Spatial data are now collected and processed in larger amounts, and used by larger populations than ever before. While most geospatial data have traditionally been recorded as two-dimensional data, the evolution of data collection methods and user demands have led to data beyond the two dimensions describing complex multidimensional phenomena. An example of the relevance of multidimensional modelling is seen with the development of urban modelling where several dimensions have been added to the traditional 2D map representation (Sester et al., 2011). These include obviously the third spatial dimension (Biljecki et al., 2015) as well as the temporal, but also the scale dimension (Van Oosterom and Stoter, 2010) or, as mentioned by (Lu et al., 2016), multi-spectral and multi-sensor data. Such a view provides an organisation of multidimensional data around these different axes and it is time to explore each axis as the availability of unprecedented amounts of new data demands new solutions. The availability of such large amounts of data induces an acute need for developing new approaches to assist with their dissemination, visualisation, and analysis by end users. Several issues need to be considered in order to provide a meaningful representation and assist in data visualisation and mining, modelling and analysis; such as data structures allowing representation at different scales or in different contexts of thematic information. Such issues are of importance with regard to the mission of the ISPRS Commission II and, pertaining to both spatial data structures and algorithms and to geovisualisation, more specifically to Working Groups II/2 and II/6. Hence, this special issue presents some recent developments and review papers covering various aspects of multidimensional data modelling and visualisation.