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Are carbonates from the India-Asia collision remagnetized ?

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Widespread carbonate rocks from the Tibetan plateau have been extensively used to constrain terrane paleolatitudes involved in the India-Asia collision. However, their reliability in preserving a primary magnetization has been recently put into question. A transformation of pyrite to magnetite has been recently proposed as a cause for late re-magnetizations in Paleocene Tethyan Himalaya carbonates (1) and late Triassic carbonates from the Qiantang (2), thus discarding such Characteristic Remanent Magnetizations (ChRM) for tectonic purposes. We have re-examined the paleomagnetic data obtained on late Triassic carbonate rocks from the Qiantang. Our SEM observations indicate pristine pyrite in non-weathered carbonate rocks. Optical microscope observations in reflected light demonstrate that pyrite, when it is weathered, is transformed to iron hydroxides minerals but not to magnetite. This is at odds with previously proposed pyrite to magnetite transformation hypothesis mainly based on interpretations of Scanning Electron Microscope data (SEM/EDS). We thus interpret the ChRM more likely related to an early diagenetic magnetization of Late Triassic age. Knowing that the arguments put forward for a remagnetization of Triassic carbonates are the same as those proposed for the remagnetization of Paleocene carbonates, the ChRM in some Paleocene carbonates could also be of early diagenetic origin. However, there is also a growing number of studies where remagnetization is obvious in the Tethyan Himalaya and undetected remagnetizations (3) are likely the cause of the large differences in the estimation of the size of Greater India. These examples show the urgent need to publish the complete demagnetization dataset in an open database like MAGIC or the FAIR data initiative from (4) in order to reassess previous interpretations if we want to solve problems like the size of Greater India and hypothesis like the Greater India basin.

(1) doi:10.1002/2016JB013662 ; (2) doi:10.1016/j.epsl.2019.06.035 ; (3) doi:10.1016/j.epsl.2020.116330; (4) doi:10.1029/2019GC008838.