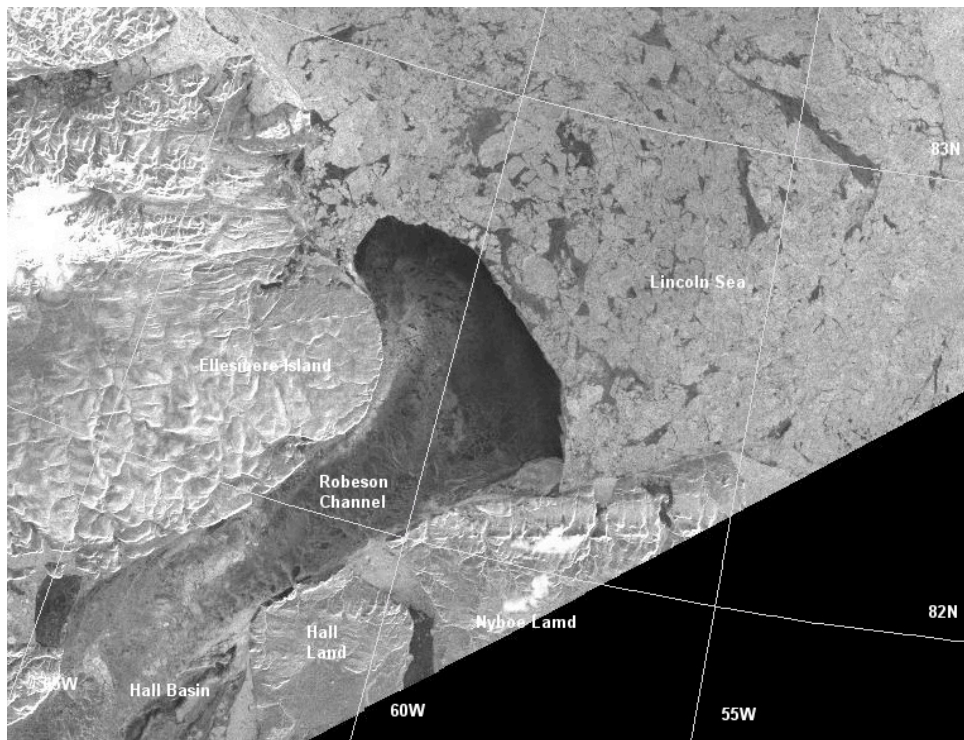


## Lincoln Sea and Nares Strait

The ice situation in the Lincoln Sea and the Nares Strait was controlled to a great extent during this winter by the formation of an arch in the Lincoln Sea extending from the coasts of Ellesmere Island and Northwest Greenland (Nyboe Land). It formed by the end of January 2017 causing a complete stop of drift ice from the Lincoln Sea into the Robeson Channel, see *Figure 1*. During the following months new ice formed below the arch and further down in the Strait drifting mainly along the coast of Ellesmere Island.

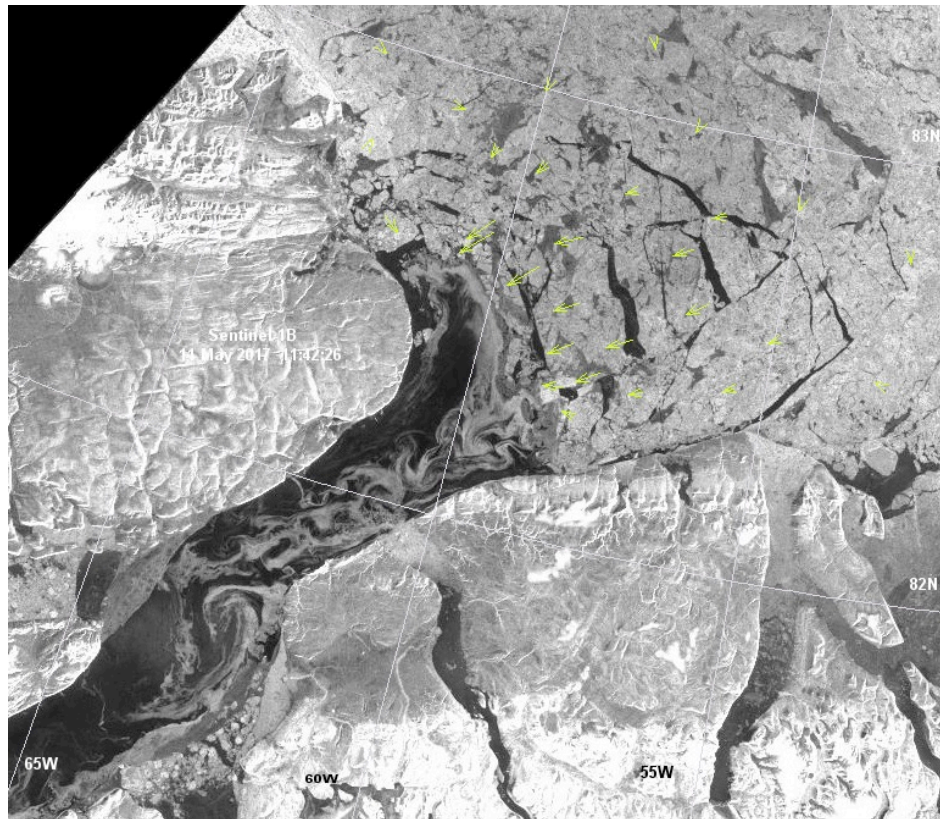


*Figure 1* The arch formed in the Lincoln Sea in the period 27 January to 1 February 2017. This image is part of a scene acquired by the Sentinel 1B on 1 May 2017 13.04.03. Note the difference between the ice canopy west and east of approximately 55°W with the ice west of this longitude being part of the in-flow to the Nares Strait before the formation of the arch.

The arch is mainly formed by small multiyear ice floes linked by new ice formed in the leads. The wider border of the arch does contain rather large areas with new ice. On this basis we concluded that the arch was rather weak and the life time of the arch therefore would be short in comparison with a similar arch that formed in 2009 with a broad edge of closely positioned multiyear floes. It existed from January to July 2009. Our best estimate was therefore that the present arch would exist until 1 June. The estimate was also based on the fact that the weekly average air temperatures were about 5°C higher in the present winter than in the winter 2008-2009. The temperatures were measured on Hans Island in the center of the Kennedy Channel about 200 km south of the entrance to the Nares Strait.

It turned out to be an optimistic estimate since the arch began disintegrating already on 10 May. *Figure 2* of 11 May shows the initial flow of ice toward the Nares Strait with displacements ranging from 0.8 km to 9.9 km within the 23 hours between two consecutive

observations corresponding to 0.9 cm/s to 12 cm/s. Note that the ice in the eastern part of the Lincoln Sea takes part in the drift towards the Nares Strait.



*Figure 2.* Ice drift shortly after the break-down of the arch in the Lincoln Sea 100 days after its formation. Drift vectors represent observations in the 23 hours between on 10 and 11 May 2017. New ice is formed in and south of the Lincoln Sea subject to eddies along the coast of Greenland.

By 1 June 2017 the ice from the Lincoln Sea had drifted more than 250 km south of the Lincoln Sea reaching the Kane Basin subjected to winds that created daily movements of up to 63 km corresponding to 76 cm/s in the northern part of the Kennedy Channel. In this period along-channel wind velocities measured on Hans Island ranged from 14 to 18 m/s. During the last weeks of May 2017 temperatures were near freezing point at Hans Island and on few occasions exceeding that

We expect that the ice drift out of the Lincoln Sea will continue in the month of June with the first multiyear floes reaching the North Water south of the Nares Strait by 15 June and the Strait by then filled with a high concentration of multiyear ice modified by wind that cannot be predicted on this time scale.

It is interesting that by the end of May the Kane Basin in front of the 100-km wide Humboldt Gletscher is almost void of sea ice and that with the positive air temperatures expected to continue will be free of ice until next winter. However, the Humboldt Gletscher is likely to discharge a great number of growlers crossing the Kane Basin towards the Smith Sound.