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Neoproterozoic Glacial Event and Its Geological Significance in the North Margin of Qaidam Basin

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The Neoproterozoic low-latitude glacial event is one of the important geological events in the period of geo-history,which triggerd a series of academic problems,such as Precambrian BIF-iron deposits,the ocean oxygenation,formation of cap carbonate,effect on early biological evolution and transformation of sulfur isotopic composition,etc.The Neoproterozoic sedimentary succession in the north margin of Qaidam Basin is represented by the Quanji Group,which sporadically crops out at Oulongbluq, Shihuigou, Quanjishan and Dameigou areas.The Quanji Group is divided into 7 formations,in stratigraphic order,the Mahuanggou, Kubaimu, Shiyingliang, Hongzaoshan, Heitupo, Hongtiegou and Zhoujieshan formations. In this paper,on the basis of detailed field geological survey of the Quanji Group in the north margin of Qaidam Basin,three glaciations can be found in Mahuanggou,Kubaimu and Hongtiegou Formations,respectively.Mahuanggou Formation Tillite also retains its glaciation structures such as striation,polished clasts and melanges,etc.This ablation moraine is interpreted as unloading products of terrigenous clastics carried by glacial melt-water.Based on the description of glacial depositional features and analyzation of sedimentary structure formation mechanism,the depositional model of “Iceberg-Iceriver” is established.This tillite was deposited in the early Neoproterozoic after the Jinning Orogeny,the isotopic chronology data shows that the formation time is about 800∼740Ma,it is probably equivalent to the Kaigas glaciation.Kubaimu Formation Tillite preserves the traces of ice rafting and wave action,which belongs to glacialmarine sedimentary environment.Through the description and analysis of characteristics of aquatillite crops out at Quanjishan and Dameigou areas,the depositional model of “Proglacial Littoral” is established.The discovery of ferruginous sandstone on the aquatillite indicates an iron enrichment event during Neoproterozoic.Combined with the previous chronology data and its relationship with BIF,it can be concluded that this glacial deposit was the product of Sturtian glaciation during the first global glacial period.By comparing glacial events,it is suggested that the Mahuanggou-Kubaimu Formations should be incorporated into Qingbaikou Period.Hongtiegou Formation stratigraphic sequence retains glacial ground moraine,ablation moraine and proglacial tidal deposit.Moreover,dropstones and striated clasts are widely distributed which indicate a glacialmarine sedimentary environment.Isotopic chronological evidence shows that the the formation time is about 590∼575Ma,and the accompanying cap carbonate demonstrates that this glacial deposit correspond to Gaskiers glaciation.According to the analyzation of the Neoproterozoic glacial event in the north margin of Qaidam Basin,it may provid new possibilities on regional stratigraphic correlation and plate affinity.