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Sedimentological features and thermal maturity signature of the upper Triassic Streppenosa and Noto Formations, source rocks in the Hyblean Plateau (SE Sicily, Italy)

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The upper Triassic Streppenosa and Noto Formations are considered the main source rocks of the Hyblean Plateau in south-eastern Sicily, that represents the present-day deformed foreland of the Sicilian fold-and-thrust belt. This work focusses on the Upper Triassic Streppenosa and Noto Formations, penetrated by the Eureka 1 onshore well (south-eastern Sicily, Italy) in order to constrain the burial-thermal history of this basin of the western Tethys. According to previous paleogeographic reconstructions, starting from Norian, the palaeogeographic scenario consisted, moving from north to south, of a wide carbonate platform (Sciacca Fm.), adjacent to two different domains: the euxinic lagoon/basin of the Noto Formation, and, to the south, the basin of the Streppenosa Formation. Eureka 1 well is located in the inner portion of the platform-basin system and its Triassic succession consists of alternation of black shales and micritic, microbial dolomitic laminated limestones. A detailed description of the sedimentological facies from cores samples has been performed together with detailed organic petrography/Raman spectroscopy and clay mineralogy on fine grained sediments to assess thermal maturity of the Streppenosa and Noto Fms. The main facies consist of light-grey limestones (wackestone-mudstone) with scattered sub-angular intraclast, light grey finely laminated limestones, dark grey-black laminated mudstones, brownish undulated algal laminae saturated with bitumen. The cores are often bitumen saturated and interrupted by different sets of open microfractures, veins filled with calcite, and stylolites (parallel and vertical with respect to lamination) that may enhance and/or inhibit at places the fluid flow. Concerning thermal maturity, the studied interval falls in the lower-mid portion of the oil window, with robust agreement among the geothermometers derived from the three adopted techniques.