Submesoscale Spatial Variability of Ocean Turbulence

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T-REMUS Vehicle
T-REMUS Drogued Gateway 3 Buoy System
LatMix T-REMUS Deployments

<table>
<thead>
<tr>
<th>Date in</th>
<th>06/03/11</th>
<th>06/05/11</th>
<th>06/08/11</th>
<th>06/10/11</th>
<th>06/14/11</th>
<th>06/16/11</th>
<th>06/18/11</th>
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<tbody>
<tr>
<td>Time in (UTC)</td>
<td>06:03:14 PM</td>
<td>02:34:42 PM</td>
<td>05:46:34 PM</td>
<td>11:32:09 AM</td>
<td>01:17:11 PM</td>
<td>01:03:08 PM</td>
<td>01:03:24 PM</td>
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<tr>
<td>Starting Latitude</td>
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<td>32.0734</td>
<td>31.9384</td>
<td>31.7897</td>
<td>32.5184</td>
<td>33.0707</td>
<td>33.887</td>
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<tr>
<td>Ending Longitude</td>
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<td>-73.1082</td>
<td>-73.019</td>
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<td>-73.7004</td>
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<tr>
<td>Ending Latitude</td>
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<td>32.6475</td>
<td>33.2104</td>
<td>34.0078</td>
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T-REMUS Vertical Track

230m
25m
45m
T-REMUS LatMIX Sampling
Froude Number 5 m average

depth (m)
downstream distance (km)
Turbulent Patch Criteria
\[ \delta_T > 1.5 \text{ cm} , \text{ Patch Extent, } \Delta_z > 30 \text{ cm}, \text{ Patch Separation } > 30 \text{ cm} \]
Analysis based on Smyth et al. (2001)
density Side East

\[ x = 10.6 \text{ kM} \]
Thermal Diffusivity $\log_{10}(k_T)$ of Patches

$\langle (k_T) \rangle_{\text{weighted}} = 3.7 \times 10^6 \frac{\text{m}^2}{\text{sec}}$
Tentative Conclusions

18 June 2011 T-REMUS data (LatMix I, Site 2)

- A cold fresh intrusion occurred at mid depth of the sampling.
- Turbulence was weaker within the intrusion and stronger at its edges.
- Patch vertical (cross isopycnmal) scales ~1-3 meters. Patch along isopycnal scales, at time, > 500 m.
- Diathermal diffusivity of order 4.0 e-6 m^2/sec.
- A sharp change in density occurred at x =11 km (submesoscale front?) beyond which $\varepsilon$ increased.