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Warm Anomalies and Heat Flux Variability in Fram Strait in 1997-2004:

A Comparison between Observations and Model Results

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Since 1997 the volume and heat fluxes through Fram Strait have been monitored by the mooring array located at 78˚50'N. During this period two prominent warming events were observed, associated with a strong increase of the heat flux. The first warm anomaly which had started in autumn 1998 and reached its maximum in summer 1999 doubled the annual mean of heat flux through Fram Strait. This large change was mostly due to the strong increase in the amount of heat carried on by the West Spitsbergen Current. However the temperature rise during the first warming event stood only for the half of the heat flux increase, while another half was caused by the intensification of the northward flow in the WSC. The warm anomaly was found in all branches of the WSC including the recirculation area. After the first warming, the AW temperature in the WSC has been falling down until its relative minimum in winter and early spring 2002. Because the northward volume transport in the WSC remained relatively large, it balanced the temperature drop and the annual means of the heat flux in 2000-2002 were only slightly lower than the maximum in 1999. Since 2002 the volume flux measured in the WSC decreased significantly, mostly due to the weaker northward flow in the outer branch. In winter 2003/2004 the second warming started and during the following spring and early summer the temperature of AW re-

mained relatively high instead to follow the seasonal minimum observed in previous years. This warm anomaly resulted in the increased heat flux in the WSC despite of the relatively low volume transport. Both warming events in 1999 and 2004 can be traced upstream to the Svinoy section at 63˚N with their estimated travel time of *ca* 1.5 year. The substantial increase of the heat flux in the recirculation area due to the stronger flow was also found in last two years. The most likely it can be attributed to the northward shift of the AW recirculating branch, visible in the observed and modelled flow structure. Both warm anomalies as well as the relatively cold intermediary period were adequately reproduced by the model with their timing and strength in a good agreement with the available observations.