

ENVIRONMENT AGENCY



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ENVIRONMENT  
AGENCY

**National Centre  
for  
Environmental Data and Surveillance**



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ENVIRONMENT AGENCY WALES

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## Introduction

The National Centre for Environmental Data and Surveillance is the Environment Agency's focus for environmental data collection and interpretation, and for the development of environmental monitoring techniques. It addresses these core requirements:

- collation of the Agency's internal environmental monitoring data in order to fulfil its statutory obligations;
- creation of an integrated picture of the state of the environment and the pressures placed upon it, by relation of these data to other internal and external data sets;
- application of a consistent level of quality control across all the Agency's environmental data;
- delivery of supra-Regional environmental monitoring and surveillance programmes;
- conversion of data into meaningful information for the Agency, the Department of the Environment, Transport and the Regions, the European Environment Agency, and other international bodies and the public;

- development of better and more effective environmental monitoring techniques; and
- management of relevant research and development programmes

The National Centre has also developed the Environmental Data Management System (EDMS) to facilitate reporting on the State of the Environment. To aid this task, the National Centre has to gather significant amounts of detailed environmental data. The bulk of the data are sourced from the Agency's eight Regions and Central Functions, which use a variety of computer systems and databases, primarily for local operational purposes.

The National Centre is responsible for a section of the Environment Agency's web site known as "Your Environment". This responsibility includes development of internet technology to promote the world wide web as a national resource for improving accessibility to environmental information.

[www.environment-agency.gov.uk/your\\_env/index.html](http://www.environment-agency.gov.uk/your_env/index.html)

## MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 4UD  
Tel: 01454 624 400 Fax: 01454 624 409

## NATIONAL CENTRE FOR ENVIRONMENTAL DATA AND SURVEILLANCE:

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Tel: 01225 444 066 ext 4223 GTN: 7 27 4223 Fax: 01225 469 939

### Head of National Centre

Mr David Palmer  
Tel: 01225 444 066 ext 4232 Email: david.palmer@environment-agency.gov.uk

### Help Desk

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### ENVIRONMENT AGENCY GENERAL ENQUIRY LINE

**0645 333 111**

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

### ENVIRONMENT AGENCY EMERGENCY HOTLINE

**0800 80 70 60**

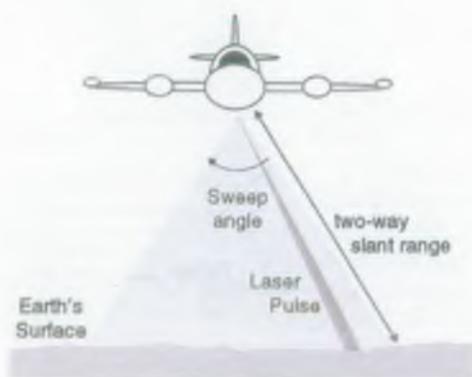


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## Light Detection and Ranging - LIDAR

LIDAR is an airborne mapping technique which uses a laser to measure the distance between the aircraft and the ground. This technique results in the production of a cost-effective terrain map suitable for assessing flood risk.

The National Centre has recently purchased a LIDAR system which it has installed in a survey aircraft along with its other operational remote sensing instruments, including the Compact airborne spectral imager (CASI), a thermal imager, high quality sVHS video camera and a digital camera. The aircraft is positioned and navigated using satellite global positioning (GPS) corrected to known ground reference points.



The aircraft flies at a height of about 800 metres above ground level and a scanning mirror allows a swathe width of about 600 metres to be surveyed during a flight. Individual measurements are made on the ground at 2 metre intervals allowing a highly

resolved model of the terrain to be generated.

The Agency's Flood Defence function has a requirement under the Water Resources Act 1991 to monitor the flood plain. LIDAR is being used to measure land topography and assess coastal erosion and geomorphology. The Conservation function requires information on land being set aside for managed retreat of sea defences. There is also a need to obtain data for a model linking land use, soil type and the potential for erosion prediction.

The National Centre has generated routines to allow for the removal of surface features from the data sets including vegetation and buildings. Products that can be generated from the LIDAR data include colour coded elevation models, height contour plots and three-dimensional perspective views allowing easy visualisation of surveyed areas.



A typical example of the LIDAR data described above

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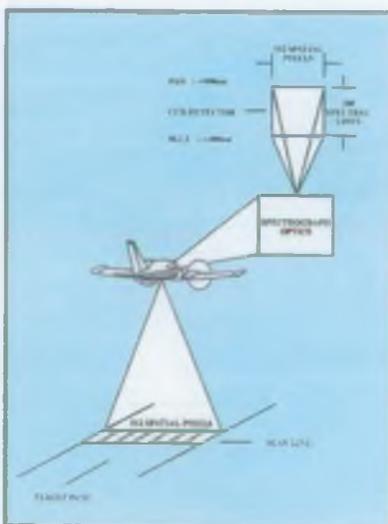


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## Compact Airborne Spectrographic Imager - CASI

The Environment Agency uses a Compact Airborne Spectrographic Imager (CASI) to help in its duty, under the Environment Act 1995, to form an opinion on the general state of the pollution of the environment.

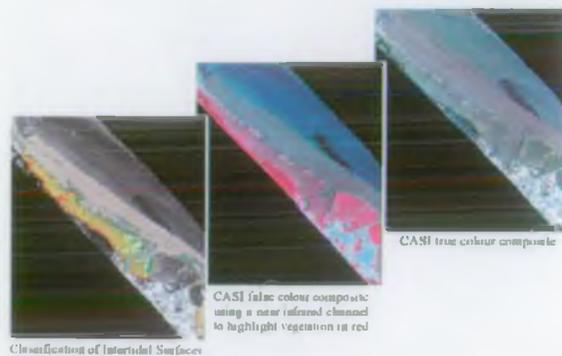
The CASI is designed to provide a flexible system which is straightforward to install and operate in a small aircraft. The system has a "pushbroom" configuration, ie the full swath width is imaged instantaneously in a large number of spectral wavebands (up to 288) covering the visible and near infra-red regions of the spectrum between 430nm and 900nm. This can be used to construct hyperspectral image data sets for detailed studies of ground or water targets. Spatial resolution can be varied from one to ten metres, and is governed by the flying altitude.



CASI Principle of operation

Typical applications are:

- Land classification and visualisation
- Inter-tidal vegetation mapping



CASI Images of Southampton Water

Contaminated land assessment

- Identification and tracking of dissimilar bodies of water
- Monitoring and pollution detection
- Mapping of mixing zones, outfalls and rivers



Oil Plume



Sewage Discharge

- Estimates of suspended solids concentration and changes in coastal morphology; and
- Estimates of chlorophyll- $\alpha$  for use in eutrophication studies

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# PROTEUS

## R&D Project

### moored marine monitor



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### 1 THE BUOY

The basic buoy has been equipped with all the necessary marine fittings such as a radar reflector, warning lights and solar panels. The construction materials are predominantly marine grade steel, foam, elastomer and fibreglass. The tubular steel frame was designed such that the structure would provide a frame on which the monitoring instruments could be suspended.

The sensors are housed in "flood cells" above the waterline. Before each sampling, the cells are filled, immersing the sensors in fresh seawater. After sampling, the cells are drained to minimise the risk of fouling by marine life.

### 2 INSTRUMENTATION

PARAMETER	UNITS	MINIMUM	MAXIMUM	ACCURACY	INSTRUMENT
1 - latitude	° N/S				GPS
2 - longitude	° E/W				GPS
3 - sample	V	0	5		NAS 2E
4 - blank sample	V	0	5		NAS 2E
5 - standard	V	0	5		NAS 2E
6 - blank standard	V	0	5		NAS 2E
7 - nitrate concentration	mg/L	0	120	0.3	AQUAPACK
8 - surface water conductivity	µS/cm	1	55	0.01	AQUAPACK
9 - surface water temperature	°C	0	25	0.005	AQUAPACK
10 - depth	m	0	200	0.2	AQUAPACK
11 - chlorophyll by fluorescence	mg/L	0	100	0.6	AQUAPACK
12 - transmission	%	0	100	< 0.2% PSD	ALPHA TRACKS
13 - surface water pH	pH	2	10	0.05	AQUATRACE
14 - surface water temperature	°C	-2	32	0.1	AQUATRACE
15 - dissolved O <sub>2</sub>	ppm	0	20	0.05	AQUATRACE
16 - sensor angle	° from vertical	5	36	0.1	VALEPORT EM
17 - tide rate	m/s	0	8	0.3	VALEPORT EM
18 - tide direction	°	0	360	6	VALEPORT EM
19 - wave intensity	°	0	150	1%	MET-OFF
20 - wind direction	°	0	360	3	MET-OFF
21 - wind speed	m/s	0	75	<1%	MET-OFF
22 - air pressure	mbars	-	-	-	MET-OFF
23 - air temperature	°C	-50	70	-	MET-OFF
24 - conductivity	µS/cm	1	55	0.01	AQUALINK
25 - temperature	°C	-2	32	0.005	AQUALINK
26 - depth	m	0	6000	0.01	AQUALINK
27 - salinity-AL	psu/standard	0	36	-	AQUALINK
28 - salinity-AP	psu/standard	0	36	-	AQUALINK
29 - main battery	volt	11.5	15	-	AQUAPACK
30 - nitrate or phosphate	mg/L	0/1	1/2	<1%	AQUASENSOR

### 3 NEPTUNE



The Environment Agency's communications controller and data acquisition system were designed and built in-house and will allow communication between the paknet cellular radio system and up to nine peripheral devices. The paknet system was chosen to provide the link between the buoy and a PC situated at a base station ashore. The unit controls the communications flow between the base station, the Aquapack and peripheral devices.

### 4 SOFTWARE

Sampler screen

Screen close up

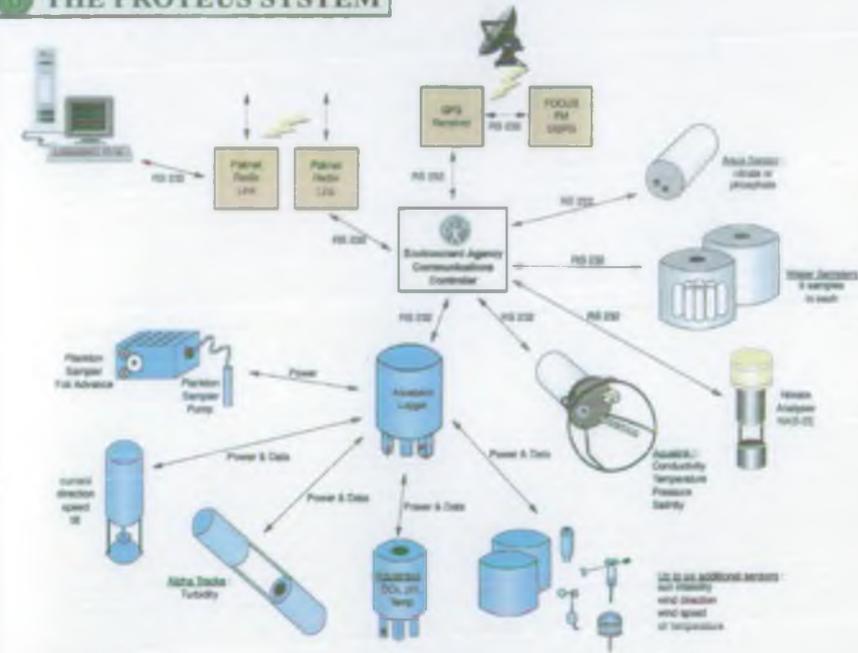
Main menu screen

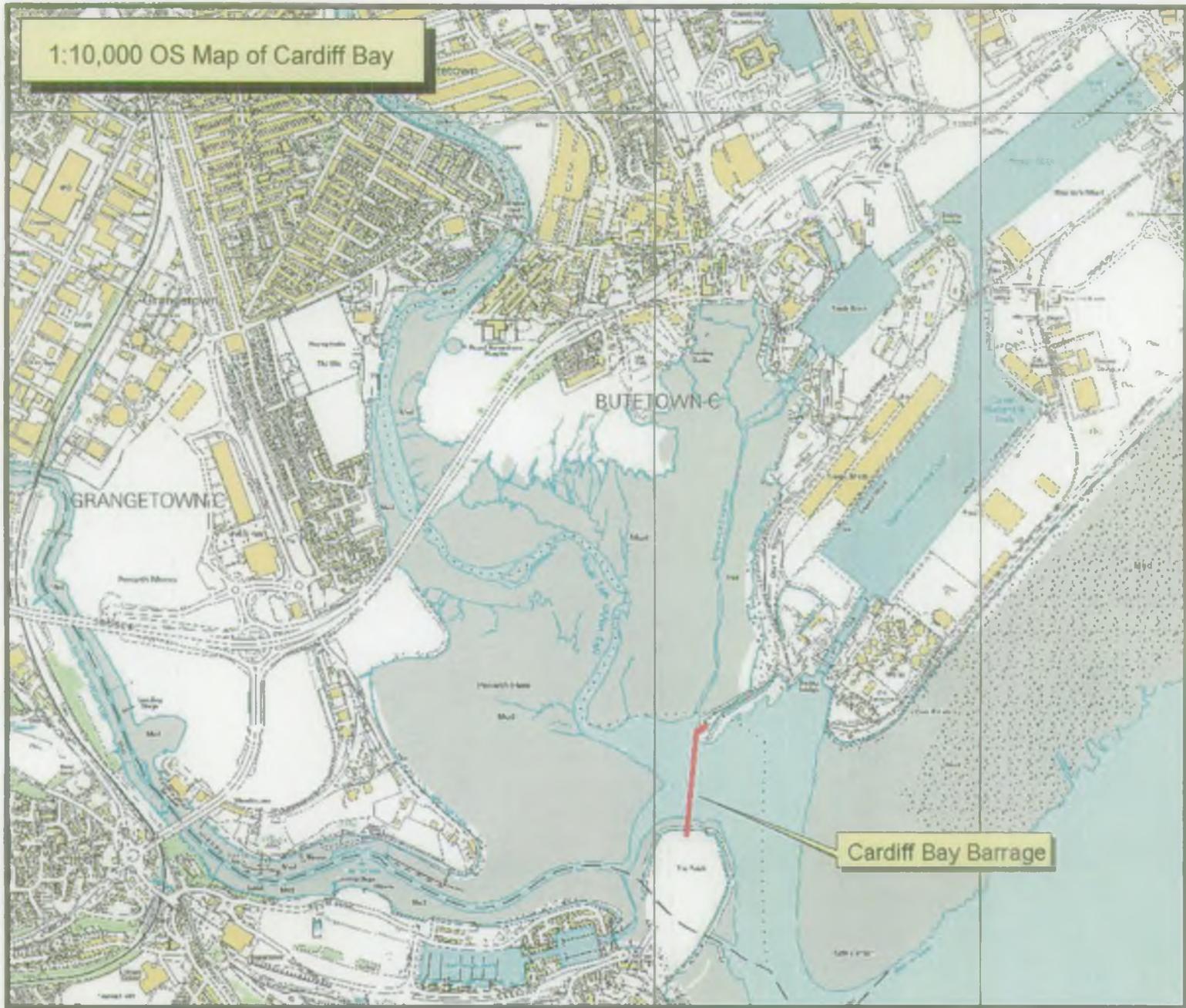
The communication system transmits the data back to a base at pre-set intervals which are set and altered remotely. The real-time data is displayed on customised software giving a real-time graphical display of the monitored water quality. The base software has facilities to generate reports on a daily, weekly or monthly basis. It is possible to recall comparative historical data so a hard copy can be printed.

### 5 PAKNET: CELLULAR RADIO SYSTEM



### 6 THE PROTEUS SYSTEM





Shaded Elevation Map Generated from LIDAR Data

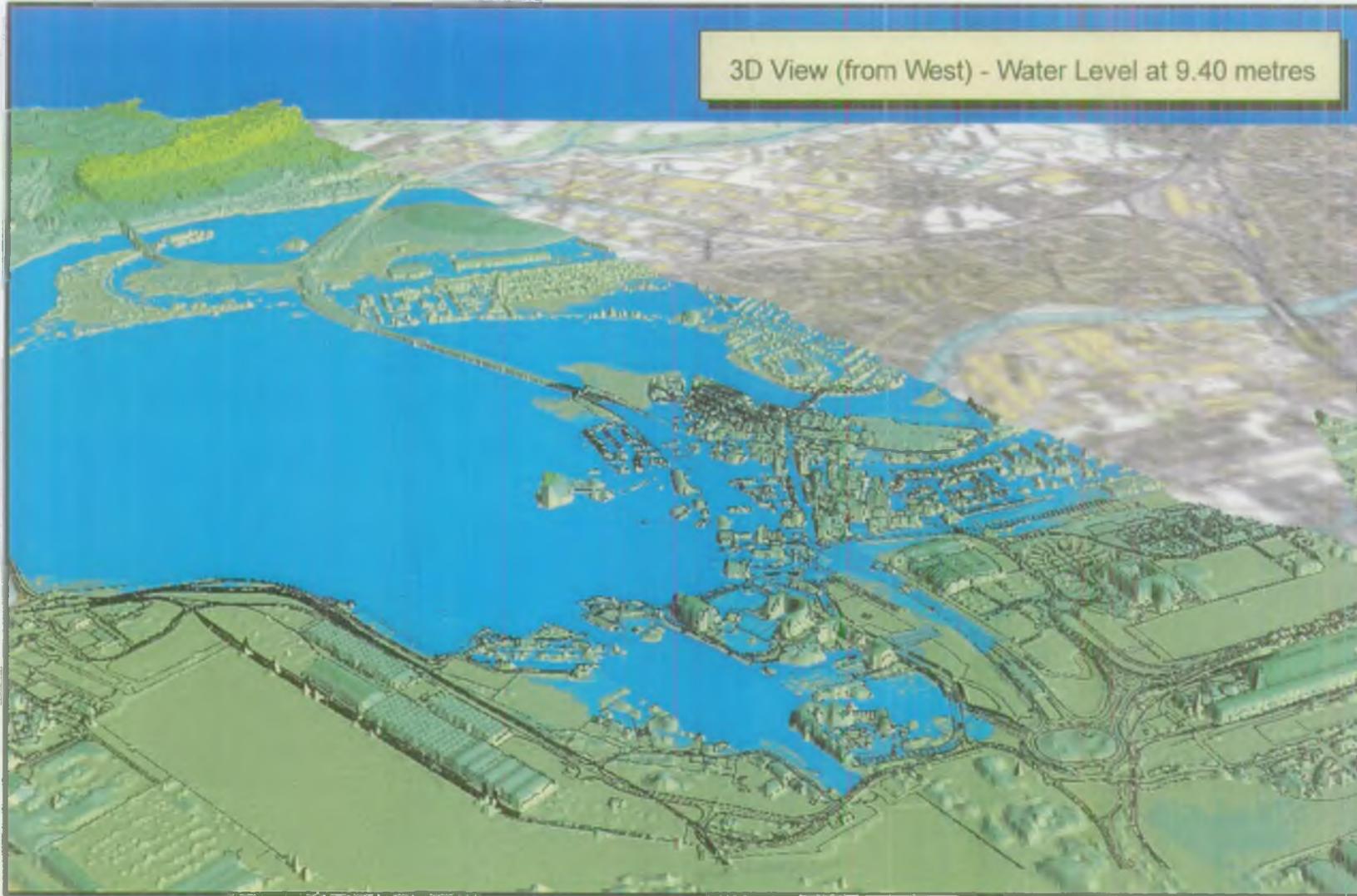




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3D View (from West) - Water Level at 9.40 metres





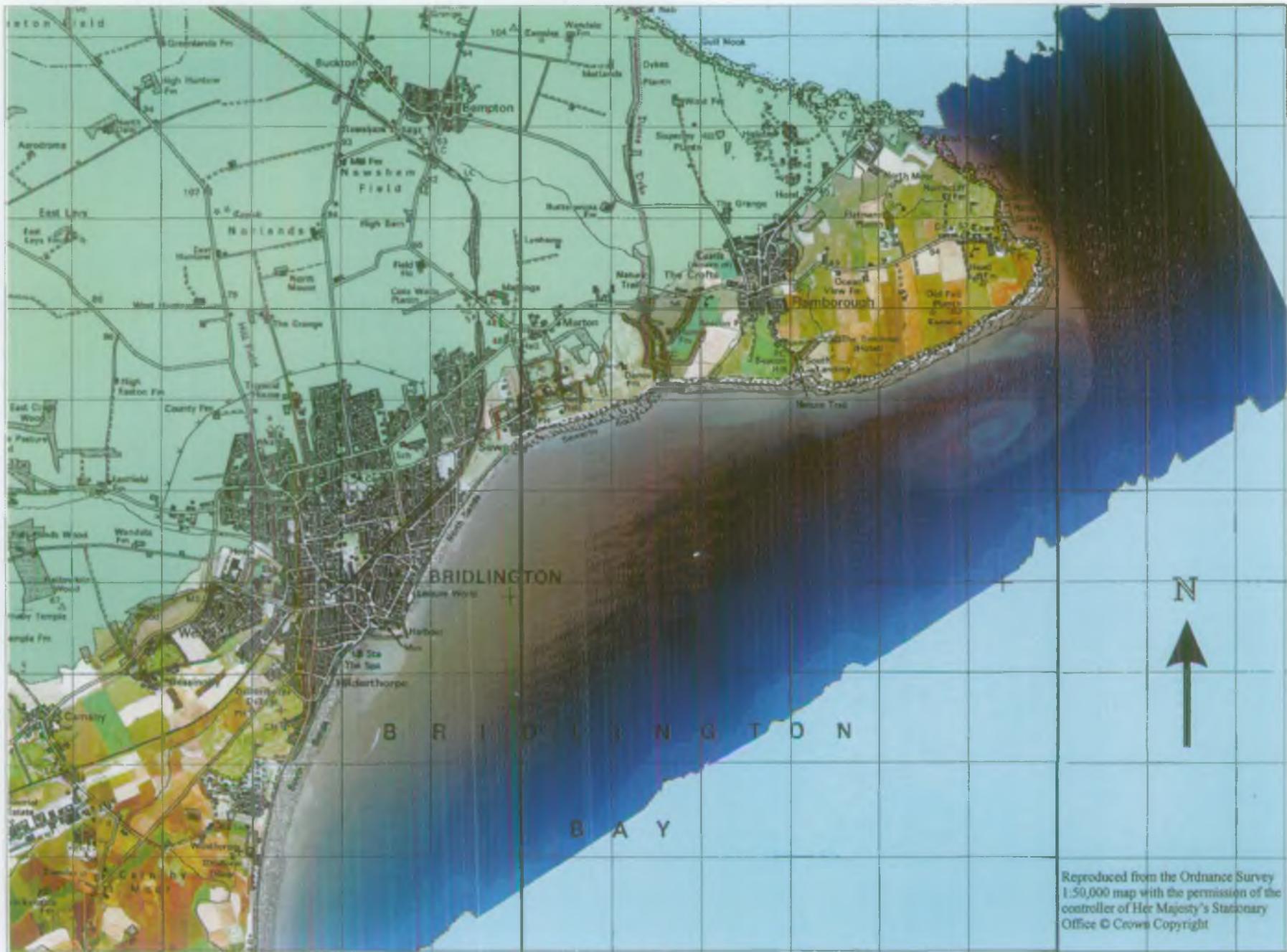
Bloom of *Emiliana huxleyi*

Fal Estuary, 27th July 1999

CASI True Colour Composite

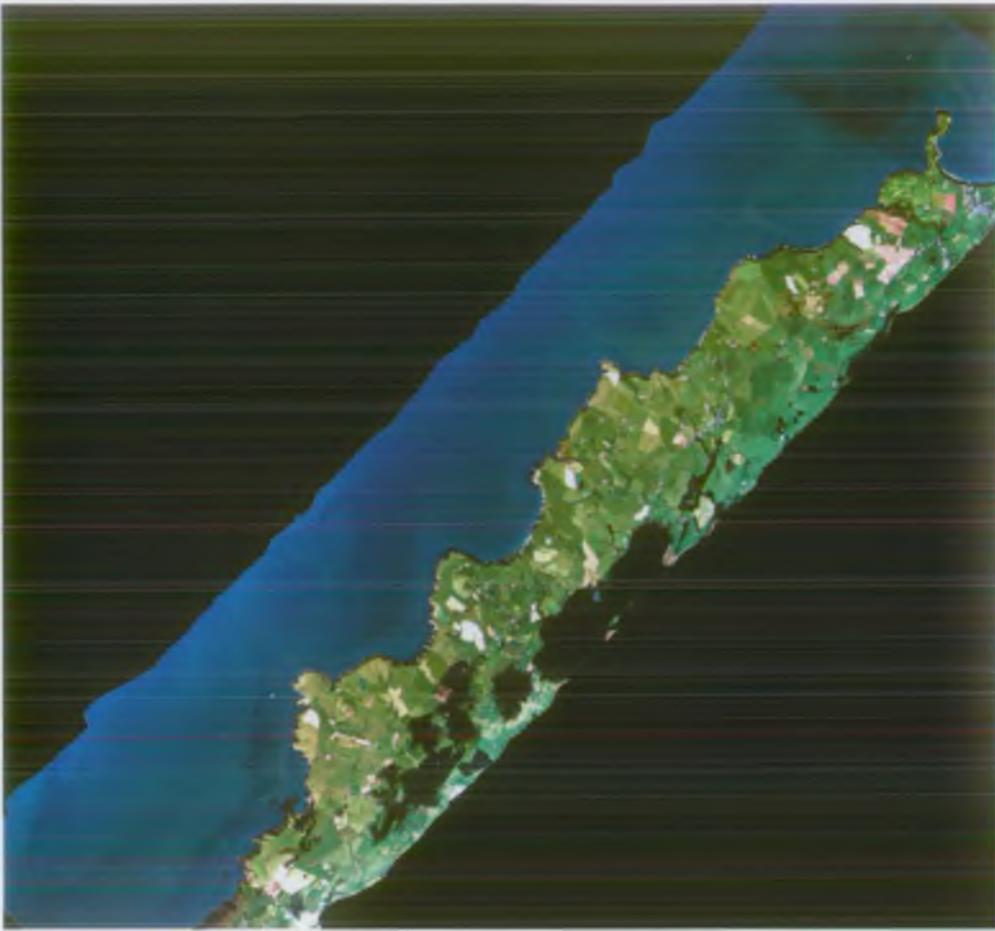
Algal Bloom





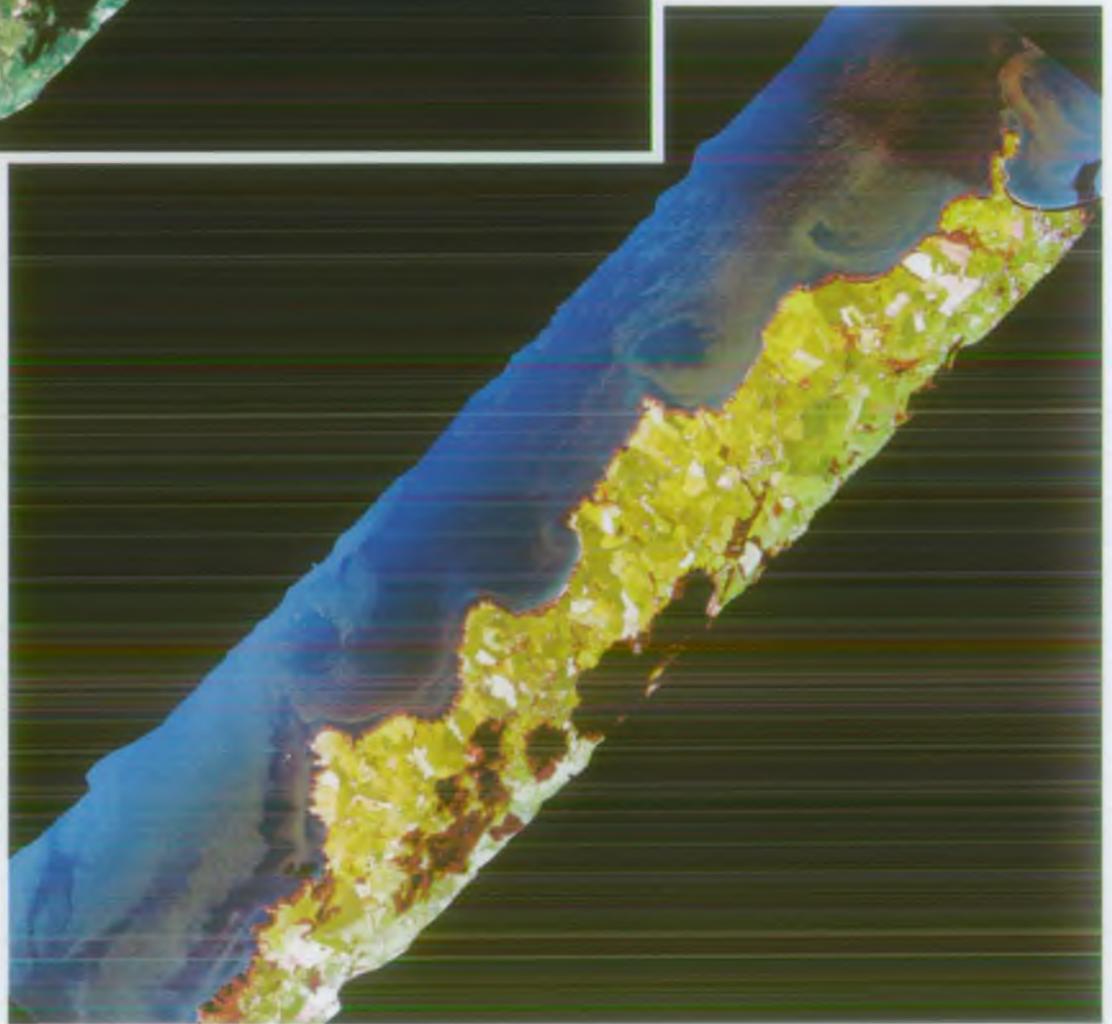
CASI True Colour Composite of the Flamborough Head Area





## Bardsey Sound to Careg Du

CASI True Colour  
Composite Enhanced to  
show Suspended Sediment



29th September 1995, 12:25

