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Results from IODP Leg 306: Long-term cooling trend in North Atlantic sea-surface temperatures during the last 5 Ma

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In the early Pliocene global surface temperatures were several degrees warmer than today and ice sheets in the Northern Hemisphere had a limited extent [e.g., *Haywood et al.*, 2005; *Zachos et al.*, 2001]. This changed during the intensification of Northern Hemisphere glaciation (INHG) between 3.4 and 2.5 Ma (with a major step around 2.7 Ma), when global climate cooled and ice sheets in the Northern Hemisphere became more extensive [e.g., *Zachos et al.*, 2001].

Here we present results from the first orbitally resolved ($\sim$ 4 ka resolution) record of $U^{k'}_{37}$ based sea-surface temperature (SST) in the North Atlantic spanning the last 5 Ma. We used samples from the recently drilled IODP Site U1313, which is located in the North Atlantic at 41 ^{o}N and is a re-drill of DSDP Site 607. Our results show that the long-term cooling of SST in the North Atlantic began in the Early Pliocene around 4.1 Ma, which is earlier than previously thought. During the Pleistocene SST continued to cool and at the beginning of the mid-Pleistocene transition (MIS 40) glacial SST show a sudden drop to temperatures comparable to the LGM. At the same time the $C_{37:4}$ alkenone, an indicator for arctic water masses [e.g., *McClymont et al.*, 2008], became more abundant. We relate this to the influence of Arctic waters reaching far into the North Atlantic as the Arctic Front moved south during the peak glacial conditions of the Middle to Late Pleistocene.

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