Table SM1. Characteristics of the studied gold-bearing deposits and sites.

Site	Rock	Meta	S1 fabric *strike and dip*	S2 fabric *strike and dip*	Hydrothermal Alteration	Mineralization style	Structural Setting	Controlling factors
Anas	I1 dykes Diorite	Amp		N-S vertical	CarFe	Qz veinlets // I1 various trends-dips	Reverse	I1 dykes
Central (C02-C04)	VS I1 dykes	GS	N-S steeply E	N-S steeply E Dyke parallel	CarFe Intense Ser margin	Subhorizontal Qz veins in dykes	Reverse along dyke contacts	Competent dykes
Dardora Dyke	I1 dykes V2A	GS		E-W // I1 dykes	Hem reddish	Extension Qz veins NE moderate SE, in I1 dykes	Sinistral	I1 dykes E-W
Dardora Principal	V2A I1 dykes	GS	E-W shallow S	N-S vertical // I1 dykes	?	Qz veins N-S vertical	Sinistral	I1 dykes -post- S1
Korup	V3B VS	Horn		NW-SE steeply W	CarFe	Deformed NW VS horizon (5 m) CarFe envelop with Qz veinlets	Dextral	VS horizon in V3B-Sill CarFe envelop
Negeim	VS V3B Dykes	GS		NNW moderate to steeply E	CarFe	Qz veins // dyke contacts	Reverse (CS)	Contacts of dykes
NW	VS I1 dykes V3B	Amp	NE-SW steeply E	N-S steeply E N-S steeply W	Bio CarFe retro Chl retro	Qz veins N-S Qz veins in I1 dykes	Dextral Reverse (CS) Normal (CS)	Contact Amp Dykes VS
Sajid	VS V3B I1 dykes	GS		N-S steeply E	CarFe weak	Qz veins < 40 cm	Dextral	Contacts lithologic and dykes
SE	I1 dykes V3B	GS	NW-SE steeply NE	Parallel to S1	Hem reddish	Sheeted Qz veinlets NW and shear E-W vertical Qz veins Py diss halo (10%)	Dextral Dykes E-W	Dyke E-W post-S1
Sheirik- km-99	SV Dyke	Amp	E-W shallow N	NE moderate N	Aluminous S1 CarFe in S2	Qz veins in S2	Reverse	S2 - nothing specific

Sheirik-km-101	SV Dyke	Amp	E-W shallow N	ENE steeply S	Aluminous S1 CarFe S2	Qz veins in S2	Strike-slip	S2 - nothing specific
Sheirik-km-108	V3B VS dykes	Amp		N-S moderate W	Aluminous + mica-schist S1	Qz veins and mica schist halo	?	Dykes E-W shortening?
Sheirik-km-108E	V3B VS (?)	Amp		N-S moderate W	nil	Qz veinlets in S2 corridors	?	Lithologic contact
Sheirik-km-108E2	VS I1 dykes	Amp		N-S NNE moderate W	CarFe Ser, >3% Py diss	Qz veinlets, dyke I1 pyritised	?	S2 Shear zone
Sheirik-km-116W	VS V3B dykes	Amp	N-S to NE moderate W	Parallel to S1	Bio S1 Chl retro CarFe retro Hem Spec	Qz veins in shear zones and dykes	Dykes	Lithologic contact VS- I1 dykes
Sheirik-km-118	VS Sill V3B dykes	Amp	N-S shallow W folded to E-W shallow N	Parallel to S1	Bio S1 CarFe retro Hem Spec	Qz veinlets, in F2 fold hinges	Reverse large S1 corridor	S1 shear zone with F2
Sheirik-km-118-Central	VS Dykes	Amp	N-S moderate W	NW to NE moderate W	Mica schist CarFe	Qz veins in S2 shear zones and dykes	Oblique Reverse Dyke	Multiple S2 shear zones
Sheirik-km-118E	VS V3B dykes	Amp	N-S to NW moderate W	NW moderate SW	CarFe retro Hem Spec	Qz veins in corridor Dykes with Qz veinlets	Reverse Dyke	Lithologic contact VS - I1 dykes
Sheirik-km-119	VS	Amp	NW shallow S	E-W moderate S	S1: Mica schist S2: CarFe	Late extensional Qz veins	Normal	S2 Shear zones
SW-1	VS V3B Dykes Marble	GS	NW steeply E	N-S vertical NW vertical	CarFe weak	Qz veins // dykes contact of various compositions	Dextral (CS)	Contacts of dykes post-S1
SW-2	V3B VS Dykes	GS		N-S vertical NW vertical	CarFe weak	Qz veins // dyke contact of various compositions	Dextral (CS)	Contacts of dykes post-S1 (?)
Toubi	VS Sill V3B I1 dykes	GS	E-W shallow S penetrative	N-S vertical penetrative	CarFe intense Sil Hem reddish	Qz veins E-W Qz veins N-S QZ veinlets in I1	Oblique Dyke	I1 dykes Sill-V3B S2 shear zones

UTM	V3B diorite	GS		N-S shallow E	CarFe Intense Ser margin Hem reddish	Qz veins in S2 shear zones	Reverse (CS)	Along contact V3B-diorite
WG-03	Gabbroic complex	Amp	E-W shallow N Shear zones	N-S steeply E Shear zones	Bio Chl-Ser retro	Qz veins // S1 Qz veins // S2 Qz veins normal	S1 Reverse S2 Reverse Late normal	S1 and S2 Shear zones
WG-14	VS	GS	E-W shallow S penetrative	N-S vertical Shear zones	CarFe intense	Qz veins // S1 Qz veins // S2 Stockwork Qz	Reverse	S1-S2 Intersection
Yasmine West	Granitoid Diorite pyroxenite	GS?		N-S moderate W	CarFe	Qz veins // dyke contacts	Reverse (CS)	Lithological contact granitoid
Yasmine Central	Granitoid I3 dykes	GS?		N-S vertical	nil	Qz veinlets 20 cm along 2 km	Strike-slip	Along dyke contact

VS: Volcano-sediments **V3B:** Basalt **I1:** Felsic **I3:** Mafic

Amp: Amphibolite **GS:** Greenschist **Horn:** Hornfels **Retro:** Retrograde

CarFe: Iron carbonates **Hem:** Hematite **Chl:** Chlorite **Hem Spec:** hematite specular

Bio: Biotite **Ser:** Sericite **Py:** Pyrite **Sil:** Silicification **Qz:** quartz

//: parallel **S1:** Principal fabric **S2:** Second fabric **CS:** CS fabrics

Table SM2. Mineral compositions of the gold-bearing quartz veins established from thin sections.

Sample	Mus	Ser	Bio	Tm	Car	Chl
Anas-1	Tr					
Central C04-1		1%			5%	
Dardora-3		Tr			Tr	
Korup-1					40%	
Negeim-3		Tr				
NW-1						
Sajid-2	Tr					
SE-2	Tr		Tr		Tr	
Shereik-99-2	Tr				1%	
Shereik-116-2			Tr	5%		
Shereik-118-2	1%				20%	Tr
Shereik-118-3	1%					
Shereik-118E-1	Tr					
SW-1		Tr				
Toubi-1	Tr					
Toubi-5					Tr	
UTM-15		1%			5%	
WG-03-14		Tr	2%		5%	1%
WG-14-1			Tr		Tr	Tr
WG-14-2		Tr			Tr	
Yasmine-1		Tr			Tr	
Yamine-2					Tr	

Mus: muscovite (large flake); Ser: sericite (micro-flake)
Bio: biotite; Tm: tourmaline; Car: undifferentiated carbonates; Chl: chlorite

Table SM3. Calculated mole % of the analysed volatiles with the total pressure (Pt) released by fluid inclusions and with the volatile assemblages, fluid types and sample settings.

NO	N2	CO2	H2O	H2	CH4	Ar	SO2	H2S	C2H6	He	Pt	Volatile assemblage	Fluid
Anas-1	5.0	12.9	82.1								2.40E-07	H2O CO2 N2	4
Dardora-1	59.7				40.3						4.98E-08	N2 CH4	5
Dardora-3	21.5		46.7		30.6				1.19		1.50E-07	H2O CH4 N2 C2H6	2
Korup-1	33.4	16.9	37.0		11.7				0.96		2.92E-07	H2O N2 CO2 CH4 C2H6	2
Korup-2	34.0	66.0									1.99E-08	CO2 N2	5
Korup-3	5.8	3.9	90.3								4.62E-08	H2O N2 CO2	4
Korup-4	11.8	18.7	60.9		6.5				2.15		1.00E-07	H2O CO2 N2 CH4 C2H6	1
Neigeim-1	1.7	3.5	94.8								5.91E-07	H2O CO2 N2	4
Neigeim-2	1.4	5.6	93.0								2.80E-07	H2O CO2 N2	4
Neigeim-3	2.6	4.8	92.6								1.11E-06	H2O CO2 N2	4
NW-1	52.9	20.7			24.1	0.17		0.42	1.64		1.86E-07	N2 CH4 CO2 C2H6	2
NW-2	40.8	31.4			27.8						2.06E-08	N2 CO2 CH4	5
NW-3													
SAJID-1	2.4	9.0	85.3	0.80	1.3				1.17		4.59E-07	H2O CO2 N2 CH4 C2H6 H2	1
SAJID-2	7.2	35.3	49.7	0.70	2.6				4.40		3.01E-07	H2O CO2 N2 C2H6 CH4 H2	2
SAJID-3	2.0	7.2	88.2	0.71	0.9				0.90		7.88E-07	H2O CO2 N2 CH4 C2H6 H2	1
SCMC-15	3.4	4.2	90.1	0.28	0.7				1.26		1.30E-06	H2O CO2 N2 CH4 C2H6 H2	1
SCMC-4	9.7	11.8	74.5		3.6				0.29		6.35E-07	H2O CO2 N2 CH4 C2H6	1
SE-1			100.0								6.35E-07	H2O	6
SE-2	62.8				37.2						1.29E-06	N2 CH4	5
Sheirik-101-3	4.3	8.5	81.1	1.04	4.6				0.39		6.19E-07	H2O CO2 CH4 N2 H2 C2H6	1
Sheirik-116-1	44.4	55.6									2.39E-07	CO2 N2	5
Sheirik-116-2	6.4	18.3	73.0		1.9				0.46		6.13E-07	H2O CO2 N2 CH4 C2H6	1
Sheirik-116-3	4.0	13.4	81.3						1.35		1.28E-08	H2O CO2 N2 C2H6	1
Sheirik-118-1	2.0	2.1	95.8								4.45E-07	H2O CO2 N2	4
Sheirik-118-2	7.1	7.2	82.8		2.9						3.07E-07	H2O CO2 N2 CH4	3
Sheirik-118-3	8.6	13.1	75.6		2.1				0.60		6.41E-07	H2O CO2 N2 CH4 C2H6	1
Sheirik-118-4	3.0	9.3	87.7								4.63E-07	H2O CO2 N2	4
Sheirik-118-5	1.8	2.4	94.4	1.39							6.99E-07	H2O CO2 N2 H2	4
Sheirik-118E-1	34.3	30.8			35.0						7.53E-07	N2 CH4 CO2	5
Sheirik-118E-2	2.0	3.1	93.6	1.32							5.97E-07	H2O CO2 N2 H2	4
Sheirik-118E-3	2.4	2.1	95.6								1.62E-08	H2O N2 CO2	4
Sheirik-118E-4			100.0								5.89E-07	H2O	6
Sheirik-119-2		100.0									1.54E-07	CO2	5
Sheirik-99-1	6.4	16.9	73.8		2.3				0.57		1.43E-07	H2O CO2 N2 CH4 C2H6	1
Sheirik-99-2	5.5	12.2	76.0	1.24	3.4				1.63		2.42E-07	H2O CO2 N2 CH4 C2H6 H2	1

SW-1	6.6	3.1	90.3				1.91E-07 H2O **N2** CO2	4
SW-1-2								
SW-2-1								
Toubi-1	6.1	29.4	60.3		1.5	2.71	2.67E-07 H2O CO2 **N2** C2H6 CH4	1
Toubi-2	4.9	13.5	78.7	1.49	1.1	0.36	6.91E-07 H2O CO2 **N2** H2 CH4 C2H6	1
Toubi-3	4.7	13.3	77.8	0.99	2.3	1.06	2.30E-07 H2O CO2 **N2** CH4 C2H6 H2	1
Toubi-4	5.8	24.5	63.4		6.1	0.28	7.84E-07 H2O CO2 **N2** CH4 C2H6	1
Toubi-5	1.2	0.4	96.6	1.38	0.4		4.28E-06 H2O H2 **N2** CO2 CH4	3
UTM	3.3	5.3	87.2	0.82	2.0	1.33	3.60E-07 H2O CO2 **N2** CH4 C2H6 H2	1
WG03-1	10.4	15.0	70.5		4.2		2.83E-07 H2O CO2 **N2** CH4	3
WG03-2	31.0	69.0					1.70E-08 CO2 **N2**	5
WG03-3	7.3	28.5	64.2				1.26E-07 H2O CO2 **N2**	4
WG03-4	38.6	61.4					9.08E-09 CO2 **N2**	5
WG03-5	34.1	23.5			42.4		1.90E-08 CH4 **N2** CO2	5
WG03-6	36.5	63.5					1.53E-08 CO2 **N2**	5
WG03-11	0.8	2.1	95.8	0.60	0.4	0.29	5.36E-07 H2O CO2 **N2** H2 CH4 C2H6	1
WG14-1	3.9	2.3	89.8	0.82	2.9	0.28	2.44E-06 H2O **N2** CH4 CO2 H2 C2H6	1
WG14-2	8.5	5.5	78.3		7.6		1.77E-07 H2O **N2** CH4 CO2	3
Yasmine-1	2.3	4.6	92.2	0.92			4.99E-07 H2O CO2 **N2** H2	4
Yasmine-2	1.7	1.6	94.6	1.25	0.9		1.40E-06 H2O **N2** CO2 H2 CH4	3
Yasmine-3								
Yasmine-4	1.8	1.0	93.4	1.90	1.9		2.02E-07 H2O **N2** CO2 CH4 H2	3
Yasmine-C1	4.1	4.4	85.9	1.07	3.7	0.84	3.48E-07 H2O CO2 **N2** CH4 H2 C2H6	1

Sample with no data was analyzed but generated no volatile release
Pt: total pressure - summation of all the partial pressure from volatiles released by fluid inclusion decrepitation from 100 to 500°C
Fluid: fluid types, see text for explanation

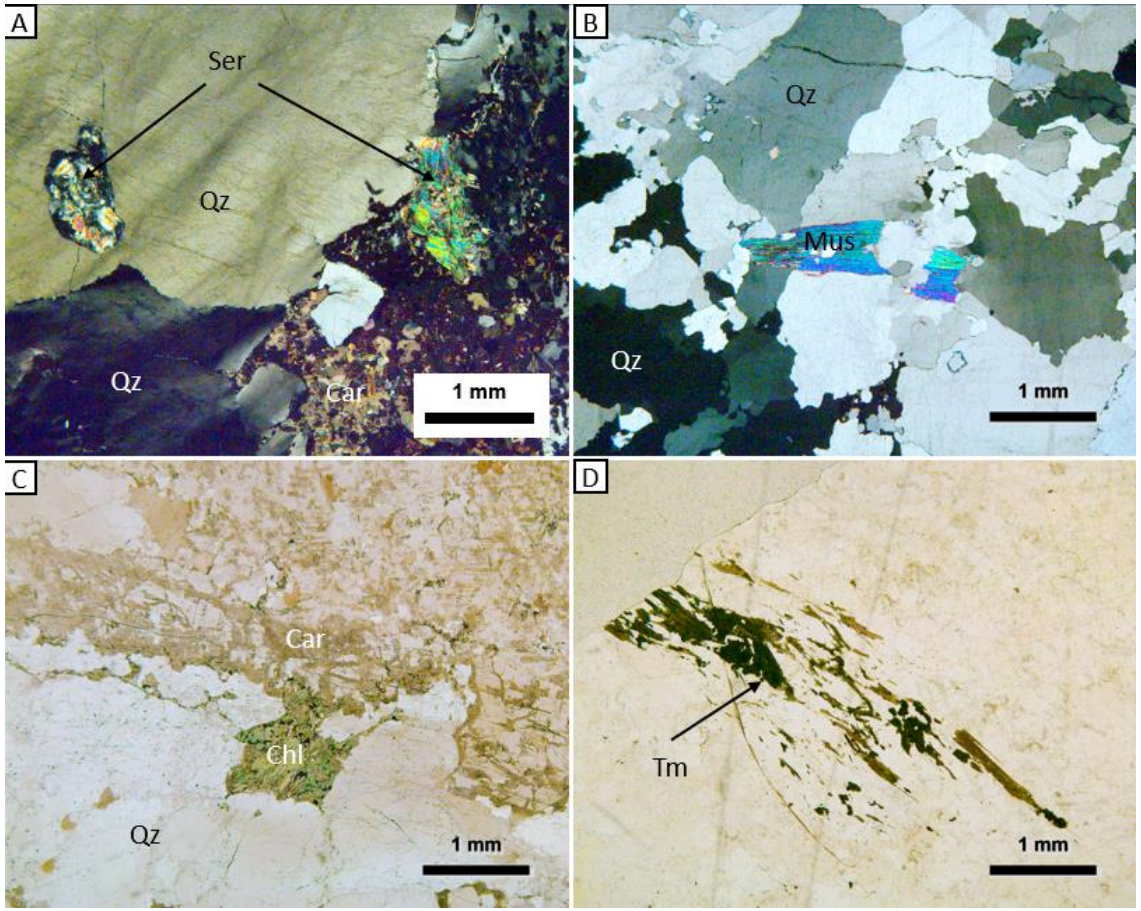

Figure SM1. Photomicrographs of gold-bearing quartz vein samples showing the trace minerals: (A) quartz with sericite (Ser) and car polarized light); (B) muscovite (Mus) in quartz in sample Shereik-118-3 (transmitted polarized light); (C) chlorite (Chl) in quartz with (D) tourmaline (Tm) with quartz in sample Shereik-116-2 (transmitted polarized light).

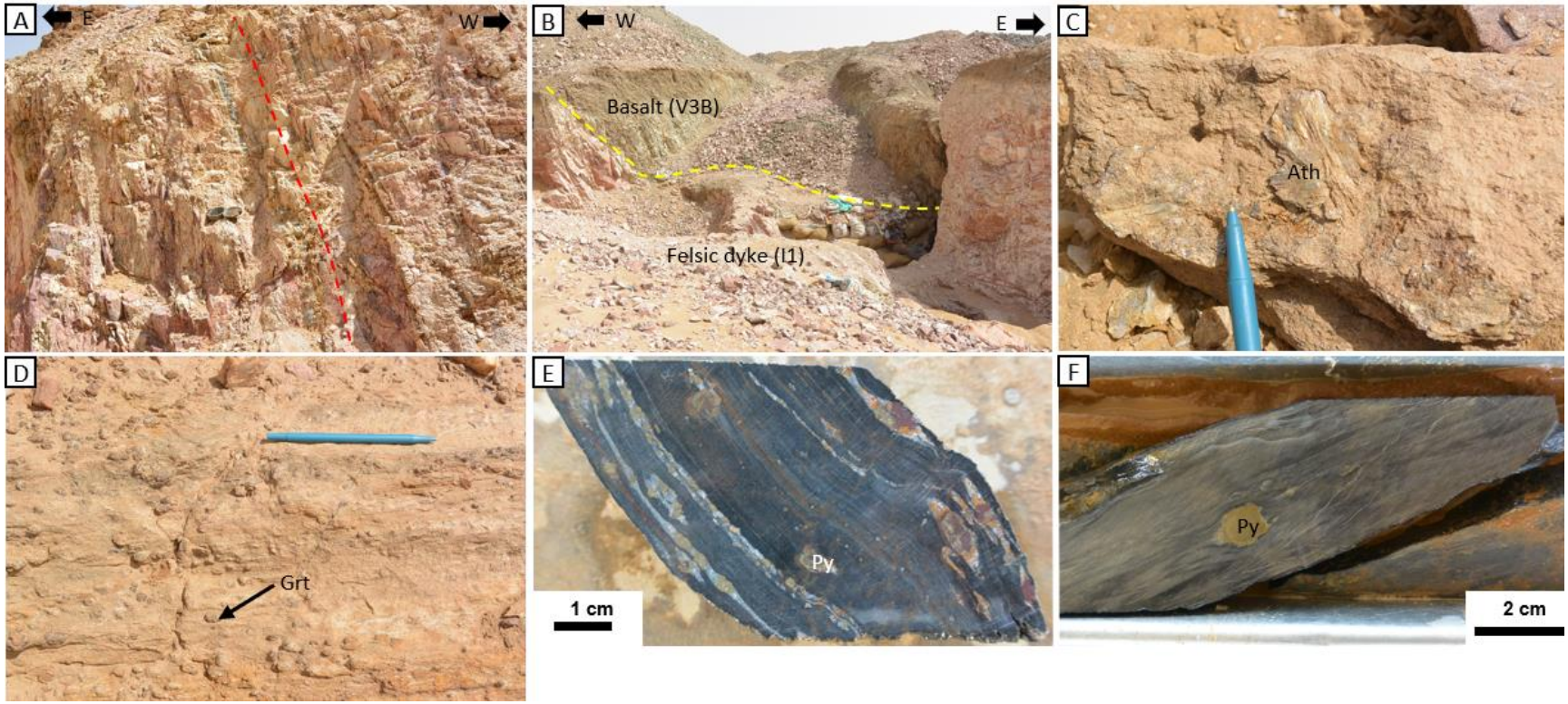

Figure SM2. Photographs of field and drill core rocks; (A) Gold-bearing sheeted quartz veinlets (parallel to the dashed red line) hosted in a reddish haematite altered felsic dyke at the SE zone (compass for scale); (B) Same area showing the reddish haematite altered felsic dyke in contact with basaltic rocks; (C) Anthophyllite-bearing (Ant) schist at Sheirik-99; (D) Anthophyllite and garnet-bearing (Grt) schist at Sheirik-101; (E-F) Drill cores of pyritic black shale in drill cores from the Central gold deposit.