For extreme wave climates after a snowball Earth, implications of experimental giant ripples

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Giant ripples were experimentally generated under the long-period wave conditions produced by our new circular flume. These occur at the same stratigraphic position within Precambrian rocks and attract attention as an evidence of sustained, extreme winds driven by rapid climate change after termination of the Marinoan glaciation (Allen and Hoffman, 2005). Quantitative estimation of environmental properties using these structures is complicated by the fact that some relationships between the fluid flow, sediment transport and bed topography are not unique. The relationship between ripple topography and sediment supply and the growing dynamics of giant ripples were experimentally examined. Sediment supply disturbs the growth of ripples and makes the crests of ripples round. Giant ripples are never generated directly from flat bed. One of these is formed by amalgamation of small ripples. The time scale of the small ripple generation is the order of minutes but the giant ripple amalgamation is hours. The results enable to estimate possible successions including giant ripples. The comparison between these artificial successions and the real Precambrian successions leads better reconstructions of paleoenvironment after the break-up of a snowball-Earth's global ice cover.

Allen and Hoffman (2005) Extreme winds and waves in the aftermath of a Neoproterozoic glaciation. Nature, 433, 123-127.