



Southern European Seas: Assessing and Modelling Ecosystem changes



**SUMMER SCHOOL**  
**Statistical Analysis of Biological data and Times-Series**  
**21 July- 01 August 2008, Varna**

**Topics**

**Day 1:** Introduction, data organisation, data exploration, software (Brodgar interface to R)

**Day 2 :** Linear regression (bivariate, multiple). Interaction, model selection (Hypothesis testing & information criteria), model validation (independence and homogeneity)

**Day 3:** Generalised linear modelling for count data (Poisson, negative binomial), binary data (presence absence) and proportional data (binomial).

**Day 4:** Generalised linear modelling and generalised additive modelling (Poisson, negative binomial, binomial).

**Day 5:** Generalised additive modelling how to apply these methods on temporal and spatial data.

**Day 6:** Presentations by the participants

**Day 7:** Social event

**Day 8:** Analysis of time series, Trend analyses, models (ARIMA, transfer functions

**Day 9:** Non-linear models, Identification of thresholds and regime shifts

**Day 10:** Theory of optimal interpolated and variational analysis. Modeling of error covariances. Parameter optimization and cross-validation

**Day 11:** DIVA analysis tool. Detection of outliers. Missing data in time series and spatial fields. Introduction to Empirical Orthogonal Functions (EOFs)

**Day 12:** Introduction to DINEOF (Data Interpolating Empirical Orthogonal Functions). Multivariate analysis. Application to time series and spatial fields.

**Course instructors:**

**Day 1-5** Dr. Elena Ieno, Highland Statistics Ltd, UK  
Dr. Alain Zuur, Highland Statistics Ltd, UK

**Day 8-9** Dr. Jacob Carstensen, NERI, Denmark

**Day 10- 12** Dr. Alexander Barth, University of Liege, Belgium  
Dr. Aida Alvera-Azcarate, University of Liege, Belgium  
Dr. Pascal Joassin University of Liege, Belgium

**Recommended literature:**

1. Analysing ecological data (2007). Zuur, A., E.Ieno, EN and Smith, GM. Springer. 680 p.
2. Analysing Ecological data using GLMM and GAMM in R. (2008). Zuur, AF, Ieno, EN, Walker, N and Smith, GM. Springer.
3. An introduction to R for life scientists: - With a paper submission guide - (2008).

4. Zuur, AF, Ieno, EN and Meesters, EHGW. Springer
5. Other books: <http://www.brodgar.com/books.htm>

The summer school will include lectures and practical exercises (half of the time). Course materials will be distributed among participants during the summer-school.

**Who may apply:** The call is open to all biologists interested in statistics, however, priority will be given to SESAME Project partners. The course will be limited to 20 participants.

**Pre-requirements to the applicants:** General knowledge of basic statistics. Experience with statistical programs will be an advantage. The successful candidates will be asked to bring their own data sets to the course. A special session for short presentation on their current work will be organized during the course.

**How to apply:** Please, fill in the **Application Form** and send the necessary documents electronically to Dr. Snejana Moncheva ([snejanam@abv.bg](mailto:snejanam@abv.bg)) not later than **15 April 2008**. Please, in the field of Subject write: Summer School Varna\_applicant name\_Institute\_Country e.g. **Summer School Varna\_Modeva\_IO-BAS\_Bulgaria**

**Selection criteria:** The selection will be based on the CV, the motivation for application and relevance to SESAME objectives. The availability of own data, especially long-term series to bring to the course will be an advantage. The selection will be done by the members of the Steering Committee and the candidates will be notified about the final results by e-mail. The list of the 20 successful candidates will be posted on the web-site.

**Financial conditions:** All expenses (air fair ticket, accommodation, meals and small per-diem) will be covered by SESAME Project. The travel arrangements will be a responsibility of the participants and they will be reimbursed upon arrival.

**Important dates:**

Dead-line for Application – **15 April 2008**

Notification of Successful candidates: **15 May 2008**

Course dates: **21 July – 01 August 2008**