

# FerryBox

## From On-line Oceanographic Observations to Environmental Information



# Final Report

## Executive Summary (Section 5)

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## Document Reference Sheet

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P 1		<b>GKSS</b>	<b>GKSS Research Centre Institute for Coastal Research</b>	<b>Coordinator</b>
P 2		<b>NERC.NOC</b>	<b>NERC.NOC – National Oceanography Centre Southampton University and National Environment Res. Council</b> formerly NERC.SOC – Southampton Oceanography Centre	
P 3		<b>NIOZ</b>	<b>Royal Netherlands Institute of Sea Research</b>	
P 4		<b>FIMR</b>	<b>Finnish Institute of Marine Research</b>	
P 5		<b>HCMR</b> (formerly NCMR)	<b>Hellenic Centre for Marine Research</b> (formerly National Centre for Marine Research)	
P 6		<b>NERC.POL</b>	<b>Proudman Oceanographic Laboratory</b>	
P 7		<b>NIVA</b>	<b>Norwegian Institute for Water Research</b>	
P 8		<b>HYDROMOD</b>	<b>HYDROMOD Scientific Consulting</b>	
P 9		<b>CTG</b> (formerly CIL)	<b>Chelsea Technology Group</b> (formerly Chelsea Instruments Ltd.)	
P 10		<b>IEO</b>	<b>Spanish Institute of Oceanography</b>	
P 11		<b>EMI</b>	<b>Estonian Marine Institute</b> (in cooperation with the Estonian Maritime Academy)	

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## Section 5 Executive Public Summary

Contract n°	EVK2-2001-00144	Reporting period	1.11.2004 – 31.10.2005
Title		FerryBox – from on-line oceanographic observations to environmental information	
<b>Objectives</b> <p>It was envisaged that FerryBox systems would provide reliable tools for efficient monitoring and management in European waters. The overall objectives of the European FerryBox Project were to demonstrate that autonomous ship-borne instrumentation could cost-effectively deliver information of immediate scientific value and that this data was both beneficial for operational oceanographic purposes and for monitoring specific environmental problems. The project also aimed to show the potential for a wider European contribution to the GOOS through the use of sensors and information technology developed in Europe.</p> <p>The first aim of the project was to get the FerryBox systems operational and run them routinely for a period of at least one year. Specifically, the following objectives were trialled:</p> <ul style="list-style-type: none"><li>• Development of standardised calibration, maintenance, data management and quality control procedures across the different systems</li><li>• Examination of the quality and comparability of the data collected</li><li>• Use of data to better characterise eutrophication in different European regions and the transport of sediment</li><li>• Development and testing of a strategy for using FerryBox data for validation in remotely-sensed (satellite) data.</li><li>• Use of data along side numerical models - to test the validity of model output - into improve model output by assimilating data into models - to improve understanding of observed data and processes</li></ul>			
<b>Scientific achievements</b> <p>Scientific analyses within the project focussed on three areas – eutrophication, sediment transport and the use of FerryBox data to calibrate and validate numerical models of water mass transport. Early effort was dedicated to make this possible by bringing the different FerryBox systems into operational stage, from then on the partners started to analyse several aspects in their data sets such as:</p> <ul style="list-style-type: none"><li>• Impact of frontal systems on the biological activity</li><li>• Change of the physiological state of phytoplankton prior, during and after a bloom</li><li>• Magnitude and variations in sediment transport in a tidal inlet</li><li>• Assessment of inter- and intra-annual variability in concentrations of nutrients and plankton species</li><li>• Comparisons of the FerryBox data to satellite based data sets</li><li>• Assimilation of FerryBox data into numerical models</li></ul>			
<b>Socio-economic relevance and policy implications</b> <p>It is too early to fully review policy implications as these tend only to become evident with a considerable time lag after the availability of the scientific results. However, a number of developments in implementation of the European Water Framework Directive as well as for other protection measures and initiatives of European seas can already be seen.</p>			

In terms of socio-economic relevance it is clear that the project has created great interest and expectation about its results. EuroGOOS has identified the project has a major initiative and foresees the significant contributions of such systems to the implementation of the Global Ocean Observing System in Europe and world wide. Specifically the EuroGOOS group as well as participants in the World Bank funded Baltic Sea Project have shown their great interest. For the Baltic Sea further intensive collaboration through the secretariat of the ICES in Copenhagen has been discussed. Several monitoring agencies, especially in Norway and the Netherlands have already started to use FerryBox systems in their monitoring networks. Promotion of the project with environmental managers and scientists outside the project has led to data and information requests. Environmental agencies and numerical modelling groups have asked for and been provided with data. Such requests are expected to increase strongly as more people get to know about both the density of data available and its quality and the wide range of data types FerryBox systems can provide.

The construction of FerryBox systems is of direct socio-economic relevance. The German company co-operating with the GKSS has built several systems for use on land as well as for other ships including for the Greek partner and recently for the Dutch North Sea Directorate. A participating instrumentation and sensor manufacturer has benefited from the project through the initiation of cooperation and business opportunities. Currently a longer-term project is ongoing to install FerryBox systems on board of German research ships and NIVA have installed more systems covering routes in the Baltic Sea, the North Sea and the Norwegian Coast. Installation of several more FerryBox systems are in preparation for instance in the Baltic and North Sea. Several ship-owners have shown interest in installing FerryBox systems which display information on marine environmental issues to their passengers while onboard their ships. This provides a high level of public outreach.

Project results were presented at numerous events including scientific conferences (e.g. EuroGOOS, ICES; ASLO and PACON), the GOOS Scientific Steering Group and at a thematic conference organised by the project itself (for details see the appended publication and activity list). A substantial series of scientific papers have been published already and the project partners are preparing a separate volume of a peer-reviewed journal to comprehensively document the results. For potential other users and system operators extensive information is presented in a public report, which provides reliable in-depth information to on both the benefits and costs and manpower required to set up and run a system. The project partners have also decided to maintain their network, exchange experiences and to keep available for several years the corporate and individual FerryBox websites and information services. We expect these activities will attract further world wide attention and stimulate the uptake of FerryBox systems on wide range of ships-of-opportunity working routes of different lengths both global and local.

## Conclusions

The project achieved its objectives very effectively starting with the installation and set-up of the measuring systems on the different ferries. It produced a large data base (now available through BODC) which is quality controlled and consistently documented. The series of scientific studies, numerical model experiments, data assimilation and validation exercises of satellite-borne remote sensing data have all achieved results which have or are being written up in peer reviewed scientific papers. Its success is shown in the large number of on follow-on and associated activities that are happening or planned, as well as by increasing utilisation of FerryBox systems by other groups. Overall the project has demonstrated the FerryBox concept is one which both provides data of scientific value and that can be expected to make a cost effective contribution to future European (and global) .operational marine monitoring and management systems.

## Keywords

FerryBox systems, monitoring, remote sensing, numerical modelling, data assimilation, eutrophication, sediment transport.