Preface

Digital soil mapping (DSM) has evolved from a science-driven research phase of the early 1990s to presently a fully operational and functional process for spatial soil assessment and measurement. This evolution is evidenced by the increasing extents of DSM projects from small research areas towards regional, national and even continental extents.

Significant contributing factors to the evolution of DSM have been the advances in information technologies and computational efficiency in recent times. Such advances have motivated numerous initiatives around the world to build spatial data infrastructures aiming to facilitate the collection, maintenance, dissemination and use of spatial information. Essentially, fine-scaled earth resource information of improving qualities is gradually coming online. This is a boon for the advancement of DSM. More importantly, however, the contribution of the DSM community in general to the development of such generic spatial data infrastructure has been through the ongoing creation and population of regional, continental and worldwide soil databases from existing legacy soil information. Ambitious projects such as those proposed by the *GlobalSoilMap* consortium, whose objective is to generate a fine-scale 3D grid of a number of soil properties across the globe, provide some guide to where DSM is headed operationally. We are also seeing in some countries of the world the development of nationally consistent comprehensive digital soil information systems—the Australian Soil Grid http://www.clw.csiro.au/aclep/soilandlandscapegrid/ being particularly relevant in that regard. Besides the mapping of soil properties and classes, DSM approaches have been extended to other soil spatial analysis domains such as those of digital soil assessment (DSA) and digital soil risk assessment (DSRA).

It is an exciting time to be involved in DSM. But with development and an increase in the operational status of DSM, there comes a requirement to teach, share and spread the knowledge of DSM. Put more simply, there is a need to teach more people how to do it. It is such that this book attempts to share and disseminate some of that knowledge.

The focus of the materials contained in the book is to learn how to carry out DSM in a real work situation. It is procedural and attempts to give the participant a taste and a conceptual framework to undertake DSM in their own technical fields. The book is very instructional—a manual of sorts—and therefore completely interactive in that participants can access and use the available data and complete exercises using the available computer scripts. The examples and exercises in the book are delivered using the `R` computer programming environment. Subsequently, this course is both training in DSM *and* `R`. Using `R`, this course will introduce some basic `R` operations and functionality in order to gain some fluency in this popular scripting language. The DSM exercises will cover procedures for handling and manipulating soil and spatial data in `R` and then introduce some basic concepts and practices relevant to DSM, which importantly includes the creation of digital soil maps. As you will discover, DSM is a broad term that entails many applications, of which a few are covered in this book.

The material contained in this book has been cobbled together over successive years from 2009. This effort has largely been motivated by the need to prepare a hands-on DSM training course with associated materials as an outreach programme of the Pedometrics and Soil Security research group at the University of Sydney. The various DSM workshops have been delivered to a diverse range of participants: from undergraduates, to postgraduates, to tenured academics, as well as both private and government scientists and consultants. These workshops have been held both at the Soil Security laboratories at the University of Sydney, as well as various locations around the world. The ongoing development of teaching materials for DSM needs to continue over time as new discoveries and efficiencies are made in the field of DSM and, more generally, pedometrics. Therefore, we would be very grateful to receive feedback and suggestions on ways to improve the book so that the materials remain accessible, up to date and relevant.

Eveleigh, Australia

Brendan P. Malone
Budiman Minasny
Alex B. McBratney

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Malone, B.P.; Minasny, B.; McBratney, A.B.

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