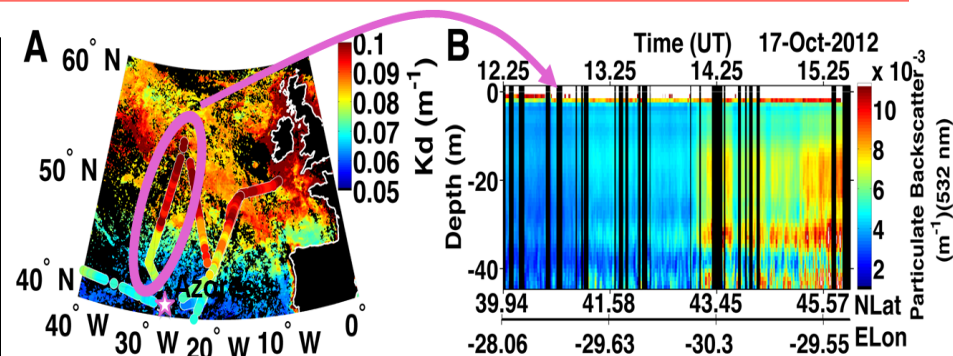


# Modification of HSRL and RSP for ACE, Geo-CAPE, and Glory Applications from the NASA P-3B

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## Objective

- Increase capability of the airborne High Spectral Resolution Lidar-1 (HSRL-1) for science applications related to
  - Air-sea gas ( $\text{CO}_2$ ) exchange
  - Ocean color
  - Ocean-Aerosol Interaction
  - Cloud extinction and cloud droplet number density
- Improve the functionality and reliability of the Research Scanning Polarimeter (RSP)
- Adapt both instruments to fly on the NASA P-3B to enable long-range over-ocean flights to assess ACE and Geo-CAPE remote sensing strategies



(A) Average diffuse attenuation,  $K_d$ , retrieved using HSRL technique between 10-30 m depth along several of the flight tracks from the Azores deployment. The background shows  $K_d$  retrieved from MODIS for the 2 week period of the airborne measurements. (B) Curtain plot of phytoplankton backscatter  $b_{bp}$  retrieved via HSRL technique along the flight leg marked by the oval.

## Accomplishments

- Conducted extensive science demonstration campaign in the Azores in October 2012 onboard the Wallops P3-B aircraft. Flights coordinated with ship-based ocean optical sounding on the RRS James Cook by NASA Phytoplankton Carbon Project (PI Prof. Mike Behrenfeld, Oregon State University.). Flights: 3 test flights, 2 transit flights, 5 science flights
- First-ever application of HSRL technique for retrievals of key ocean optical properties required to determine Net Primary Productivity (NPP).
- Led to award of project under the NASA Ocean Biology and Biogeochemistry Program to develop algorithms, participate in field campaigns, and validate ocean retrievals using ship-based in-situ measurements.
- Data collected from Azores deployment used to set requirements for the ACE Decadal Survey mission concept and improve CALIPSO ocean retrievals.

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