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TITLE: Linking continental-slope failures and climate change: Testing the clathrate gun hypothesis

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ABSTRACT:

Research Article| January 01, 2004 Linking continental-slope failures and climate change: Testing the clathrate gun hypothesis Mark Maslin; Mark Maslin 1Environmental Change Research Centre, Department of Geography, University College of London, 26, Bedford Way, London WC1H 0AP, UK Search for other works by this author on: GSW Google Scholar Matthew Owen; Matthew Owen 1Environmental Change Research Centre, Department of Geography, University College of London, 26, Bedford Way, London WC1H 0AP, UK Search for other works by this author on: GSW Google Scholar Simon Day; Simon Day 1Environmental Change Research Centre, Department of Geography, University College of London, 26, Bedford Way, London WC1H 0AP, UK Search for other works by this author on: GSW Google Scholar David Long David Long 2British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA, UK Search for other works by this author on: GSW Google Scholar Geology (2004) 32 (1): 53?56. <https://doi.org/10.1130/G20114.1> Article history received: 08 May 2003 rev-recd: 19 Sep 2003 accepted: 22 Sep 2003 first online: 09 Mar 2017 Cite View This Citation Add to Citation Manager Share Icon Share Facebook Twitter LinkedIn MailTo Tools Icon Tools Get Permissions Search Site Citation Mark Maslin, Matthew Owen, Simon Day, David Long; Linking continental-slope failures and climate change: Testing the clathrate gun hypothesis. Geology 2004;; 32 (1): 53?56. doi: <https://doi.org/10.1130/G20114.1> Download citation file: Ris (Zotero) Refmanager EasyBib Bookends Mendeley Papers EndNote RefWorks BibTex toolbar search Search Dropdown Menu toolbar search search input Search input auto suggest filter your search All ContentBy SocietyGeology Search Advanced Search Abstract It has been suggested that the release of clathrates rather than expansion of wetlands is the primary cause of the rapid increases observed in the ice-core atmospheric methane record during the Pleistocene. Because submarine sediment failures can involve as much as 5000 Gt of sediment and have the capacity to release vast quantities of methane hydrates, one of the major tests of the clathrate gun hypothesis is determining whether the periods of enhanced continental-slope failure and atmospheric methane correlate. To test the clathrate gun hypothesis, we have collated published dates for submarine sediment failures in the North Atlantic sector and correlated them with climatic change for the past 45 k.y. More than 70% by volume of continental-slope failures during the past 45 k.y. was displaced in two periods, between 15 and 13 ka and between 11 and 8 ka. Both these intervals correlate with rising sea level and peaks in the methane record during the Bølling-Ållerød and Preboreal periods. These data support the clathrate gun hypothesis for glacial-interglacial transitions. The data do not, however, support the clathrate gun hypothesis for glacial millennial-scale climate cycles, because the occurrence of sediment failures correlates with Heinrich events, i.e., lows in sea level and atmospheric methane. A secondary use of this data set is the insight into the possible cause of continental-slope failures. Glacial-period slope failures occur mainly in the low latitudes and are associated with lowering sea level. This finding suggests that reduced hydrostatic pressure and the associated destabilization of gas hydrates may be the primary cause. The Bølling-Ållerød sediment failures were predominantly low latitude, suggesting an early tropical response to deglaciation, e.g., enhanced precipitation and sediment load to the continental shelf or warming of intermediate waters. In contrast, sediment failures during the Preboreal period and the majority of the Holocene occurred in the high latitudes, suggesting either isostatic rebound?related earthquake activity or reduced hydrostatic pressure caused by isostatic rebound, causing destabilization of gas hydrates. You do not have access to this content, please speak to your institutional administrator if you feel you should have access.

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