EURO-BASIN
BASIN SCALE ANALYSIS, SYNTHESIS AND INTEGRATION

SEVENTH FRAMEWORK PROGRAMME THEME 7 Environment

Collaborative project (Large-scale Integrating Project)

Project no: 246 933

Project Acronym: EURO-BASIN

Project title: European Basin-scale Analysis, Synthesis and Integration

Deliverable 4.6 Trophic dynamics validation supported via coupled stable isotope natural abundance sub-model

Contributors: Kevin J Flynn & Aditee Mitra (CSAR, Swansea, UK),
Antonio Bode (IEO, A Coruña, Spain)

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Organisation name of the lead contractor of this deliverable: DTU Aqua

Start date of project: 31.12.2010 Duration: 48 months
Project Coordinator: Michael St John, DTU Aqua

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Theme 6 Environment

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission)	
RE	Restricted to a group specified by the consortium (including the Commission)	
CO	Confidential, only for members of the consortium (including the Commission)	

Deliverable 4.6
is a contribution Task 4.5

Related Milestones: D4.5) Analytic model and synthesis report on the lipid pump

Responsible: Kevin J Flynn, Aditee Mitra, Antonio Bode
Start month 1, end month 48

Executive Summary:

- A range of planktonic food webs of different complexity (each containing nitrate, ammonium, primary producer, 3 consumers, and detritus) were configured to describe both N dynamics and partitioning of ^{15}N in consequence of discriminatory and non-discriminatory biological processes, and with dilution events.
- The model produced as outputs both the real (computed) trophic level (TL) for each biotic component and the $\delta^{15}N$ value
- Regressions of TL vs $\delta^{15}N$ revealed a spread in data that confounded the use of $\delta^{15}N$ to estimate TL. Although this spread appeared to be damped at levels increasingly distant to primary production, omnivory (and especially omnivory including consumption of detritus) could so confuse the relationship that $\delta^{15}N$ values appear of limited prognostic utility. Certainly that must be so when not backed with other data types.
- The existence of mixotrophy with planktonic protists, the presence of significant amounts of debris in size fractionated samples, or of food within guts of consumers would further complicate such interpretations.
- The use of field-collected $\delta^{15}N$ data would appear to be of value in validating the construction of food web models; only a model adequately configured would be able to explain $\delta^{15}N$ data. This could be a relatively severe test, validation, of model structure because the $\delta^{15}N$ signal integrates across time, space and activity of the biological community, while sampling of the smallest plankton also integrates across trophic levels (e.g. bacteria, primary producers, mixotrophs, microzooplankton and detritus).

Relevance to the project & potential policy impact:

This deliverable carries no direct policy impact. However, it does impact on ecosystems modeling outputs and associated fisheries (WP5) and biogeochemical aspects (WP2,6) that may be affected by the health of the plankton populations. Most obviously it impacts upon our ability (or inability) to reconstruct the food web upon which our understanding of fisheries populations ultimately rests.

Access to Data and/or model code:

Model code is provided in this deliverable. The output of the work is being prepared for publication.