Operational oceanography and the oil and gas industry – the UK experience

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Presentation Overview

- My background
- Operational oceanography and the role of Operators, Trade Associations, JIP's, Academia and Scientific Institutes, Regulators, Standards Organisations, Government and Professional Bodies (IMarEST).
  - North Sea and UKOOA – the early history
  - Piper Alpha and the role of regulation in the UK
  - Standards – NORSOK & ISO
  - North Sea helicopter operations and CAP 437
  - Joint Industry Projects – JIP's (SIMORC, Oil Spill)
  - UK Government and the EU
  - Professional bodies – IMarEST
- Conclusions

My Background

- BSc Physical Geography / PhD Satellite Meteorology
- Weather Forecasting - North Sea: 1978 – 1980
- Brunei Shell Metocean Dept: 1980 – 1984
- BP Metocean: 1984 – 2014
  - Chair North West Approaches Group (1988 – 2012)
  - Chair UKOOA Metocean Committee (1990 – 2001)
  - Chair IOGP Metocean Committee (2008-13)
- Outside BP
  - Member GOOS Scientific Steering Committee (2006 – 2010)
  - IMarEST (Fellow & CSci; Vice President 2008 – 14)
  - UK Science Council (Board Member since 2012)
  - National Oceanography Centre – Member Advisory Council
- Independent Consultant: 2014 - Present

North Sea – Early Years

- First successful well drilled September 1965 – Sea Gem
- Later to be BP's West Sole gas field
- First successful oil well 1969 – Amoco's Montrose field
- BP Forties 1970 – Sea Quest
- Shell Brent 1971
- First oil onshore in 1975

UKOOA

- UK Offshore Operators Association
- Technical Committees, including “Metocean”
- Metocean data collection from 1973 to 1988
- 11 offshore sites
- Weather ships (3), fixed platforms (4) & data buoys (4)
- Collaboration with Institute of Oceanographic Sciences on buoy design
- Winds, waves, currents, sea and air temps, humidity
- Costs and data shared amongst the members
- All data stored at British Oceanographic Data Centre

Piper Alpha and after

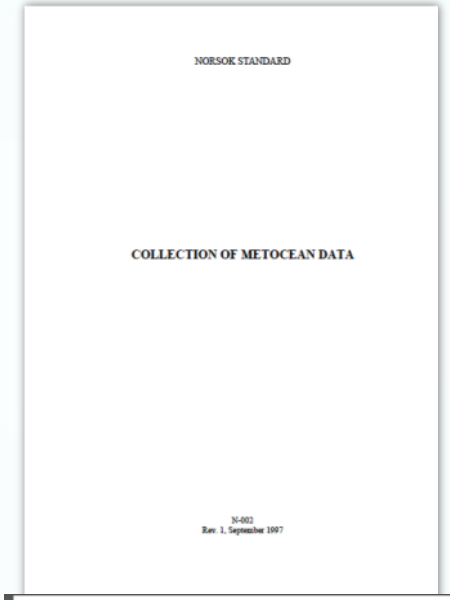
- 6 July 1988
- 167 personnel perished
- Cullen Inquiry – Nov 1990
- Dept. of Energy safety role replaced by the Health & Safety Executive (HSE)
- Offshore Installation Safety Case Regulations 1992 – Duty Holder Responsibilities
- Management & Admin Regs (MAR) 1995
  - Required monitoring of metocean info
- Design & Construction Regs (DCR) 1996
  - Required criteria to be based on suitable measured and modeled data
  - All data to be suitably QC'd and stored

Regulation	Guidance
MAR (Reference 2)	**MAR Guidance (Reference 3)**
Regulation 14 Operational Information The duty holder shall make arrangements for the collection and keeping of – (a) such meteorological and oceanographic information; and (b) such information relating to the motions of the offshore installation, as is necessary for securing, so far as is reasonably practicable, the safe operation of the installation and the safety of persons on or near it.	**Guidance 81** ……Information to be collected might need to include: (a) wind speed and direction; (b) the sea state; (c) air temperature; (d) barometric pressure; (e) visibility, cloud base and cover; and in respect of floating installations (including mobile units and floating production installations): (f) the roll, pitch heave, yaw and heading of the installation. **Guidance 82** …..Much of the information will be collected for immediate use only. It need be recorded and kept only if necessary for later use.

Norwegian & ISO Standards

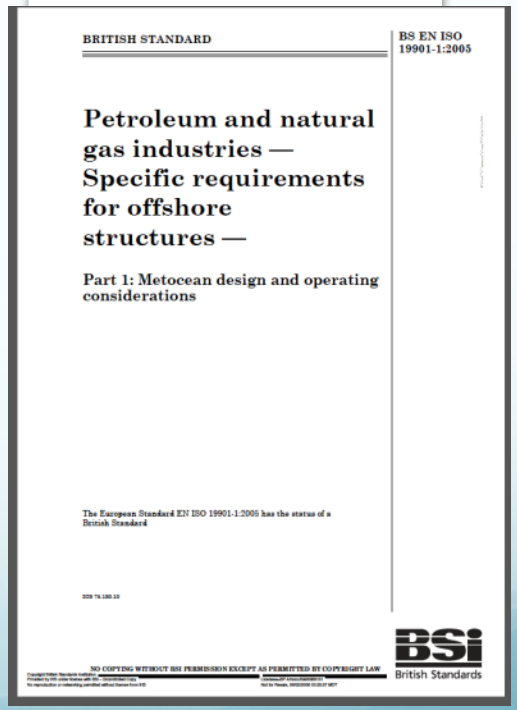
- NORSOK standard N-002 1997
  - Collection of Metocean Data
- Updated 2010

- Will be incorporated into the updated ISO 19901-1 (Metocean), first issue 2005
- In new chapter 11
- Due for issue in 2015
- Many of the ISO recommendations already accomplished in the UK due to CAP 437 regulations


NORSOK STANDARD

COLLECTION OF METOCEAN DATA

N-002
Rev. 1, September 1997


BRITISH STANDARD

BS EN ISO 19901-1:2005

Petroleum and natural gas industries — Specific requirements for offshore structures —

Part 1: Metocean design and operating considerations

The European Standard EN ISO 19901-1:2005 has the status of a British Standard

BSi British Standards

Aviation

- Helicopters are the main mode of offshore transport
- 57,000 personnel on 600 installations
- Approx. 45,000 flights per year
- Several fatal accidents in the North Sea
  - 1990 – 2013: 5 Fatal; 13 Non Fatal
  - Weather information an issue in some accidents
- Civil Aviation Authority (CAA)
  - Responsible body for UK flight safety
  - CAP 437

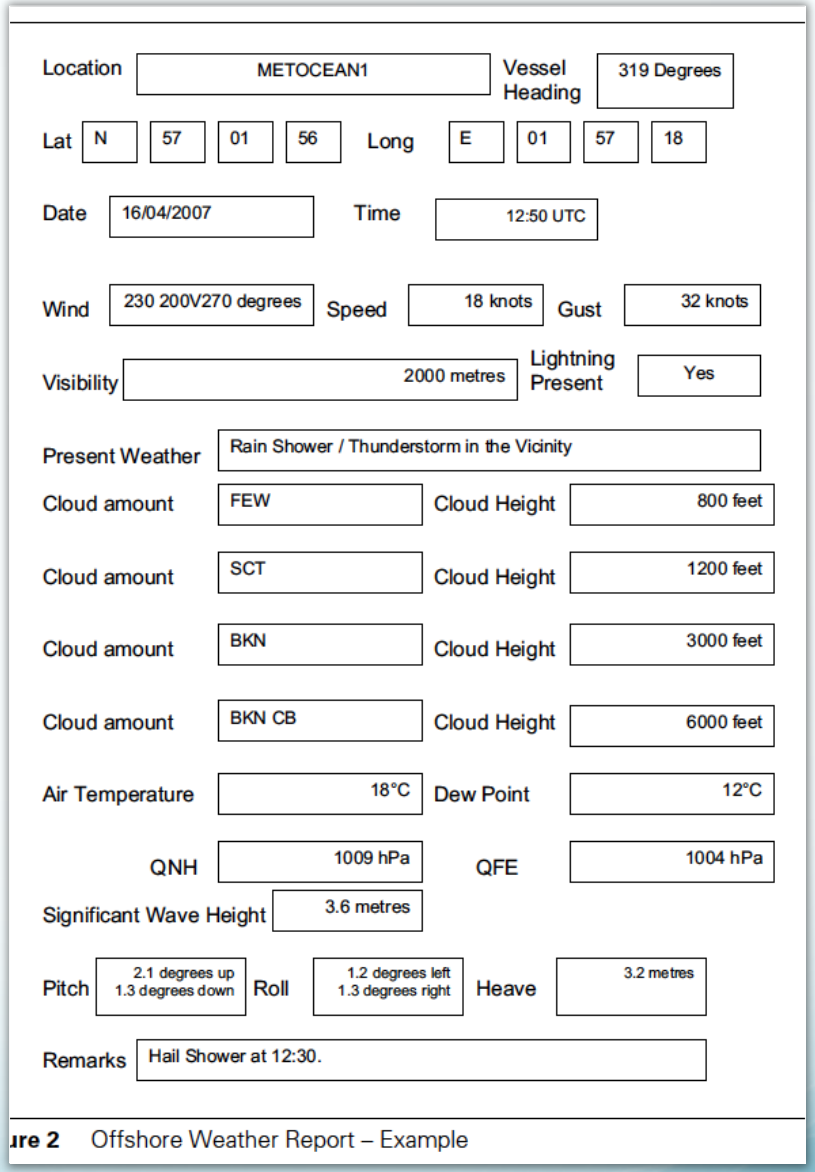
CAP 437

- Offshore Helicopter Landing Areas – Guidance on Standards
- 1st edition 1988
- Liaison with industry for 6th Edition in 2008

4.1 Accurate, timely and complete meteorological observations are necessary to support safe and efficient helicopter operations.

4.4.1 **Real-Time Web-Based Systems**

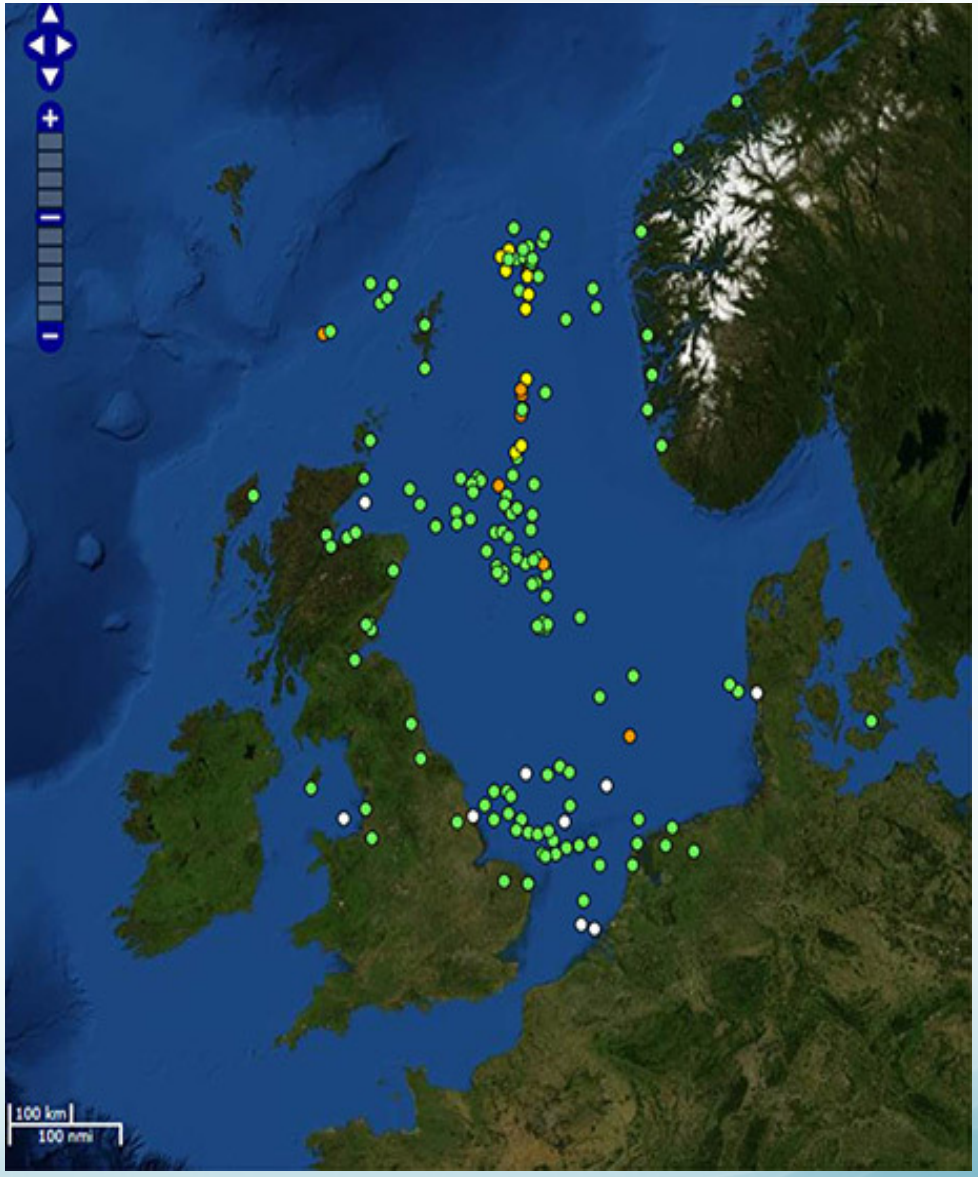
Offshore installations are strongly encouraged to supply meteorological information produced from the automated sensors to web-based systems that are operated on behalf of the UK offshore industry. These systems enable helicopter operators, installation duty holders and others to access the latest weather information in real



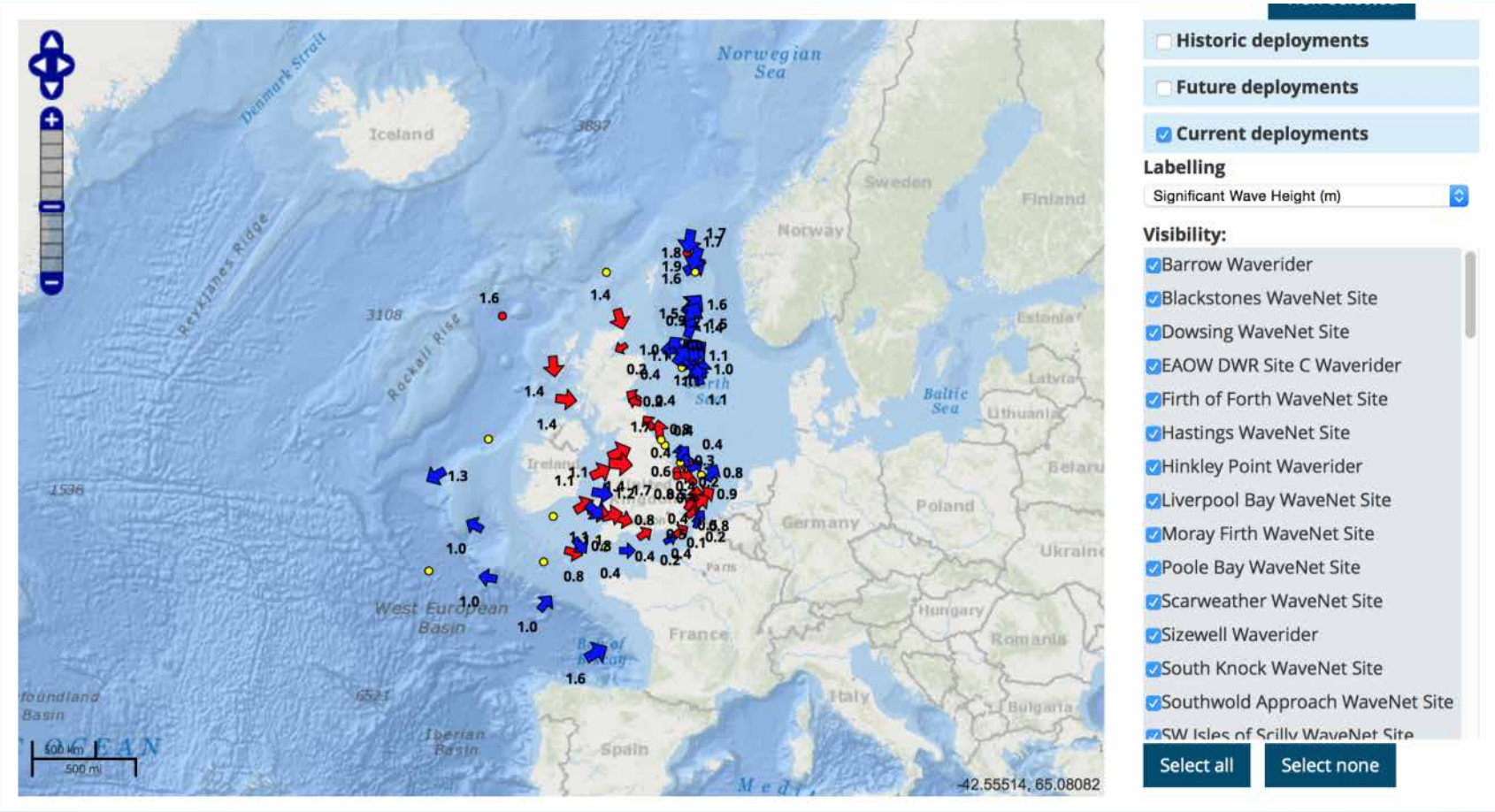
ure 2 Offshore Weather Report – Example

Helimet

- Operators fund stations
- Oil & Gas UK Members fund web system
- Based around Shell's "Metnet" system
- Operated by RigNet
- 68 stations plus diversion airports
- 2 min updates
- Offshore Observers must be suitably trained
- Data fed to Met Office & GTS
- On CEFAS "Wavenet" web page



CEFAS “Wavenet”



Funded by the Environment Agency and Defra in association with the Met Office, BODC, NOC, SEPA & NRW

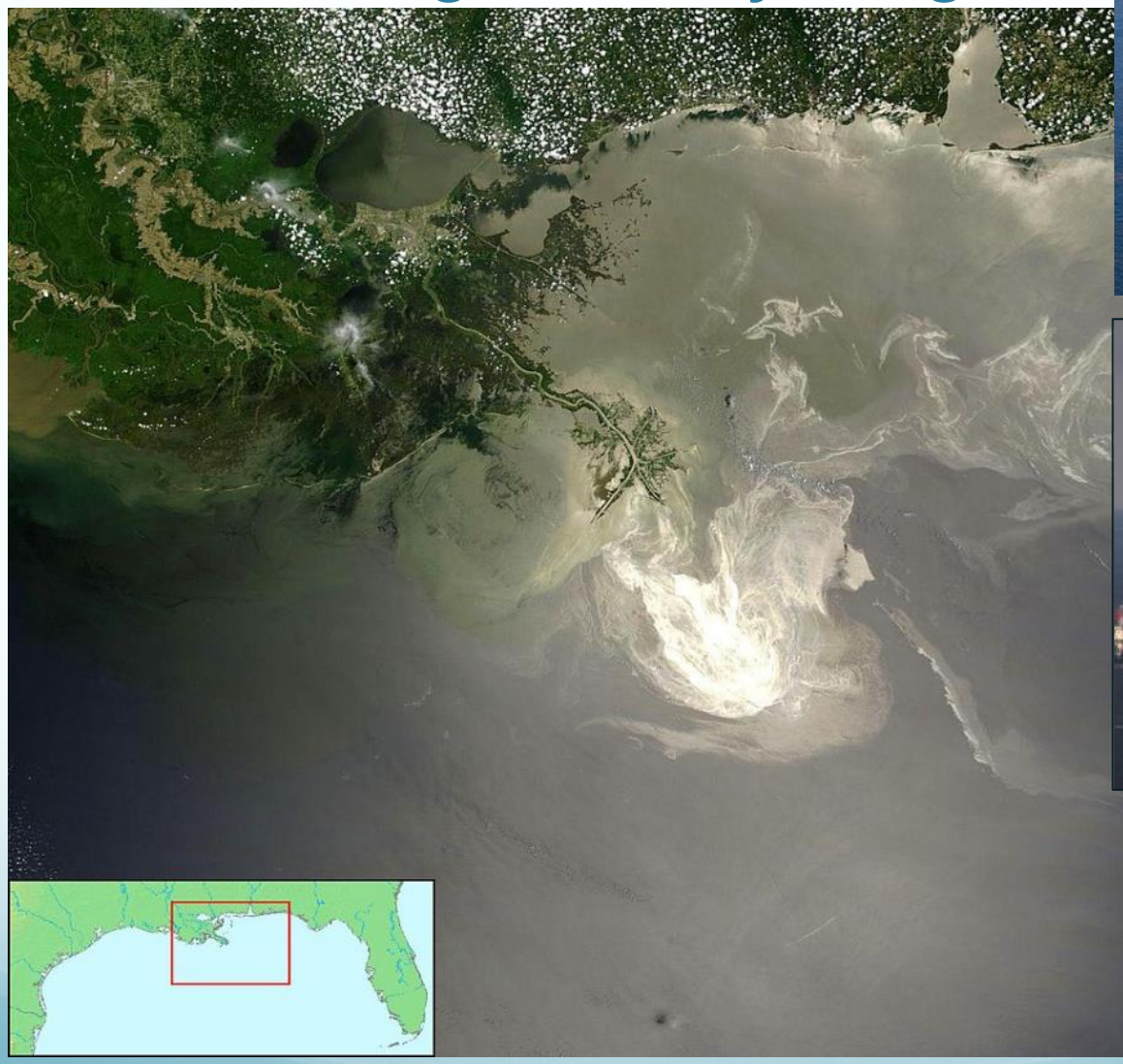
SIMORC

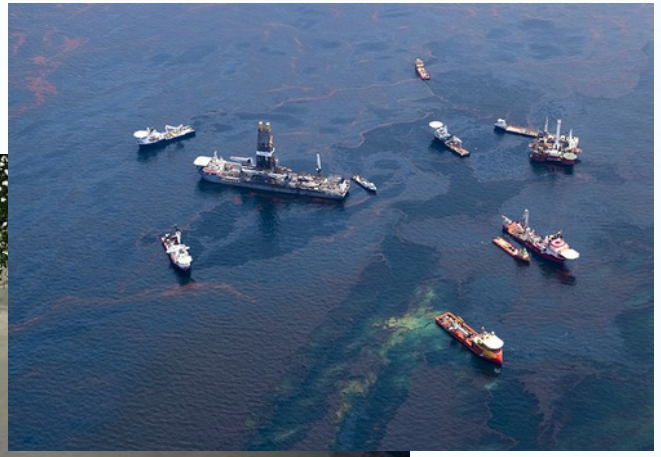
"**S**ystem of **I**ndustry **M**etocean Data for the **O**ffshore & **R**esearch **C**ommunities"

- EU funded 2005 – 2007
- BP, Shell & Total
- Now Limited Interest Project under IOGP
- 3600 data sets shared – metadata and data
- QC by BODC
- IOC-IODE – promotion & dissemination
- Maris operate the web site
  - Based on SeaDataNet principles

www.simorc.org

This changed everything…





Outcome of the IOGP "GIRG" Process

The role of the IOGP committees

- Recommendations 8, 10, 11, & 16: Surveillance, Modelling &Visualization:

- IOGP Committees managed elements of the Oil Spill JIP
  - Metocean
  - Geomatics
  - Environment

Knowing where spilled oil is, and understanding what condition it is in following a spill, is critically important. The GIRG analysis recognized the emergence of new technologies, but also the fragmentation between groups who facilitate the technology and the responders who ultimately use it.

JIP IOGP Committee Work Packages

WP1 - In-Water Surveillance (Metocean)

WP2 - Surface Surveillance (Geomatics)

WP3 - Modelling & Prediction (Metocean)

WP4 - Metocean Databases (Metocean)

WP5 - GIS / Common Operating Picture – COP (Geomatics)

WP6 - Regulatory Issues (Environmental)

WP7 - Report Deliverable (CG)

WP1 In-water surveillance: Battelle & Oceaneering

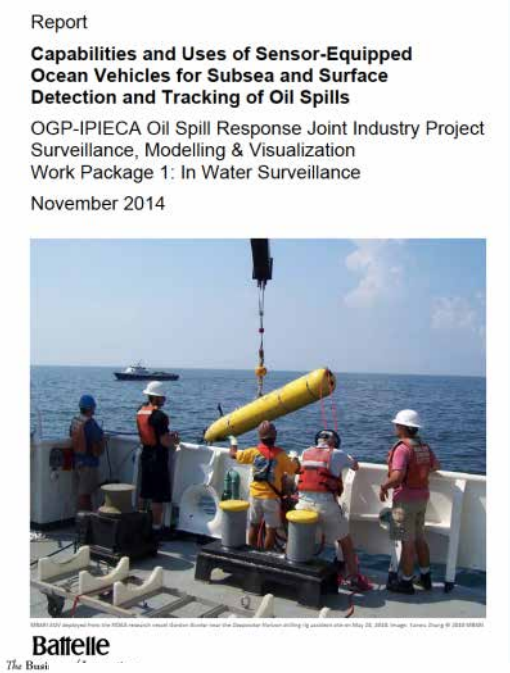
Leader: BP

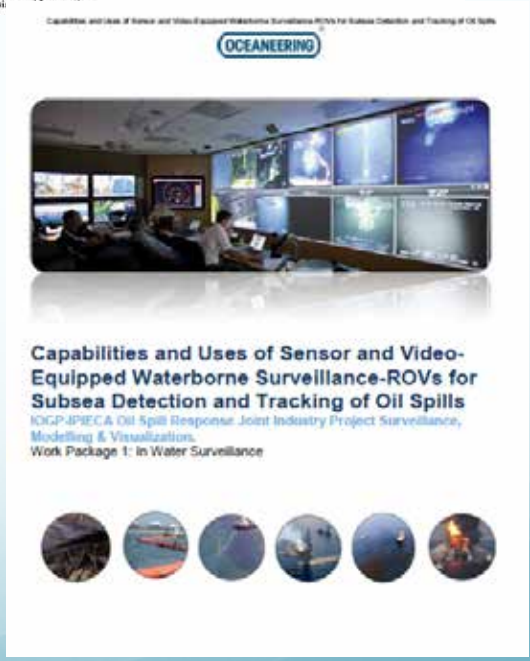
Battelle Tasks

1. Update Battelle Nov 2013 Report to BP
2. Review API TR 1152 to determine flow rate
3. Include surface vessel detection of oil spill
4. Review of USNRT guidance
5. Summarize recommendations for the 5 scenarios

Oceaneering Task

1. Review ROVs & Hydrocarbon sensors, including video systems





Battelle Report

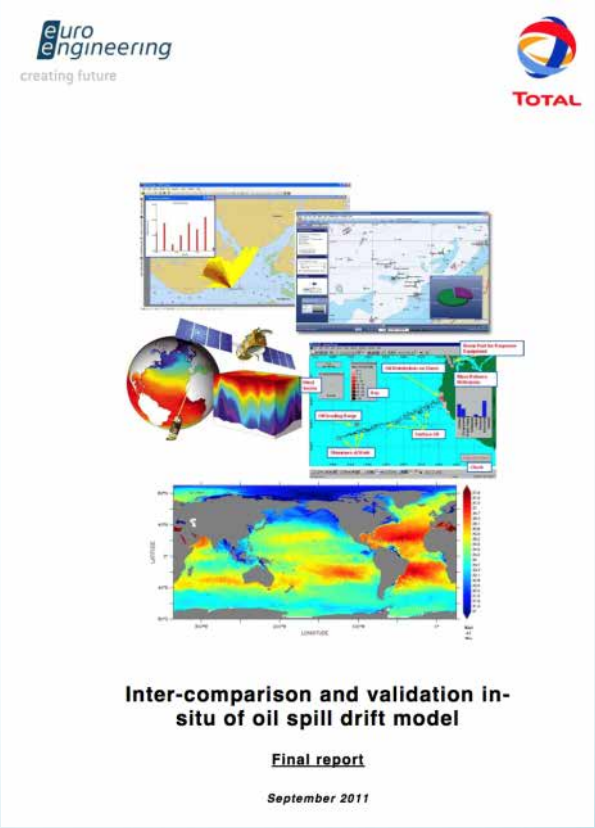
- Oceanographic Sensors
  - Direct & Indirect Oil Detection
- Autonomous Oceanographic Vehicles (AOV's)
  - AUV's, Gliders, ASV's etc
- AOV & Sensor Compatibility Matrix
- Remote Sensors & Surface Vessels
- US National Response Team Dispersant Guidelines
- Spill Scenario Priority Recommendations

http://oilspillresponseproject.org/completed-products

WP3 Modeling & Prediction

Leader: Total

- Built on work by Euro Engineering for Total – updated by Actimar
- Updated the existing 2011 review of hydrodynamic models
- Developing a protocol to validate hydrodynamic models as an input to oil spill plume models
- Collaborate with API on oil spill plume models



WP4 Metocean Databases

Leader: Total

- Consultant - Actimar
- Extend from West Africa to global
- Both real time and historical databases in scope
- Builds on databases such as those in SIMORC

WP4 Areas of interest

Basin	Sea/Ocean	Countries
Brazil	Atlantic Ocean	Brazil
Gulf of Mexico	Gulf of Mexico	US, Mexico
Gulf of Guinea	Atlantic Ocean	Côte d'Ivoire, Ghana, Benin, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, DR of Congo, Angola, Namibia
Australia - NW Shelf	Indian Ocean, Timor Sea	Australia
North Sea	North Sea	UK, Netherlands, Denmark, Norway
South China Sea	South China Sea, Gulf of Thailand, Java Sea & Makassar St	Indonesia, Thailand, Malaysia, China, Brunei, Vietnam
Caspian Sea	Caspian Sea	Azerbaijan, Kazakhstan, Russia, Turkmenistan
Indian Ocean	Indian Ocean, Arabian Sea, Gulf of Oman, Bay of Bengal	Bangladesh, India, Oman, Yemen, Kenya, Tanzania, Mozambique, S Africa
Arabian Gulf	Arabian Gulf	Iran, Iraq, Kuwait, Qatar, Saudi Arabia, UAE
Mediterranean Sea	Mediterranean Sea	Algeria, Libya, Cyprus, Egypt, Lebanon, Turkey
Black Sea	Black Sea	Russia, Ukraine, Bulgaria, Turkey
Barents Sea	Barents Sea	Russia
Baltic Sea	Baltic Sea	Sweden, Finland
Norwegian Sea	Norwegian Sea	Norway
Irish Sea	Irish Sea	Ireland, UK
Andaman Sea	Andaman Sea	Myanmar
East China Sea	East China Sea	China
Caribbean Sea	Caribbean Sea	Aruba, Trinidad & Tobago, Venezuela
North West Atlantic	Atlantic Ocean	Ireland, UK
South East Atlantic	Atlantic Ocean	Morocco, Mauritania, South Africa
South West Atlantic	Atlantic Ocean	Argentina, Uruguay, French Guinea, Guyana, Surinam
West coast of Canada	Pacific Ocean	Canada
East coast of Canada	Atlantic Ocean	Canada
Coral Sea	Pacific Ocean	Australia, Papua New Guinea

House of Commons Science & Technology Cttee Report - 2007

Investigating the Oceans

- Our central recommendation is that there should be a new marine science agency, replacing the current inter-agency coordinating committee. The responsibilities of this agency should include co-ordination of marine science throughout the UK, promoting marine science education in schools, universities and to the wider public, undertaking a strategy to tackle skills shortages in marine science and technology, engaging with industry and facilitating UK involvement in international organisations. **It should also take on the role of coordinating ocean monitoring and observations, with direct funding for operational observations where appropriate**.

UK Marine Interests

- Spread amongst many departments
- Co-ordinated by the Marine Science Coordination Committee – formed 2008 after the Commons report
- Reports to the Ministerial Marine Science Group (Defra chair)
- UK Vision “clean, healthy, safe, productive and biologically diverse oceans and seas”
- UK Marine Monitoring & Assessment Strategy (UKMMAS)
- Focus mainly on regulatory requirements
- EU Marine Strategy Framework Directive & INSPIRE

MSCC & UKMMAS

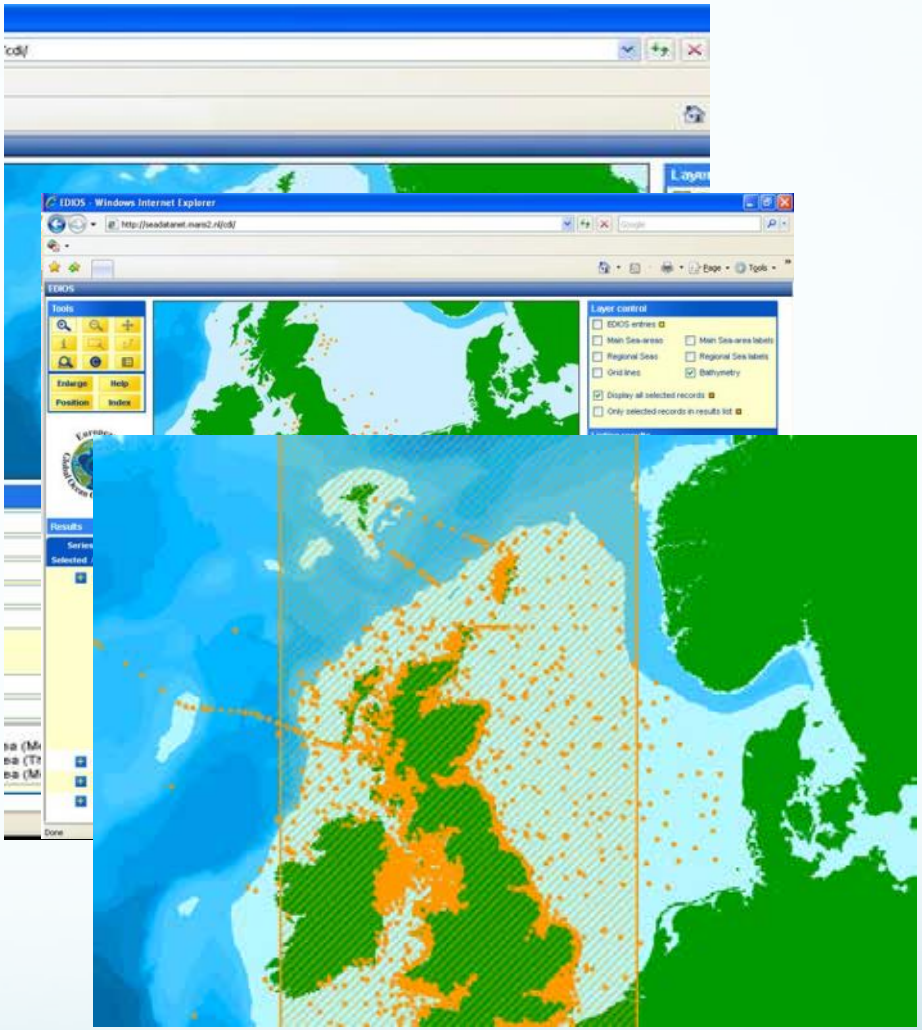
- Four Evidence Groups
  - Clean & Safe Seas
  - Healthy & Biologically Diverse Seas
  - Productive Seas
  - Ocean Processes (physical oceanography)
- Marine Industries Liaison Group (MILG)
- MEDIN – Marine Environmental Data Network
- UK Directory of Marine Observing Systems (UKDMOS)

MSCC & MEDIN

- Marine Environmental Data Information Network
- Open & collaborative partnership to improve management of marine data
- Public & private sector – (>30active partners)
- Funding from sponsors – approx. £500k / year
- “Measure once, use many…”
- Roles
  - Data Archive Centres (“DACs”) e.g. BODC, Met Office
  - Standards for data & metadata
  - Web portal – data searches (www.oceannet.org)
  - Resource & application development
  - International coordination (IOC & ICES)

UKDMOS

- The UK Directory of *Marine Observing Systems* was developed for UKMMAS to help coordinate and plan marine monitoring in the UK
- Provides information on all routine monitoring programmes carried out by UKMMAS organisations and is updated annually
- It does not include information on one-off surveys & research programmes
- UKDMOS contains more detailed information on a smaller range of data than the MEDIN Discovery portal
- Links to EMODNET



http://www.ukdmos.org

UK IMON

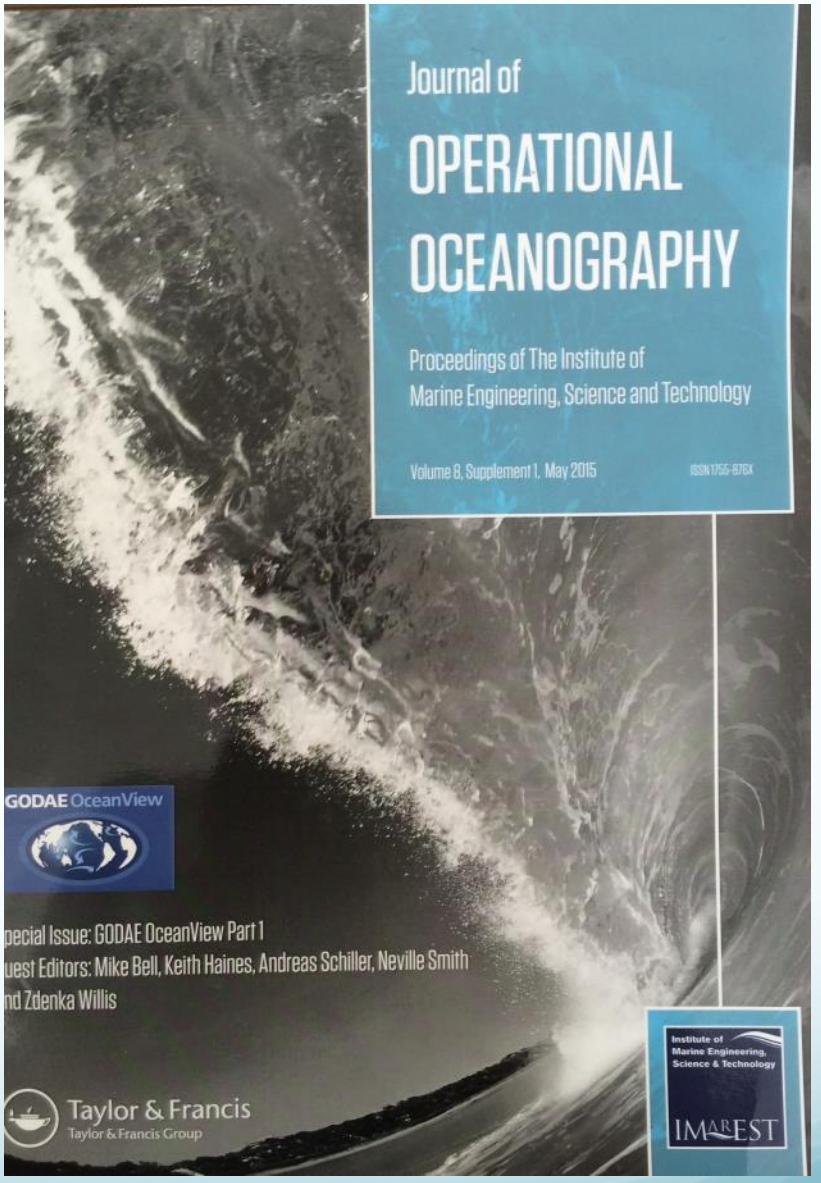
- IMON: “Integrated Marine Observing Network”
- Developed under OPEG following an IMarEST coordinated workshop in 2011 to discuss UK monitoring programmes & their coordination
- Led by Cefas under Defra (David Mills is chair)
- Liaison with US-IOOS on “core variables”
- Workshop on future technologies in Sept 2013 organised with IMarEST support
- Resource limitations an issue at present

IMarEST

Operational Oceanography Special Interest Group (OOSIG)

The overall aim of the OOSIG is to improve awareness of the concept of operational oceanography and to engage the wider marine sector in ocean observation and the associated development of operational products and services

www.imarest.org



Conclusions

- Regulatory involvement can be beneficial for operational oceanography but…
  - If resources are limited there can be a tendency to only do what is required by regulation
- "Measure once use many" but….standards are vital – variables, QC, archiving, metadata, "free" availability, exchange formats etc.
- Adequate & sustained funding and resources for oceanographic observations
- Organisational challenges – coordination is required
  - Devolved powers (UK), many Departments have interests
  - Involvement of all stakeholders, including industry
- Professional bodies (IMarEST) have a role in providing linkages
- Benefits of committed, engaged & enthusiastic staff
  - Encourage staff to have external involvement in their roles for career development and the benefit of marine science in general

Questions?