Irish Sea Ferry - some results

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Measurements (real time)
Numerical models

www.pol.ac.uk

Web site - http://coastobs.pol.ac.uk
Irish Sea Observatory
Integrated measurements

- Measurements to test models
- Variety of space and time scales
- Some real time
- Long time series
- In situ time series
  Sites A and B
- Spatial survey
- HF Radar
- Ferry
- Satellite (weekly composite)
- Glider
Liverpool Seaways, Birkenhead - Belfast

Norfolk Line / Norse Merchant / DFDS
December 2003 - January 2011

CTD - SeaBird SeaCat SBE / FSI
Turbidity - Sea Point + wiper
Fluorimeter - Chelsea Minitracka II
Oxygen - Aanderaa optode
Intake 3m below surface
Sample interval - 10 seconds
Data transmission - Orbcomm - 15 mins

Wiper on turbidity sensor
Isolation valve

7 hour crossing, 230 km there and back daily
Water depths (m)

98% within 5 km of tracks
Tides

Mean spring tidal current (m s\(^{-1}\))

Mean spring surface maximum amplitude (m s\(^{-1}\))
Irish Sea

Number of days temperature stratified in a year
Salinity

Dublin-Birkenhead
Salinity

Birkenhead-Dublin
**Average salinity**

**Graphs:**

- **Salinity vs Longitude (°W)**
  - Red: westbound
  - Blue: eastbound
  - Constant 4.75 mins; 1.6 miles (sea chest)

**Eastern end expanded**

**Red** westbound; **blue** eastbound

**Constant 4.75 mins; 1.6 miles (sea chest)**

**Salinity correction per crossing** 0.009
(Before valve installed 0.019)
SmartBuoy Comparison

Temperature (°C)

Salinity

<table>
<thead>
<tr>
<th></th>
<th>Temperature</th>
<th>Salinity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation coefficient</td>
<td>0.998</td>
<td>0.91</td>
</tr>
<tr>
<td>Mean difference</td>
<td>0.16</td>
<td>-0.00</td>
</tr>
<tr>
<td>Standard deviation of difference</td>
<td>0.23</td>
<td>0.27</td>
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</tbody>
</table>
Temperature - seasonal cycle

**Mean**

- Dublin: August
- Birkenhead: September

**Amplitude**

- Dublin: Birkenhead

**Phase**

- Dublin: August
- Birkenhead: September

**r^2**

- Dublin: August
- Birkenhead: September
Amplitude of temperature seasonal cycle: relation with water depth
Salinity - seasonal cycle

Mean

Amplitude

Phase

$r^2$

Days

December

June
Salinity variability

Maximum salinity per crossing

2009

Days
Near shore gradients
Mersey Bar
Mouth of Mersey
Difference

Correlation
Temperature 0.96
Salinity 0.42
Spring - neap cycle at SmartBuoy site

Salinity

Red - leaving of Liverpool
Green - arriving
Blue - SmartBuoy

Liverpool tide gauge
Turbidity

4-25 November 2010

Mean spring surface maximum amplitude (m s\(^{-1}\))

\(r=0.67\)
Summary

East-west differences - time / distance constant

Seasonal cycle

Temperature variability

Salinity variability

Nearshore gradients

Effect of Spring-Neap cycle
Liverpool Seaways, Birkenhead - Belfast

Norfolk Line / Norse Merchant / DFDS
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Sample interval - 10 seconds
Data transmission - Orbcomm

Wiper
Isolation valve

7 hour crossing there and back daily