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3D fracture pattern in the Fiastrone anticline, Sibillini thrust sheet, Northern Apennines (Italy).

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Structural stratigraphic and environmental variables interact to determine the type, frequency, and attitude of folding-related deformation structures in fault-related folds. These deformation structures in turn exert a first-order influence on the migration and accumulation of fluids in reservoirs within thrust wedges. Because of this, understanding the genetic relationships of folding-related deformation structures is of importance for both academic and industrial purposes.

In this work we analyse deformation structure data from the Fiastrone anticline of the Northern Apennines (Italy). The anticline consists of a homogeneously dipping (30-35˚) backlimb, a wide flat crest and a steeply dipping up to overturned forelimb. In this anticline, we collected 4432 structural data in 325 field analysis sites and in different mechanichal units. Data include extensional fractures, pressure solution cleavages, and faults. Extensional fractures are at high angle to bedding, striking both parallel (i.e. longitudinal) and perpendicular (i.e. transverse) to the fold axis. Fault data mainly include normal faults striking parallel to the fold axis. Pressure solution cleavages include stratabound elements at high angle to bedding striking about parallel to the fold axis. Longitudinal fractures and normal faults mainly locate in the fold crest, while the longitudinal cleavage locates in the fold limbs. Such a distribution strongly suggests a syn-folding origin for the deformation pattern in the Fiastrone anticline.