CMS application – Forecasting approach for National Weather Service (NWS), Eureka, CA

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Steep waves with strong opposing current = Hazardous conditions for boats
Wave – sea floor interactions
Wave – current Interactions

Wave direction

Current

Bar

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Presently, NWS Eureka uses machines running Linux to run the SWAN wave model and the ADCIRC circulation model for forecasting results.
How good is the present system?

Pretty Good

Image taken at the forecasted time looking SW from north jetty.
1. Tidal current only

Wave action does not affect the current

Without interaction between waves and current, no longshore transport can occur.
2. Takes too long to run – only one forecast per day.

3. Realtime wave data from local buoys (CDIP, NDBC) are not used.

4. Circulation model is not resolved enough to support current forecasts in the bay.
Using the CMS to address the existing Humboldt Bay Bar Forecast shortcomings

- **Now-time and 5-day forecast.** Uses the same linux computers and replaces SWAN/ADCIRC with the CMS flow and wave models
- Collaboration with NWS
- Significant effort, but CMS now runs on PCs and Linux

![Diagram](image)

- **56.7 k cells**
- **12.5 m – 1.6 km**

Coastal Inlets Research Program Technology Transfer Workshop
Comparing the SWAN/ADCIRC approach with the new CMS approach

Existing Forecasting output

Wave height (ft) and direction

Current speed (knots) and direction

SWAN output

ADCIRC output
Comparing the SWAN/ADCIRC approach with the new CMS approach

CMS Forecasting System output
Wave height (ft) and direction  Current speed (knots) and direction

CMS system – waves and wind affect the current direction

Note: Event shown is different time from the previous event
CMS is a 2-way coupled system

**Wave Model**
- Diffraction, Reflection, Run-up, Setup, Overtopping, Wave generation, Structures

**Flow Model**
- Tide, Wind, River flow, Current

Wave Height, Direction, Period, Dissipation, Radiation Stresses

Current, Water Level
Existing 5-day Forecast

- 1 forecast per day
- No wave-current interaction

NOWcast with CMS is possible: will use latest real wind/wave information from presently positioned *buoys* (NOAA 46022, CDIP).
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- 6+ forecasts per day
- Full wave-current interaction
The CMS approach can also provide information for other locations within the domain.
Future Additions to NWS Forecast

- Create larger domain grid to match NWS Eureka’s present area of responsibility

- Add NOWcast
  - Will provide graphics showing results using latest REAL wind/waves.
  - Obtain wind and wave information from presently positioned **buoys** (CDIP, NOAA 46022).

- Better web graphics - show results as overlay with Google Earth
  - Users would be able to change viewing direction and zoom in to areas of interest.
Questions?

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