

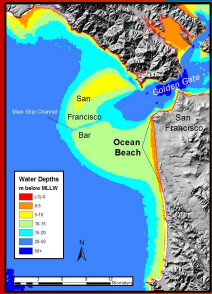
The Morphology and Dynamics of the Sandwaves of the Golden Gate

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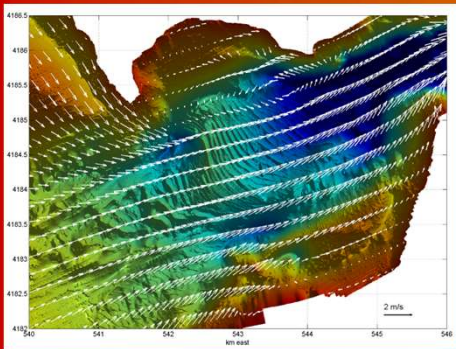


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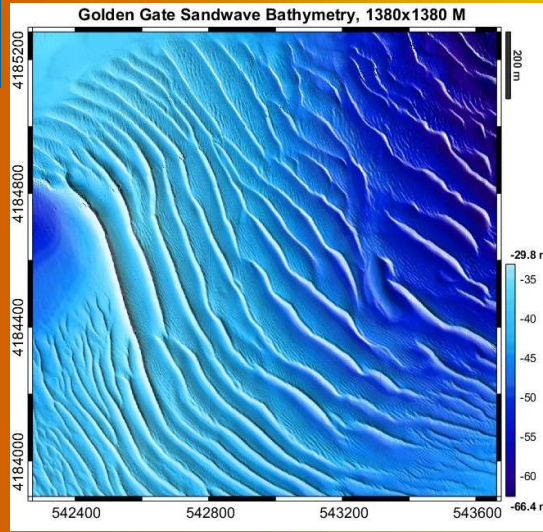
1. The Setting:
Golden Gate Inlet, San Francisco, CA, USA



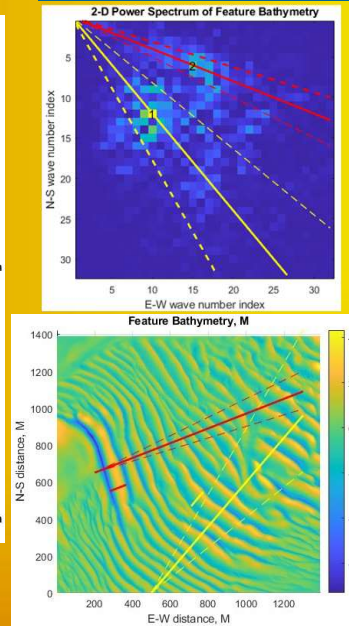
Very Strong tidal currents



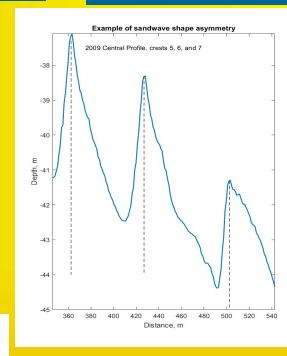
2. Field of Sandwaves



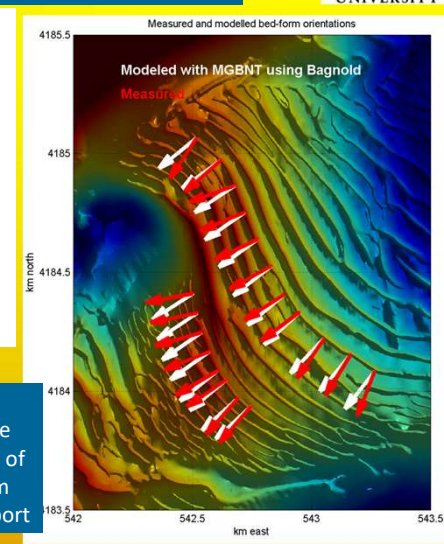
3. Wavelength and orientation from 2D power spectrum of the feature bathymetry (the large-scale smoothed bathymetry has been subtracted to make the feature bathymetry).



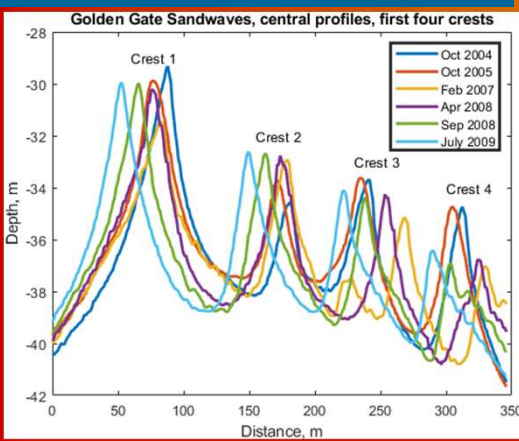
4. Transverse asymmetric shape generally indicates migration toward steeper-facing direction



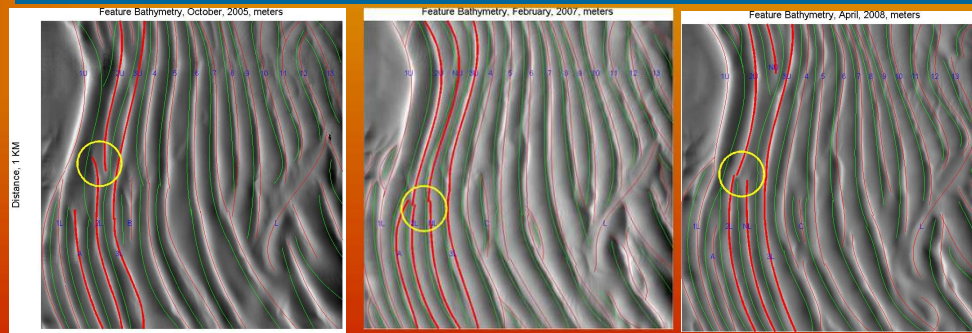
5. Longitudinal crest orientation and curvature consistent with principle of Maximum Gross Bedform Normal Sediment Transport



6. Migration and evolution on annual time scale



7. Appearance and disappearance of a new sandwave crest (orientation rotated from views above)



Oct., 2005: Dislocation along crest 2 indicates instability.

Feb., 2007: A new crest (labeled NU/NL) has formed between crests 2 and 3; the other crests have moved away from the new crest.

Apr., 2008: The upper half of the new crest (NU) has disappeared; the other crests have migrated back toward their previous positions.

8. Conclusions

- The 2x2 km Golden Gate sandwave field is relatively stable, but individual sandwaves within the field evolve considerably.
- The distribution of orientations and wavelengths can be quantified from the 2D power spectrum of the feature bathymetry.
- Individual sandwave transverse profiles tend to have an asymmetric shape, with the steeper face toward the southwest.
- Sandwave crest orientation and longitudinal curvature consistent with modeled sediment transport (MBNGT).
- A new sandwave formed within the field, and later disappeared, within two years.
- The surrounding sandwaves, up to several wavelengths away from the new sandwave, migrated in directions consistent with both the genesis and disappearance of the new sandwave, and sometimes in a direction opposite to that indicated by the asymmetric shape of individual sandwaves.

9. Acknowledgements and References

Acknowledgements:
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