[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CC Cryospheric Sciences & Cold District Environment

[A-CC29]Ice cores and paleoenvironmental modeling

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Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Analyses of ice cores from polar and mountain regions have contributed to the reconstruction and understanding of the past environmental changes on timescales from years to several hundred thousand years. In this session, we welcome paleoenvironmental studies using ice cores and paleoclimatic modeling. Studies on reconstruction methods, recording processes and new paleoenvironmental proxies, technical aspects of paleo-modeling are also welcomed. Studies with marine sediment cores, terrestrial sediment cores and tree-rings on similar timescales are also important and welcomed, in order to discuss past environmental changes from multidisciplinary viewpoints.

[ACC29-P11]Iron fertilization and atmospheric CO2 change during Heinrich event: a model study

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Keywords:ocean carbon cycle, glacial-interglacial cycle, iron cycle, ocean biogeochemical model

Weakening of the Atlantic Meridional Overturning Circulation (AMOC) during Heinrich events was often accompanied by the atmospheric CO_2 increase of 10−20 ppm over 1000 years (Ahn and Brook, 2008). However, previous modeling studies display conflicting atmospheric CO_2 responses to an AMOC shut down. Recent paleoproxy records suggest that dwindling iron fertilization by dust in the Southern Ocean can also explain millennial-scale CO_2 oscillations (Martínez-García et al., 2014). In this study, we investigate the response of atmospheric CO_2 to changes in ocean circulation and dust-borne iron supply using numerical models. In associate with the AMOC weakening from 26 Sv to 6 Sv, the atmospheric CO_2 decreases by 0.5 ppmv over 1000 years. Combining AMOC weakening and decrease in dust-borne iron supply, the atmospheric CO_2 increases by 16 ppm over 1000 years. Reduction in export production associated with dwindling iron supply in the Southern Ocean release carbon from the deep sea, contributing to the rise of atmospheric CO_2. Reduction in export production also increases dissolved oxygen in the Antarctic Bottom Water, which is consistent with proxy records. Our results support the contribution of changes in dust-borne iron supply to the millennial CO_2 change in the glacial periods.