

Shunlin Liang and colleagues are authors of a number of very useful books in remote sensing, including the well-known *Quantitative Remote Sensing of Land Surfaces*, and this new text is no different. It is impressive in both its breadth and depth, and will, I believe, become one of the 'must-have' books for remote sensing researchers.

The first chapter (*A Systematic View of Remote Sensing*) is the best introduction to the field that I have ever read, managing to fit almost an entire introductory remote-sensing course into thirty pages. Although probably too advanced for undergraduates, this chapter would be a perfect read for a MSc or PhD student transferring into remote-sensing from a different discipline. As well as introducing the field generally, this chapter demonstrates the scope of the rest of the book, which has a strict focus on quantitative remote sensing.

The rest of the book takes each of the topics mentioned in the first chapter and expands them, first discussing pre-processing techniques (geometric and atmospheric correction), and generally-applicable processing techniques before providing a chapter on each of a wide range of satellite-derived data products including those related to radiation (such as albedo and surface temperature), vegetation (Leaf Area Index and Fractional Vegetation Cover, amongst others) and water (including precipitation and soil moisture content). The book closes with a look at product integration methods, data management systems and a quantitatively-based examination of land-cover and land-use change.

These chapters cover an impressive breadth of topics within remote sensing, but each topic is covered in an even more impressive depth. Chapters are rarely less than thirty pages long - many are over sixty - with up-to-date references taking into account the latest developments in the field.

As someone with limited knowledge of Data Fusion I was particularly interested to read this chapter, and it is a good example of the academic depth provided by this book. It starts with a high-level discussion of the different types of data fusion and methods for assessing the resulting fused image. A number of methods are then discussed and the mathematics behind these methods are presented, but - unlike in many books - the reader is taken through the mathematics in a manner that makes it far more understandable than if the equations were simply shown by themselves. After a number of methods are presented, a very useful generalisation of all of the methods of data fusion into one simple formula is given, along with a table describing how each method implements the individual terms of the formula.

The use of large tables to effectively summarise a number of methods, algorithms or datasets is a recurring theme in the book (for example, large tables are providing summarising LAI datasets, absorption features caused by leaf biochemicals, and approaches to soil moisture measurement) and it is useful even for these tables alone. The chapter finishes with a look at fusion of heterogeneous data sources (such as LiDAR and optical data), before summarising the current state of the sub-field and the major problems and developing trends. This assessment of problems and trends is another recurring theme, and is very helpful when grappling with a new topic.

It is hard to find any issues with this book, although it does feel like the final chapter (*Land cover and land use changes*) was somewhat 'tacked on' to the end of the book in an effort to show how land-cover classification can still come under the umbrella of quantitative remote sensing. It does this very well, showing that combining classification results with other quantitative products (such as Aerosol Optical Thickness or Vegetation Fractional Cover) can produce very useful results, but still feels somewhat out of place. Apart from this, the only other criticism I have of the book is its

price (£95 RRP) and thus it will be out of reach of many early-career researchers - unfortunately one of the groups of readers who will find it most useful. Many staff may also have to think twice about purchasing it themselves, but hopefully university libraries will soon acquire copies so that all staff and students can access this wonderful resource.

In summary: if you are working within quantitative remote sensing buy this book. This is the book that I wish I had when I started my PhD, and it is the book that I turn to now when I need to (re)familiarise myself with a specific topic within remote-sensing.

**Liang, S., Li, X. and Wang, J., 2012, Advanced Remote Sensing: Terrestrial Information Extraction and Applications, Academic Press, Oxford, UK, 799pp. ISBN: 978-0-12-385954-9 RRP: £95**