

## 4. Weekly Report S0226 CHRIMP

At the beginning of week four we moved to the second working area where bathymetric profiles have previously imaged pockmarks of mid-size (typically 3-5 km diameter). As there are no existing seismic images of the subsurface available we ran a reconnaissance 2D seismic survey first. Migrated sections of these lines image a very different sedimentation regime than observed in the previous working area.

The Pockmark field of working area 2 seems to be inactive or of limited modern activity as we did not come across any gas flares in the water column. Images of two different systems of fluid migration pathway were found underneath the seafloor depressions.

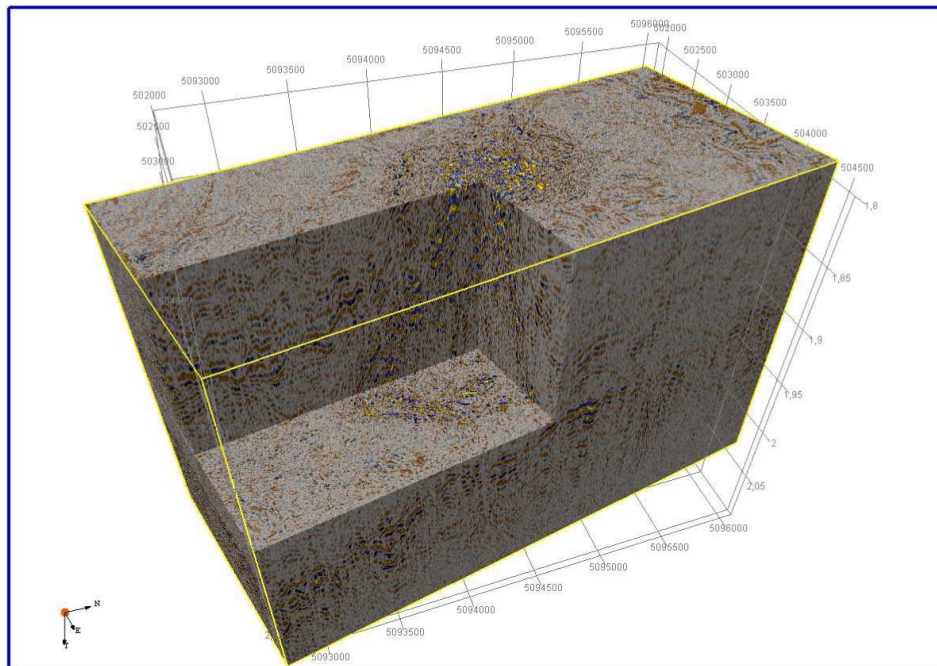
In the first system there are features, which are comparable to what we have observed in the first working area with a radial graben forming the rim of the pockmark and the centre of the pockmark having been eroded down to an interface that can be traced continuously throughout the region. This interface is found at the same depth as the base of the graben. The centre and generally north-eastern parts of the rim have been covered with sediment again and in some areas prominent contourite deposits are imaged. Underneath the rim of the pockmark near vertical faults in the seismic data are interpreted as possible migration pathways for fluid flow.

The second system is characterised by a 250 m wide transparent zone underneath the pockmark. This is interpreted as an ancient feeder channel and can be traced vertically for about 2 km. Reflection events from an interface imaged beneath this vertical channel bend upwards in conical shape at this location. This feature may be completely covered and imaged by the 3-D seismic volume subsequently acquired. The horizon below this interface shows a rough topography but no signs for fluid migration pathways. The top of the feeder channel can be imaged until it intersects with the erosional horizon forming the original base of the pockmark. Infilling sediments involving multiple periods of infill are seen above this erosion surface and are extensively imaged elsewhere in Area 2.

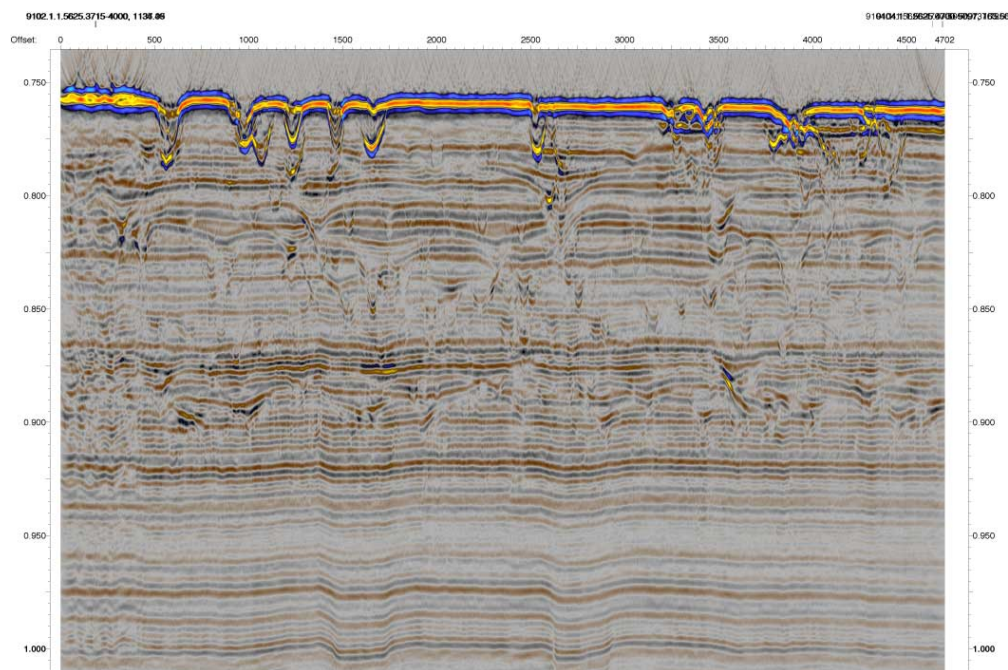
The third working area of the cruise is located in shallow waters (500 m) near the top of the western Chatham Rise. Previous multi-beam bathymetric surveys have mapped a dense distribution of evenly spaced normal size pockmarks (one to two hundred metres diameter). Parasound seismic images from a 2003 RV Sonne voyage show multiple stacks of pockmark layers. Below the penetration of the Parasound, the seismic images collected on this voyage show additional layers of buried pockmarks. No further pockmarks are visible below about 150 metres beneath the seafloor. Unfortunately weather conditions did not allow deployment of additional OBS's at the 3<sup>rd</sup> site. During the evening of the 04 February another low pressure system arrived from the south. Wind and wave state did not allow continuation with any scientific work.

We are looking back on intensive weeks which have provided us a very large data set. The first impressions of the data do not fit to what we have expected. Questions are caused by understanding the context of pockmarks and sedimentation. We need to explain the variability in distribution of the pockmarks along the Chatham Rise. As well it is not obvious how the two different feeder systems lead to similar anomalies of the seafloor topography.

Leg 1 of cruise S0226 will end on 07 February in the port of Lyttleton. Here we will pass on our findings to the following crew. Based on the seismic images collected and maps compiled suitable locations for sampling and detailed observations by sidescan and video are to be identified.



*3D image of the conical lower part of the feeder channel of a pockmark*



*Seismic image of multiple layers of buried pockmarks*



All are doing well on board. With regards on behalf of all participants

*Fiona Rider*