The SSB models currently adopted for the Jason-1 and Jason-2 GDR products are based on significant wave height (SWH) and altimeter wind speed. We investigate the impact of creating SSB models based on different combinations of variables. We find that SSB models based on SWH and sigma0 have similar performance to currently adopted models based on SWH and wind-speed. We also find that models based on a third dimension, comprising the difference between 1-Hz and along-track-smoothed SWH values, reduce sea level anomaly variance by ~2 cm^2.

Three-dimensional sea state bias models

- Explored three different sea state bias models
  - Based on SWH and wind speed
  - Based on SWH and sigma0
  - Based on smoothed SWH, smoothed Sigma0 and SWH smoothing residual
- SSB, sigma0 models produce almost identical performance metrics to the SWH, wind-speed models
- Sigma0 is a fundamental altimeter measurement.
- Wind speed is derived from SWH and sigma0 using a parametric model.
- Basing SSB on Sigma0 and SWH would eliminate one of the parametric models involved in determining global SSH.

Three-dimensional sea state bias models based on smoothed sigma0, smoothed SWH, and the SWH smoothing residual reduce Jason-1 SLA variance by:
- Along-track variance reduction: 2.1 cm^2
- Collinear variance reduction: 4.1 cm^2
- Crossover variance reduction: 0.3 cm^2

Variance reductions are likely the result of removing correlation between range measurement noise and SWH measurement noise.

Obtaining SSB by linear interpolation

- Construct a grid of SSB nodes
- Obtain SSB by linear interpolation
- Minimize collinear SLA differences
- Built a flexible tool for exploring N-dimensional SSB models.