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Nota di contenuto	Preface -- 1 Introduction to Bayesian thinking -- 2 Introduction to Bayesian science -- 3 Assigning a prior distribution -- 4 Assigning a likelihood function -- 5 Deriving the posterior distribution -- 6 Sampling from any distribution by MCMC -- 7 Sampling from the posterior distribution by MCMC -- 8 Twelve ways to fit a straight line -- 9 MCMC and complex models -- 10 Bayesian calibration and MCMC: Frequently asked questions -- 11 After the calibration: Interpretation, reporting, visualization -- 2 Model ensembles: BMC and BMA -- 13 Discrepancy -- 14 Gaussian Processes and model emulation -- 15 Graphical Modelling (GM) -- 16 Bayesian Hierarchical Modelling (BHM) -- 17 Probabilistic risk analysis and Bayesian decision theory -- 18 Approximations to Bayes -- 19 Linear modelling: LM, GLM, GAM and

mixed models -- 20 Machine learning -- 21 Time series and data assimilation -- 22 Spatial modelling and scaling error -- 23 Spatio-temporal modelling and adaptive sampling -- 24 What next? -- Appendix 1: Notation and abbreviations -- Appendix 2: Mathematics for modellers -- Appendix 3: Probability theory for modellers -- Appendix 4: R -- Appendix 5: Bayesian software.

Sommario/riassunto

This book describes how Bayesian methods work. Its primary aim is to demystify them, and to show readers: Bayesian thinking isn’t difficult and can be used in virtually every kind of research. In addition to revealing the underlying simplicity of statistical methods, the book explains how to parameterise and compare models while accounting for uncertainties in data, model parameters and model structures. How exactly should data be used in modelling? The literature offers a bewildering variety of techniques and approaches (Bayesian calibration, data assimilation, Kalman filtering, model-data fusion). This book provides a short and easy guide to all of these and more. It was written from a unifying Bayesian perspective, which reveals how the multitude of techniques and approaches are in fact all related to one another. Basic notions from probability theory are introduced. Executable code examples are included to enhance the book’s practical use for scientific modellers, andall code is available online as well.