全球氣候變遷預警機制-海域水質環境資料長期連續即時監測

On-line real time monitoring system of the water quality at the Nanwan Bay, southern Taiwan

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Abstract

This study under the support of the Kenting National Park Headquarters, conducted an on-line real time monitoring system of the water quality in coral reef ecosystem of the Nanwan Bay, southern Taiwan. The monitoring parameters include temperature, salinity, pH, dissolved oxygen, nutrients (e.g., nitrite, nitrate, ammoxnium, and phosphate), chlorophyll a, as well as turbidity for the "Coral Reef Environmental Observatory Network" monitoring programs. Based on the reliable data obtained through a good quality assurance/quality control (QA/QC) performance has provided a valuable database. Results provide useful contribution to the literature, documenting contamination, environmental conservation and education by on-line real time monitoring in Taiwan. Furthermore, on-line real time monitoring results have also showed helpful explanation for natural episodic events, e.g., cold water intrusion, in this coral reef ecosystem. The program is not only successfully fitted in the bench top simulation, but also has a successful application in field work. The on-line real time monitoring results with emphasizing on the short time scale, e.g., hours to days, effects on coral reef ecosystem has also been discussed in this study.

Figure 1.
Location of on-line real time water quality monitoring system in coral reef ecosystem of the Nanwan Bay, southern Taiwan.

Materials & methods

The monitoring parameters include temperature, salinity, pH, dissolved oxygen, nutrients (e.g., nitrite, nitrate, ammonium, and phosphate), chlorophyll a, as well as turbidity for the "Coral Reef Environmental Observatory Network" monitoring programs (Fig.3) .

Table 1. The results of QA analyses samples for chemical parameters.

Monitoring parameters	Reading range	Resolution	Accuracy
Temperature	-5℃ ~50℃	0.01℃	± 0.15℃
Salinity	0~60 psu	0.01psu	± 1%
Conductivity	0~100ms/cm	0.01 ms/cm	± 0.5% + 0.001 ms/cm
pH	0~14	0.01	± 0.2
Dissolved oxygen	0~20mg/L	0.01 mg/L	± 1%
Turbidity	0~1,000NTU	0.1NTU	± 2%

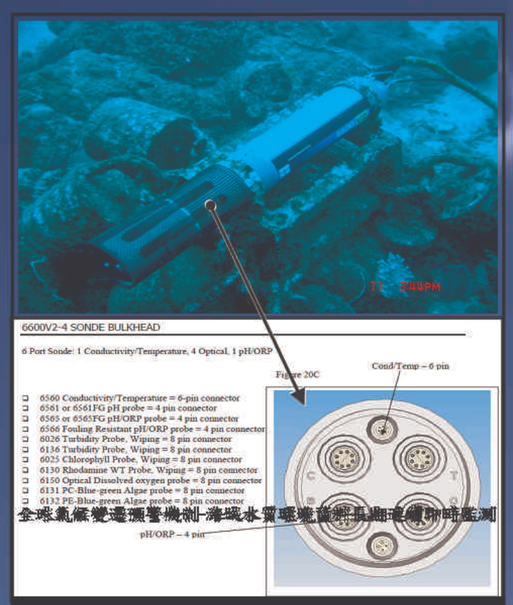

Figure 3. The multi-parameters water quality monitor. (YSI Co., Model 6600)

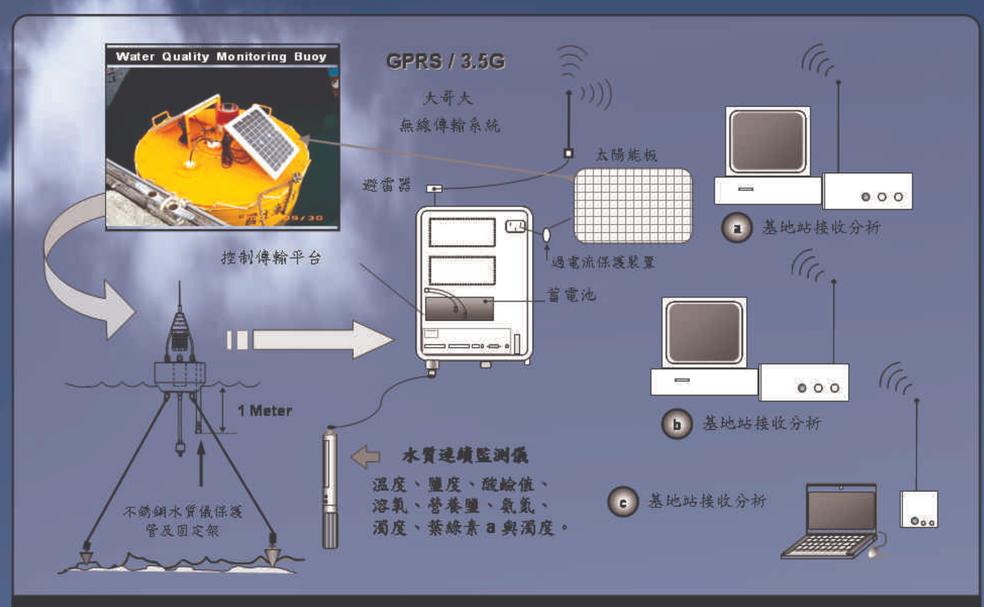

Figure 2. The framework of on-line real time water quality monitoring system.

Primary result

Figure 4. Time series data of water quality taken from multi-parameters water quality monitor system (October 2009 through October 2010).

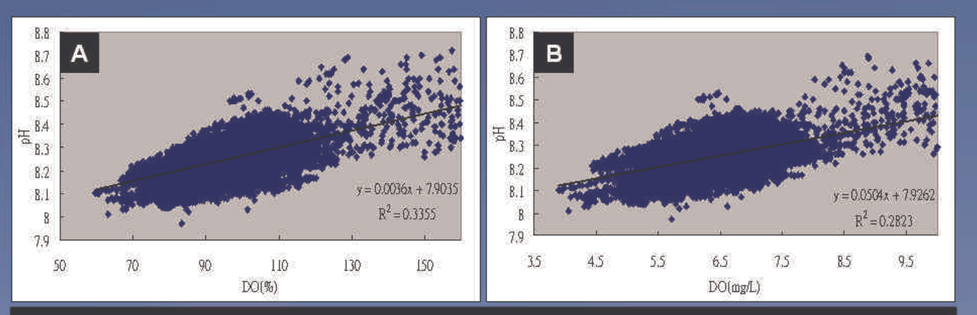

Figure 7. Relations among water pH and dissolved-oxygen concentration at Nanwan Bay (October 2009 through October 2010).

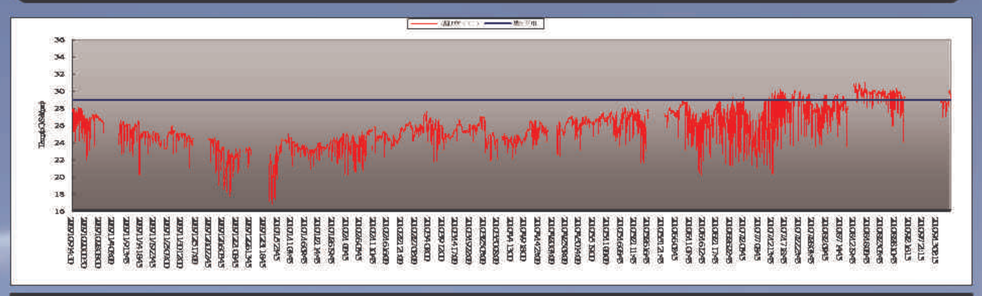

Figure 8. Time series data of temperature and threshold of coral bleaching temperature at Nanwan Bay (October 2009 through October 2010).

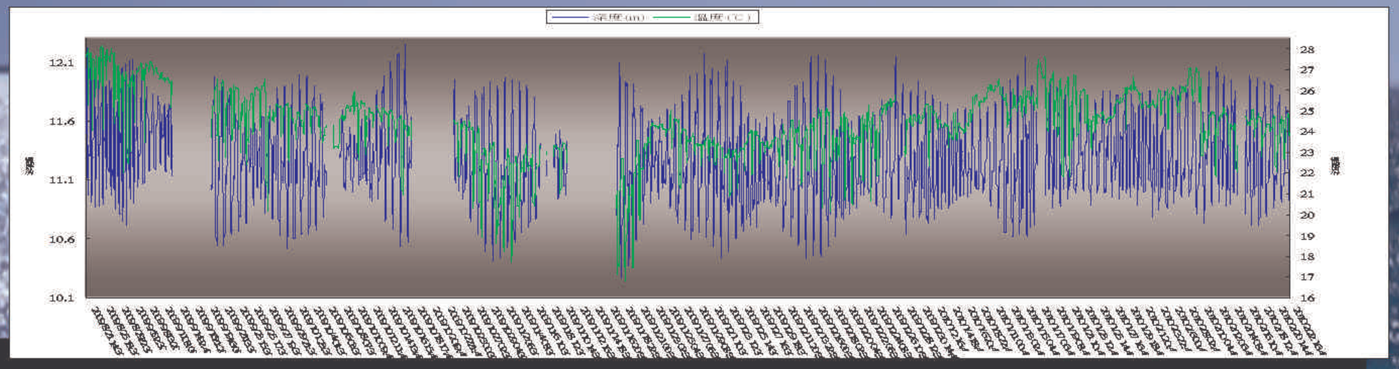

Figure 5. Relations among tide level and temperature at Nanwan bay (October 2009 through October 2010).

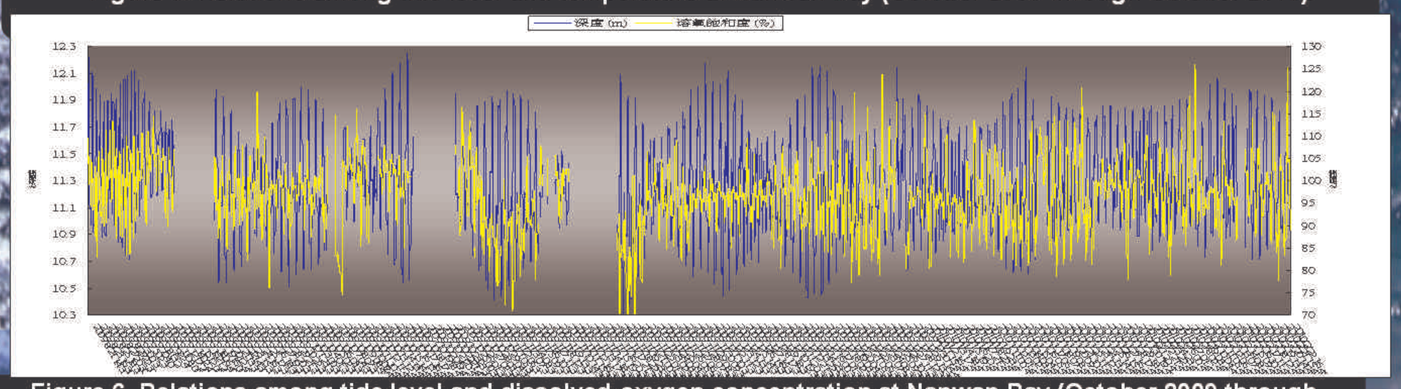

Figure 6. Relations among tide level and dissolved-oxygen concentration at Nanwan Bay (October 2009 through October 2010).

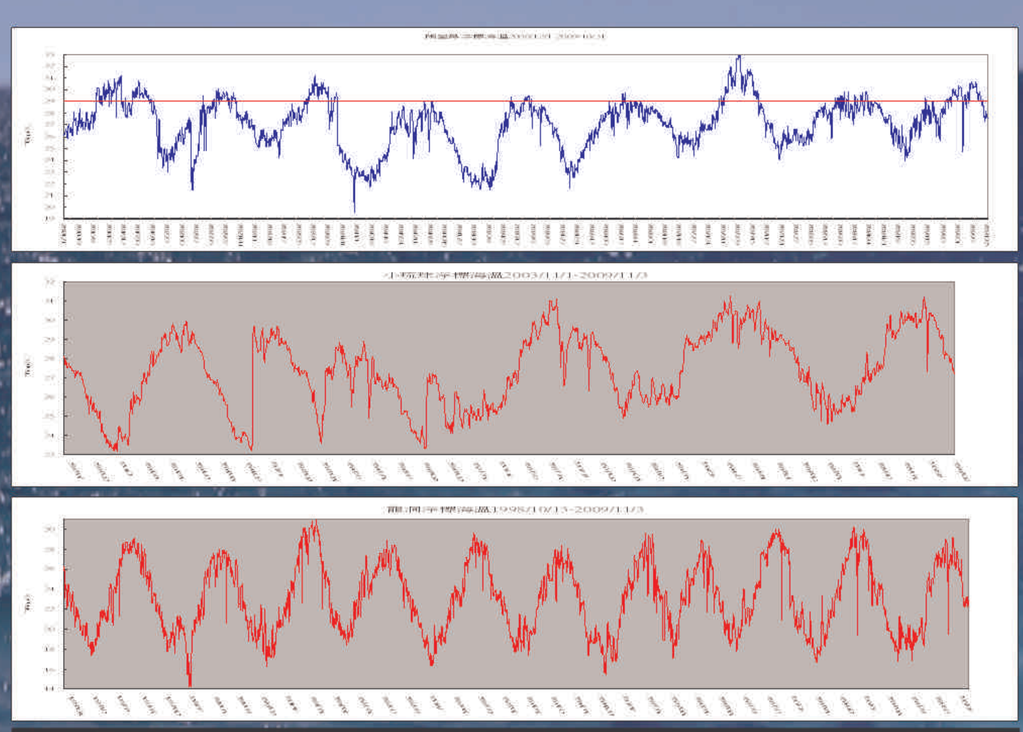

Figure 9. Time series data of temperature and thres-hold of coral bleaching temperature at Nanwan bay, Hsiao-Liouciou and Long-dong from 2000 to 2009.