

COASTAL IMAGING

NORTHERN BEACHES, GOLD COAST

NOVEMBER 2009 - APRIL 2010

Shoreline monitoring is conducted using coastal imaging technology on the Gold Coast by Coastalwatch and the Griffith Centre for Coastal Management (GCCM) at Griffith University. There are two camera sites currently used for the analysis, Palm Beach and the beaches of the northern Gold Coast. More details of the shoreline analysis can be found in the six monthly reports available from the Northern Beaches & Palm Beach Monitoring Portal (<http://gccm.coastalcoms.com>).

Analysis of Wave and Beach Conditions

The wave conditions (height, period and direction) for the 6 months are shown in Figure 1. There was relatively low wave energy for most of this monitoring period. There was a brief 2-4m E swell early in November with small swell for the rest of the month. A 3m (offshore H_s) S-SE swell in the first week of December only delivered 1m waves the beaches with larger waves recorded at the Gold Coast buoy from a smaller E swell ($H_s \sim 2m$) late in the month.

There was a general decline in wave height through January 2010 with waves less than 1m from NE to SE for most of the month. The highest waves of this six month period occurred early in February with an east swell of 2-3m recorded by the buoy with wave periods between 8 and 12 seconds. A maximum wave height of 5.78m was recorded during the swell's peak on 8th February. A second east swell event occurred from the 18th to the 21st February with wave heights of 2-3m recorded on the 19th February. The peak wave period was higher at 16-17s during this event.

Waves increased from 1-2m to 2-4m from the E-NE on the 4th March with onshore winds, easing to less than 1m until March 11th. Increased E swell at 1-2m lasted until the 21st March then dropped to less than 1m until the end of the month.

Wave energy increased from the 2nd to the 7th April with 2-4m of 6-12s E swell. Wave heights dropped to less than 0.5m from the SE from the 9th to 13th April and increased to 2-4m on the 21st April. Buoy wave heights decreased to 1-2m until the end of the month with wave direction changing SSE on the 26th April to the end of the month.

Beach Management Actions

No significant nourishment or re-profiling activities were undertaken during this period.

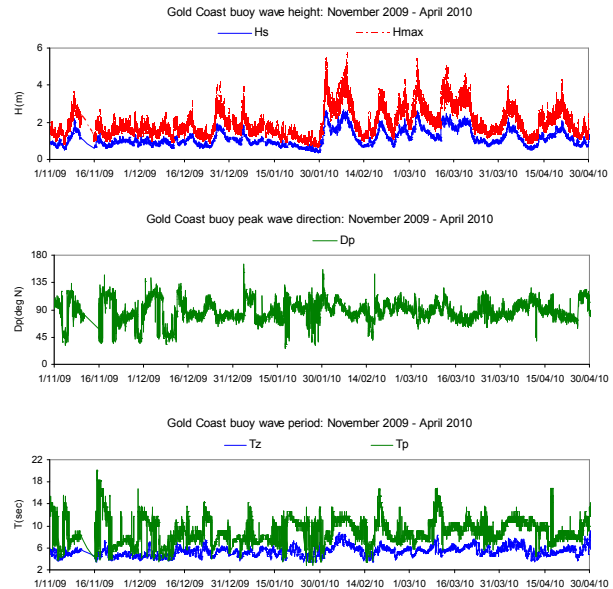
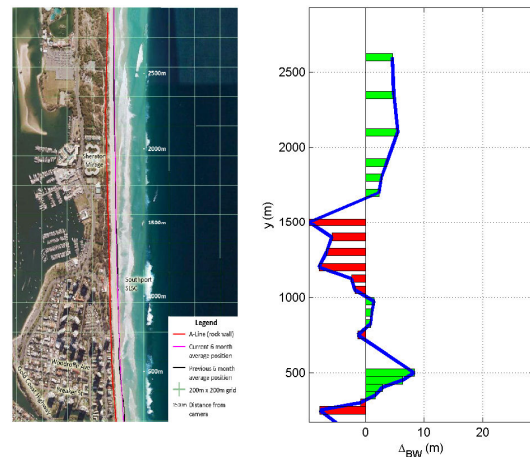


Figure 1: Gold Coast Wave height, period and direction over the period from November 2009 - April 2010.

Analysis of Beach Width Variations

The relatively mild wave conditions during this monitoring period resulted in low levels of accretion, mostly less than 10m, along the Northern Gold Coast beaches.

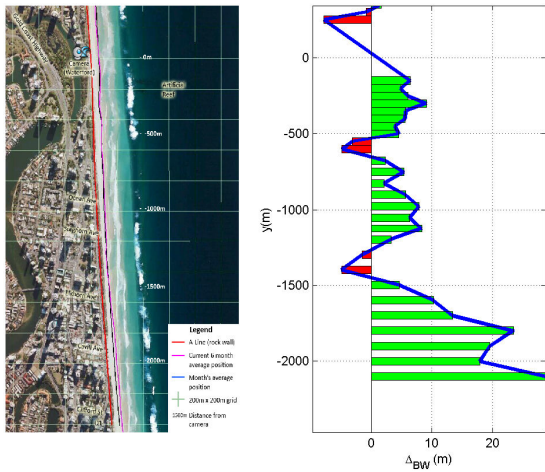


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Figure 2: (Left) Average 6 month shoreline position for previous (April – October 2009) and current (November 2009 to April 2010) monitoring periods for the northern end of Northern Beaches. (Right) Change in beach width between current and previous monitoring period. Red indicates erosion.

An exception is a 500m length of beach just north of the Southport SLSC (Figure 2). This is the same region that experienced net accretion whilst the rest of the northern coast experienced net erosion, primarily associated with the May 2009 storm event, during the previous period.

Several smaller regions of net erosion occur at regular intervals, at approximately 200m north of the camera site, at 600m south of the camera site and 1400m south of the site (Figure 3). These recessed features appear to be aligned with the shoreline perturbations of several well-defined rip currents which developed in January and remained through February.



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Figure 3: (Left) Average 6 month shoreline position for previous (April 2009 - November 2009) and current (November 2009 - April 2010) monitoring periods for the southern end of Northern Beaches. (Right) Change in beach width between current and previous monitoring period. Red indicates erosion.

The beach width variability is low and evenly distributed along the coast during this six-month period (Figure 4). The average beach width for this period was around 40-50m at the northern end increasing to around 60-70m at the southern end. Minimum average beach widths occurred near the -500 and -1400m alongshore locations. The changes in monthly beach width over the six months are shown in Figure 5. Plotted are the mean monthly beach width and the 95% and 5% beach width percentiles which indicate the monthly variability of the shoreline.

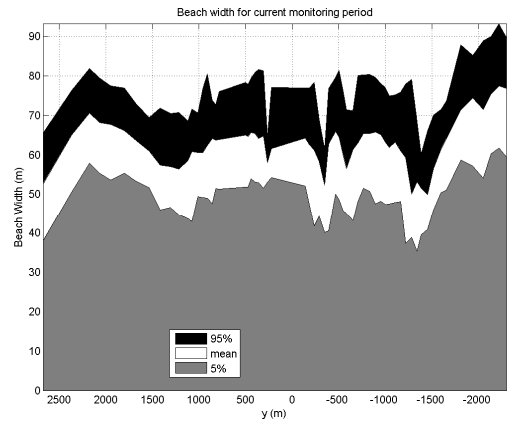


Figure 4 Beach width statistics for northern Gold Coast beaches during the 6 month monitoring period from November 2009 to April 2010

As with the six monthly beach width statistics (Figure 4) the monthly statistics (Figure 5) display a reasonably uniform variation in beach width alongshore for each month. Greater variability is evident from November to February around the -500m alongshore location. Increased variability also occurs towards the northern end (near 2000m) during April 2010.

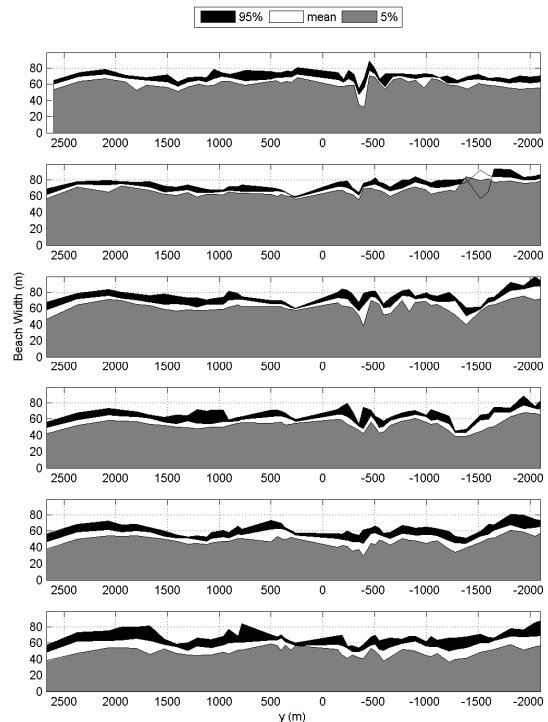


Figure 5: Monthly beach width statistics at Northern Beaches. Top to bottom: November 2009 to April 2010.

<i>Glossary of Terms</i>	
H _s (m)	Significant wave height. The average of the highest 1/3 of the waves in a measured record. This is most often associated with the wave height you see when standing on the beach.
H _{max} (m)	The maximum wave height recorded in a given time period.
T _z (s)	Mean wave period. Measured as the average time between two wave crests.
T _p (s)	Peak wave period. The wave period associated with the peak of the wave spectrum or energy.
D _p (deg N)	Peak wave direction. Measured as the dominant direction of the waves.
P	Wave Power, $P=H^2T$. A measure of the transport of energy associated with a wave height (H) and period (T). Higher values are associated with more destructive conditions.

This information sheet has been produced by the Griffith Centre for Coastal Management (GCCM) and Coastalwatch (CW) on behalf of the Gold Coast City Council (GCCC). Shoreline data and Google Images were provided by CW. Wave data was provided by CW, GCCC, and the Department of Environmental Resource Management (DERM).

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