

STATISTICAL, SPATIAL AND TIME SERIES ANALYSIS TECHNIQUES

Method Indicator		
Bottom-Up	Hybrid	Top-Down
NA	NA	NA

Summary of key issues

Issue	Description
Description	Data analysis techniques applicable to estuarine modelling.
Temporal Applicability	From the short to long term, including tidal to geological/millennial.
Spatial Applicability	All
Links with Other Tools	These techniques can be used in conjunction with most other modelling tools in the analysis of estuarine processes and systems, e.g. the use of spatial analysis within GIS for Historical Trends Analysis and Expert Geomorphological Analysis.
Necessary Software Tools / Skills	Statistical analysis requires knowledge of statistics and there are a variety of software packages available. Spatial analyses require knowledge of GIS and use of a dedicated GIS software package such as ArcMap, or MapInfo.
Typical Analyses	Use of time series data for derivation of trends (Figure 1),
Limitations	Data availability, in terms of sufficient data to perform adequate statistical analyses, or sufficient data coverage for spatial analyses.

The statistical analysis of data is a huge subject, which is covered extensively by a wide range of standard texts in the literature (Benjamin & Cornell, 1970; Coolican, 1996; Gumbel, 1958; Leadbetter et al., 1982). In addition, many statistical software packages now include their own handbooks or supporting explanatory notes (MATLAB, NAG, SAS, SPSS, StatSoft and many others: see [Statistical Software](#)).

The need for studies of estuaries often relates to the analysis of time-series data, the manipulation of geographic information, or a combination of the two. Again time-series analysis is an extensive subject that is well covered in the literature (Williams, 1997; Young, 1999) and on the web (e.g. [Time Series Analysis](#)). The development of spatial analysis is less well developed but with the rapid proliferation of GIS for environmental studies there is now a growing literature (Burrough & McDonnell, 1998; Raper, 2001).

In carrying out this type of analysis one is invariably seeking to identify, underlying trends or cycles (in time or space), associations between different parameters, or the probability distribution of the data (statistically or in time or space). In any such analysis, the recognition of uncertainty and use of [error analysis](#) is an essential component of helping to avoid spurious conclusions and once again this is well covered in the literature (Mayo, 1996; Taylor, 1997; Bevington & Robinson, 2002).

Emery and Thomson (2001) cover all these topics in relation to physical oceanography in their book on data analysis methods.

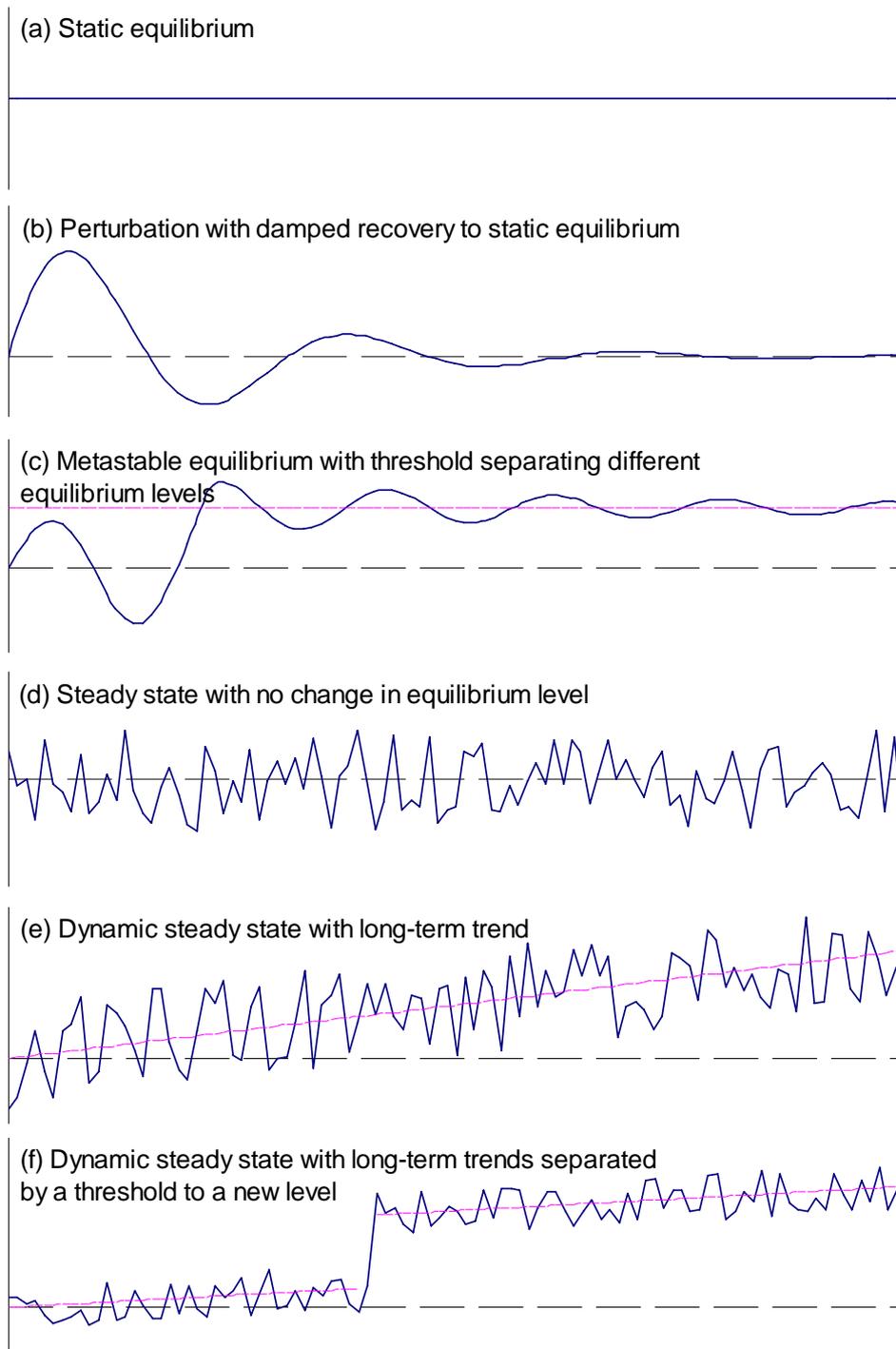


Figure 1. Use of time series data to analyse trends

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