The inner shelf, bounded on the shoreward side by the surf zone and offshore by a depth of approximately 50-100 m, is a region in which a variety of physical processes can occur over a wide range of time scales (from fractions of a second for wave breaking, to the two-week spring-neap tidal cycle and seasonal cycles), and length scales (millimeters for the wind-stress supporting gravity-capillary waves and other microstructure, to O(10-100 km) for along and across-shelf processes) associated with a wide range of different forcings. In this work, we report on a large field campaign conducted off the coast of Point Sal, CA in September 2017, as part of the Office of Naval Research funded Departmental Research Initiative (DRI) Inner Shelf program. We used a combination of airborne remote sensing techniques along with in-situ surface and subsurface measurements to investigate the role of surface and internal wave processes on the dynamics, transport and mixing in the water column of the inner shelf.

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**Tool? The Modular Aerial Sensing System (MASS)**

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**Surface response to the internal wave packet**

- **Sea surface Temperature**
  - Smooth
  - Rough

- **Whitecap coverage (%)**
- **Chlorophyll-a concentration**

- **Surface velocity (from MASS)**

- **Surface wave spectrogram along the flight track**
  - "Smooth" band
  - "Rough" band

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**Internal Wave packet propagating toward Point Sal, CA**

- **Temperature (100m isobath)**
- **Temperature (50m isobath)**
- **SST (from MASS)**

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CSK SAR image recorded on September 14, 2017 at 01:52 UTC showing a packet of high frequency internal waves propagating toward Point Sal during the Inner shelf DRI experiment. Also shown in (b) is the location of a zoom of the moorings deployed during the field program (red dots). The temperature profiles collected at two of those sites, MS 100 and PS 90Y, respectively at 100 m and 50 m water depth is shown in (b), capturing the evolution of the internal waves as they propagate toward shore. (c) shows infrared imagery of the surface packet of internal waves on September 13, 2017 at 23:45 UTC, approximately two hours before the SAR image depicted in (a). The location of the flight track and the expected location of the front of the WW based on the propagation speed computed from the mooring is also shown.

"Note the modulation of the surface wave field from the internal wave packet (smooth/rough bands sequence), the modulation of the whitecap coverage and the focusing of surface chlorophyll in the forward part of the wave."

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**Omnidirectional wave spectra of surface waves**

- **Background**
- **"Rough"**
- **"Smooth"**

Redistribution of energy in the wave spectra computed in "rough" (red color) and "smooth" (blue color) bands of the internal wave packet caused by the surface gravity waves interacting with the internal waves. Background wave spectrum is shown in black.