PATTERNS OF RECRUITMENT AND DEVELOPMENT OF BIOFOULING AT EUROPEAN AQUACULTURE FACILITIES

Simone Dürr

School of Biology and Psychology
Division of Biology
Newcastle University
UK

J. C. Thomason, D. I. Watson, D. Beaz, E. Bergtun, R. Breur, J. Cebria, J. Davenport, D. Fowler, C. Hough, J. Icely, A. Lane, J. Maguire, A. Manjua, M. Marhuenda, K. Maroni, J. McElwee, H. Mortensen, D. Murphy, J. Murphy, J. Newman, A. Pereira, J. Power, S. Prieto, J. Watters, P. Willemsen

CRAB

- CRAB: Collective Research in Aquaculture Biofouling
  - Objective: non-toxic antifouling strategies for the European Aquaculture Industry

www.crabproject.com

Pan-European Fouling Baseline at Aquaculture Facilities

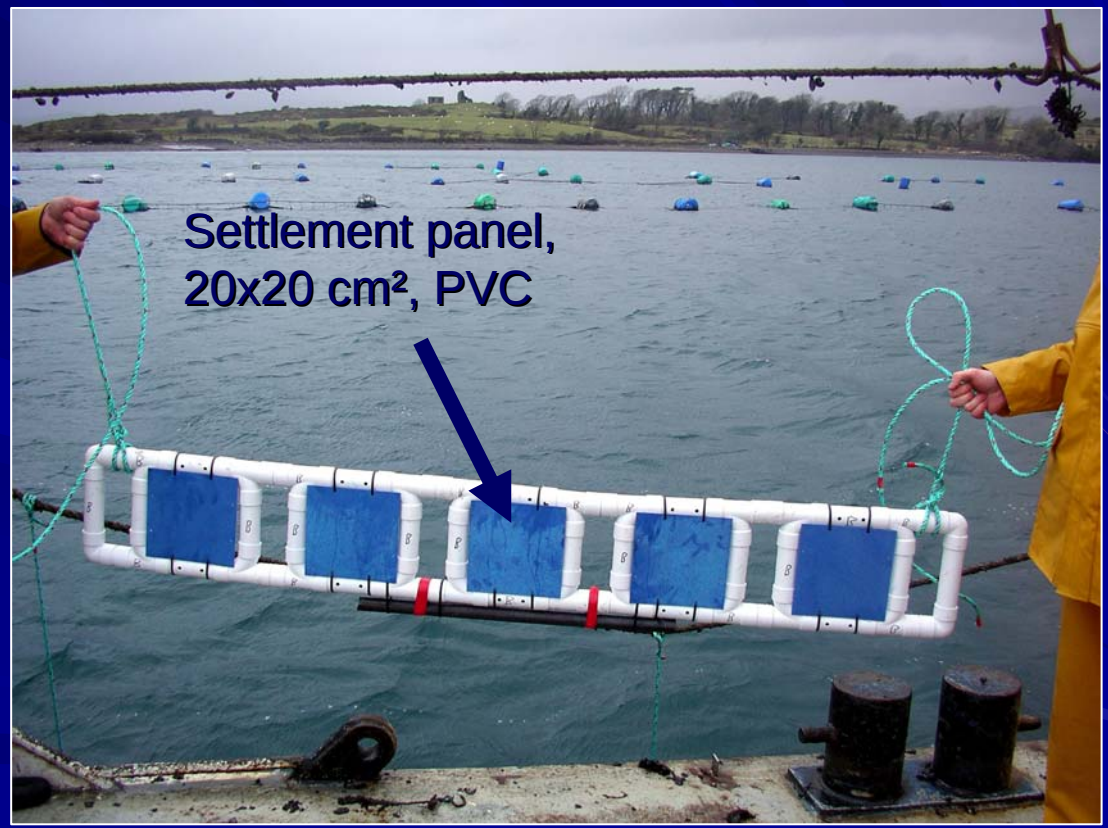
- Biofouling Pressure:
  - Defining the problem: Type, Extent, Timing of Biofouling at European Aquaculture Sites
- Benchmark antifouling strategy performance
- Prediction for applicability of CRAB tested antifouling strategies at other sites

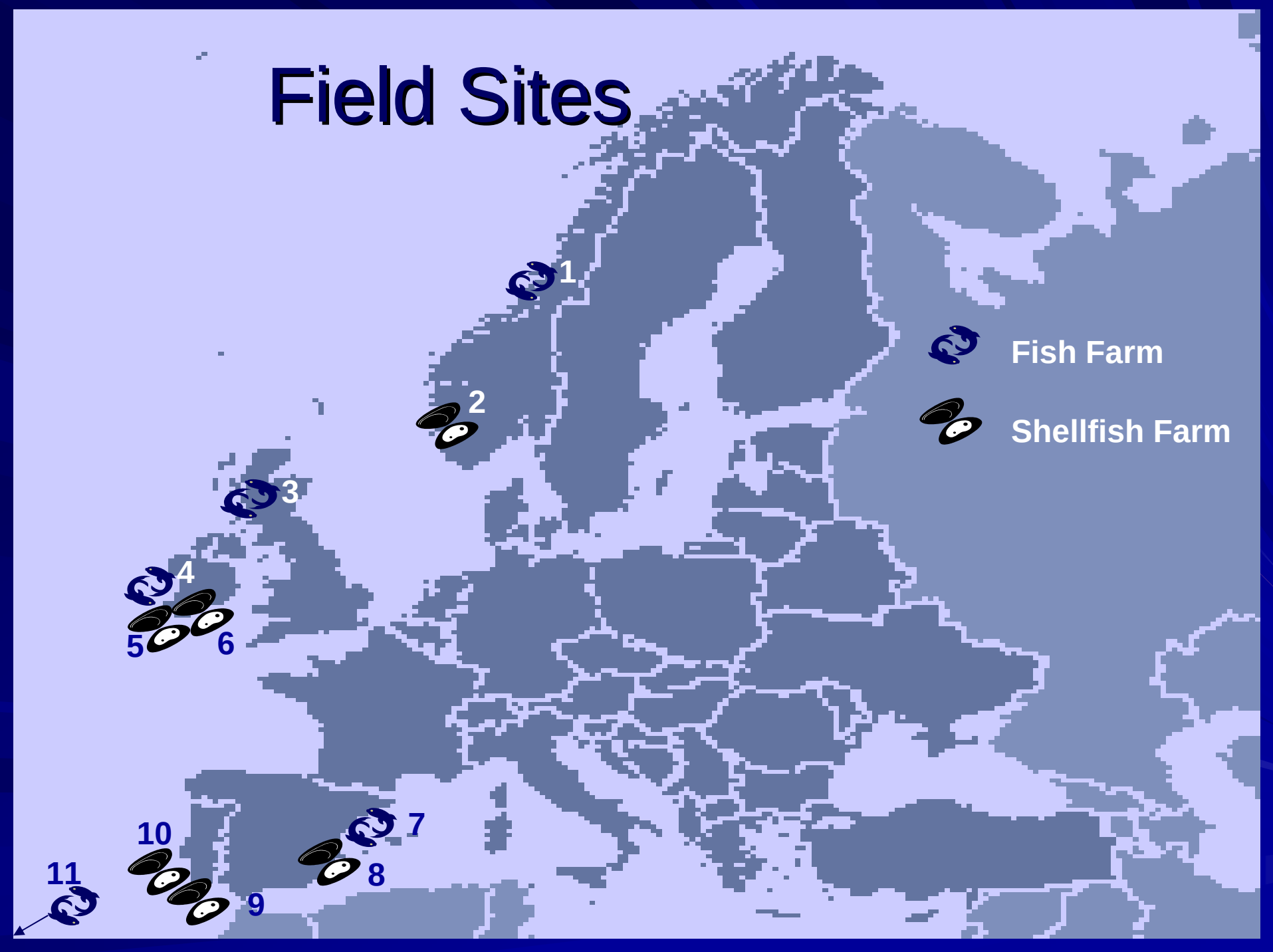
Baseline Study in CRAB

- 2 Experiments conducted directly at farm sites
  - Recruitment
  - Succession
- Start of experiments at 11 aquaculture sites in Europe in Feb ‘05
- Ongoing work
- Preliminary results presented
- End of experiments in May ‘07

Experimental Set-up (centrally, Newcastle University)

- Recruitment: n=10
- Succession: n=50, reduction by 10 every 6 months
- Depth 2 m




Field Sites
1
2
3
4
5
6
7
8
9
10
11
Fish Farm
Shellfish Farm

Baseline Assessment (industry workers)

- Monthly
- Digital photography
- Wet weight
- Height of fouling

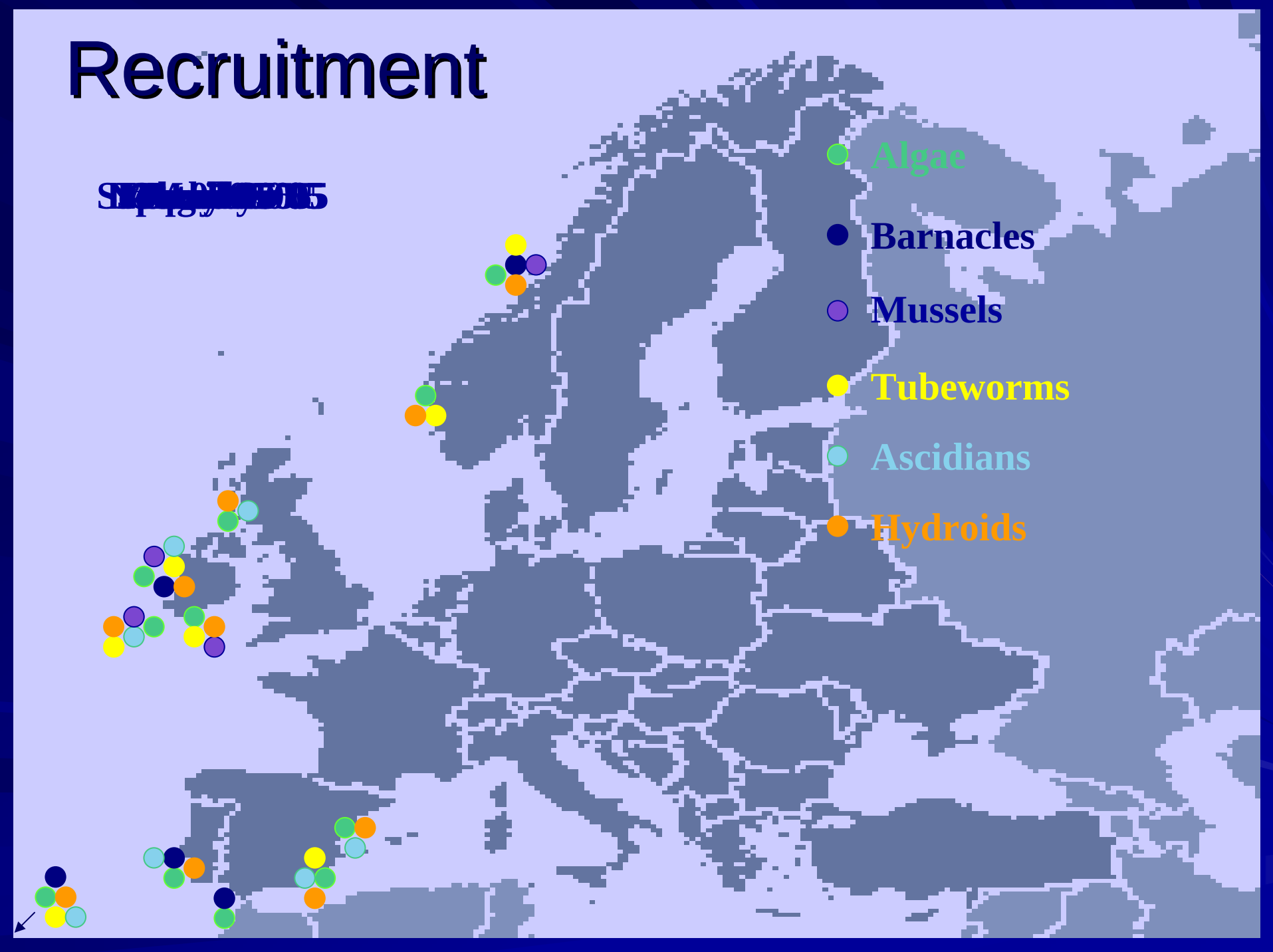
Image and Data analysis (centrally, Newcastle University)

- Image analysis of digital photos using ImageJ and stereological principles (Stereology Poster 2nd poster session, Thursday)
- Calculation of total cover, diversity H' (Shannon Index), number of species S
- Statistical analysis:
  - ANOVA
  - ANOSIM
  - SIMPER

Results

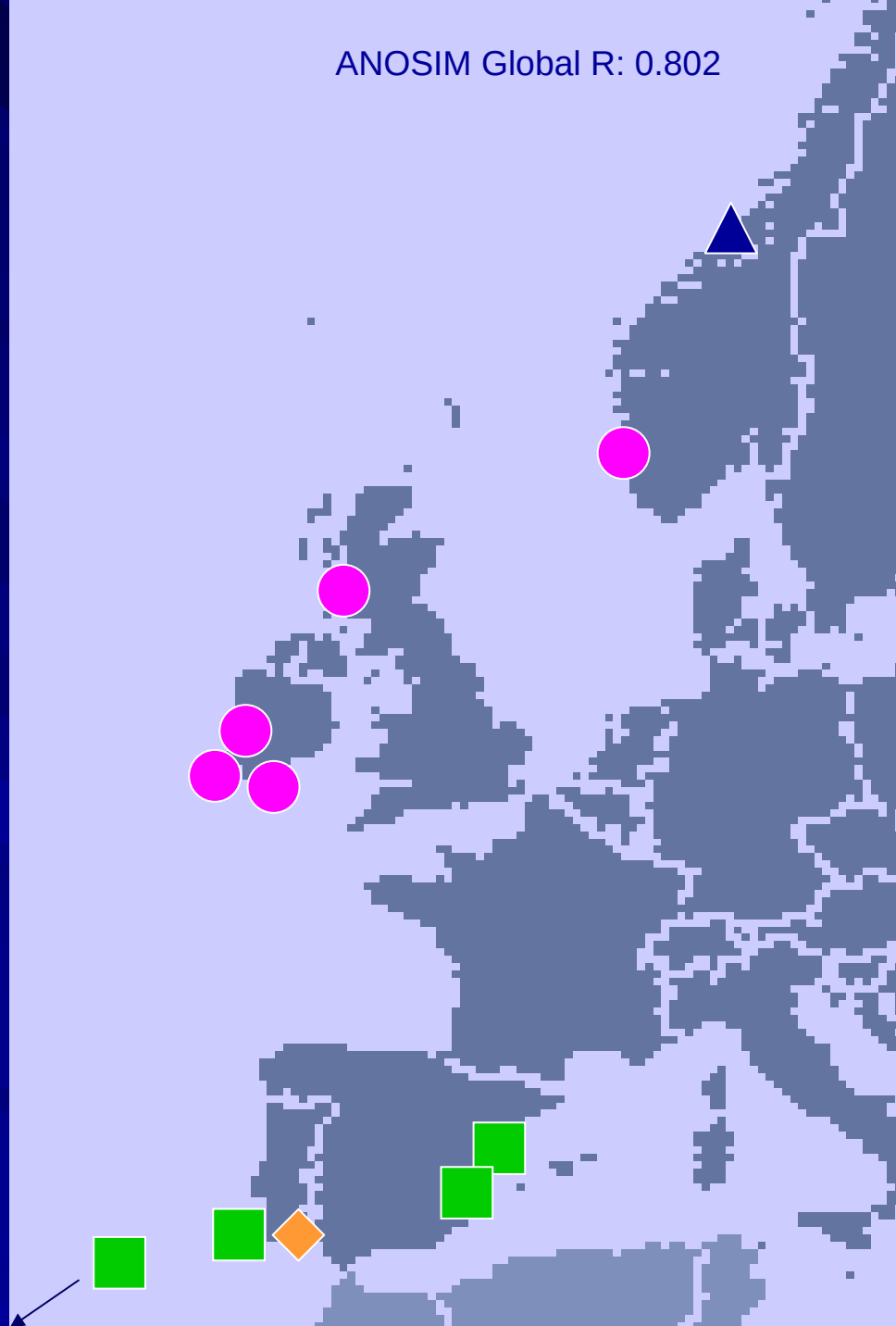
- Presented here
  - Recruitment: Present/Absent data of the major fouling groups for 11 sites for 1 year
  - Succession: community pattern of all sites for 3 representative assessment dates
  - Wet weight: beginning of the new fouling season in April ‘06

Recruitment



Succession Communities in May ’05

- : brown alga ***Alaria esculenta***
- : brown alga ***Ectocarpus spp.***
- : soft tube forming polychaetes and amphipods
- : diatoms



Developing Communities in August ’05

: blue mussel *Mytilus edulis*

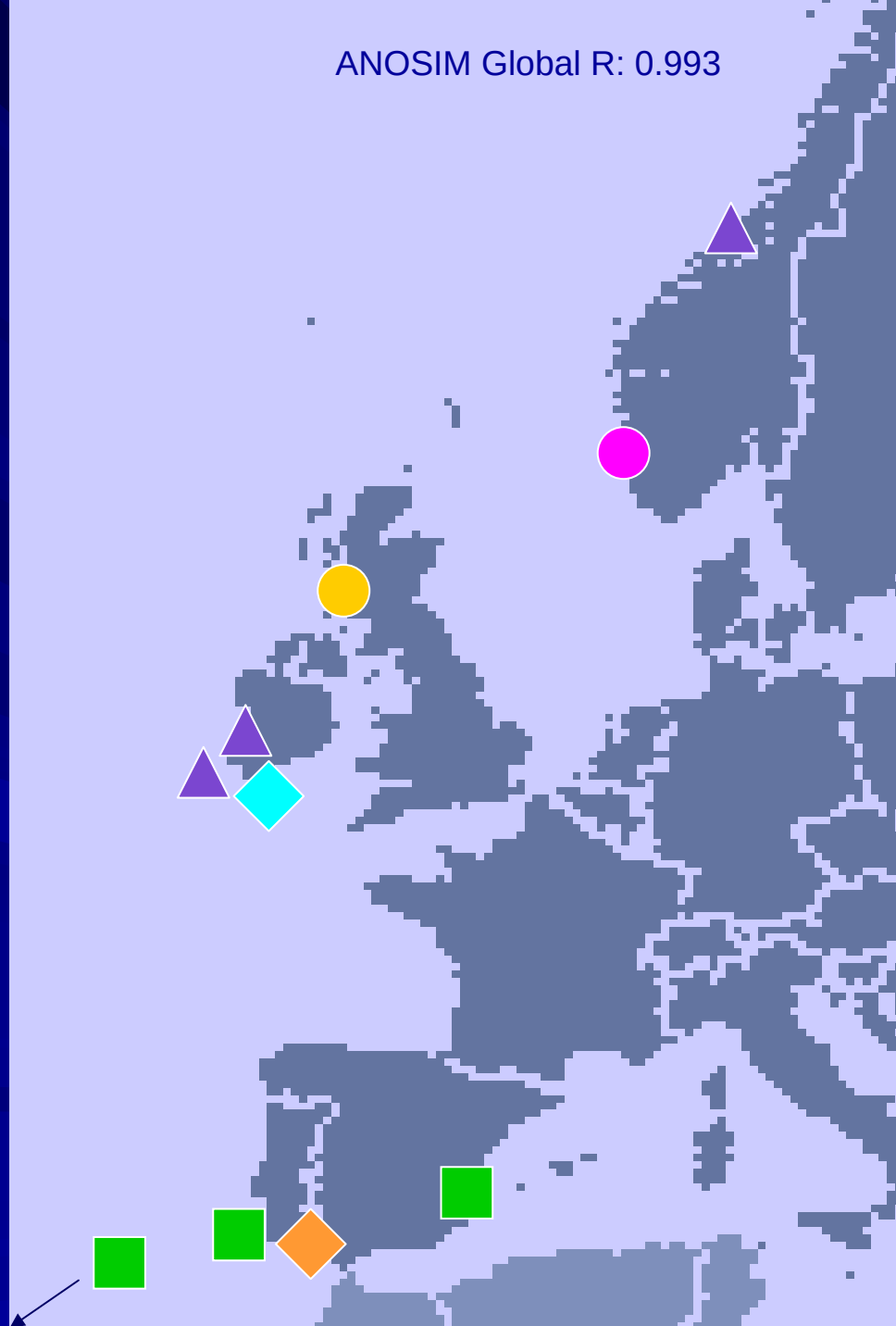
: brown alga *Ectocarpus spp.*

: solitary ascidian *Ciona intestinalis*

: red algae

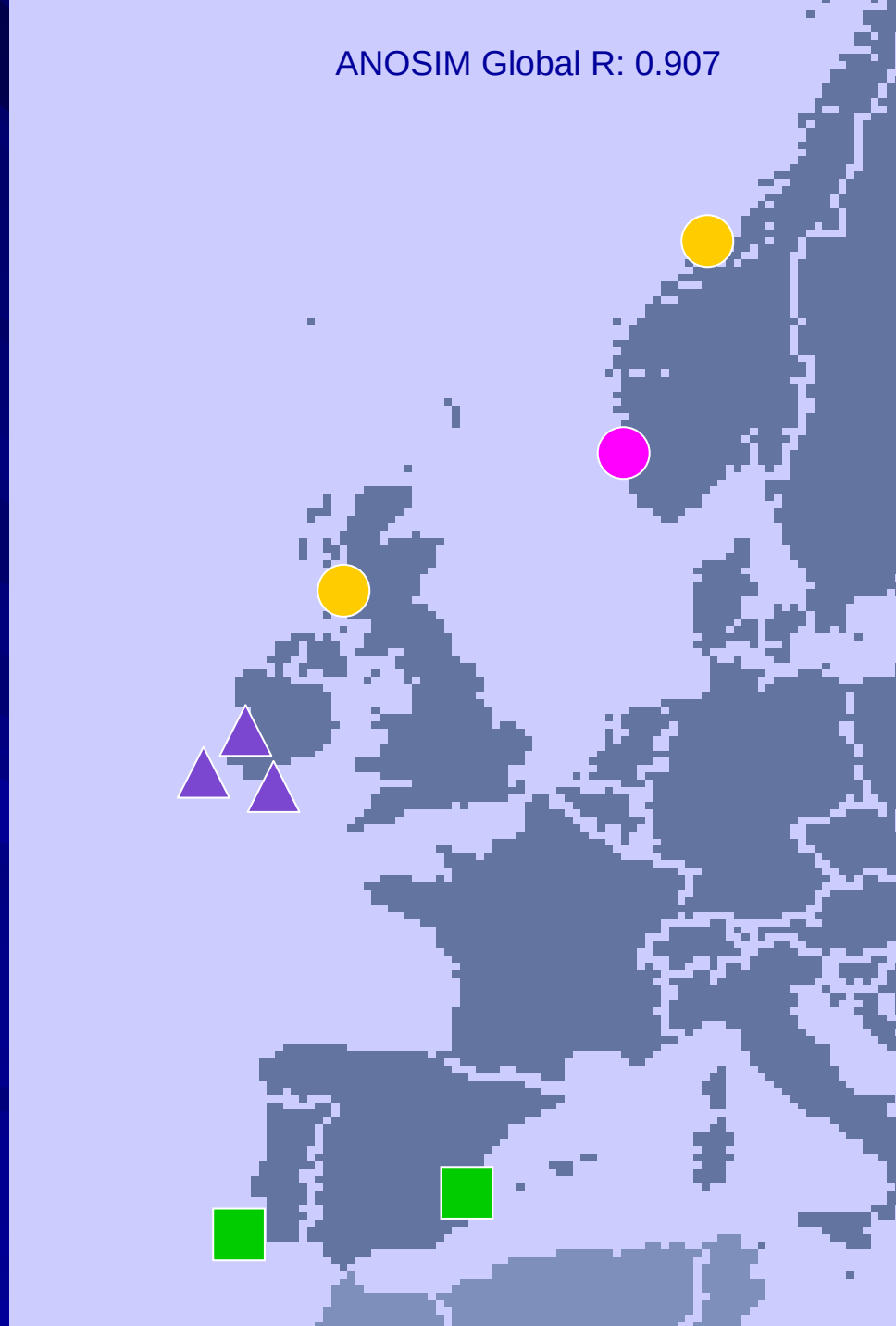
: soft tube forming polychaetes and amphipods

: crustose coralline red algae

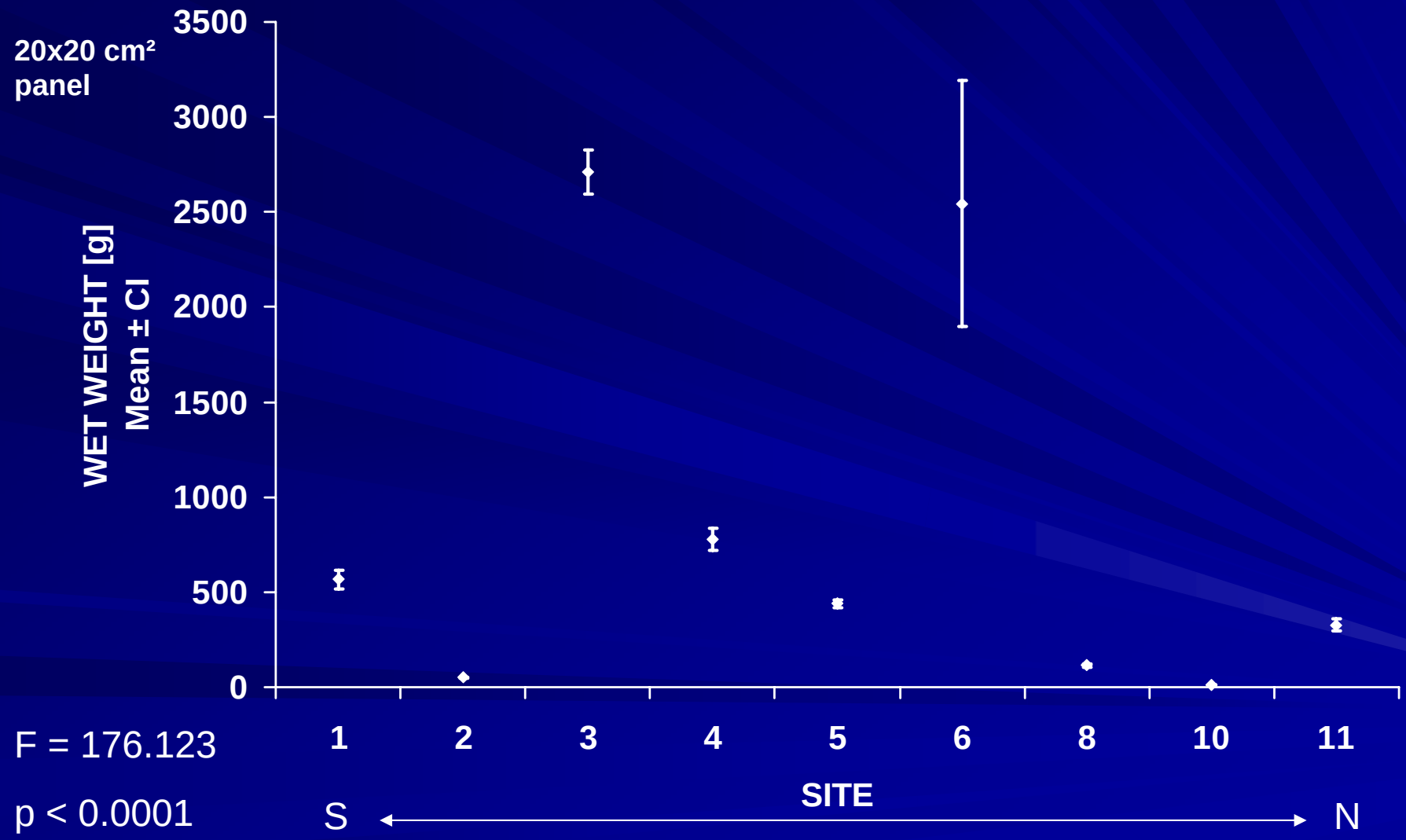


Developing Communities in November ’05

- : brown alga *Ectocarpus spp.*
- : solitary ascidian *Ciona intestinalis*
- : blue mussel *Mytilus edulis*
- : soft tube forming polychaetes and amphipods



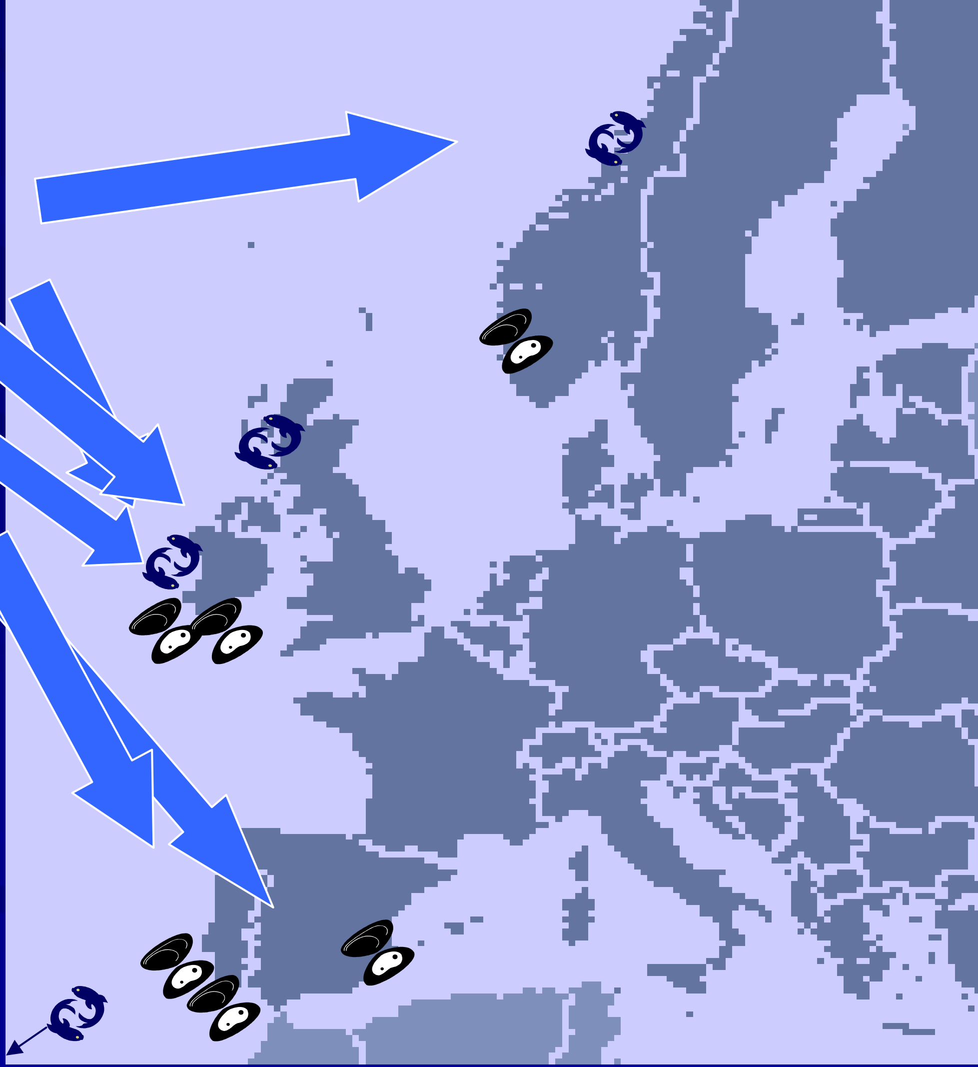
Developing Communities Wet Weight April ‘06



F = 176.123

p < 0.0001

Conclusions
Recruitment



- Diatoms/algae recruiting all year at most sites (not at northern sites and at intertidal in winter)
- Isopods [illegible] sites

- Mussels at N-Norway in summer, at Irish Sites in late winter, spring and summer
- Mediterranean sites from summer to autumn

- Ascidians at Southern Sites from April, some in autumn
- At British Isles Sites in summer and winter

- Barnacles recruit almost all year round
  - 1 spatfall at some sites
  - 2 spatfalls in N-Norway

Conclusions Succession

Site - Blue Mussels

9 months - all Irish Sites – Blue Mussels

After 6 months - first Scottish Site – all tunicates

Change in N-Norway

Stays - ... first N-Norway amphipods and polychaetes

Norway crustose coralline red algae

Conclusions 1st year

- Site specific and seasonal differences in fouling
- Fouling on short-term immersed equipment, infrastructure or stock is different from long-term immersed
- Weight of fouling as problem for equipment and infrastructure depends on dominant fouling species at each site
- Site and duration of immersion is important when choosing an antifouling strategy
- Need 2nd year results for confirmation and to complete picture

Acknowledgements

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- www.crabproject.com

- Contact: s.t.duerr@ncl.ac.uk