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Ocean-to-shelf signal transmission

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Oceanic signal transmission onto and across the continental shelf to the coast is investigated, focusing on pressure and surface elevation. The model used represents a uniform cross-slope section on an "f-plane" with stratification, along-shelf wave-number and oscillatory frequency. At the model's oceanic boundary, care is needed for the prescription of the oceanic signal to be physically realistic.

Then substantial transmission of oceanic surface elevations across the slope and shelf is limited to (i) large response near a dispersion relation for a coastal-trapped wave, (ii) large along-shelf scale relative to a frictional-decay distance (D) for coastal-trapped mode 1.

Friction aids signal transmission by reducing the decay distance D, thereby increasing the range of scales ($>$ D) for which coastal trapped wave mode 1 performs shelf-ocean matching.

Relative to the open ocean, there is a prior reduction on approach to the slope unless (i) or (ii) applies for mode 0 (an approximate Kelvin wave).

As a consequence, coastal gauges are likely to be effective monitors of only the largest-scale oceanic motion (typically 1000s km).

A model including "beta" is necessary for a full treatment of the response to oceanic signals including Rossby waves; this probably implies a fully 3-D numerical model.