

ACKNOWLEDGEMENTS

You care for the land and water it, you enrich it abundantly. The streams of God are filled with water to provide people with corn, for so you have ordained it. You drench its furrows and level its ridges; you soften it with showers and bless its crops. You crown the year with your bounty and your carts overflow with abundance. The grasslands of the desert overflow; the hills are clothed with gladness. The meadows are covered with flocks and the valleys are mantled with corn; they shout for joy and sing.

Psalm 65 vv.9-13

First of all, I must thank and praise the LORD my God, for guiding me through the last four years, for protecting me, especially at the time of my car crash in Jordan, and for his abundant grace and intimacy during my time in the desert. Our beautiful creation constantly reveals the hand of the LORD and that is no more clearly demonstrated by the intricate nature and processes which occur at the interface between soil, water and atmosphere. This thesis seeks to look into the storehouse of God's knowledge in order to gain His true wisdom.

Second, I must thank my parents and sister Louise, who have supported me with their overwhelming love, in both prayer and financial sacrifice, throughout the past four years. They have funded the majority of my doctoral studies and it is therefore my great joy to dedicate this work to them.

I thank my supervisors, Drs Bob Allison and Nick Cox. Bob has encouraged and driven me towards my goal. He has supported me financially and even given me supervisory sessions in the Philippines next to the South China Sea! He has become a friend, a mentor and has put up with my many idiosyncrasies which is a feat in itself. Nick has been instrumental in the production of the thesis with his fine eye for my many mistakes in earlier drafts. He has also encouraged me to use statistics in an inspirational fashion!

There are many people and organisations who have been very helpful during the course of my doctoral studies. I will endeavour to pick out those who have been most influential.

I cannot go any further before acknowledging the role of the Royal Geographical Society in London and the Higher Council for Science and Technology in Amman. Without the Badia Research and Development Programme there would have been no opportunity to study the fascinating landscape of the black basalt desert. They have provided financial support in the field as well as an infrastructure at Safawi which has been invaluable even if, at times, it seemed more of a hindrance than a help. In terms of personalities, I thank Dr Roderic Dutton, Dr Fataftah and Mr Shahbaz as the directors of the Programme, the Safawi team and the CORD personal assistants, Patrick Miller and Rodney Stobbs. Working in the desert alone was a lonely existence, but my heartfelt thanks goes to Darius Campbell, Alan Roe and Karen Jones for lending support in the field and giving me the necessary encouragement to carry on. Karen especially needs a gold medal for the many mornings she got up at 5 to go out to the field to help me with the rainfall simulation experiments. Thanks also must go to the farmers with whom I worked. They were most welcoming and I hope that some of the work presented here might become useful in making irrigated agriculture more sustainable in their environment.

Gratitude must be shown to the Institute of Hydrology for generously providing the Automatic Weather station and the Surface Capacitance Probe. These two items have been instrumental in the direction of the research and I hope that the SCIP data will be especially useful for further use in arid soils. Special thanks must go to David Cooper and David Robinson.

Various people from different academic departments have given advice and helped with technical aspects of laboratory work. Dr Abu-Sharar from the University of Jordan is one of the best Arab soil scientists and I am grateful to him for his help and hospitality while in Jordan. Mervyn Jones and his assistant Anne, who co-ordinate the micromorphology preparation at the Faculty of Agriculture at the University of Newcastle, have spent many hours helping me. Mervyn is the only man I know who

asks for payment in Crystic resin! My thanks also goes to Dr Nicholas Pepin in Portsmouth for putting me on the right track with my climate data. Alex Koh from Bath should be commended for his hours of help trying to improve the method of using digital photography on my thin sections.

Communication is one of the most important aspects of research and I have valued discussions with research staff in Durham, especially Dr David Higgitt and Dr Eric Brouwer and fellow postgraduates, Edward Twiddy, Neil Coe, Christoph Puhr, Helen Dunsford and Owen Kimber.

Thanks must go to the staff at St John's College. David Day, Margaret Masson and Gillian Boughton have all lent their heartfelt support reinforcing the fact that St John's is a loving community, which is rare to find these days.

Finally, and with great fondness, I would like to thank the technicians for all their hard work, patience and encouragement. The laboratories would not be the same without Derek Coates, Brian Priestley and Frank Davies who put up with my mess and often disorganised work schedule. Thanks also to Ron Hardy in geology for his help and encouragement with regard to all the X-ray work. A big thank-you must go to Michele Johnson who has helped me with all the thin-section photography and has often developed photographs at short notice.