Table 3 Climate data (for 1999) from three sites in the Ross Sea region

Parameter	Scott Base	Marble Point	Bull Pass
Air temperature ° C			
Max.	1	3.5	6
Min.*	<-40	<-40	-53
Mean	-20	-19	-22
Period where air temp. intermittently > 0° C	Mid Dec–early Feb	Early Dec–mid Feb	Early Nov–late Feb
Wind speed ms^{-1}			
Max	27	18	
Min	0	0	
Mean	5	3	
Soil surface temp. ° C			
Max	20	18	28
Min	-45	-40	-56
Mean	-17	-20	-20
Depth to permafrost, P (cm)	30<P<45	45<P<60	45<P<75

* Temperature sensors at Scott Base and Marble Point do not register below -40° C.

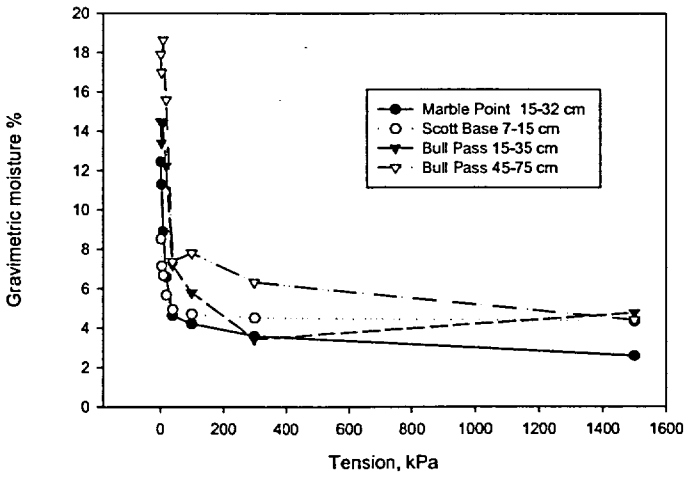
sites. The increased temperature is evident at least to the 20 cm depth.

At the Marble Point site, it is possible that the increased temperature and thermal conductivity in the soil, has, over the 30 years since the spill occurred, led to an increase in the depth to permafrost and lowering, or possibly destruction, of the glacic layer at the contaminated site. Work is continuing to confirm this hypothesis.

Soil hydrophobicity and moisture retention

Some of the oil-contaminated samples displayed weak hydrophobicity (0.2 on the ethanol droplet molarity scale of Carter and Hamilton (1995)) while there was no evidence of hydrophobicity in the control soils at any of the sites sampled. The hydrophobicity of the oil-contaminated sites was unexpectedly low and is not likely to limit moisture penetration into the soil. Moisture retention of control soils (Figure 3) indicates that the soils, in their field moisture content of 1–5 % in the surface 10 cm, are at or below a 1500 kPa tension, thus confirming the limited availability of water near the surface of these soils.

Figure 3 Soil moisture retention for control soils From Scott Base, Marble Point and Bull Pass.



Conclusion

Significant hydrocarbon contamination has been shown to occur at the three sites sampled. Where hydrocarbons accumulate at the soil surface they are contributing to increased soil temperatures during sunny periods. This is likely to be the result of a decrease in surface albedo and an increase in soil thermal conductivity due to the presence of the hydrocarbon material. Work is continuing to elucidate the effects of the hydrocarbons on soil moisture properties.

Acknowledgements

This work was supported by funding from the Foundation for Research, Science and Technology, New Zealand (C09601). Antarctica New Zealand provided logistic