

ESF Exploratory Workshop on

Econometric Time-Series Analysis Applied To Climate Research

Frascati, Italy, 5 - 8 September 2007

Convened by:

**Torben Schmith^①, Søren Johansen^②, Hans von Storch^③
and Peter Thejll^④**

^① Danish Meteorological Institute, Centre for Ocean and Ice

^② Department of Statistics and Operations Research, University of Copenhagen

^③ GKSS Research Center

^④ Danmarks Meteorologiske Institut



The European Science Foundation (ESF) is an association of 76 Member Organisations devoted to scientific research in 30 European countries. The Mission of ESF is to provide a common platform for its Member Organisations in order to advance European research and to explore new directions for research at the European level. Through its activities, the ESF serves the needs of the European research community in a global context.

The main objectives of ESF for the years 2006-2010 as defined by its current *Strategic Plan* are to promote Science Strategy and Science Synergy, paving the way for initiatives across disciplinary and geographic boundaries in the European Research Area (ERA).

The Exploratory Workshops scheme is one of the key instruments of the Science Strategy “pillar”. Each year, ESF supports approximately 50 Exploratory Workshops across all scientific domains. The focus of the scheme is on workshops aiming to explore an emerging and/or innovative field of research or research infrastructure, also of interdisciplinary character. Workshops are expected to open up new directions in research or new domains. It is expected that a workshop will conclude with plans for specific follow-up research activities and/or collaborative actions or other specific outputs either within the frame of ESF (e.g. prepare the ground to develop a [Forward Look](#), a [Research Networking Programme](#) or a [EUROCORES](#) proposal; publication of a Policy Briefing...) or for submission to the EU 7th Framework Programme or to other European or international funding organisations.

European Science Foundation

1 quai Lezay Marnésia
BP 90015
67080 Strasbourg Cedex
France
Fax: +33 (0)3 88 37 05 32
<http://www.esf.org>

ESF Exploratory Workshops:

Nina Kancewicz-Hoffman
Scientific Coordinator

Valerie Allspach-Kiechel
Administrator
Tel: +33 (0)3 88 76 71 36
Email: vallspach@esf.org
<http://www.esf.org/workshops>

Convenor:

Torben Schmith

ts@dmi.dk

Tel: +45 39 15 74 44

Fax: +45 39 27 06 84

<http://ocean.dmi.dk/staff/ts/ts.html>

Danish Meteorological Institute
Centre for Ocean and Ice
Lyngbyvej 100
2100 Copenhagen OE
Denmark

Co-Convenors:

Søren Johansen

sjo@math.ku.dk

Tel: +45 35 32 0681

Fax: +45 35 32 07 72

<http://www.math.ku.dk/~sjo/>

University of Copenhagen
Institute of Mathematical Sciences
Department of Statistics and Operations
Research
2100 Copenhagen Ø
Denmark

Hans von Storch

storch@gkss.de

Tel: +49 4152 87 1831

Fax: +49 4152 87 1831

<http://w3g.gkss.de/staff/storch/>

GKSS Research Center
Institute of Coastal Research
Max-Planck-Strasse 1
21502 Geesthacht
Germany

Peter Thejll

pth@dmi.dk

Tel: +45 39 157 477

Fax: +45 39 27 10 80

Danmarks Meteorologiske Institut
Lyngbyvej 100
2100 København Ø
Denmark

Main Objectives of the Workshop:

We want to bring top experts in theoretical and applied time-series econometrics together with top experts in climate science, with the specific goal of interdisciplinary knowledge transfer. The idea of the meeting is to explore the possibilities for applying some highly advanced statistical methods, which have already proven fruitful in macroeconomics and finance, in the field of climate science. This will be done by presenting and discussing selected statistical problems in climate research with the aim of stimulating further collaboration between econometricians and climate scientists.

PRELIMINARY PROGRAMME

Wednesday 5 September 2007

Evening *Arrival*

Thursday 6 September 2007

09:00-09:15 *Welcome*

Session 1: Introduction to statistical analysis of climate data

09:15-10:15 **Douglas Nychka**: NCAR's Geophysical Statistics Project

10:15-10:30 *Coffee break*

Session 2: Current issues in climate research

10:30-11:15 **Anders Moberg**: Reconstruction methods of past climate from proxies

11:15-12:00 **Eduardo Zorita**: Statistical downscaling methods

12:00-12:45 **General discussion**

12:45-14:00 *Lunch break*

Session 3: Regressions, dynamic models and causality

14:00-14:45 **Richard Reichel**: Spurious regression

14:45-15:45 **Søren Johansen**: Statistical analysis of multivariate nonstationary time series

15:45-16:00 *Coffee break*

16:00-17:00 **Katarina Juselius**: Applying the cointegrated VAR approach to climate data

17:00-18:00 **General discussion of correlations versus causality**

19:00- *Dinner*

Friday 7 September 2007

Session 3: Applications to climate data

09:00-09:45 **Dave Stainforth**: Sensitivity of Earth's climate to external forcings

09:45-10:30 **Gabriele Hegerl**: Detection of climate change and attribution of causes

10:30-11:15 **Discussion/coffee**

Session 4: Fractional integration and climate data

11:15-11:45 **Luis Alérik Gil-Alana**: Fractional integration and long range memory

11:45-12:30 **Armin Bunde**: On fractional integration detected in observed climate series

12:30-13:00 **General Discussion**

13:00-14:00 *Lunch*

14.00-14.30 **Presentation of the European Science Foundation (ESF)**
Tiina Nöggès (ESF Standing Committee for Life, Earth and Environmental Sciences)

Session 4: Plans for the future

14:30-17.00 **Discussion of future plans for collaboration or proposals.**
Summer schools, ERC and ESF possibilities discussed

Series of 5-minutes presentations of current projects/ideas by workshop participants

A few solicited presentations of 'what next' scenarios

Evening *Dinner*

Saturday 8 September 2007

Morning *Departure*

European Science Foundation

Objectives of the ESF Standing Committee for Life, Earth and Environmental Sciences (LESC)

The main objectives of the **ESF Standing Committee for Life, Earth and Environmental Sciences (LESC)** are:

1. to identify and promote emerging scientific topics and high quality science deserving special attention in Europe;
2. to manage a wide ranging portfolio of activities of the European Science Foundation;
3. to examine and report on issues of strategic scientific importance within its fields of competence.

This committee's sphere of activities comprises the broad field of life, earth and environmental sciences:

- Biology
- Biotechnology
- Agriculture
- Earth sciences
- Climate research
- Glaciology
- Oceanography
- Environmental sciences, etc.

ESF Standing Committees support a limited number of **Exploratory Workshops** each year. These workshops allow leading European scientists to explore novel ideas at the European level with the challenging aim to "*spearhead*" new and preferably interdisciplinary areas of research. Further details are available on the internet at <http://www.esf.org/workshops>.

One desirable outcome of an ESF Exploratory Workshop may be that participants submit **high quality proposals for further ESF activities** (such as "à la carte Programmes" or a EUROCORES initiative), or **research funding applications** for submission to the EU 7th Framework Programme or to other European or international funding organisations.

In the case of **ESF Programmes** ("à la carte" or [EUROCORES](#)), which are financed by, and coordinated through, the European Science Foundation, a draft proposal should be submitted to the LESC Secretariat for advice, to then subsequently undergo further external refereeing. If successful in obtaining LESC's scientific recommendation, the proposal will be submitted to ESF Member Organisations for funding on a voluntary basis. More details are available at <http://www.esf.org/research-areas/life-earth-and-environmental-sciences.html>.

ESF Life, Earth & Environmental Sciences Unit:

Arja Kallio
Head of Unit - Senior Scientific Secretary

Astrid Lunkes
Scientific Secretary

Jane Swift
Senior Administrative Assistant

Celine Seewald
Administrative Assistant

Tel: +33 (0)3 88 76 71 29
Email: lesc@esf.org
<http://www.esf.org/lesc>

Provisional List of Participants

Convenor:

1. **Torben SCHMITH**
Centre for Ocean and Ice
Danish Meteorological Institute
Lyngbyvej 100
2100 Copenhagen OE
Denmark
Tel: +45 39 157444
Fax: +45 39 270684
Email: ts@dmi.dk

Co-Convenors:

2. **Søren JOHANSEN**
Department of Statistics and Operations
Research
Institute of Mathematical Sciences
University of Copenhagen
Universitetsparken 5
2100 Copenhagen Ø
Denmark
Tel: +45 35 320681
Fax: +45 35 320772
Email: sjo@math.ku.dk
3. **Hans VON STORCH**
GKSS Research Center
Institute of Coastal Research
Max-Planck-Strasse 1
21502 Geesthacht
Germany
Tel: +49 4152 871831
Fax: +49 4152 871831
Email: storch@gkss.de
4. **Peter THEJLL**
Danmarks Meteorologiske Institut
Lyngbyvej 100
2100 Copenhagen
Denmark
Tel: +45 39 157 477
Fax: +45 39 27 10 80
Email: pth@dmi.dk

ESF Representative:

5. **Tiina NÖGES**
Centre for Limnology
Estonian University of Life Sciences
61101 Tartumaa
Estonia
Tel: +372 52 97 148
Fax: +372 74 54 546
Email: tiina.noges@limnos.ee

Participants:

6. **Rafael BORÉN**
Meteologica SA
C. Almansa 110 - esc. 2 - 1C
28040 Madrid
Spain
Email: rboren@meteologica.es
7. **Jörg BREITUNG**
Department of Economics
University of Bonn
Adenauerallee 24-26
53113 Bonn
Germany
Tel: +49 228 73 9220
Fax: +49 228 73 9221
Email: breitung@uni-bonn.de
8. **Armin BUNDE**
Fachgebiet Physik im Fachbereich 07
Heinrich-Buff-Ring 16
35392 Gießen
Germany
Email: Armin.Bunde@physik.uni-giessen.de
9. **Aristida BUSUIOC**
National Institute of Meteorology, Hydrology and
Water Management
Sos. Bucuresti-Ploiesti 97
71552 Bucharest
Romania
Email: busuioc@meteo.inmh.ro
10. **Krzysztof FORTUNIAK**
Katedra Meteorologii i Klimatologii
Uniwersytet Łódzki
Narutowicza 88
09-139 Łódź
Poland
Email: kfortun@uni.lodz.pl
11. **Luis Albérigo GIL-ALANA**
Facultad de Ciencias Económicas y
Empresariales
Universidad de Navarra
Edificio de Bibliotecas (Entrada Este)
31080 Pamplona
Spain
Email: alana@unav.es
12. **Malcolm HAYLOCK**
University of East Anglia
Norwich NR4 7TJ
United Kingdom
Email: m.haylock@uea.ac.uk

13. **Gabriele HEGERL**
Dept. of Earth and Ocean Sciences
Duke University
Durham NC 27708
United States
Email: hegerl@duke.edu
14. **Phil JONES**
University of East Anglia
Norwich NR4 7TJ
United Kingdom
Email: p.jones@uea.ac.uk
15. **Katarina JUSELIOUS**
Department of Economics
Studiestræde 6
1455 Copenhagen K
Denmark
Email: katarina.juselius@econ.ku.dk
16. **Olavi KÄRNER**
Tartu Observatory
61602 Tartumaa
Estonia
Email: olavi@aai.ee
17. **Robert KAUFMANN**
Center for Energy & Environmental Studies
675 Commonwealth Avenue
Boston MA 02215
United States
Email: kaufmann@bu.edu
18. **Jürg LUTERBACHER**
Institute of Geography
University of Bern
Hallerstrasse 12
3012 Bern
Switzerland
Email: juerg@giub.unibe.ch
19. **Anders MOBERG**
Institutionen för naturgeografi och kvartärgeologi
Stockholm universitet
106 91 Stockholm
Sweden
Email: anders.moberg@natgeo.su.se
20. **Paolo PARUOLO**
Department of Economics
University of Insubria
Via Ravasi 2
21100 Varese
Italy
Email: paolo.paruolo@uninsubria.it
21. **Anders RAHBK**
Institut for Matematiske Fag
Universitetsparken 5
2100 Copenhagen OE
Denmark
Email: rahbek@math.ku.dk
22. **Richard REICHEL**
Volkswirtschaftliches Institut
Universität Erlangen-Nürnberg
Postfach 3931
90020 Nürnberg
Germany
Email: richard.reichel@wiso.uni-erlangen.de
23. **Nadja RIEDWYL**
Institute of Geography
University of Bern
Hallerstrasse 12
3012 Bern
Switzerland
Email: riedwyl@giub.unibe.ch
24. **Anders RYGH SWENSEN**
Matematisk institutt
Postboks 1053
Blindern
0316 Oslo
Norway
Email: swensen@math.uio.no
25. **Dave STAINFORTH**
Dept of Physics AOPP
University of Oxford
Parks Road
Oxford OX1 3PU
United Kingdom
Email: d.stainforth1@physics.ox.ac.uk
26. **David STEPHENSON**
Department of Meteorology
University of Reading
Earley Gate
PO Box 243
Reading RG6 6BB
United Kingdom
Email: d.b.stephenson@reading.ac.uk
27. **Dag TJØSTHEIM**
Department of Mathematics
University of Bergen
Johannes Bruns gate 12
5008 Bergen
Norway
Email: dagt@mi.uib.no
28. **Douglas W. NYCHKA**
National Center for Atmospheric Research
PO Box 3000
Boulder CO 80307-3000
United States
Email: nychka@ucar.edu
29. **Hans WACKERNAGEL**
Centre de Geostatistique de l'Ecole des Mines
de Paris
35 Rue St Honore
77300 Fontainebleau
France
Email: hans.wackernagel@ensmp.fr
-

30. Joanna WIBIG

Dept. of Meteorology and Climatology
University of Lodz
Narutowicza 88
91-139 Lodz
Poland
Email: zameteo@uni.lodz.pl

31. Eduardo ZORITA

GKSS-Forschungszentrum Geesthacht GmbH
Max-Planck-Straße 1
21502 Geesthacht
Germany
Email: eduardo.zorita@gkss.de

mn 29/06/2007