

## PREFACE

Michael F. Goodchild, University of California, Santa Barbara

Inventiveness has always been a distinguishing characteristic of the human race, but over the past few centuries our rate of new inventions has been accelerating exponentially. Some inventions are so obviously beneficial as to be adopted without question, but others raise significant ethical and moral issues. Some, such as the telescope, have led to important discoveries and in some cases entirely new disciplines dedicated to exploiting their power. This book stems from one such invention, that of the geographic information system or GIS, which emerged in the 1960s, became commercially available in the late 1970s, and has since revolutionized virtually any activity that relies on information about the Earth's surface, from map-making and local government to resource management, wayfinding, warfare, and social and environmental research (for introductory texts on GIS see, for example, Burrough and McDonnell, 1998; Chrisman, 2002; Clarke, 2003; DeMers, 2003; or Longley *et al.*, 2001). Abler (1987, p. 322) has written that "GIS technology is to geographical analysis what the microscope, the telescope and computers have been to other sciences".

The invention and improvement of the telescope required significant advances in the theory of optics, and similarly there exists an intimate relationship between GIS and theory in relevant areas of numerous sciences: cartography, the science of map-making; photogrammetry, geodesy, and surveying, the sciences of Earth measurement; computer and information science; statistics, the science of error and uncertainty; and many more. In the early 1990s the term *geographic information science* (GIScience) was coined (\*) to describe this "science behind the systems", and this book is the most extensive effort to date to lay out exactly what it contains – the set of issues and fundamental scientific problems that must be solved if the use of GIS is to advance.

It is a great honor to me to be asked to write these introductory comments. I originally suggested the term GIScience in a keynote address to the 1990 International Symposium on Spatial Data Handling in Zurich (the "spatial" of the keynote title was later changed to "geographic" in the 1992 paper in part as a play on the "S" in "GIS", and in part to emphasize the focus of GIS on the Earth's surface and near-surface, rather than any other space), because it seemed to me that the research the participants were describing was far more profound and general than "data handling" would suggest -- I argued that the discipline represented at that meeting was "more than the United Parcel Service of GIS" (Goodchild, 1992, p. 31). The publication of this book is a significant milestone in the development of GIScience, a term that now appears in the titles of numerous journals, in degree programs, and in the names of conferences.

The founding of the University Consortium for Geographic Information Science was one of the more significant events in the development of GIScience in the United States. UCGIS rightly saw one of its first priorities as the identification of the field's research agenda, to provide some collective guidance on the topics that represented major

challenges to the research community. What issues lay at the heart of GIScience, and how did they relate to the research agendas of cognate fields such as statistics or cognitive science? The chapters of this book present the results of a multi-year effort to answer these questions, using the process that is described in detail in Chapter 1. As such, the book will be essential reading for young scholars in GIScience – for the young faculty, graduate students, and senior undergraduates who will be pushing the frontiers of research and the development of GIS technology in the years to come.

## REFERENCES

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