How does HFR wave measurement work?

1. Wave data extracted from 3rd-order Bragg Doppler spectra caused by the orbital motion of long traveling ocean waves.
2. Wave parameters are determined for each radar Doppler spectrum at concentric range rings from the HFR and collapsed into a single-voxel spatial average.
3. Spatial average and temporal resolution based on operating frequency: 3–50 km offshore & 15–60 min.
4. Assumes waves producing scatter do not interact with the ocean floor:
   - $\pi \ll \frac{D}{\lambda}$
   - $k \approx 2 \pi / \lambda > 0.8$

What are strengths and limitations?

Strengths:
- Non-invasive remote sensor.
- Uses existing surface current measurement HFR National Network.
- Assumptions for waves producing scatter do not interact with the ocean floor.
- Assumes waves producing scatter do not interact with the ocean floor.

Limitations:
- Somewhat large spatial and temporal averaging.
- Spatial average and temporal resolution based on operating frequency.
- Evaluation by Weather Forecast Office program for coastal operations.
- Evaluation and Transition Plans for the Use of High-Frequency Radar (HFR) Coastal Wave Observations.

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