The development of the Scotia Sea resulted from the plate motions of South America and the Antarctic Peninsula since the Oligocene. During the SCAN 2001 cruise we investigated a sector of the central and southern Scotia Sea using swath bathymetry, multichannel and high resolution seismic profiles, together with magnetic field measurements. The objectives of our study were to analyze the influence in sea-bottom processes of the two probably most important bottom water currents of the Antarctic: the Antarctic Circumpolar Current (ACC) and the Weddell Sea Bottom Water (WSBW), the largest source of Antarctic Bottom Water (AABW).

The MCS profiles show an irregular depositional sequence of units about 0.8 s (twt) thick on the top of Layer 2 of the oceanic crust. The units are bounded by large amplitude, continuous reflectors that can be recognized across most of the profiles. These reflectors are conformable or erosional above the underlying deposits and overlain by discontinuous reflectors, which are either conformable or exhibit downlap terminations. The depositional units contain high amplitude, discontinuous internal reflectors with wavy to subparallel internal configuration. Towards the base of each unit, oblique and sigmoid configurations also are observed, which downlap the reflector boundary. The uppermost units exhibit, in addition, a marked cyclic pattern of deposition represented by alternating high and low energy packages of reflectors. The
Seismic characteristics of the uppermost deposits are best observed in the high resolution profiles, which represent a variety of contourite deposits. The contourites occur as sediment drifts, including a contourite fan and sediment waves. Large contourite drifts have elongate-mounded morphology oriented in two predominant directions: N-S in the southern area and NW-SE in the northern area. A drift in the northeastern area has depositional characteristics indicating these two directions. Drift deposits are over 1 s (twt) thick in the center of the drift, above the igneous crust and they have wedge geometry with reflectors converging towards marginal zones of erosion and non-deposition. Several drift deposits are bounded by incised channels in both sides. The dimensions of the drifts range between 100 to 1,400 km². The contourite fan occupies the central area. It is about 80 x 40 km² and elongated in the downslope direction. Sediment wave fields also occur throughout the area. Two types of sediment waves are recognized: large and small-scale waves. Large waves are asymmetric, and they have typical wave lengths of up to 2 km and wave heights of about 75 m, but that may reach up to 150 m. Large waves are observed in wave fields ranging from 20 to 1,500 km². The small waves show a subdued relief and they are characterized by a repetitive pattern of alternating high and low amplitude reflectors.

The contourite deposits are widely spread above the igneous oceanic crust dated at Early to Middle Miocene age and their distribution highlights the importance of AABW production. The opening of seaways around Antarctica not only allowed the development of a strong ACC circumpolar flow, but also triggered a high production of AABW. The WSBW was swept northward into the South Atlantic and it could be a major thermal driver influencing Late Cenozoic circulation patterns, the cooling of the oceans and, as a consequence, the evolution of the world climate.