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Diagenetic effects on magnetic minerals in Holocene lacustrine sediments core from Huguangyan maar lake, southeast China

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Grain size, rock magnetic and geochemical investigations on the entire core, as well as SEM observations and XRD analyses for representative samples were carried out on a Holocene sediment core from the deep part of Huguangyan maar lake (HGY), southeast China. The pristine magnetic mineral assemblage of the studied core has been profoundly modified by post-depositional reductive diagenesis. The studied core can be divided into three subsections based on down-core variations of the average grain size (MZ), total organic carbon (TOC), terrestrial elements (Al, Ti, Fe and Mn), and abundance and composition of magnetic minerals. The uppermost subsection has the lowest MZ values and TOC contents , but the highest detrital mineral input. Detrital magnetite is the main magnetic mineral in the uppermost subsection, which suggests minims of diagenetic modification of detrital magnetic minerals. The intermediate subsection is characterized by relatively higher MZ values and TOC contents, but relatively lower detrital mineral input compared to the uppermost subsection. The abundance and mineralogy of magnetic minerals in the intermediate subsection indicates progressive down-core dissolution of detrital magnetite, concomitant formation of authigenic siderite and iron sulphides, and hence a sustained down-core diagenetic modification of detrital iron bearing mineral assemblages. The lowermost subsection has the highest MZ values and TOC contents, but the lowest detrital mineral input. Detrital magnetite becomes scarce or absent at certain positions in the lowermost subsection, and gives way to authigenic iron sulphides and siderite. Complete dissolution of detrital magnetite and preservation of authigenic ferrimagnetic greigite in the lower part of the studied core could complicate or compromise palaeomagnetic studies. The studied core have undergone more severe diagenetic modification than two previously studied cores form relatively shallower part of HGY. It appears that relatively higher TOC content, lower detrital matter content, calmer sedimentary environments, and less DO at the water-sediment interface for the studied core generated by its relatively deeper sampling position all contribute to its relatively stronger post-depositional reductive diagenesis. Thickening of the upper two subsections with increasing water depth is resulted from increasing sedimentation rate with increasing water depth.