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INTEGRATED PROVENANCE EVALUATION OF THE CRETACEOUS SEDIMENTARY RECORD IN THE UPPER MAGDALENA VALLEY BASIN: IMPLICATIONS IN THE NORTHERN ANDES TECTONIC EVOLUTION

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The Cretaceous evolution of the Northern Andes of Colombia has been related to modifications in the subduction angle and the convergence vectors, as well as the accretion of exotic terranes, which resulted in fluctuations among contractional, extensional, and neutral tectonic regimes (Cooper et al., 1995; Parra et al., 2012; Horton et al., 2018). One of the major Cretaceous tectonic switches in the Colombian Andes includes the transition from Early Cretaceous extension to compression during the onset of the Andean Orogeny at 90 Ma (Bayona, 2018; Cardona et al., 2020; Zapata et al., 2019). Furthermore, between 80 and 60 Ma took place the collision of the Caribbean Plateau, which marked another period of compression, major topographic growth, and foreland sedimentation. The tectonic inferences on Cretaceous evolution of Colombian Andes have been based on regional or local stratigraphic observations (Pardo et al., 2020; Villamil, 1993; Zapata et al., 2019), however, the magnitude and along-strike variations of the Cretaceous tectonic phases are still open research question.

We have performed stratigraphic and field mapping in the Cretaceous strata preserved in the southwestern Upper Magdalena Valley. Field relations reveal an angular unconformity between the Cretaceous and the underlying Jurassic volcanic rocks of the Saldaña Formation. Five Cretaceous sedimentary units with contrasting facies were recognized: Caballos Formation, mostly composed of quartz-rich sandstones and mudstones with plane-parallel lamination. The Villeta Group that conformably overlays the Caballos Formation is made of fine-grained black carbonated sandstones and mudstones also with planar-lamination and interbedded with wackestones. The Olini Group and Tabla Formation conformably overlaying the Villeta Group. The former is composed of lites with



plane-parallel lamination while the Tabla Formation includes massive fine-grained quartz-rich sandstones. Finally, the Seca Formation is characterized by cross-laminated lithic-rich sandstones interbedded with massive red claystone.

The Jurassic to Cretaceous unconformity suggests the existence of a significant tectonic event for this interval and implied that the Jurassic units were positive relief and potential source area during the Early Cretaceous, associated to an extensional regime. The quartzose character of the Caballos Formation could indicate a climatic control during the sedimentation and several sedimentary cycles. The Villeta and Olini Groups features show distal and quiet sedimentation with marine influence between ~100 to 85 Ma, and likely lower topography around the basin, these units could indicate a tectonic “quiescence” stage during the Early Upper Cretaceous. The quartzose character of the Tabla Formation could be also related to intense weathering and sedimentary recycling, probably associated with mild exhumation during the initiation of the Late Cretaceous tectonic compression. This was followed by an enhanced exhumation marked by the increase in the lithic fraction of the Seca Formation, these latest shifts could be related to compressional phases and a major topographic growth during Andean Orogeny at Latest Cretaceous.

Additional petrographic, geochronological, and thermochronological data will be obtained aiming to understand the provenance, sedimentation, burial, and exhumation history of these units, thus, a more precise reconstruction of the timing, magnitude, and areal distribution of these Cretaceous events in the Upper Magdalena Basin.