The Gorno Zn project (Bergamo, Italy): new data on the Pian Bracca exploration area

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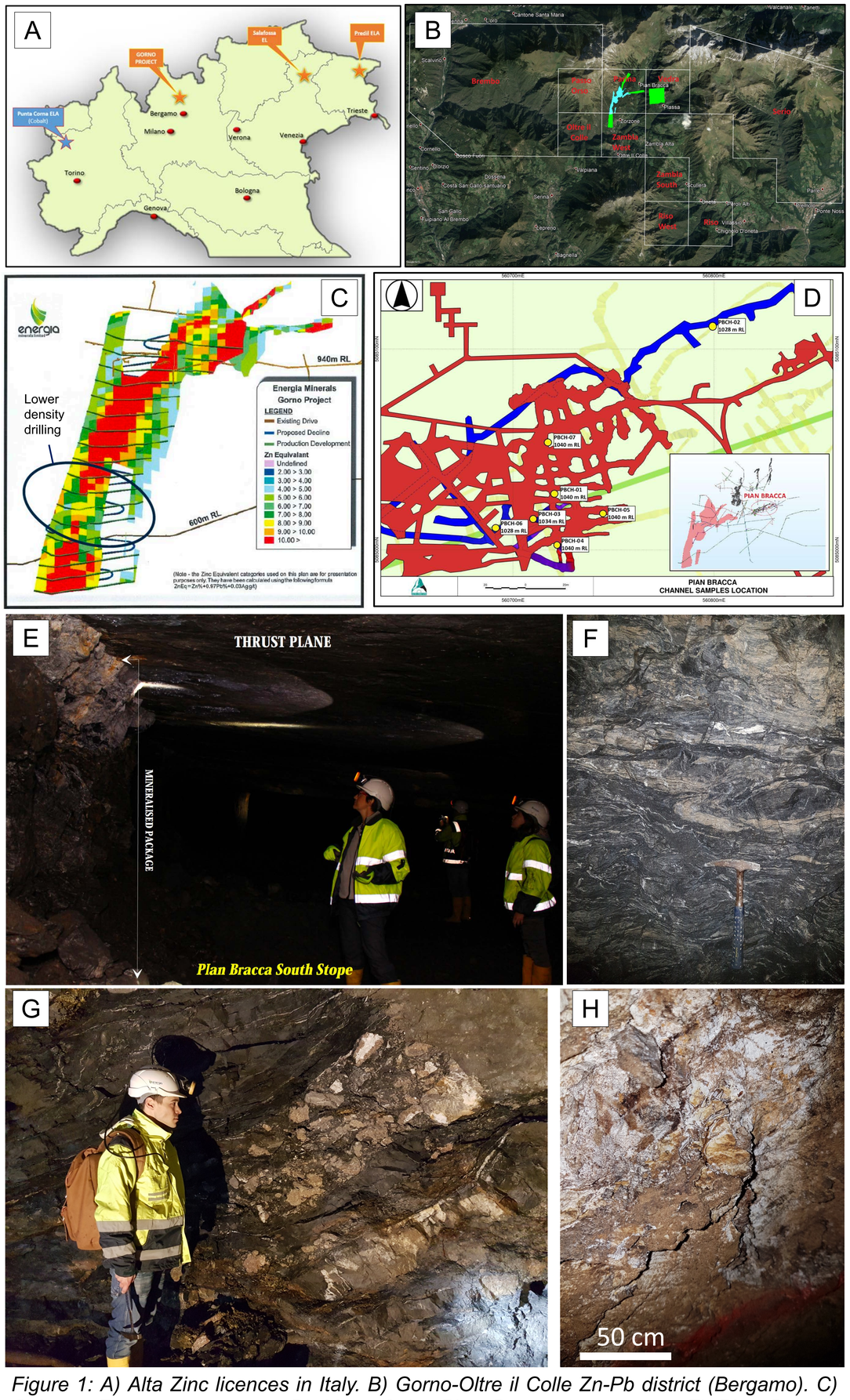

Figure 1: A) Alta Zinc licences in Italy. B) Gorno-Oltre il Colle Zn-Pb district (Bergamo). C) Colonna Zorzone resources. D) Map of the Pian Bracca target area. E) Pian Bracca: mineralized thrust footwall. F & G) Pian Bracca sulfides: Sphalerite>>Galena. H) Pian Bracca Nonsulfides: Smithsonite-Hydrozincite >>Hemimorphite.

Introduction, mining history and aims of the work

The Gorno Zn-Pb(Ag) deposit, located in the Bergamo province (northern Italy), is a Mississippi Valley-type (MVT) mineralization belonging to the "metallogenic province" of the eastern Alps, as Bleiberg, Raibl and Mežica mines [1]. The Gorno mines were active since the beginning of the 20th century and ceased operations in the early 1980s, even though excellent intercepts of zinc, lead and silver had been identified in numerous locations, including the so-called "Colonna Zorzone" area (now ready to be developed) before operations prematurely stopped.
Extensive drilling carried out from 2015 onward by Alta Zinc Ltd. (the current owner of mining concession and exploration licenses in the area) allowed to estimate in the Colonna Zorzone at least **3.3 Mt JORC compliant indicated+inferred resources at 4.9% Zn, 1.3% Pb, and 27.2 ppm Ag (cut-off grade of 1% Zn)**. In this area, the mineralization, consisting of sphalerite and galena (with inclusions of Ag-bearing sulfosalts), is hosted in Triassic carbonaceous shales of the Calcare Metallifero Bergamasco Formation, and has mostly a stratabound orientation, with an overall thickness ranging from 6 to 14 m. In 2018, the presence of a further mineralized nucleus in the Gorno-Pian Bracca area has been confirmed by mapping and sampling in a partially developed network of galleries extending between 990 to 1040 m.a.s.l.
The present work aims to evaluate the mineralogy of this newly discovered Zn mineralization, consisting of both sulfides and nonsulfides.

Results

Several samples were collected in the Pian Bracca area, at the 1040 level, and others at the levels 1028 and 990. The samples were cut in two halves at the DiSTAR (Napoli). Half of each sample was crushed, grinded and powdered for XRD analyses, whilst the other half was sub-cut to prepare thin/polished sections for optical (OM) and electron microscopy (SEM-EDS). Fine-grained sphalerite and galena (with inclusions of Ag-bearing sulfosalts) occur in the footwall of a low-angle thrust fault. The sulfide ore is deformed and concentrated in multiple sheared lenses. The average sulfide grade is **7% Zn.** High-grade nonsulfide bodies ("Calamines") are hosted in the Triassic limestones of the Breno Formation, tectonically underlying the sulfide-bearing shales, and occur in sub-vertical breccia bodies associated with several normal faults that displace the sulfide lenses. The nonsulfide concentrations commonly show Zn grades around **20 wt.%** (locally higher than 35 wt.%) and a mineral association mostly consisting of smithsonite, hydrozincite, hemimorphite, cerussite and anglesite. These minerals formed after the alteration of pre-existing sulfides, when Zn and Pb precipitated in the fractures network of the fault zones, after the reaction of the Zn-Pb-bearing fluids with the carbonate host rock.

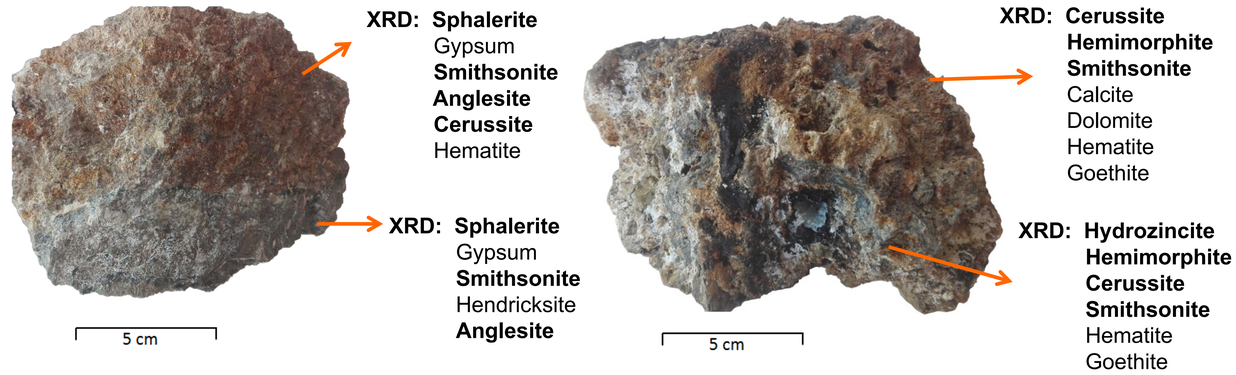

Figure 2: XRD analyses of typical Pian Bracca samples.

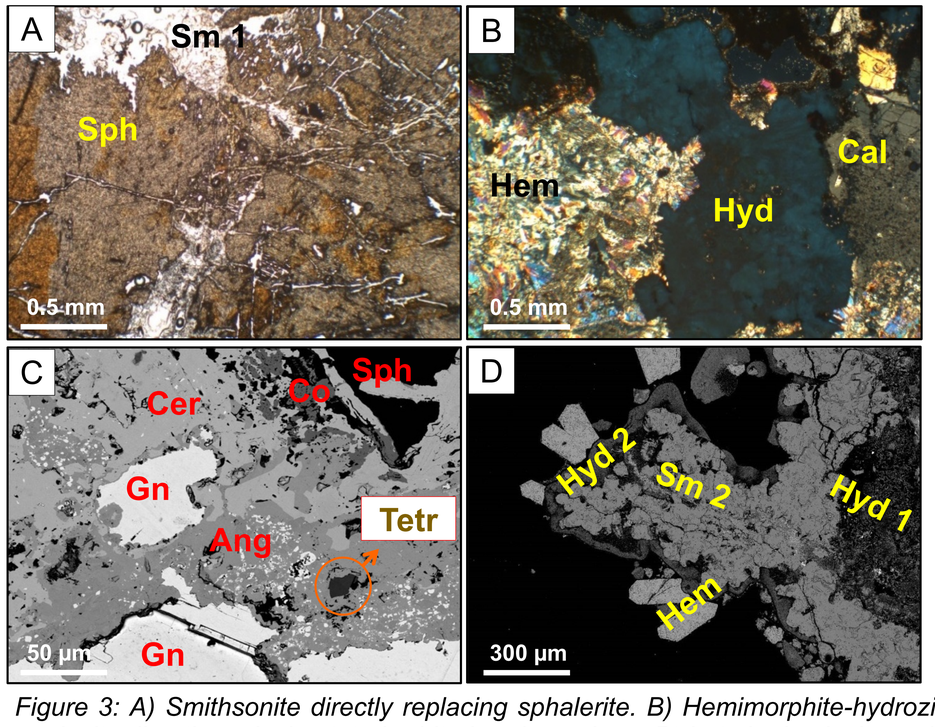

Figure 3: A) Smithsonite directly replacing sphalerite. B) Hemimorphite-hydrozincite assemblage (OM). C) Cerussite-anglesite directly replacing tetrahedrite-bearing galena. D) Late hydrozincite-smithsonite assemblage (SEM-EDS).

Table 1. Tetrahedrite-tennantite chemistry (EDS)

	Sp 9	Sp 10	Sp 7	Sp 3	Sp 6
			wt. %		
S	24.61	24.57	24.09	23.66	24.55
Fe	1.43	1.44	1.46	1.70	1.74
Cu	36.86	36.58	35.87	35.37	34.98
Zn	7.03	6.01	7.93	7.64	6.81
As	3.13	3.06	2.60	2.78	2.61
Ag	**2.20**	**1.95**	**2.15**	**2.06**	**1.71**
Sb	24.37	24.08	24.18	24.05	24.50
Tot	100.00	97.89	98.61	97.58	97.02
			a. p. f. u.		
S	13.00	13.00	13.00	13.00	13.00
Sb	3.39	3.36	3.44	3.48	3.42
As	0.71	0.69	0.60	0.65	0.59
Σ	4.10	4.05	4.04	4.13	4.01
Fe	0.43	0.44	0.45	0.54	0.53
Zn	1.82	1.56	2.10	2.06	1.77
Ag	0.35	0.31	0.34	0.34	0.27
Σ	2.60	2.30	2.90	2.93	2.57
Cu	9.83	9.77	9.77	9.81	9.35

Conclusions

This significant mixed sulfide-nonsulfide mineralization in the Pian Bracca area occurs in a section of the Gorno Zn project, which is currently under exploration. If drilling operation will confirm the extension of the nonsulfide zones, commonly characterized by high metal grades and low-cost metallurgy, the value of the Gorno deposit will be further enhanced, as well as the Italian potential of metallic resources.

References

[1] Leach D., Bechstädt T., Boni M. & Zeeh S. (2003) - Triassic-hosted Mississippi Valley-type Zinc-Lead ores of Poland, Austria, Slovenia, and Italy. In: Europe's Major Base Metal Deposits, Andrew C., et al. Eds., IAEG, 169-213.