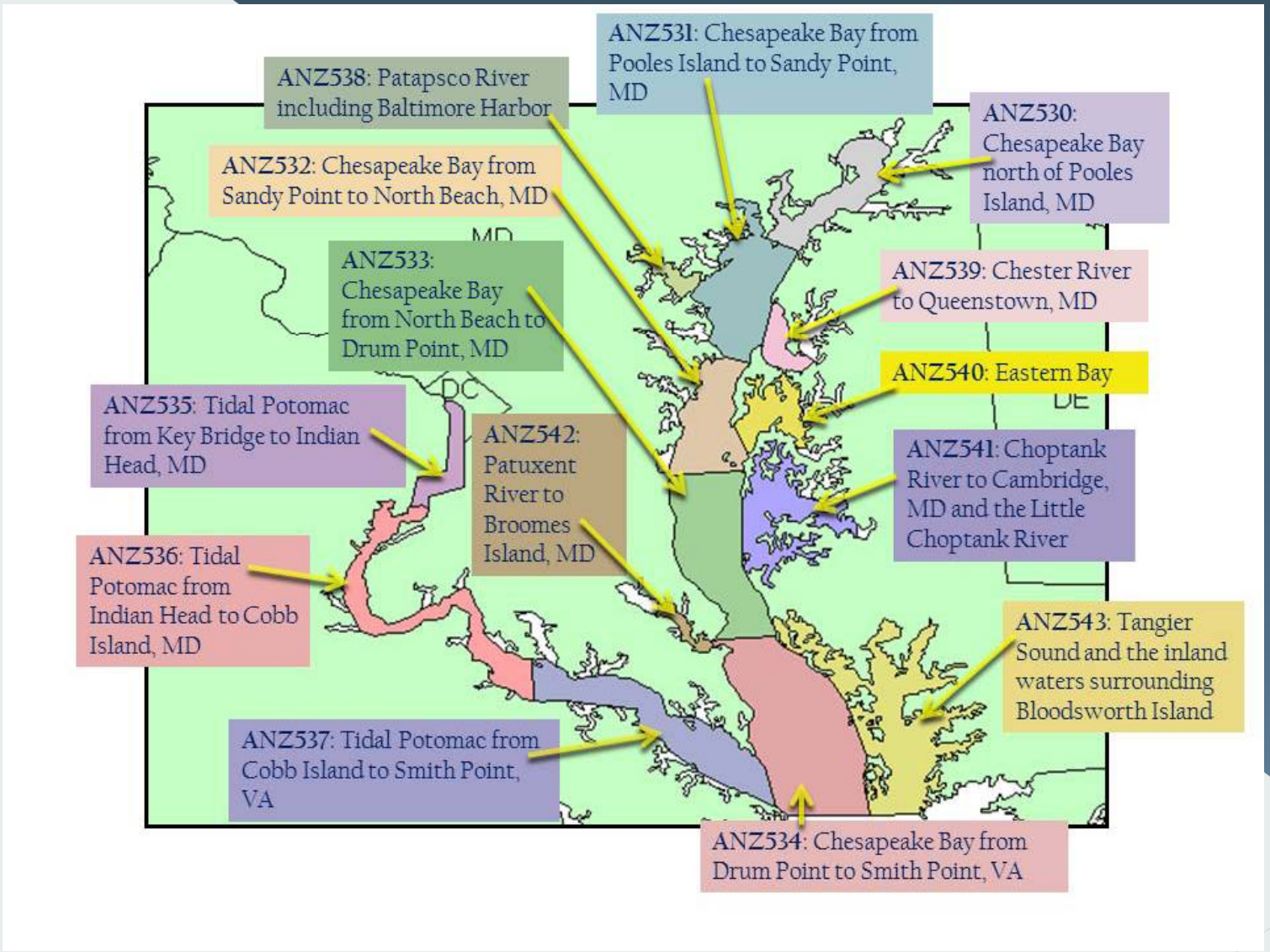
CBIBS Data Use at the Baltimore/Washington, NWS

CBIBS Science Users' Forum

Feb 28th, 2012

Carrie Suffern

Baltimore/Washington (LWX), NWS Marine Area



- **3** zones in the Tidal Potomac
- **11** zones in the Chesapeake Bay

Coastal Waters Forecast (CWF)

- Issued a minimum of every 3 hours
- Amendments issued as necessary
- Each CWF goes out 5 days, with each period covering 12 hours
- Used by small pleasure boaters to large commercial transport ships.




Elements:

- Synopsis – Short, concise written overview of main weather features
- Headlines of long duration hazards: Advisories, Watches, Warnings
- Wind – from 8 compass points, in knots (kt)
- **Waves – wave heights, in feet (ft)**
- Weather – thunderstorms, rain, snow and fog (significant visibility reduction)

Coastal Waters Forecast Example

Your National Weather Service forecast

Chesapeake Bay from North Beach to Drum Point MD (ANZ533)

Enter Your "City, ST" or zip code Go BOOKMARK

NWS Baltimore, MD/Washington, D.C.

Zone Forecast: Chesapeake Bay from North Beach to Drum Point MD (ANZ533)

Mobile Weather Information

Last Update: 930 AM EST WED NOV 30 2011

Marine Zone Forecast

Hazardous marine condition(s):

Hazardous Weather Outlook
Small Craft Advisory

FORECASTS OF WAVE HEIGHTS DO NOT INCLUDE EFFECTS OF WIND DIRECTION RELATIVE TO TIDAL CURRENTS. EXPECT HIGHER WAVES WHEN WINDS ARE BLOWING AGAINST THE TIDAL FLOW.

Synopsis...HIGH PRESSURE WILL BUILD ACROSS THE WATERS THROUGH THURSDAY. A WEAK COLD FRONT MOVES THROUGH ON FRIDAY...THEN HIGH PRESSURE RETURNS FOR THE WEEKEND.

Rest Of Today...W winds 15 kt with gusts to 25 kt. Waves 2 to 3 ft.

Tonight...NW winds 10 to 15 kt with gusts to 25 kt. Waves 2 ft.

Thu...N winds 10 to 15 kt with gusts to 25 kt. Waves 2 ft.

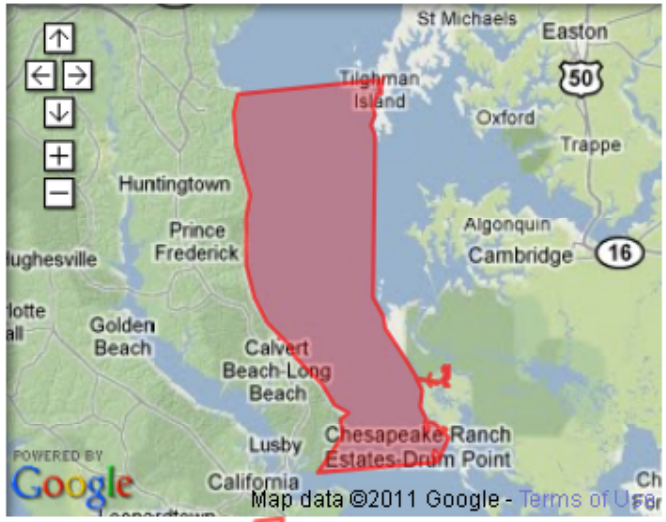
Thu Night...N winds 5 to 10 kt. Waves 2 ft.

Fri...W winds 5 to 10 kt. Waves 1 to 2 ft.

Fri Night...NW winds 10 to 15 kt with gusts to 20 kt. Waves 2 to 3 ft.

Detailed Point Forecast [Move Down]

Click for Point Specific Forecast Disclaimer



Current Conditions [Move Up]

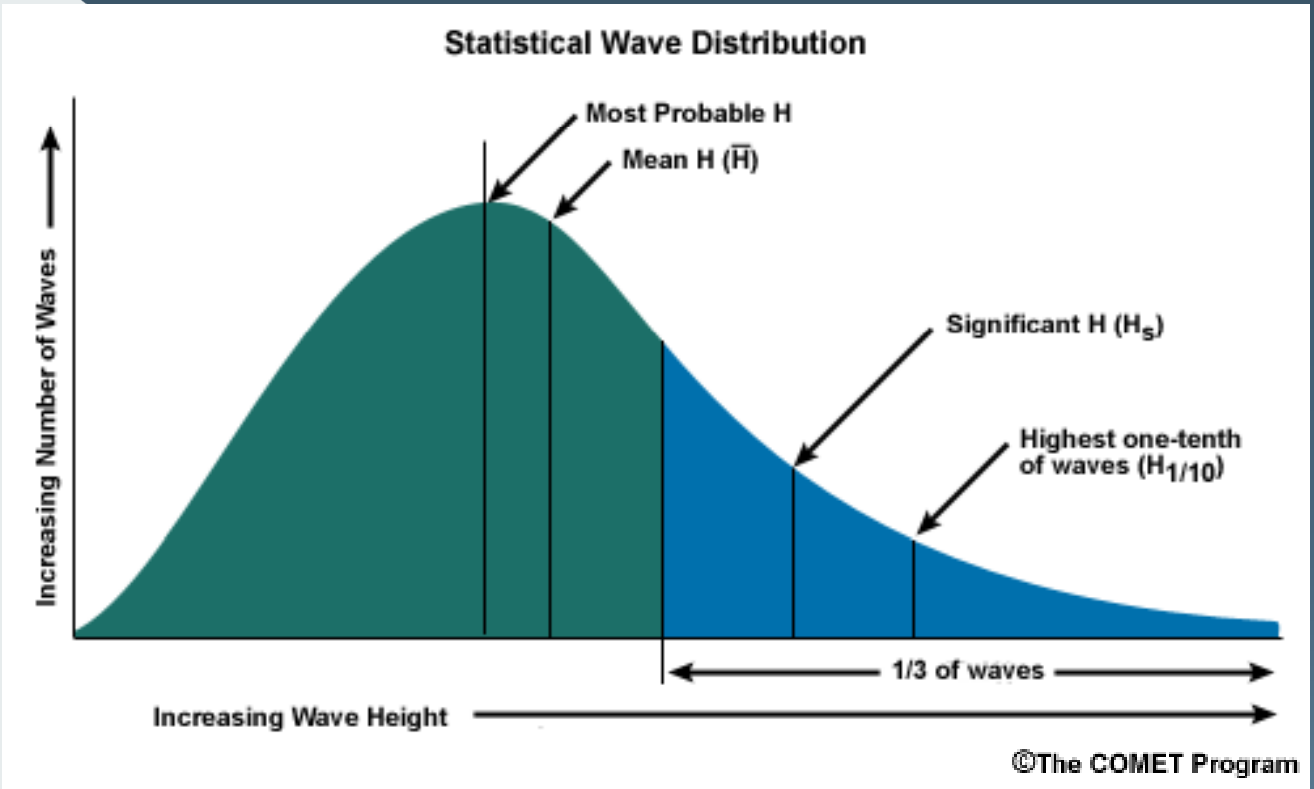
COVM2 8577018 - Cove Point

Lat: 38.43°N Lon: 76.39°W Elev: 0

Last Update on Nov 30, 10:30 am EST

Wind: W 15 KT

Wave Height Forecasting at LWX



- At the moment, using pre-determined wave heights based on prevailing wind direction and speed
- This is a combination of significant wave height (Hs) and maximum wave height (Hmax).

The SWAN Model

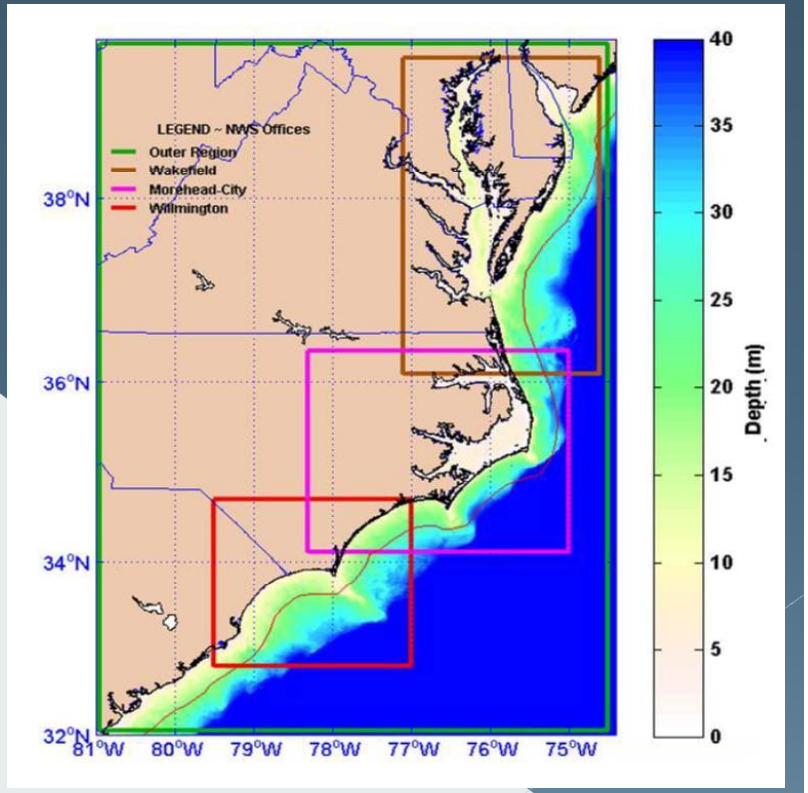
- SWAN stands for ***Simulating WAves Nearshore.***

- SWAN was implemented at the Morehead City, NC, Wakefield, VA and Wilmington, NC offices in spring/summer 2009 (Willis, 2010)

- The model uses forecasted winds.

- For areas where the forecasted winds are not available, SWAN uses winds from a numerical weather forecasting model.

- Every 6 hours, SWAN outputs updated wave heights.



- SWAN is useful in areas bounded by multiple land masses, such as the Chesapeake!

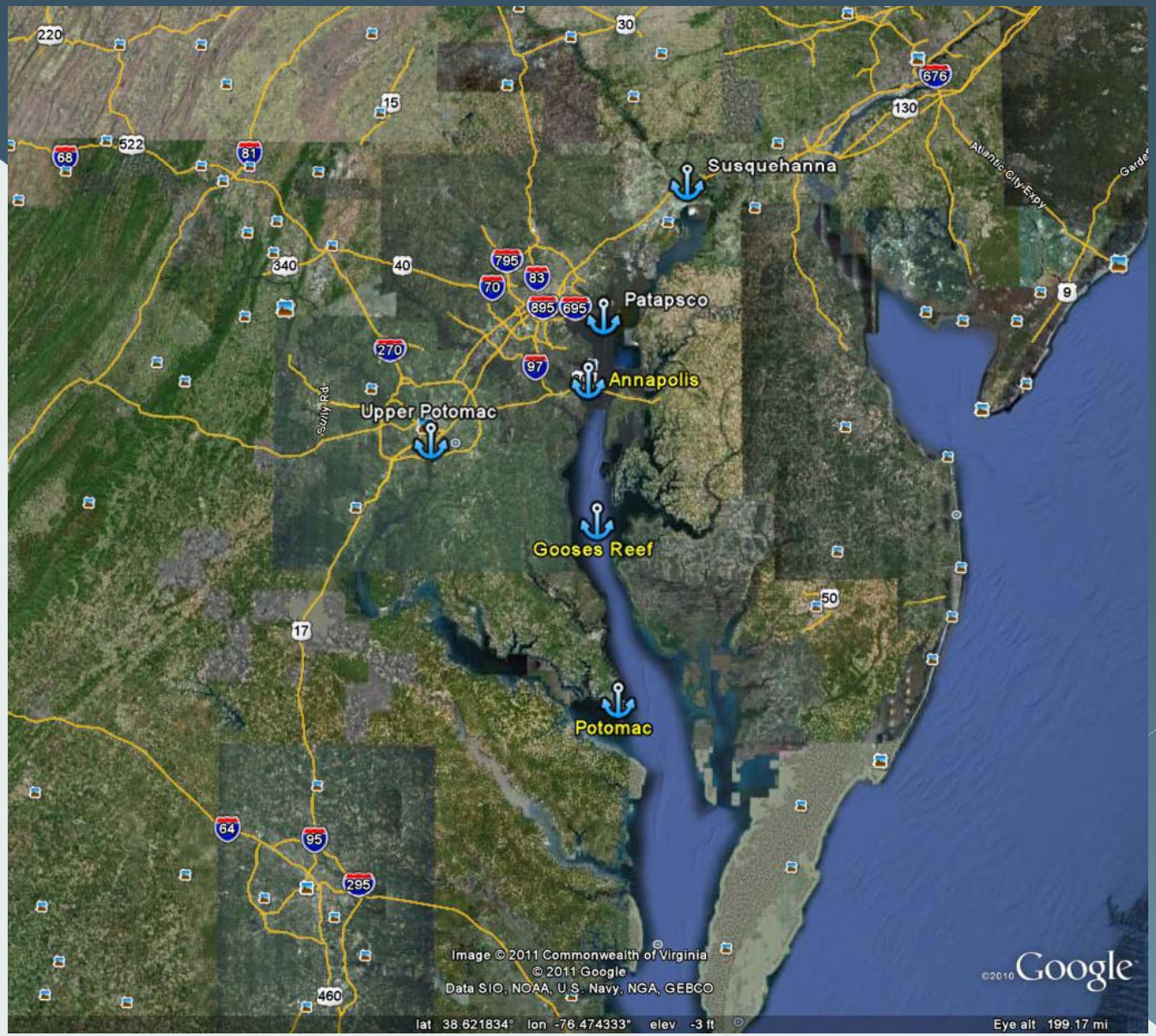
Need Observations to Answer:

- How well the SWAN model performs in the Chesapeake Bay…
- If it does a better job forecasting wave heights then our current forecasting method using wind/wave correlations…
- How the SWAN wave height output compares to the observed Hs and Hmax (especially since LWX is currently using a combination of Hs and Hmax for the wave height forecast)…

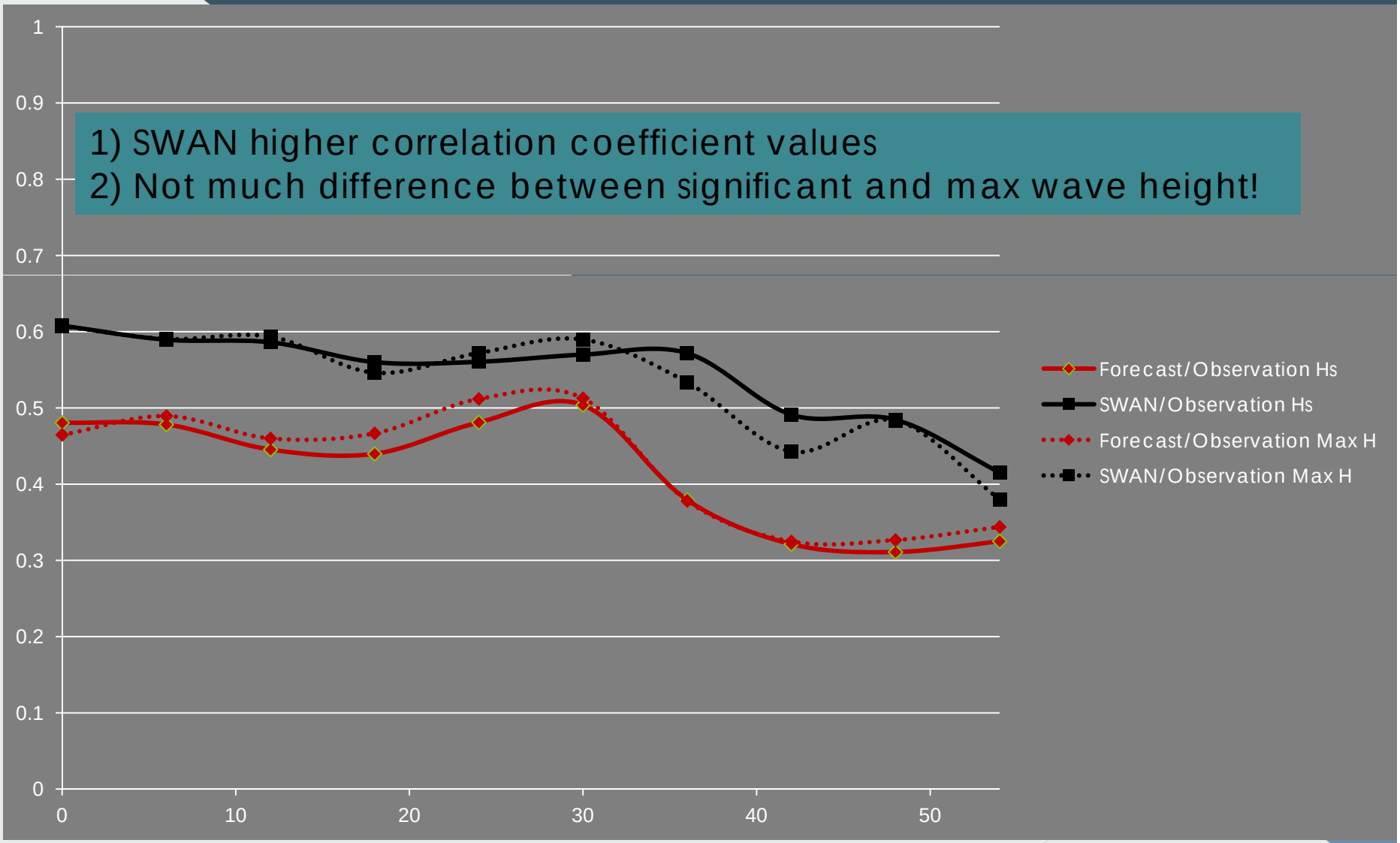
CBIBS Buoys Used

Downloaded starting in Jan 2011:

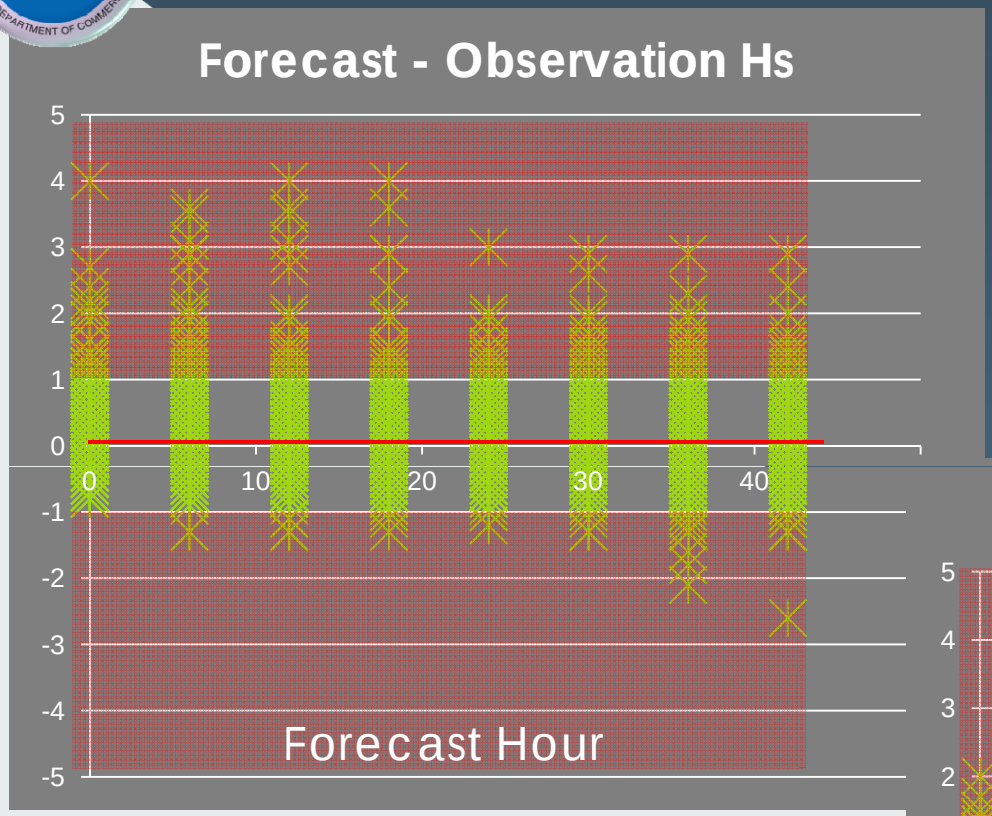
- Significant wave height (Hs)
- Maximum wave height (Hmax)
- Wind speed
- Wind direction



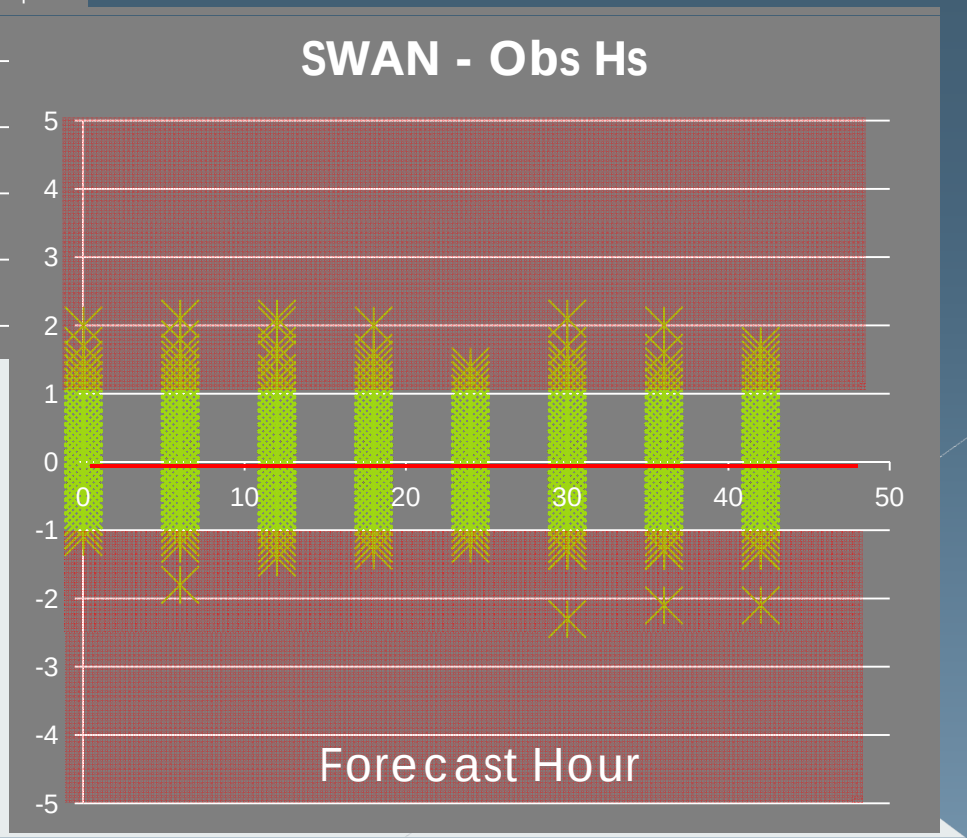
Comparison: Annapolis Buoy



High or low bias in Hs?

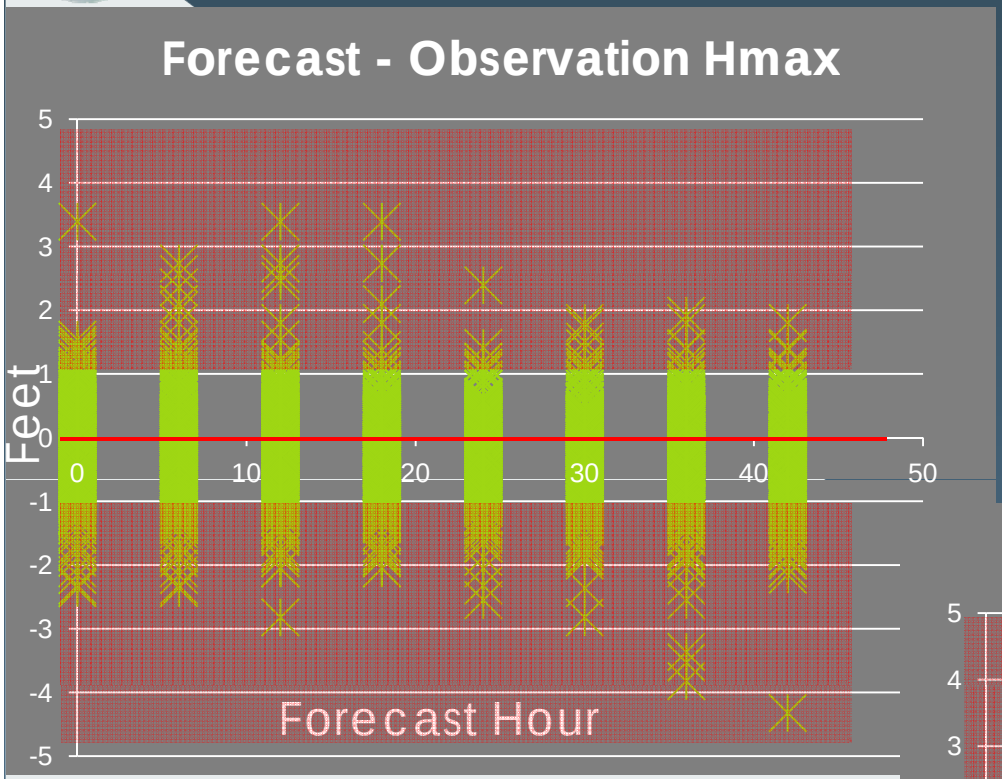


Both the forecast and SWAN **over** predict the wave height when compared with the observed Hs.



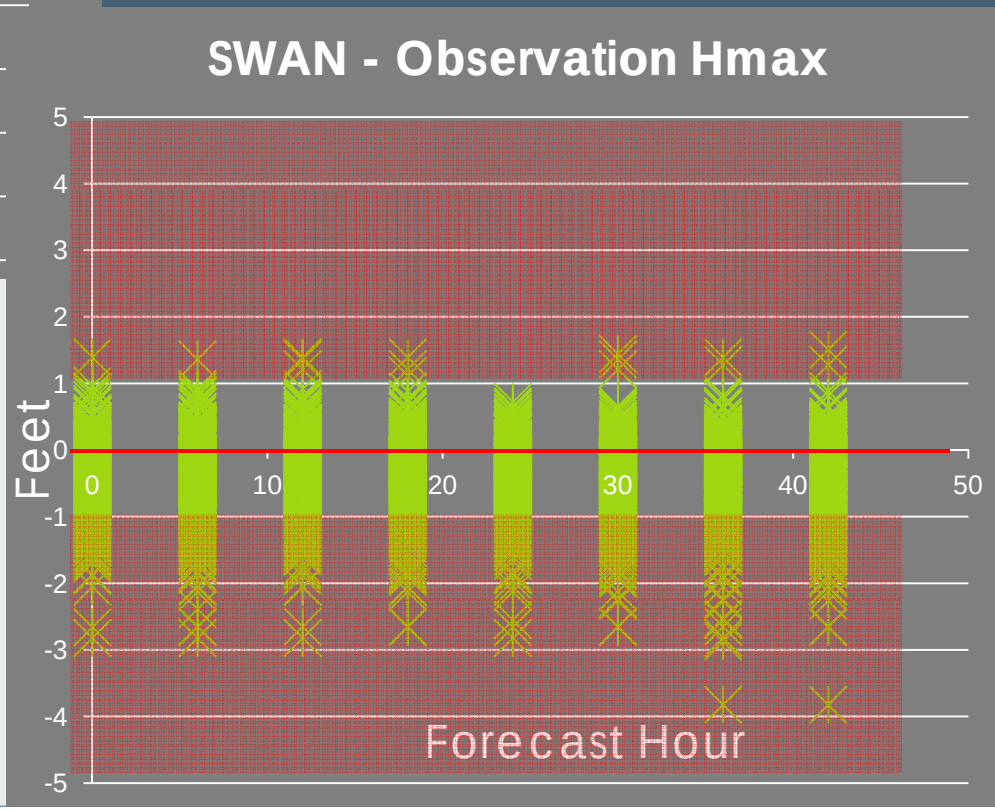
The **forecast** over predicts the wave height more often then the SWAN.

High or low bias in Hmax?



Both the forecast and the SWAN **under** predict the wave height when compared with the observed Hmax.

The **SWAN** under predicts the maximum wave height more often then the forecast.



Final Thoughts

- The CBIBS website is easy to navigate and the data accessible.
- It's very helpful that the date range for data to download can be customized to a single hour. Also, it's nice that just one parameter can be downloaded for a time period instead of having to download every measurement taken at a particular time.
- The format is compatible with Excel.

Study Findings:

- In most instances studied, the SWAN model output was better correlated with the CBIBS observed Hs value.
- There was not that big of a difference between the Hs correlation plots and the Hmax plots.
- Both the forecast and SWAN showed a high bias in predicted wave height when compared with the observed Hs. The forecast had a stronger high bias.
- Both the forecast and SWAN showed a low bias in predicted wave height when compared with the observed Hmax. The SWAN had a stronger low bias.

Thank you

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