

# Collaborative Research: Zooplankton in the BASIN - Linking habitats and processes across scales and trophic levels in the North Atlantic

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Objective: To address significant knowledge gaps that have inhibited prediction of North Atlantic ecosystem dynamics under forcing from climate change, including:

- Coupled biological and physical processes determining the habitats, distribution, life history characteristics, and ecological roles of zooplankton and micronekton from the meso- to basin-scale across the North Atlantic
- Trophic interactions between zooplankton and micronekton, and their impacts on bio-carbon flux Process models for zooplankton and micronekton addressing life history strategies and biomass fluxes linking the lower to higher trophic level models.

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A 4-year project is proposed to:

- Assemble and cross-calibrate an integrated multi-sensor suite for measurement of zooplankton and micronekton,
- Conduct a 19-day US-sponsored Northwest Atlantic cruise to investigate shelf–basin processes and compare sensor methodologies,
- Organize a genetic and genomic method comparison workshop,
- Conduct retrospective analysis,
- Establish a time series station in the Gulf of Maine and on the Norwegian shelf off Bodø, Norway,
- Participate in three EURO-BASIN cruises on EU vessels, including a 45-day Northeast Atlantic spring cruise (2012), and two 45-day trans-Atlantic spring cruises (2013),
- Estimate growth and mortality rates of key zooplankton species and predation rates/impacts of midwater fishes,
- Estimate biomass transfer rates among trophic levels and
- Develop process model components for integration into EURO-BASIN end-to-end models.

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## An overview of research activities and timelines

<b>Activities</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
<b>Integrated sampling methodologies</b>				
Developing integrated sensor packages	X			
Genetic/genomic method comparison workshop	X			
<b>Joint EU-US cruises to study habitats and processes across scales and trophic levels</b>				
A 19 day cruise for shelf-basin exchange/sensor comparisons	X			
A 45-day North Atlantic spring cruise on the RV Meteor		X		
A 45 day transatlantic spring cruise on the RV GO Sars			X	
A 45 day transatlantic spring cruise on the RV Meteor			X	
<b>Field studies of seasonal and life history strategies</b>				
Establishing 2 time series stations in the GOM and shelf off Bodø	X	X	X	
<b>Lab-based studies, data analysis and model development</b>				
Retrospective analysis	X	X	X	
Sample and data analysis, lab studies and model development	X	X	X	X
Integrating models and rates with lower and higher trophic models		X	X	X

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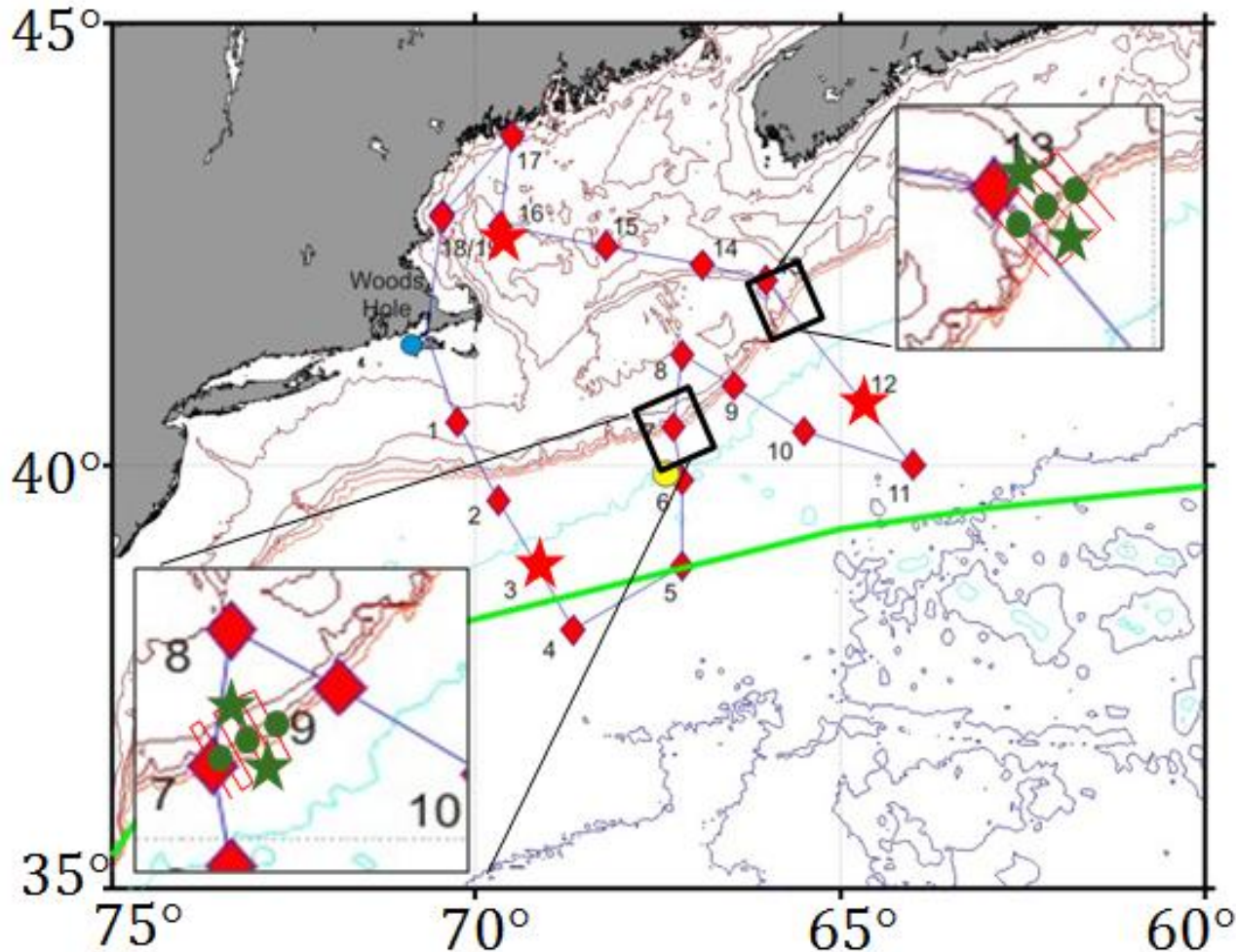
## Major instrument packages proposed for the USA and EU BASIN cruises

Instrument Package	Max. Dep (m)	T/S	Vel.	Taxa	Size ( m )	# m-3	H.Res.	Tow spd
VPR II-CTD-LOPC	350	X		X	100-30,000	X	0.5	10 kts
MVP-CTD-LOPC	800	X			100-30,000	X	0.5	10 kts
Rosette-CTD-LOPC-LADCP-LISST	300-1000	X	X		100-30,000	X	10s	Profiling
ADCP (38/150 kHz)	2.5		X				1	12 kts
MF echosounder (18-710 kHz)	930				>1,000	X	0.1	6-12 kts
1 and 10 m <sup>2</sup> MOCNESS systems	1000	X		X	>180	X	100	2 kts
IYGPT	1000			Y	>3,000	Y	100	2 kts
DHPC	2000	Y	Y	Y	30-35,000		100	Profiling

<b>VPR II:</b>	Video Plankton Recorder (100 mm–30 mm)
<b>CTD:</b>	Conductivity, temperature and depth sensors
<b>LOPC:</b>	Laser Optical Plankton Counter (100 mm–30 mm)
<b>LISST:</b>	Laser In-Situ Scattering and Transmissometry (1.25–250 mm)
<b>MVP:</b>	Moving Vessel Profiler
<b>ADCP/LADCP:</b>	Acoustic Doppler Current Profiler/Lowered ADCP
<b>MF echosounders:</b>	Either hull-mounted EK60 or surface-towed HTI
<b>MOCNESS:</b>	Multiple Opening and Closing Nets and Environmental Sensing System
<b>IYGPT:</b>	International Young Gadoid Pelagic Trawl
<b>DHPC:</b>	Digital holographic plankton camera (30 mm–30 mm) on ARGO floats
<b>H.Res:</b>	Typical horizontal resolution in km.

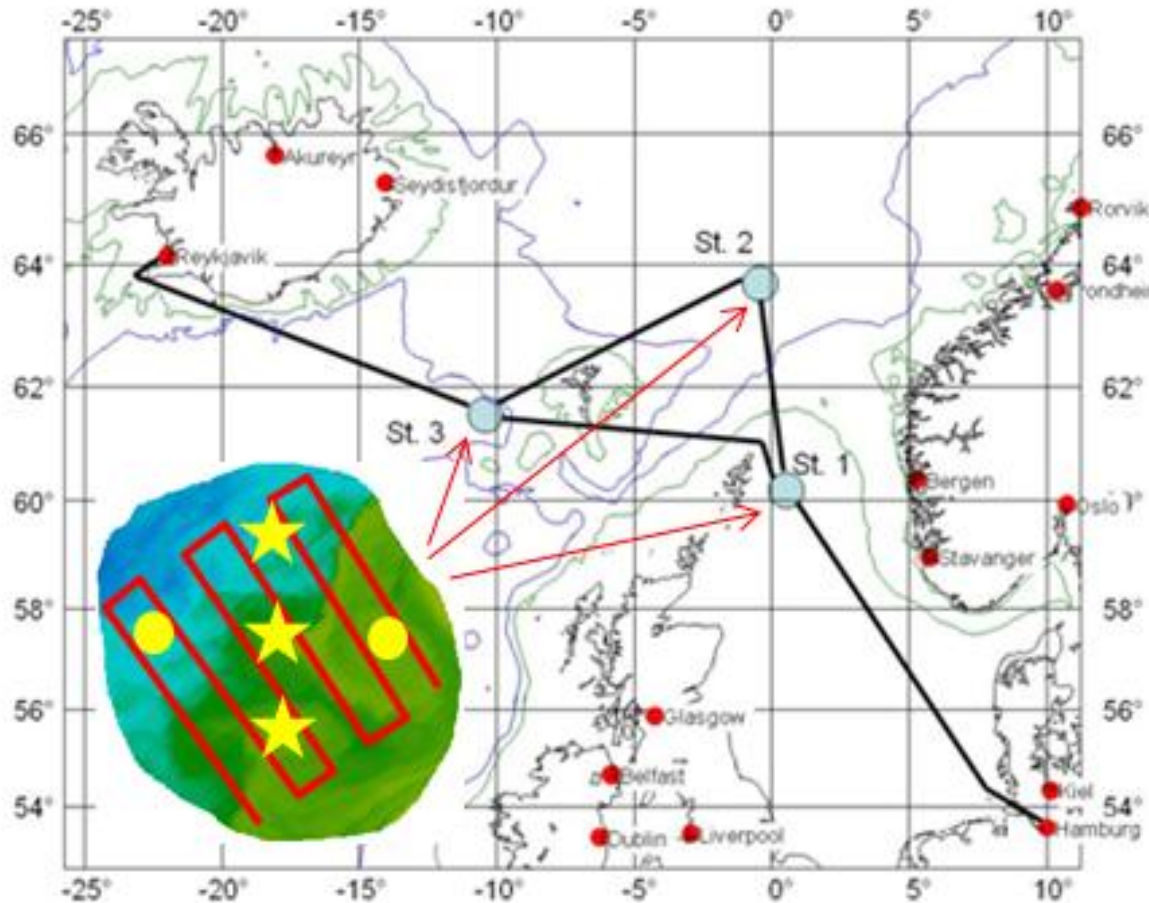
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Proposed pilot cruise including 16 CTD/MOCNESS stations (◆), 3 24-hour time series stations (★), and meso-scale study sites (black boxes) composed of 6 20-km transects (-), 5 CTD stations (★ and ●), and 2 MOCNESS stations (★). The yellow dot represents the Bear Seamount.



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The site locations in the proposed 2012 EU North Atlantic Spring Bloom cruise. The inserted color panel hypothetically illustrates the 20×20 km surveys at a station. The red thick lines represent a mesoscale survey, both yellow stars and dots represent 5 CTD stations, and yellow stars represent 3 MOCNESS stations.



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