

Pre-Congress Field trip: *The central Southalpine belt: from inherited Permian structures to the pre-Cenozoic thrusting*

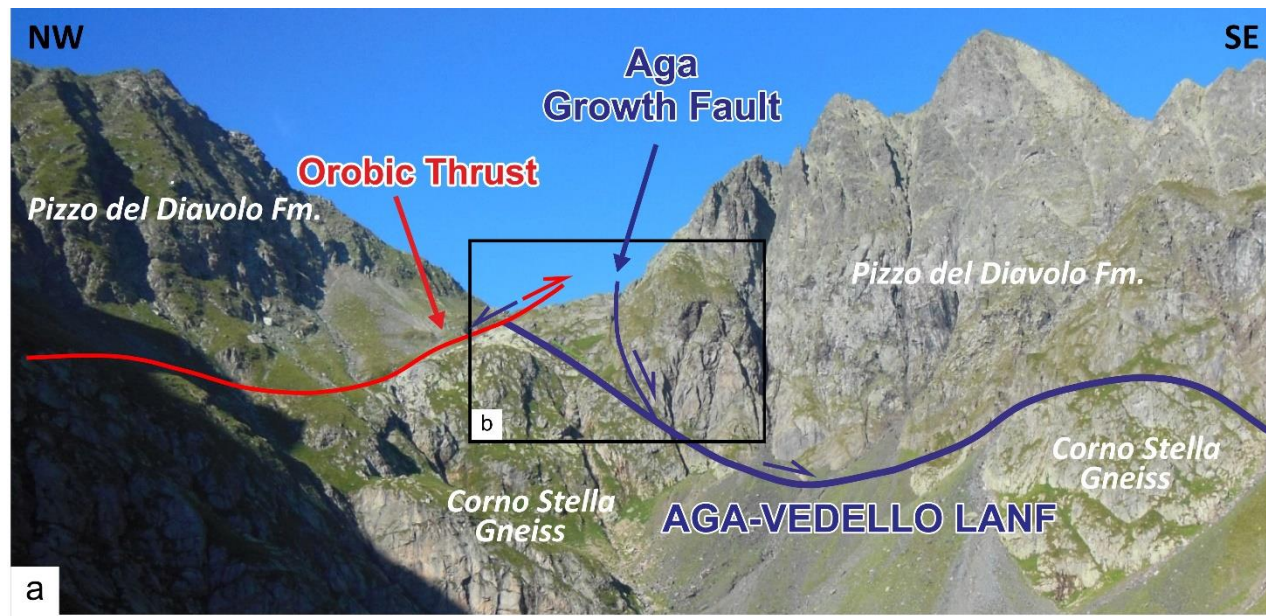
Field trip leaders (Stefano Zanchetta & Andrea Zanchi; Department of Earth and Environmental Sciences, University of Milano-Bicocca)

September 14-16, 2019. Limited to 25 participants (15 minimum) **Cost 300 EU** from Bergamo to Parma, all included.

Day 1 - Transfer to the Brembana Valley (14-9-2019): starting from the Bergamo railway station with minibus at 17 pm to Branzi-Carona, Brembana Valley. Stay overnight; introduction to the geology of the area.

Day 2 - The Permian extensional tectonics and Alpine inversion: the Orobic Basin and Range - Start at 7 am with a mountain taxi up to Rif. Longo (2025), Lago del Diavolo (2150). From the Lago del Diavolo we will walk along an easy and nice path built during the 1° world war (Linea Cadorna) taking to the Cigola Pass (2450) in 2 hours. We will follow one of the major inverted fault of the belt juxtaposing the Lower Permian Pizzo del Diavolo Formation in the hangingwall to the Variscan Basement in the footwall. Just below the pass we will meet the Aga-Vedello LANF, a well-preserved low-angle normal fault of Permian age draped with tourmalinites. We will then visit a Permian growth fault accompanied by spectacular mesoscopic structures developed in the Pizzo del Diavolo Formation, including small normal faults rich in liquefaction structures. The top of Mt. Aga (2710) can be reached in half an hour through a steep path. Wonderful geologic panorama and sight on the Central Alps. Back to Rif. Longo and to Branzi-Carona in the evening; stay overnight.

References: Zanchi A., Zanchetta S., Berio L., Berra F. & Felletti F. - Low-angle normal faults record Early Permian extensional tectonics in the Orobic Basin (Southern Alps, N Italy) - *Italian Journal of Geosciences*, <https://doi.org/10.3301/IJG.2018.35>.



- Synsedimentary Permian extensional faults
- Orobic Thrust (Alpine inversion of a Permian high-angle normal fault)

Panoramic view of the symsedimentary fault system of Mt. Aga, showing its interactions with the Aga-Vedello LANF and with the subsequent Cigola-Longo reverse fault.



Planar high-angle normal fault that caused 1-3 cm of vertical throw.

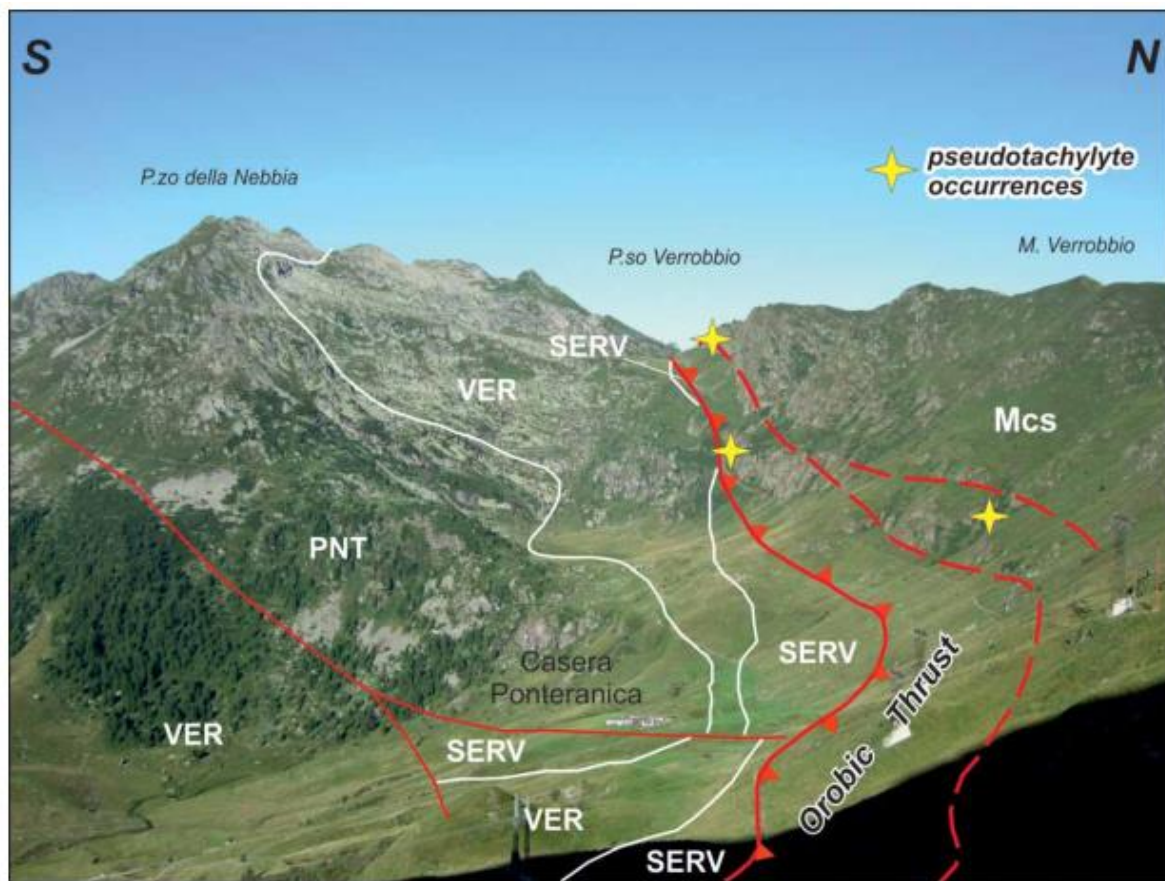
Day 3 - The Orobic Thrust at Passo San Marco: pre-collisional development of the Central Southern Alps fold-and-thrust belt.

Start at 8 by bus from Carona/Branzi to the San Marco area (1 hour). Stop at the historical Cantoniera di Ca' San Marco (1815 m).

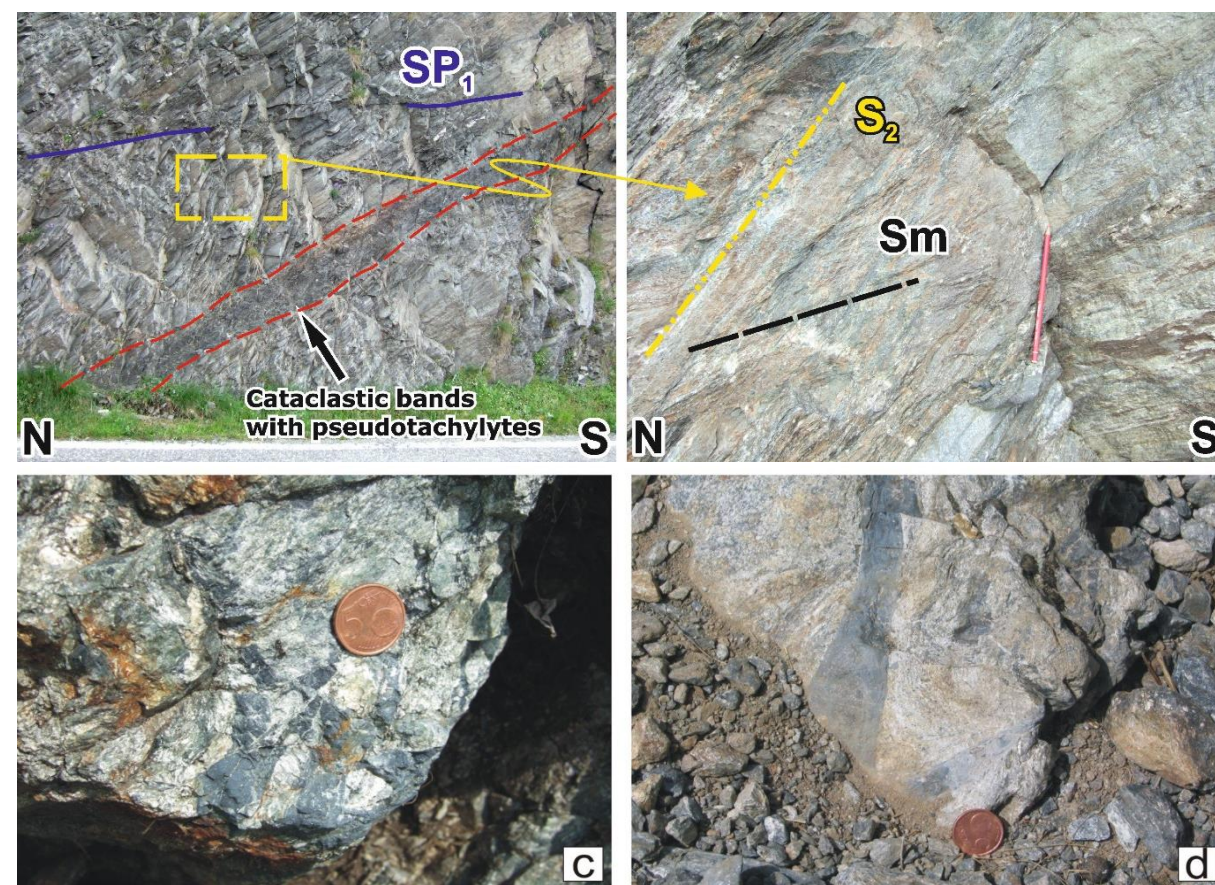
Walk to the Verrobbio Pass (2020) along a nice path (1/1.5 hour) to observe the Orobic Thrust. The path crosses both the Permian to Lower Triassic sedimentary cover in the footwall and the Variscan basement in the hangingwall of the thrust plane. Nice sight from the pass on the Central Alps. Back to Ca' San Marco and lunch there. Climb along "Strada Priula" to the San Marco Pass (m 2020) in 45 minutes. Walk along the road down to the starting point in 2 hours. Observations along the road to the Variscan basement showing Alpine folds superposed on structures of Variscan age. The fault architecture of the Orobic Thrust can be observed continuously on outcrops along the road: mylonites overprinted by several cataclastic shear zones rich in pseudotachylites can be observed in the Morbegno Gneiss of the hangingwall block. Back to Parma in about 3 hours in time for the ice-breaker party.

References: Zanchetta S., Malusà G., Zanchi A., 2016 – Pre-collisional development and Cenozoic evolution of the Southalpine retrobelt (European Alps). *Lithosphere*, 7, 662-681.

D'Adda P. & Zanchetta S., 2014 – Geological-structural map of the Orobic and Porcile thrust junction, central Southern Alps (N Italy). *Journal of Maps*, doi: 10.180/17445647.2014.944944



Panoramic view from the road to the San Marco Pass toward the Verrobbio Pass. The path runs through the fault zone.



Cataclastic shear zones containing multiple generations of pseudotachylites along the thrust.