Quaternary Contourite Drifts of the Western Spitsbergen Margin

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The study of contourite drifts is an increasingly used tool for understanding the climate history of the oceans. In this paper we analyse two contourite drifts along the continental margin west of Spitsbergen, just south of the Fram Strait where significant water mass exchanges impact the Arctic climate. We detail the internal geometry and the morphologic characteristics of the two drifts on the base of multichannel seismic reflection data, sub-bottom profiles and bathymetry. These mounded features, that we propose to name Isfjorden and Bellsund drifts, are located on the continental slope between 1200 and 1800 m depth, whereas the upper slope is characterized by reduced- or non-deposition. The more distinct Isfjorden Drift is about 25 km wide and 45 km long, and over 200 ms TWT thick. We revise the 13 years-long time series of velocity, temperature, and salinity obtained from a mooring array across the Fram Strait. Two distinct current cores are visible in the long-term average. The shallower current core has an average northward velocity of about 20 cm/s, while the deeper bottom current core at about 1450 m depth has an average northward velocity of about 9 cm/s. We consider Norwegian Sea Deep Water episodically ventilated by relatively dense and turbid shelf water from the Barents Sea responsible for the accumulation of the contourites. The onset of the drift growth west of Spitsbergen is inferred to be about 1.3 Ma and related to the Early Pleistocene glacial expansion recorded in the area. The lack of mounded contouritic deposits on the continental slope of the Storfjorden is related to consecutive erosion by glacigenic debris flows. The Isfjorden and Bellsund drifts are inferred to contain the record of the regional palaeoceanography and glacial history and may constitute an excellent target of future scientific drilling.