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Since the beginning of the week we have experienced true Antarctic conditions. Monday evening the first iceberg crossed our course, and Tuesday morning we reached the first sea ice near the South Sandwich Islands.

This arc of volcanic islands marks the eastern boundary of the Scotia plate, which slowly moves eastward due to the opening of Drake Passage between South America and the Antarctic Peninsula. It overrides the eastern end of the South American plate pushing it down and creating a deep trench of about 8000m depth just east of the South Sandwich Islands. The South Sandwich Trench is one of the deepest places in the world's oceans. In winter the Sandwich Arc is generally a preferred region for a northward expansion of the sea ice.

Also this year the northward expansion was quite large and reduced the speed of the ship considerably. During the following days we steamed through loose pack ice, dispersed by strong southerly winds, which also brought us Antarctic air masses with temperatures around -17°C.

Wednesday evening we started our scientific programme, which will now continue around the clock until Mid-October when we leave the ice again. Amongst other measurements we started to measure the vertical structure of temperature and salinity in the ocean and to take water samples at different depths. These data will be used to determine the heat and fresh-water exchange between the Weddell Sea and the South Atlantic.

The main tool of the oceanographers for this work is the so-called CTD-rosette, which consists of a cylindrical frame with sensors for temperature, salinity, oxygen, and turbidity in its centre. Added is an LADCP (Lowered Acoustic Doppler Current Profiler), which is used to determine the vertical profile of the ocean currents. At its rim, a carrousel of water samplers is fixed, consisting of 20 plastic tubes of 1m length and 20 cm diameter. With a sea cable (max. length is 8000m) the CTD/Rosette is lowered to the ocean floor producing vertical profile of the various oceanic properties. Upon lifting from the ocean floor, the water samplers are closed at particular depths capturing the different water masses, which are then analysed for various tracer concentrations.

The South Scotia Ridge, the investigation area at the moment, is part of an ocean ridge system with a few islands on top, which connects the Antarctic Peninsula and the tip of South America. In general, this ridge prevents the cold and freshly ventilated bottom water from escaping to the north after it has travelled more than 1000 km from its source regions in the southern and western Weddell Sea near the Antarctic continent. However, a few gaps exist, which are up to 3600 m deep. Our work during the previous days was focussed on the South Orkney Passage east of the South Orkney Plateau,

which represents the main gate to allow bottom water at temperatures below -0.4°C and with a thickness of 1500 m to escape into the Scotia Sea with velocities of up to 20 cm per second. Once in the Scotia Sea this water----mass, known as Antarctic Bottom Water (AABW), flows into the deep basins of the Atlantic Ocean and, partly, Pacific Ocean. The influence of AABW in the Atlantic Ocean reaches up to 42°N, which was first recognized by Alexander von Humboldt during his voyage to South America.

With this I would like to close and send best wishes from all participants of the cruise.
Yours Peter Lemke
Polarstern, 60°38’S, 42°36’W