

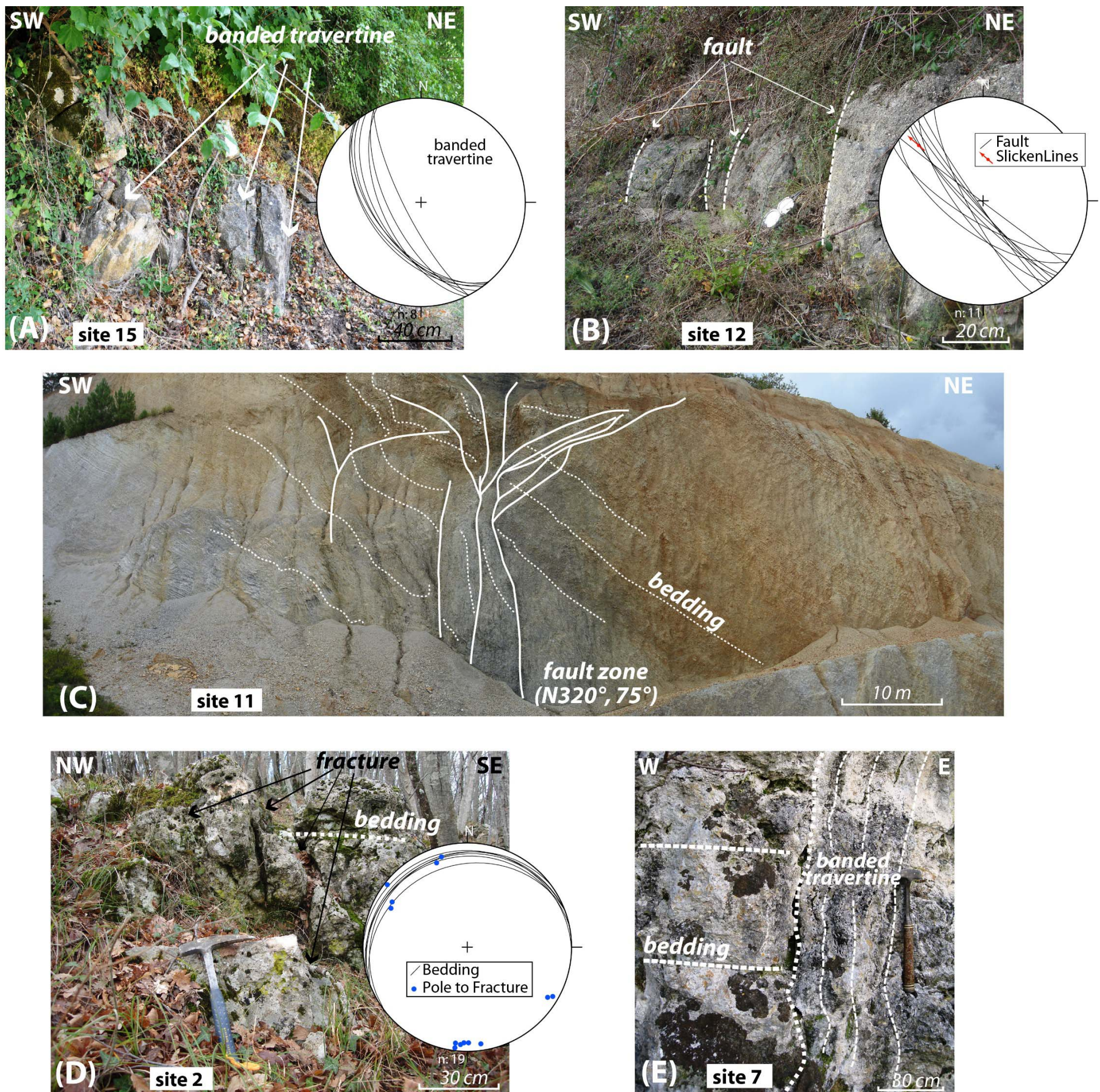
**Vignaroli et al., 2016, Tectonics, hydrothermalism, and paleoclimate recorded by Quaternary travertines and their spatio-temporal distribution in the Albegna basin, central Italy: Insights on Tyrrhenian margin neotectonics: Lithosphere, v. 7, doi:10.1130/L507.1**

**GSA Data Repository Item 2016147**

This Data Repository includes:

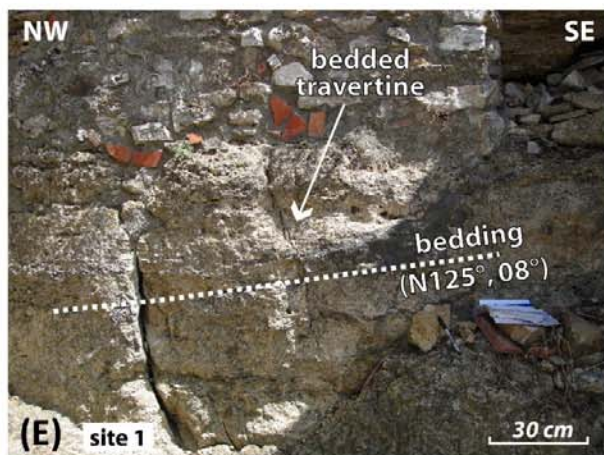
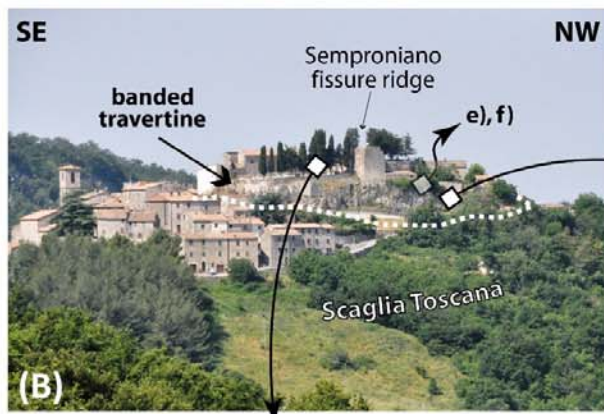
- (1) A figure of travertine structures observed in the study sites (**Fig. DR1**);
- (2) The color version of **Figures 5, 6, 7, 8, 9, 10**.





**Figure DR1** – (A) NW-SE-striking banded travertine exposed in the I Vignacci locality (see the stereoplot, stereographic projection, Schmidt net, lower hemisphere). The travertine attitude suggests a structural continuity with the NW-SE-striking banded travertine forming the fissure ridge of the Semproniano village, which is located a few hundreds of meters from I Vignacci. (B) Decimetre-spaced faults affecting the Quaternary continental deposits exposed to the southeast of Semproniano village (see the stereoplot, stereographic projection, Schmidt net, lower hemisphere). These fault surfaces strike NW-SE, i.e., parallel to the fissure ridge banded travertine of Semproniano. In one case, we found evidence of right-lateral displacement along this fault set. (C) NW-SE-striking fault zone exposed in an abandoned quarry located to the southeast of the Semproniano village. Faults affect and deform beds of radiolarites and siliceous shales belonging to the Tuscan Nappe. The fault architecture consists of fault surfaces forming a negative flower structure (in cross-sectional view). This fault system aligns along the NW-SE trend of the travertine fissure ridge (see also the geological map in Fig. 3A). (D) Karstified fractures cutting through the bedded travertine that forms the plateau of Poggio i Piani (see the stereoplot, stereographic projection, Schmidt net, lower hemisphere). (E) Bedded travertine exposed immediately to the north of the Saturnia village. The bedded travertine is cut by a meter-thick subvertical banded travertine.





**Figure 5** - (A) Northeastward panoramic view of the study area showing the Mt. Amiata volcanic district, the Mesozoic carbonate reservoir exposed in the Mt. Labbro area, and the studied travertine deposits. Travertine plateaus occur at Saturnia, Poggio Semproniano, and Poggio i Piani. The northernmost travertine deposit corresponds to the huge fissure ridge cropping out in the Semproniano village. (B) View of the fissure ridge travertine extensively exposed below the fortress of the Aldobrandeschi family (tenth Century) in the Semproniano village. The host units are represented by the Pliocene deposits belonging to the post-orogenic depositional cycle. (C) The central part of the fissure ridge (Semproniano) is characterized by a thick vein of banded travertine consisting of a rhythmic sequence of centimeter-thick crystallized levels of sparry calcite. (D) The banded travertine (Semproniano) is mainly oriented NW-SE and characterized by high dip values (see the stereoplot; stereographic projection, Schmidt net, lower hemisphere). (E) Sub-horizontal, bedded travertine exposed in the south-western flank of the fissure ridge (Semproniano). (F) Detail from the bedded travertine (Semproniano) with peculiar fabric defined by lamination, shrubs, and karst-dissolution cavities.

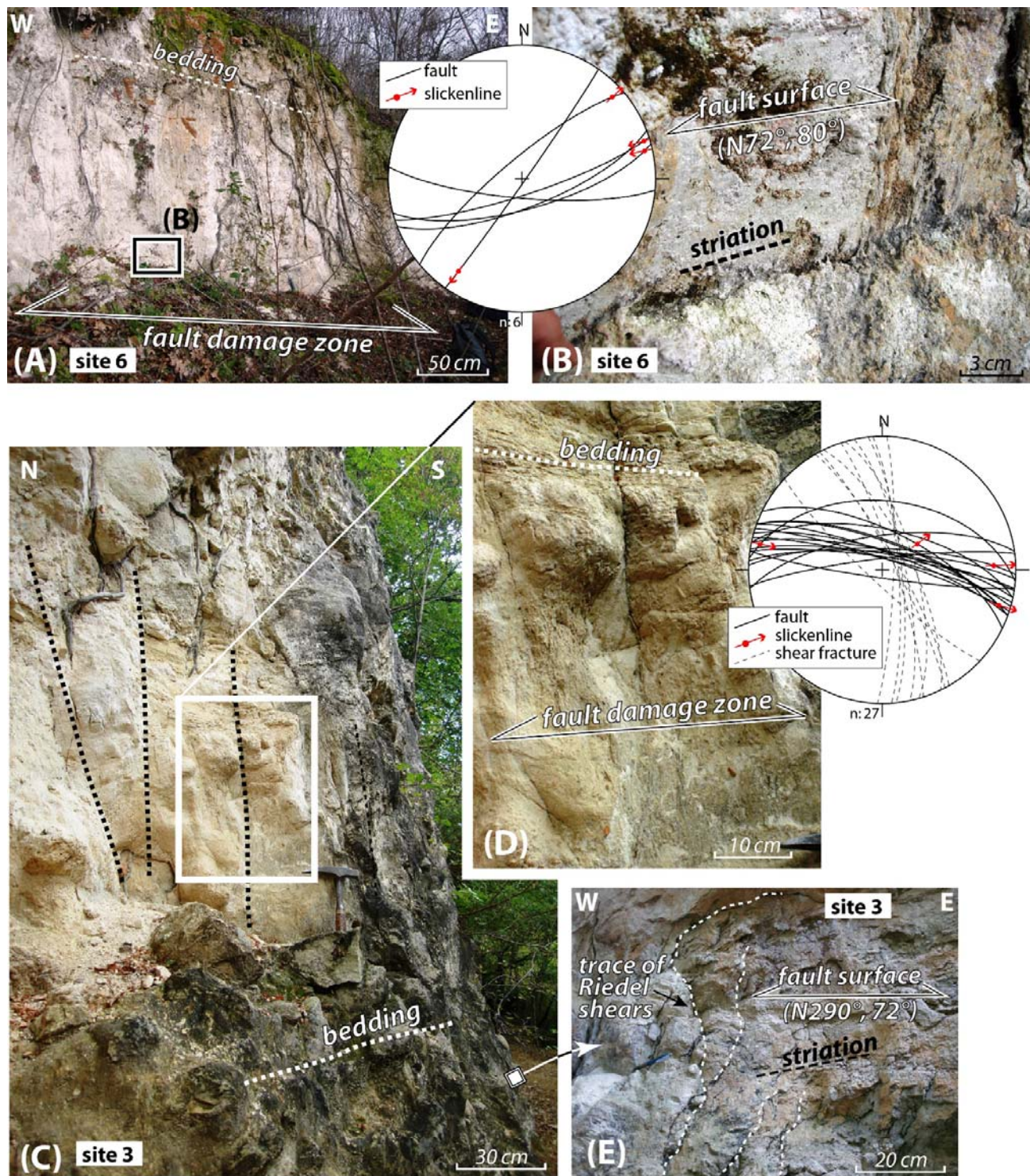




**Figure 6** - (A) Panoramic view of the Poggio Semproniano travertine plateau lying on top of the Plio-Quaternary marine deposits and bounded, toward the east, by a major N-S-striking extensional fault. In the fault footwall, the Scaglia Toscana Fmt. (belonging to the Tuscan Nappe) is exposed. (B) Sub-horizontal, meter-thick bedding of the

travertine deposit forming the plateau of Poggio Semproniano. (C) Close-up view of the bedded travertine occurring at Poggio i Piani. (D) Bedded travertine exposed within the abandoned quarry of the Pian di Palma locality. The travertine deposit is characterized by sub-horizontal beds affected by karst cavities. (E) Travertine terraces with active deposition from  $\text{CaCO}_3$ -rich thermal waters near the public thermal center in Bagni di Saturnia. (F) Recent fossil travertine waterfalls near Saturnia.

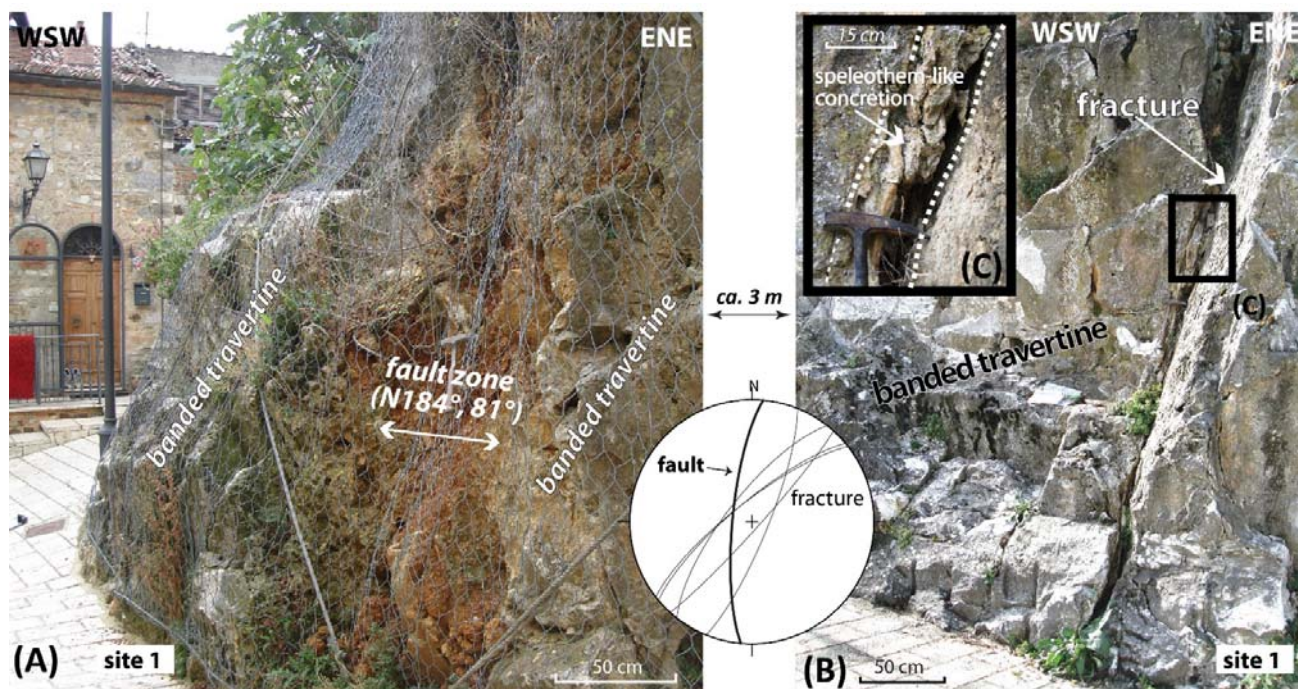




**Figure 7** - E-W-striking right-lateral strike-slip faults affecting the bedded travertine at (A-B) Poggio Pancotta and (C-E) Poggio Semproniano. (A) At Poggio Pancotta, a meter-wide fault damage zone and narrowly-spaced (in the order of a few decimeters) fault surfaces occur within the travertine deposit. (B) Fault surfaces are equipped with oblique- to strike-slip striations (pitch is generally higher than 160° or lesser than 20°; see the stereoplot). (C) The fault damage zone across travertine beds at Poggio Semproniano is characterized by highly-dipping surfaces (see the stereoplot). (D) Meter-wide fault cataclastic bands consisting of severely fractured travertine blocks and decimeter-spaced fault surfaces. (E) Fault systems include curvilinear shear surfaces making an angle of 20–25°

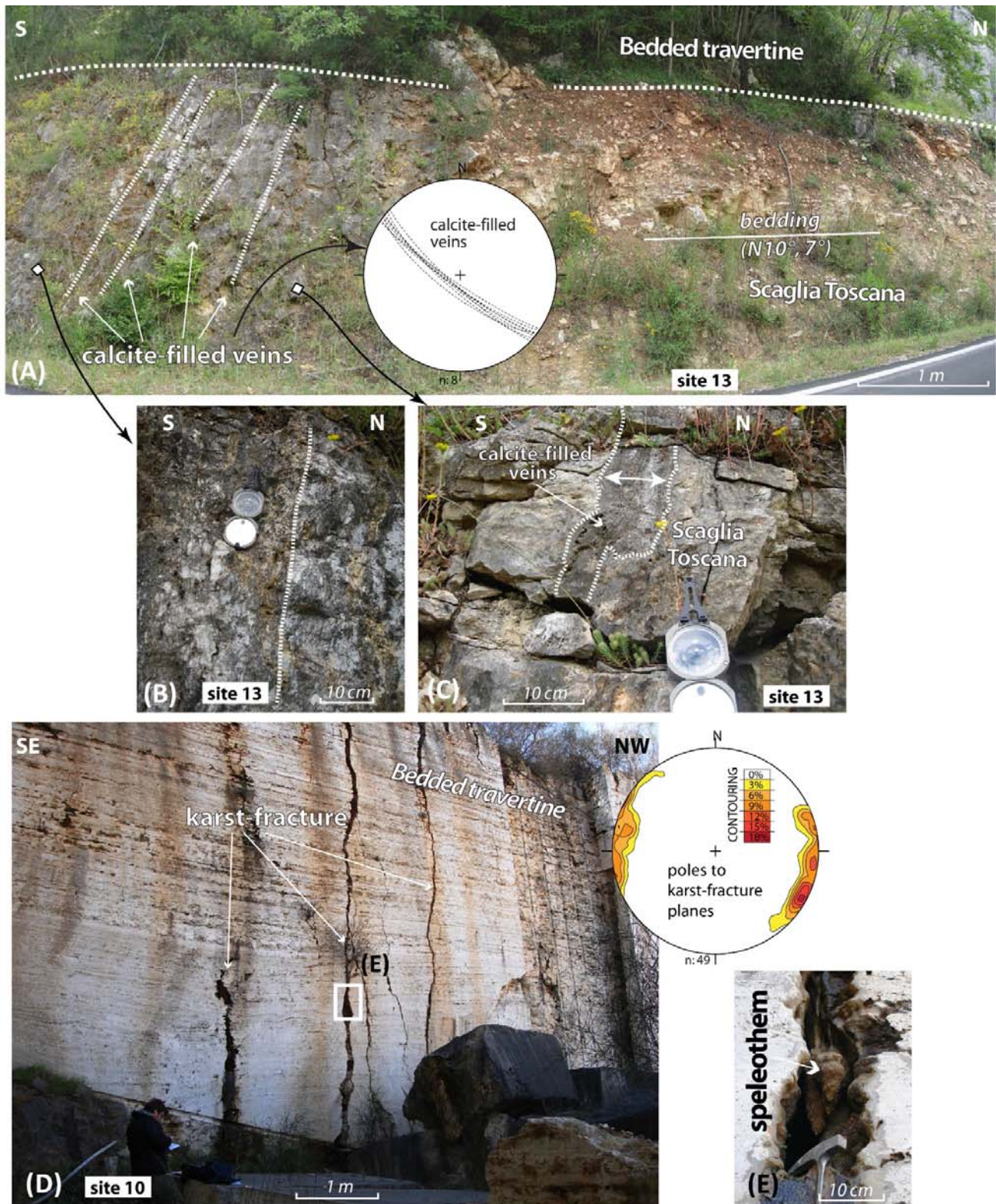
with the strike of the main fault surface and interpreted as Riedel shears within a right-lateral strike-slip kinematic structure. Arrows of slickenlines in stereoplots indicate hangingwall movement.





**Figure 8** – (A) N-S-striking fault across the banded travertine of the Semproniano village. The fault is characterized by a half-meter-wide damage zone. (B) NE-SW-striking fractures, correlated to the N-S-striking fault, cut through the banded travertine. (C) Fractures are filled by speleothem-like concretions. Geometrical relationships between fault surface and speleothem-filled fractures suggest left-lateral shear (see the stereoplot, stereographic projection, Schmidt net, lower hemisphere).

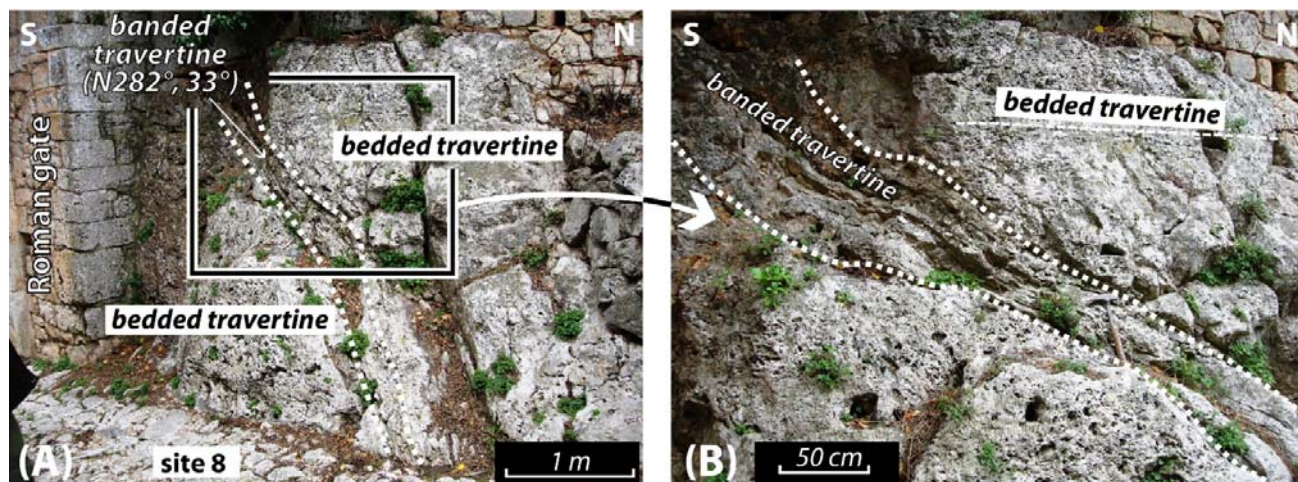




**Figure 9** – (A) Set of calcite-filled steep veins cutting through the sub-horizontal Scaglia Toscana units lying below the bedded travertine of Poggio Semproniano. The veins strike NW-SE and dip toward the SW (see the stereoplote, stereographic projection, Schmidt net, lower hemisphere). These features consist of both (B) centimeter-thick monogenic calcite-filled veins and (C) decimeter-thick rhythmic layering of white-and-grey levels. (D) NNE-SSW-striking (see the stereoplote, stereographic projection, Schmidt net, lower hemisphere) karstified fractures across



bedded travertine exposed in the I Pianetti quarry. (E) Close-up view of the previous photograph showing a speleothem occurring within a karstified fracture.



**Figure 10** – (A) Banded-bedded travertine relationships observed in the Saturnia travertine plateau near the Roman gate (Saturnia village, site 8). (B) A decimeter-thick banded travertine cross-cuts the sub-horizontal bedded travertine (Saturnia village, site 8).