W of Kampos Belt. (C) Lia Beach isoclinally-folded blueschists; the older, folded foliation is relict D_R , and isoclinal folding developed during D_S . (D) Unstrained cm-sized lawsonite pseudomorphs in Grizzas blueschist. (E) Zoom-in to margin of a Kampos Belt block showing static, radiating clusters of blue and green amphibole. (F) Unstrained D_S lawsonite pseudomorphs in Lia blueschists. (G) D_{T1} crenulation cross-cutting D_S at Kini. (H) The cores of D_{T1} upright folds in Azolimnos schists have strong axial planar cleavages associated with blueschist-to-greenschist facies retrogression. (I) Earlier D_S fabrics in Azolimnos schists record asymmetric shear in isoclinally-folded schists; pinkish layers are meta-cherts. (J) Isoclinal folds in marbles (foreground) and meta-conglomerates (background) and in meta-mafic greenschists (M) on Palos Peninsula mimic the map-scale folding seen in Fig. 2. (K) Sub-horizontal axial planar cleavages form in dolomitic blue-grey marbles during exhumation-related flattening (coaxial strain). (L) Upright D_{T1} folding at Kalamisia is associated with hinge-parallel greenschist retrogression (N) selectively permeating foliation-parallel layers. (O) Fault contact between marbles and blueschist-eclogite lithologies at Agios Dimitrios. Stretching is directly down-dip (essentially out of the page) and parallel to mullion hinges developed along the contact. Structures on either side of this contact are homogeneous. (P-S, U) Multiple generations of folding at Delfini. (P) Upright D_{T2} folding (discussed in text) develops an axial planar cleavage and hinge-parallel stretching and mineral lineations defined by quartz, epidote, and actinolite (Q). Older D_S foliations contain axial planes of isoclinal folds, best seen by salmon-colored meta-cherts (R) and compositional banding (T). Hinge:limb thickness variations locally exceed 20:1 (T, Lotos). (S) Along the limbs of upright folds like (P), coaxial stretching leads to boudinage of competent lenses. These structures record top-WNW shear, but top-ESE structures occur in roughly equal proportions. (U) Symmetric quartz-filled pressure shadows on delta-type D_S garnet porphyroblasts. (V) Asymmetric, non-coaxial strain during exhumation is limited to localities proximal to the Vari Detachment, like this example from Fabrikas.