Thursday, October 11
Poster Session 4
10:30–12:00

Poster 8

EXTRACTING SPATIAL DISTRIBUTIONS OF OPTICALLY ACTIVE CONSTITUENTS FROM AIRBORNE HYPERSPECTRAL OCEAN COLOR DATA USING A BLIND-SOURCE SEPARATION APPROACH.

Airborne ocean color sensors provide the flexibility to sample rapid local physical processes, as high temporal and spatial resolutions are required to study their role in advection and mixing of tracers in the surface ocean. Provided short revisiting times, effective removal of the instrument artifacts and atmospheric effects would result in water-leaving reflectances with temporally consistent spatial patterns, only distorted by the advective flow field. However, calibration and atmospheric correction errors often result in significant spatiotemporal discrepancies, that propagate to the abundance maps of optically active constituents (OAC), like chlorophyll concentrations, derived with bio-optical algorithms. A novel approach to obtain consistent abundance maps from airborne ocean color time series is presented. It uses Independent Component Analysis, a blind-source separation technique, to extract the signal-variability patterns due to changes in the OACs directly from the at-sensor signal. Thus, it does not require highly accurate instrument calibration or explicit atmospheric correction. Each extracted component corresponds to the signal of an OAC-assemblage with variable concentrations in the targeted region. An OAC-assemblage is described by two factors: a spectral signature, determined by its inherent optical properties (IOPs), and a signal-score, proportional to relative changes in its concentration. The method is illustrated with a ~1.5-hour long time series of ~20 images of a coastal submesoscale eddy collected with an experimental hyperspectral push-broom sensor at ~3.000 m altitude. Results show a single OAC-assemblage which spectral signature appears to be dominated by chlorophyll-like pigments. Spatiotemporally consistent signal-score maps are evidence of the absence of atmospheric effects.

Ingrid M. Angel Benavides, Helmholtz Zentrum Geesthacht, ingrid.angel@hzg.de
Burkard Baschek, Helmholtz-Zentrum Geesthacht, burkard.baschek@hzg.de
W. David Miller, Naval Research Laboratory, dave.miller@nrl.navy.mil
Rüdiger Röttgers, Helmholtz-Zentrum Geesthacht, rroettgers@hzg.de