

## Supplemental informations-Photos



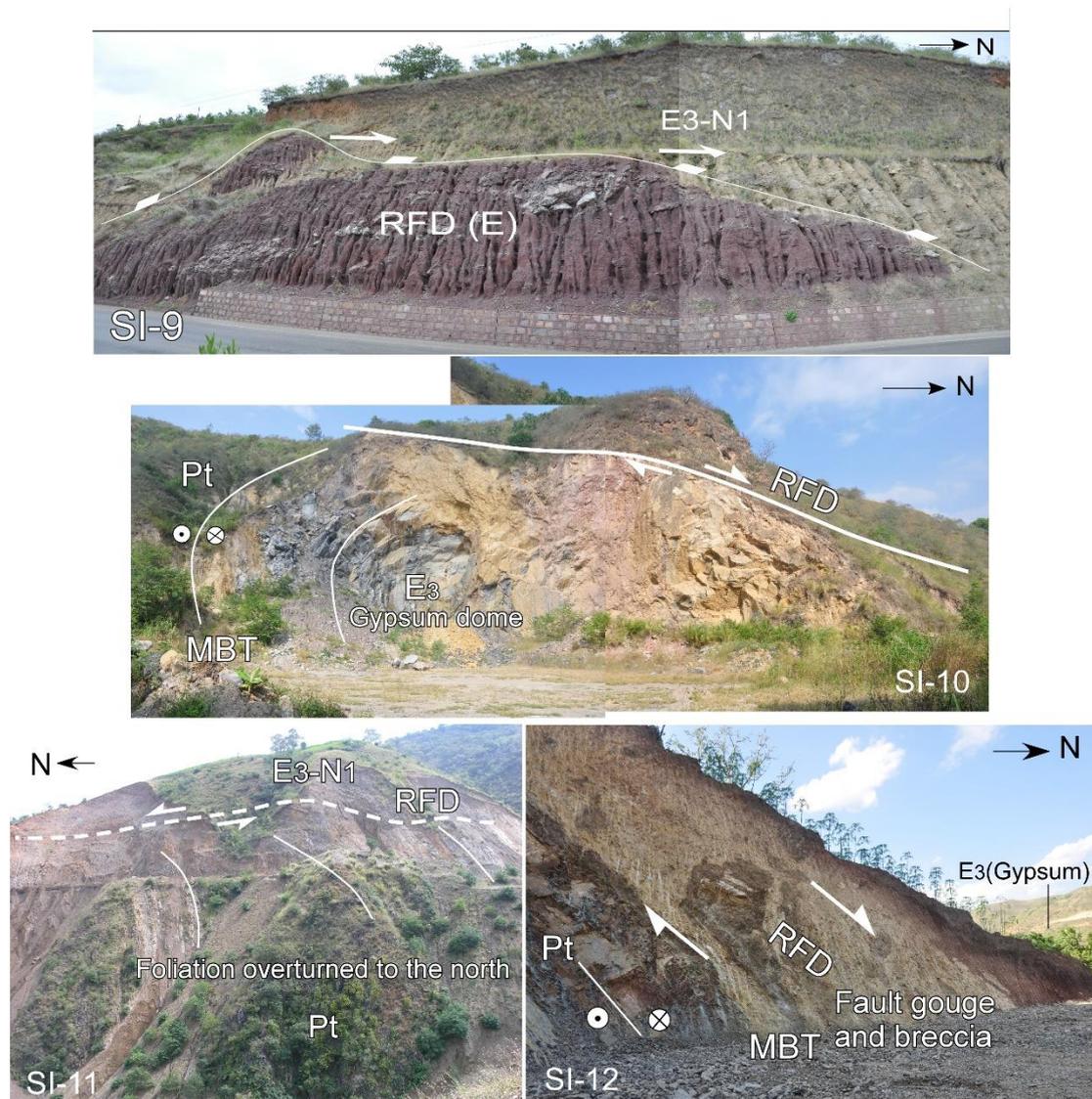
**SI-5a:** View west at the range-front detachment (RFD) fault, juxtaposing the Lengdun growth strata to the hanging wall and the Wubang Breccia to the footwall, 2000 m southwest of Dawenti.

**SI-5b:** View west at the Range-front detachment (RFD), dividing the Lengdun Conglomerate to the hanging wall and the fault itself is bent to the north as a result of its top-to-north shear and the none-rigid deformation the Wubang Breccia (E).

**SI-6:** View east at the Wubang Breccia, dividing the Lengdun Conglomerate to the hanging wall along its northern boundary fault, 500 m north of Nansha. Note that the fault is covered by undeformed alluvial deposits, presumably of Middle to Late Quaternary age, indicating the fault is no long active since then, 2000 m east of the Nansha.

**SI-7:** Photograph of the RFD fault, dividing the Lengdun Conglomerate to the hanging wall and the Wubang Breccia to the footwall, 2000 m south of Hongguang; see Fig. 2 for the location.

**SI-8:** View west at the Red River valley. The boundary of the Wubang Breccia with the Lengdun Conglomerate, dipping north at a low angle ( $25^\circ$ ), defined as the RFD fault. The isolated mountain in the background is composed of limestone of Triassic age, which bounds the Lengdun Conglomerate along the unconformity, dipping to the south at  $75^\circ$ , 1000 m east of Nansha.



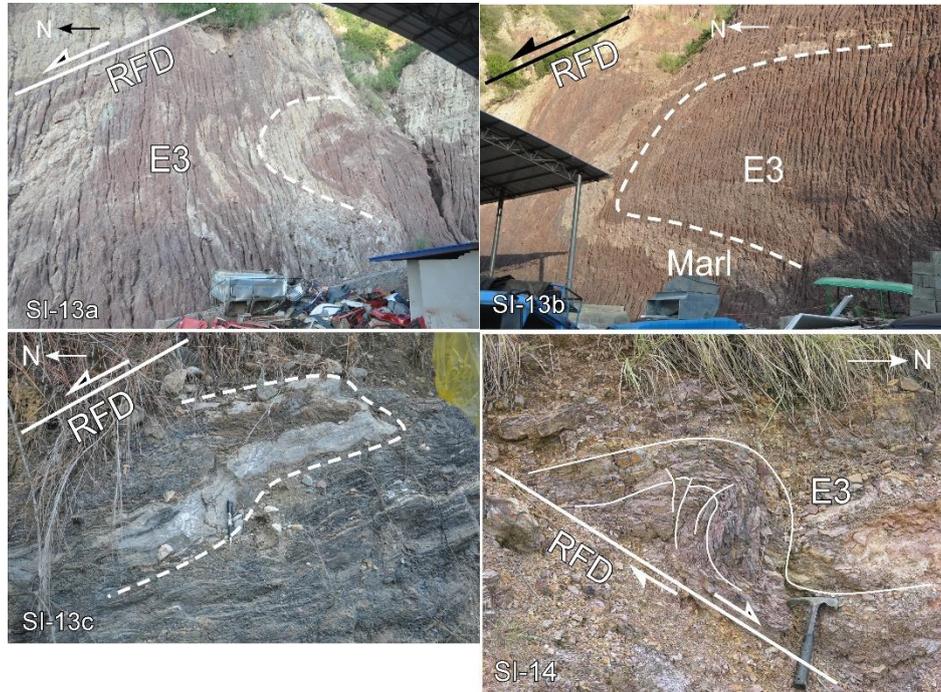
**SI-9:** View north at the RFD, dipping to the north at low angle, defined by the Wubang Breccia, dividing the Lengdun Conglomerate to the hanging wall, 2000 m west of Lengdun.

**SI-10:** View west at the boundary fault between the Wubang Breccia and mylonite (MBT), which is bent to the north, placing the mylonite on the gypsum dome and the latter is bent to the north consistently, 2000 m south of Lengdun.

**SI-11:** View southeast at the northern slope of the Ailao Shan, along which the Lengdun Conglomerate overlaps the mylonite along the RFD, formed as a

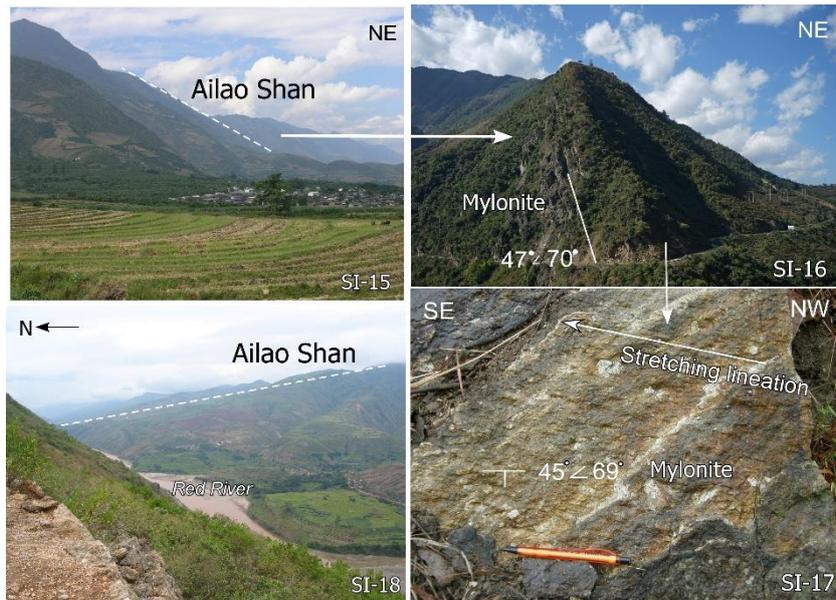
growth fault, and the mylonite underneath is bent to the north, in the area 1000 m south of Nabing.

**SI-12:** View west at the boundary fault between the Wubang Breccia and mylonite (MBT), which is cut by a wide zone of fault gouge and breccia, designated as RFD, in the town of Nansha.



**SI-13a–13b-c:** Outcrop views of the Wubang Breccia, showing a series of gypsum and marl layers folded along a fold axis overturned to the north along their upper boundary fault, assigned to the RFD fault, 3000 m east of Nansha.

**SI-14:** Close-up view of the Wubang Breccia, which is folded and decoupled by a N-dipping low-angle normal fault, assigned to the RFD fault, 3000 m west of Honghe.



**SI-15:** Side view of the NE edge of the NW segment of the Ailao Shan metamorphic belt, featured by a series of triangular facets.

**SI-16:** View looking NW at the mylonite triangular facet bounding the NE edge of the Ailao Shan shear zone, located 5 km northwest of Gasa. Foliations of the mylonite on this facet dip to the NE at  $65^\circ$ .

**SI-17:** Close-up view of a foliation exposed along the triangular fault facet in SI-16 showing that foliations display stretching lineation plunging to the northwest at  $20^\circ$ .

**SI-18:** View southeast at the southern flank of the Big Band of the ARSZ, present with low topographic relief, in contrast with that of the NW segment of the ARSZ.



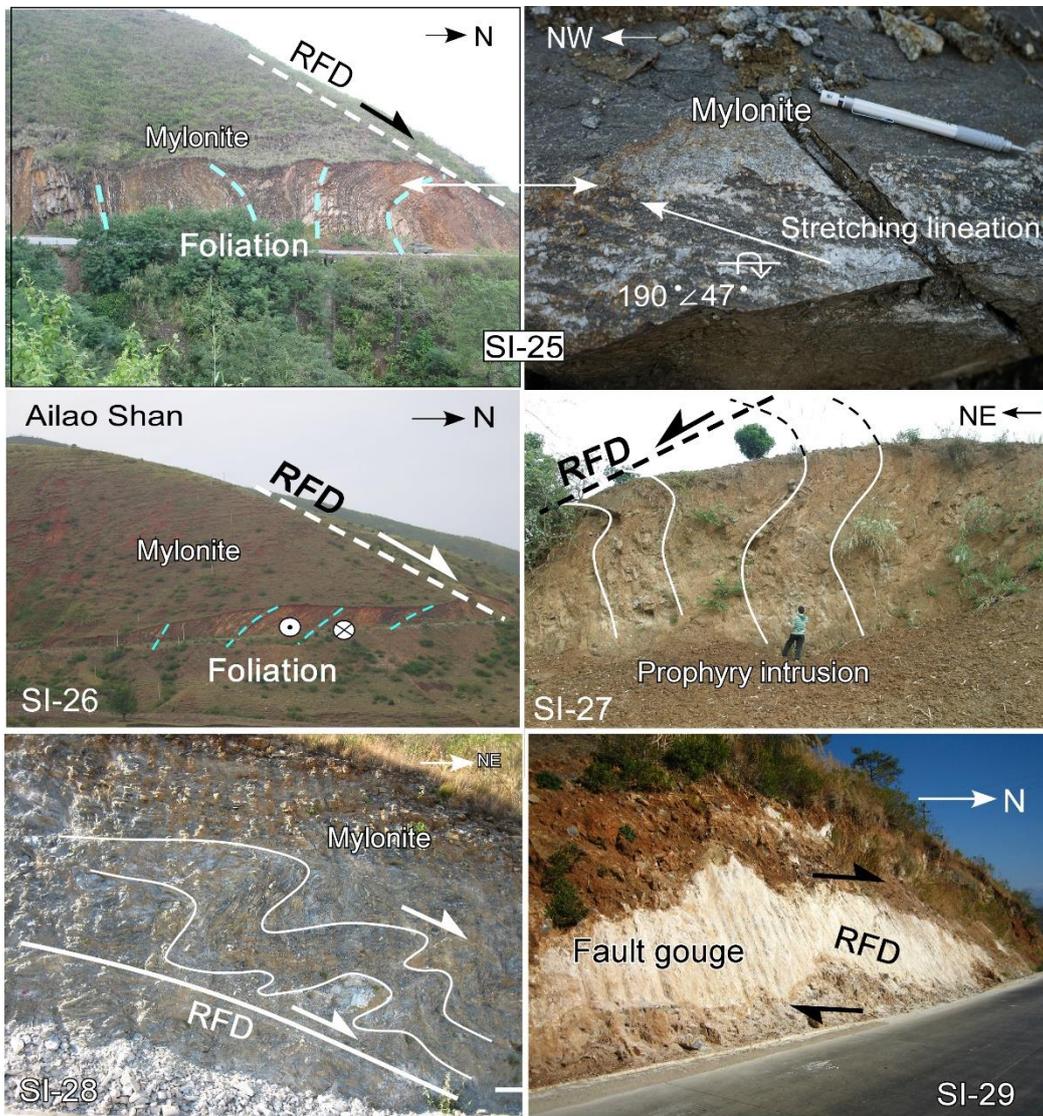
**SI-19:** View south of the S-dipping foliation exposed along the northern edge of the Ailao Shan, displaying subhorizontal stretching lineation, in the area 2000 m west of Nabing.

**SI-20:** View north of the SW-dipping foliation (originally interpreted as a thrust fault) of the Ailao Shan mylonite cropping out along its northeast edge, which bears the subhorizontal stretching lineation plunging to the NW at a 20° angle, in the Nabing area.

**SI-21 and SI-22:** View northwest at the NE edge of the Ailao Shan metamorphic belt, showing the outward bending of the mylonite bearing the subhorizontal stretching lineation and the top-to-the north shear sense along the northern slope of the Ailao Shan (RFD fault), in the area 200 m northwest of Nabing.

**SI-23 and SI-24:** View west at the mylonite exposed along the northern edge of the Ailao Shan mylonite belt, with the foliation bending to the north,

displaying subhorizontal stretching lineation and showing top-to-north shear sense, 2500 m west of Nanbin.



**SI-25:** View west at the mylonite cropping out along the NE edge of the Big Band, showing the foliation bending to the north, but the lineation remains subhorizontal, 3000 m southwest of Nanbin.

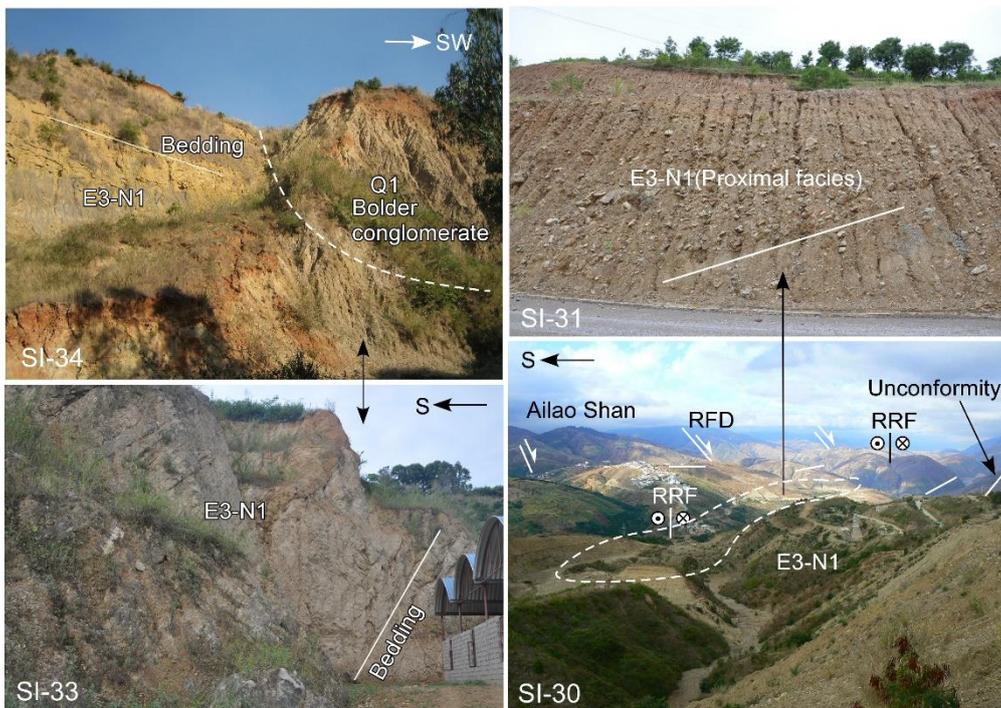
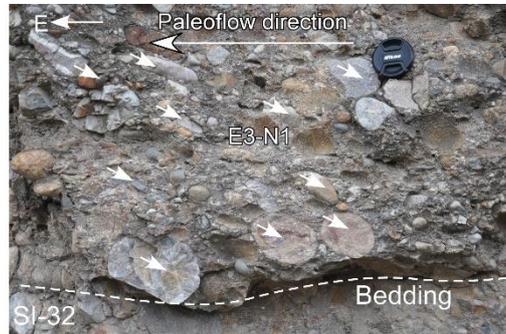
**SI-26:** View west at the northern edge of the Ailao Shan, showing the foliation of the mylonite being consistently bent to the north and the top-to-north shear, 4000 m west of Honghe.

**SI-27:** View east at a porphyry intrusion, intruded along the boundary between the Lengdun Conglomerate and mylonite belt, with the cleavages consistently bent to the north, showing the top-to-north shear.

**SI-28:** View west of the RFD fault that extends into the northern margin of the mylonitic belt, along which the mylonite are decoupled and folded,

overturned to the north, showing top-to-north shear; 5000 m southwest of Honghe.

**SI-29:** View north of the fault gouge and breccia, which marks the northern continuation of the detachment fault in SI-28, confined within the mylonite.



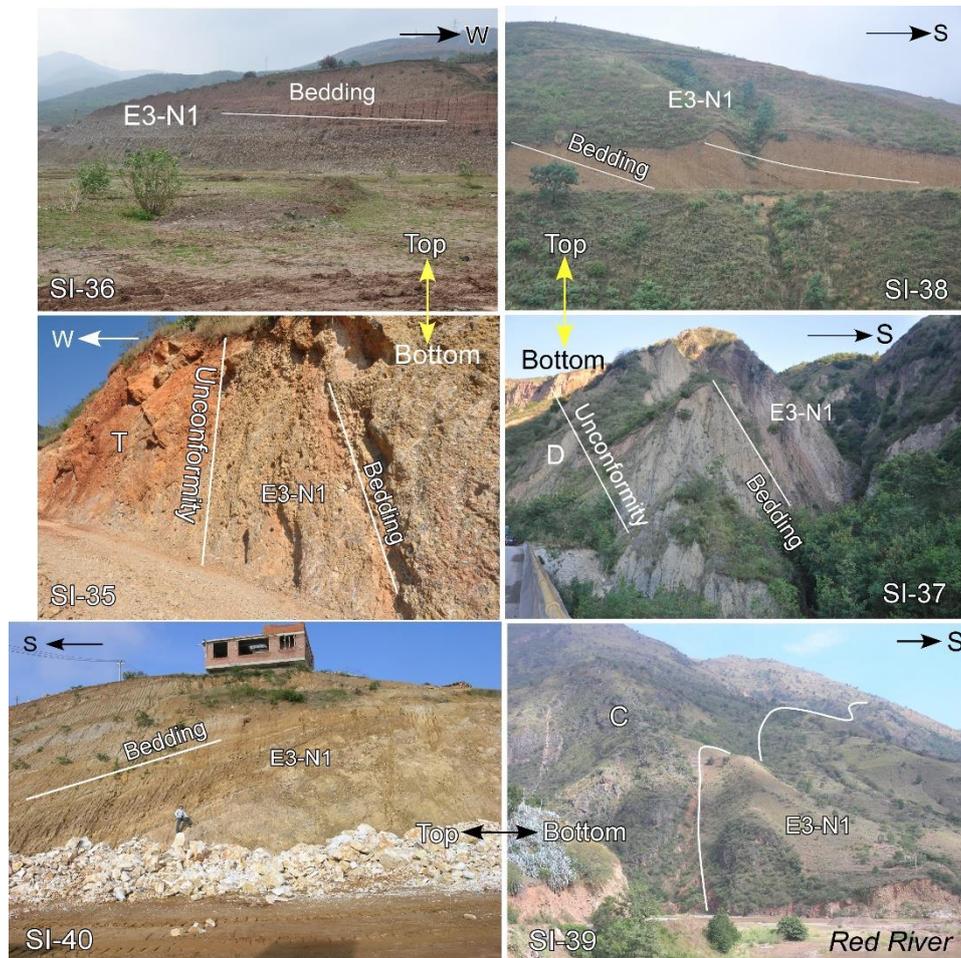
**SI-30:** View west at the Red River valley, floored by the Lengdun Conglomerate, which dips to the west with dipping angle decreasing upward.

**SI-31:** Coarse-grain conglomerate bearing crystalline detritus, probably proximal facies, exposed to the surface along the Red River fault.

**SI-32:** View south at the Lengdun Conglomerate cropping out in the central part of the succession, present with numerous flat pebbles consistently dipping to the west, from where the paleoflow came, located in an area 5 km west of the town of Honghe.

**SI-33:** View northwest at the basal part of the Lengdun Conglomerate, dipping to the southwest at a high angle, 3000 m south of Hongguang, see Fig. 2 for location.

**SI-34:** View south at the upper part of the Lengun Conglomerate, characterized by fine-grain lacustrine deposits, dipping to the south at a low angle against the mylonite, showing the feature of growth strata with SI-33. They are covered by the bolder conglomerate of Early Quaternary age in the Manfei area; see Fig. 2 for the location.

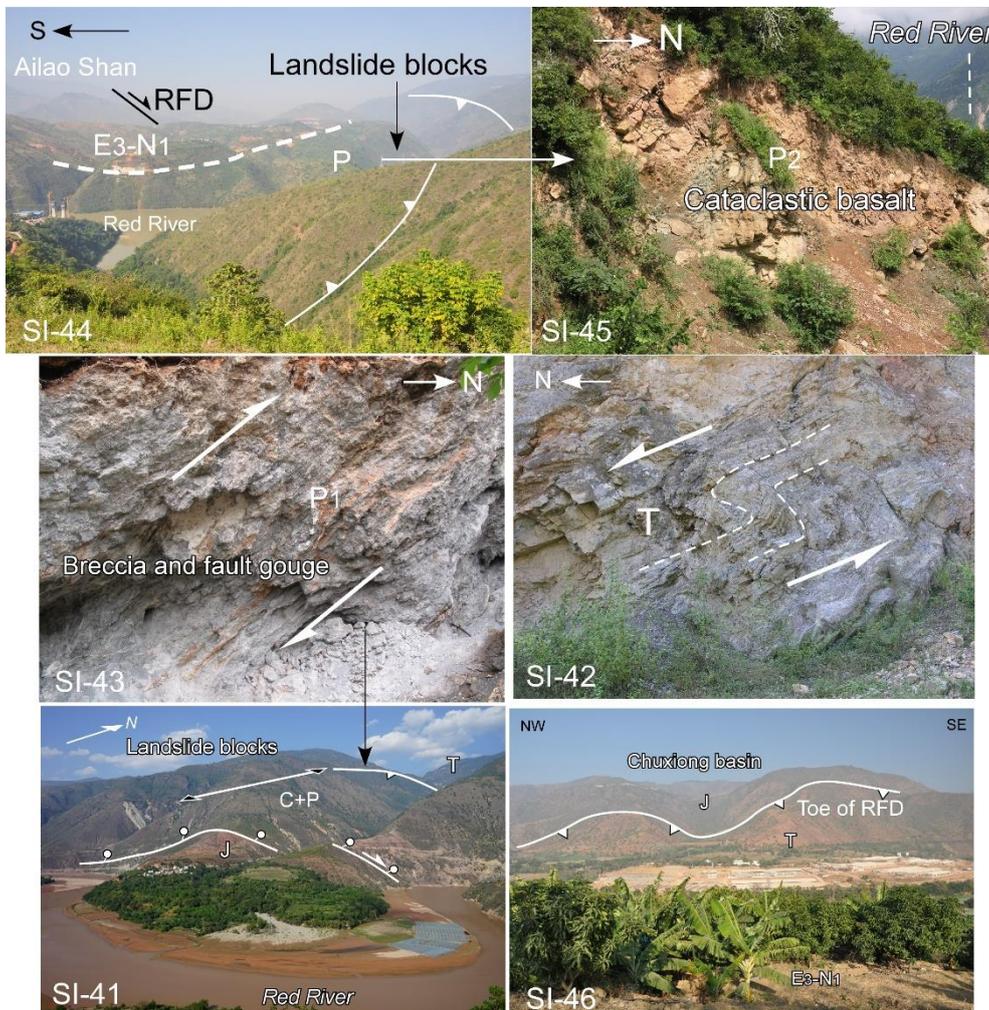


**SI-35 and SI36:** View north at the Lengdun Conglomerate, with its basal part consisting of limestone breccia dipping to the south at  $\sim 70^\circ$ , and, moving to the south, the top part, the fine-grade fluvial deposits (view to the south) dip to the south at  $10^\circ$ , characteristic of upward fining growth strata, 5000 m north of Lengdun.

**SI-37 and SI-38:** View east at the coarse-grain basal part of the Langdun Conglomerate overlying limestone of Devonian age at  $70^\circ$ ; the fine-grain upper part dips to the south  $20^\circ$  against the mylonite, defining an upward fining syntectonic sequence, 10 km east of Honghe.

**SI-39 and SI-40:** View east at the northern flank of the Red River valley, along with the Langdun Conglomerate (E3-N1), dipping to the south at  $70^\circ$ , with the dipping angle decreasing upward to  $15^\circ$  (with the bedding shown by

the blue line), characteristic of upward fining growth strata, in the town of Honghe.



**SI-41:** View north at the northern flank of the Red River valley, present with high topographic relief, which is underlain by a series of crustal fragments of Late Paleozoic and Triassic age. The Permian rocks underlain by Jurassic red beds along a N-dipping normal fault, which are interpreted to be the landslide blocks, dropped down from the Ailao Shan mylonitic belt in the Nabing area.

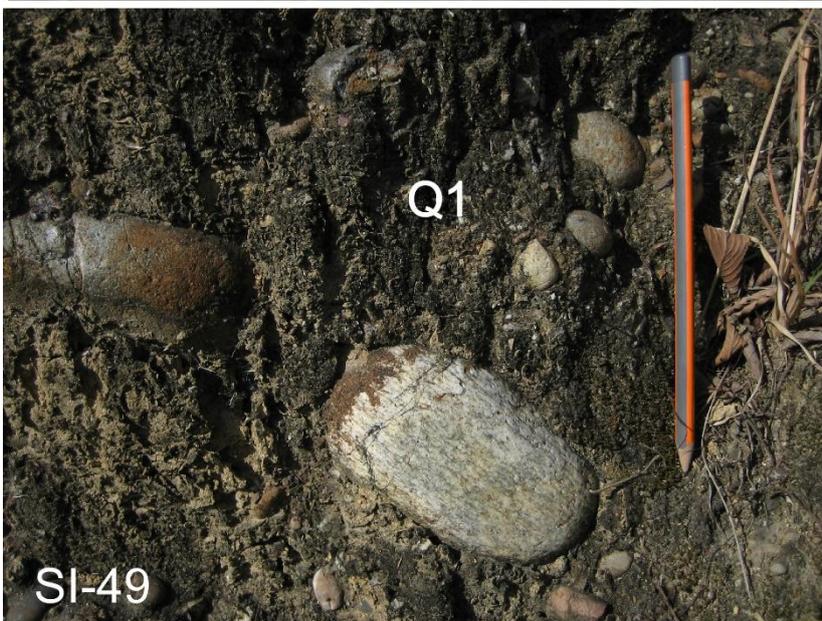
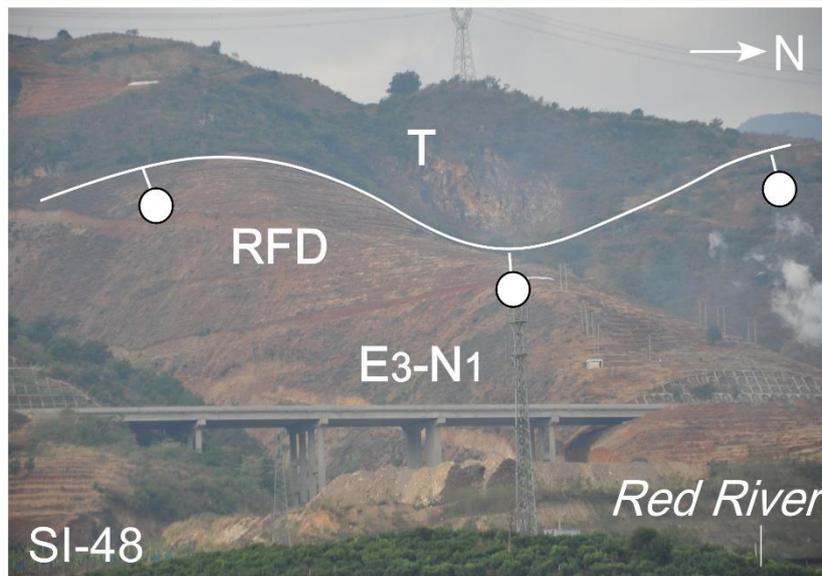
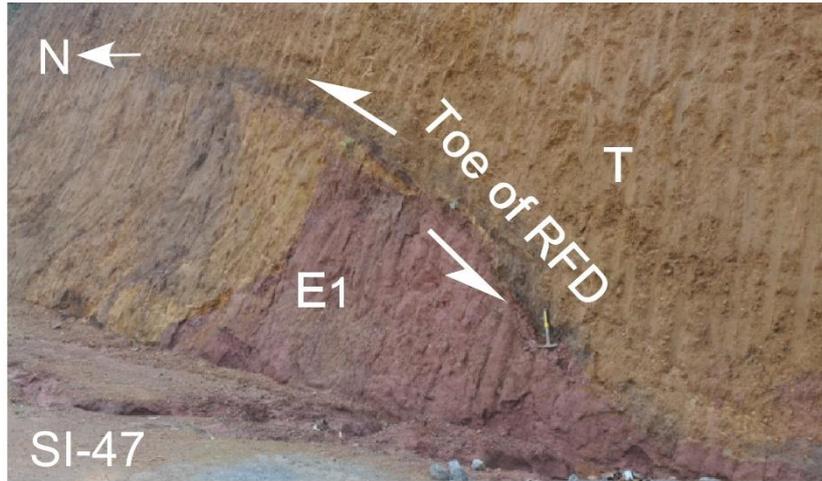
**SI-42:** Outcrop view of the Permian limestone that experienced down-slip deformation along the normal fault on the hanging wall of the Jurassic rocks (SI-41) in the area north of Nabing.

**SI-43:** Close-up photograph of the breccia and fault gouge, which mark the northern boundary fault of a large landslide block, probably the toe of the normal fault in SI-41.

**SI-44:** View west at the Red River valley, showing an isolated hill in the center of the valley (Fig. 3E–F, underlain by Permian rock on the north and the Lengdun Conglomerate on the south; the former is considered to be a part of the massive landslide block, 5 km north of Nansha.

**SI-45:** Close-up view of the Permian rocks in SI-44, which are brecciate, in contrast with the overlying Lengdun Conglomerate.

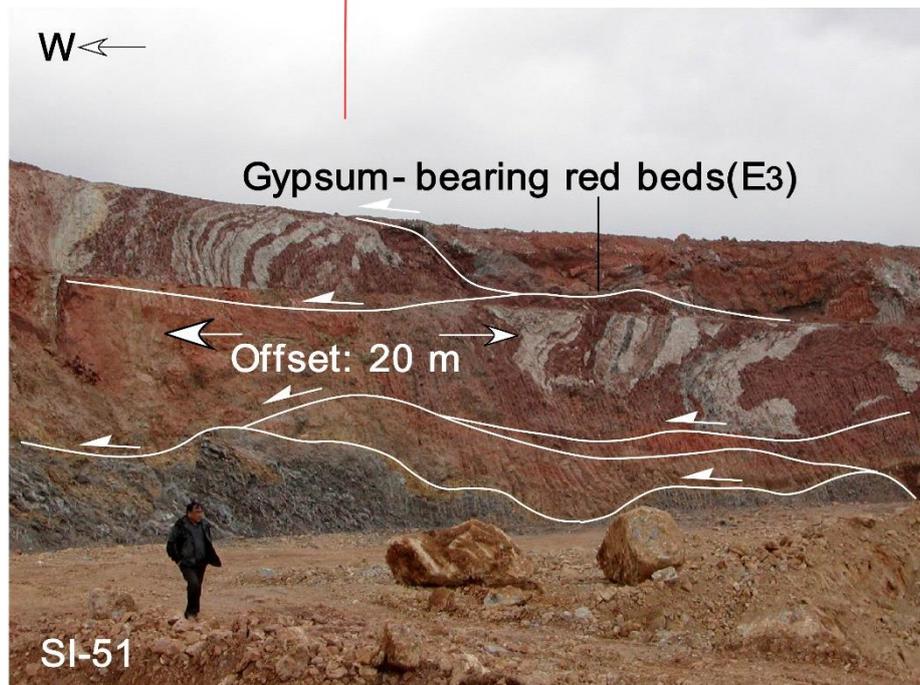
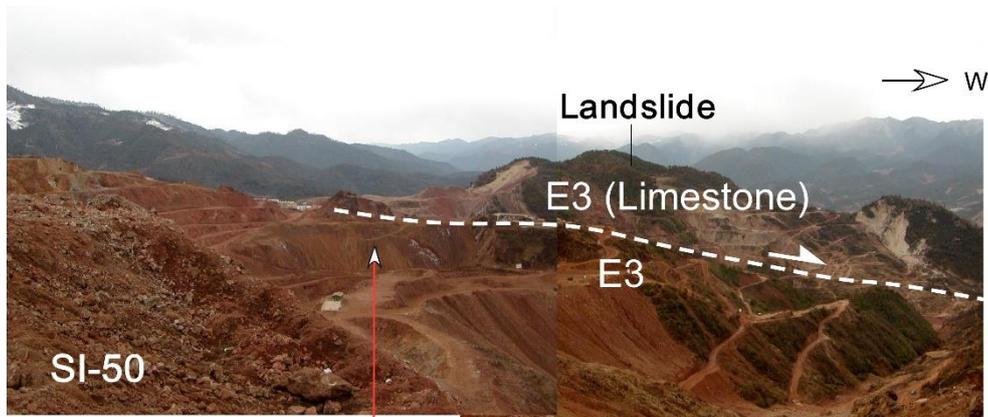
**SI-46:** View north at the northern boundary thrust fault (The tow of the RFD) of the anticline holding up the Lengdun Conglomerate in the Masha area, dividing the Triassic rocks to the hanging wall and the Jurassic rocks to the footwall.



**SI-47:** Close-up view of the northern boundary fault (The tow of the RFD) of the southern rim of the Yangtze block, placing the Triassic clastic rocks (Landslide block) northward on the Eocene red beds.

**SI-48:** View south at the southern flank of the Ailao Shan, where the Lengdun Conglomerate is separated from the mylonitic belt by a strip of limestone of Triassic age, probably a landslide block.

SI-49: Close-up view of the bolder conglomerate of early Pleistocene age, standing as the highest terrace within the Red River valley.



**SI-50:** Distal view of a landslide block broken into a series of pieces, comprising limestone of Triassic age; their down-slip movement to the west was accommodated by the underlain Eocene red beds and the contained gypsum layers were deformed into many recumbent folds overturned to the west, acting as a lubricant, 3 km southeast of the town of Lanping.

**SI-51:** View to the west at the outcrop of the Oligocene red beds within the Lanping area of the Landping–Simao basin (see Fig. 7 for the location). These rocks are strongly sheared into fault gouge and breccia and the contained gypsum layers are deformed into a series of rootless folds overturned to the

west, showing the direction of movement of the overlying landslide blocks; the location is the same as that in SI-49.