



Closing and continentalization of the South Pyrenean Foreland Basin (NE Spain) and its impact on basin fill trends and thrust-belt evolution

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The South Pyrenean foreland basin (NE Spain) is a particular case among the alpine foreland basins because it was limited by active margins that underwent sufficient uplift to cause isolation of the basin from the open ocean. The continentalization of the basin was preceded by a phase of progressive restriction of its marine connections, leading to precipitation of relatively thick salt deposits in two distinct depocentres. This study presents new magnetostratigraphic results from a set of composite sections across the marine to continental sediments of the central part of the SE margin of the Ebro basin. Integration with existing marine and continental biochronological data allows a robust correlation with the geomagnetic polarity time scale. The resulting absolute chronology ranges from chron C20n to chron C12r (Lutetian to Rupelian), and yields an interpolated age of ca. 36.0 Ma (within chron C16n.2n) for the youngest marine sediments of the eastern Ebro basin. This age is in concordance with a reinterpretation of earlier magnetostratigraphic data from the western South Pyrenean foreland basin, and indicates that continentalization of the basin occurred as a rapid and isochronous event. The basin continentalization, determined by the seaway closure that resulted from the uplift of the western Pyrenees, was probably coincident with a mid-amplitude eustatic sea level low with a minimum at 36.2 Ma. The base level drop that followed the basin closure and desiccation does not appear associated to a significant sedimentary hiatus along the Ebro basin margins, suggesting a late Eocene shallow marine basin that rapidly refilled and raised its base level after the seaway closing. Rapid basin filling following continentalization predates the phase of rapid exhumation of the Central Pyrenean Axial Zone at 35.0 to 32.0 Ma determined from thermochronologic data. It is possible then that sediment aggradation at the front of the fold-and-thrust belt and burying of the most external active structures could have contributed to a decrease in the taper angle, triggering growth of the inner orogenic wedge through break-back thrusting and underplating. Contrasting sedimentation trends between the western and eastern sectors of the South Pyrenean foreland indicate that basin closing preferentially affected those areas subjected to sediment bypass towards the ocean domain. As a result, sediment ponding after basin closure is responsible for a two-fold increase of sedimentation rates in the western sector, while changes of sedimentation rates are undetected in the more restricted scenario of the eastern Ebro basin.