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Poerbandono, Yantarto, D., Yosi, M. & Magetsari, R. N., *Characterizing Current and Sediment Dynamics of Gembong Rivermouth, North Java, Indonesia*, in prep. (Abstract accepted; To be presented in the 31st ICCE 2008 Conference, Hamburg, Germany).

Subject: ICCE 2008
From: "Smith, Jane M ERDC-CHL-MS" <Jane.M.Smith@erdc.usace.army.mil>
Date: Sat, November 3, 2007 3:59 am
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Abstract 948 "Characterizing Current and Sediment Dynamics of Gembong Rivermouth, North Java, Indonesia" by Poerbandono et al.

It is a pleasure to inform you that the Technical Paper Review Committee for the 31st International Conference on Coastal Engineering (ICCE 2008) has accepted the abstract referenced above from the 979 that were submitted. Instructions for the preparation and submission directly to the Local Organizing Committee of an abstract in depth will be available on the ICCE home page (<http://icce2008.hamburg.baw.de/>). The Local Organizing Committee must receive your abstract in depth and conference registration by 1 April 2008. The abstracts in depth will be available online in July 2008 and will be distributed electronically at the Conference. If you do not submit the abstract in depth, you cannot present your paper at the Conference.

A Manuscript Style for final papers will be made available on the conference web site for preparation of your paper for publication in the Proceedings. The final manuscript must be in my hands by 15 October 2008, to ensure that it will be included in the Proceedings of the Conference. It is the Policy of the ICCE that only papers presented by the author can be published in the Proceedings of the Conference. If an author or co-author is unable to present the paper orally, you should inform the Local Organizing Committee immediately. Please note that you may present only one paper at the conference. You will have a total of 20 minutes to present your paper, which includes the time for discussion. Instructions for preparing your presentation will also be available on the conference web site. Deadlines for both the summary and final manuscript must be strictly observed.

Please provide your coauthors the above information. I look forward to seeing you in Hamburg.

Sincerely,

Jane McKee Smith
Secretary, Coastal Engineering Research Council, COPRI

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Characterizing Current and Sediment Dynamics of Gembong Rivermouth, North Java, Indonesia

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1 Introduction

This study is intended to identify generic pattern of current dynamics leading to detection of processes controlling sediment transport according to results from *in-situ* measurement in Gembong Rivermouth (Figure 1). Analysis is carried out according to data from stationary and cross-sectional current measurement. Data from supplementary activities comprising of tide observation, seabed mapping and grab sampling are considered.

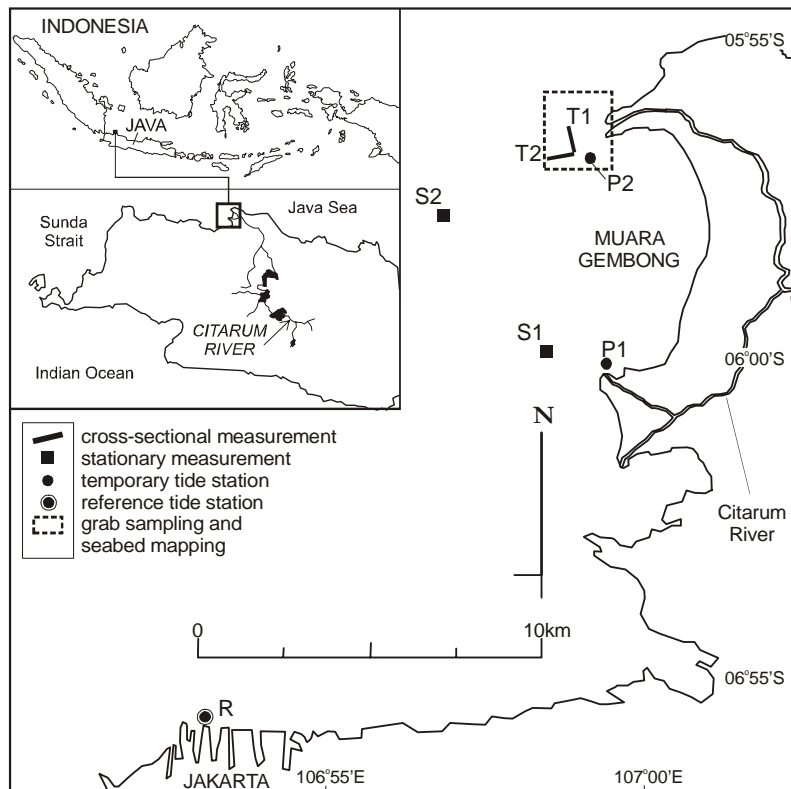


Figure 1 Study site

2 Field Measurement and Analysis

Record of current profile covering neap and spring tides (9 to 28 Dec. 2006) is obtained from S1 and S2 (see Figure 1) using two 600kHz Aquadopps. Cross-sectional measurement is carried out using a 600kHz Acoustic Doppler Current Profiler (ADCP) across T1 and T2 (see Figure 1) over a tidal cycle (24 and 25 Nov. 2006). Concentration of Suspended Particulate Matter (SPM) is obtained from conversion of backscatter following empirical equation (Figure 2) documented in Poerbandono & Mayerle (2005). Prior to verifying the empirical equation, direct samples were collected simultaneously.

Seabed mapping was carried out in front of rivermouth. Samples of seabed sediment across charted depth were collected using grab sampler. Sampling locations are randomly distributed and 24 samples were collected. Standard Sieve and hydrometer analyses were applied for obtaining grain size distribution and clay-silt-sand ratio.

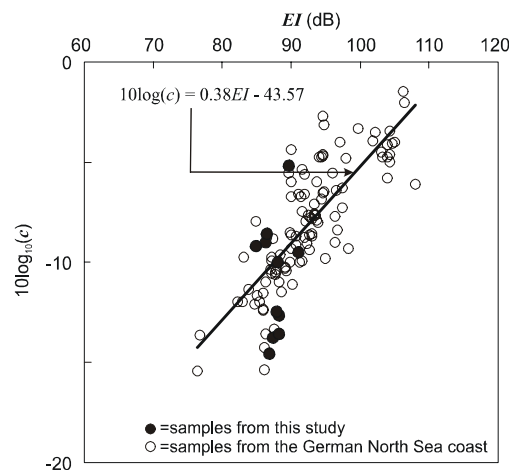


Figure 2 Calibration curve for converting acoustic backscatter intensity into suspended particulate matter concentration

Data from stationary measurement are visualized in forms of contour plots. Generic current pattern is concluded using Joint Probability Table represented by current rose plot and Fast Fourier Transform (FFT) for producing hourly-series plot. Cross-sectional measurement data are depth averaged and visualized as time-series plot. Similar approach is also applied to SPM concentration and suspended load transport being the product of current magnitude and SPM concentration.

3 Results and Discussions

Figure 3 shows seabed morphology just in front of the rivermouth. Sub-aqueous lobate body heading to westward direction with greater slope at the southern part is seen. Most of sediments in the investigated site are dominated by clay and silt. Sandy sediment is found only in the southern part where the slope is greater.

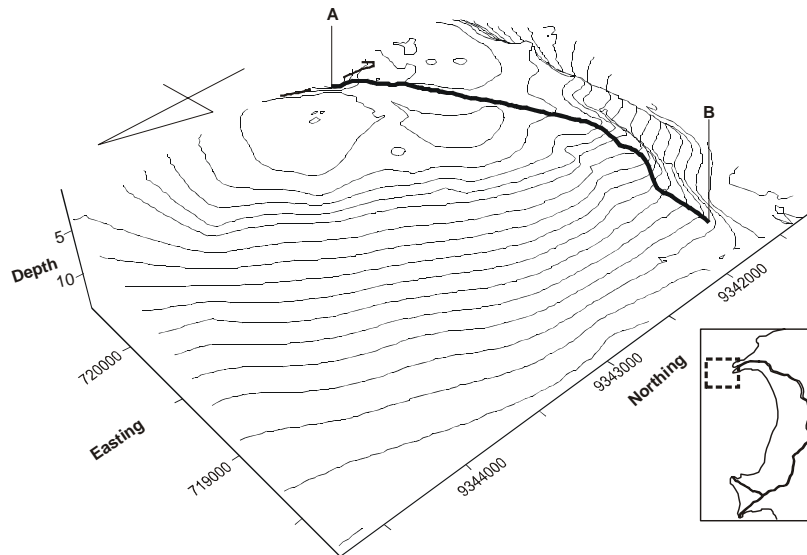


Figure 3 Morphology of rivermouth delta

Figure 4 shows current rose from mid layer of the measured column. At S1, strong North-Eastward domination is observed. At S2, bi-directionality with South-South-westward domination is observed. Hourly-series plots of stationary data taken from the mid layer of the measured column are shown in Figure 5 and Figure 6. Diurnal periodicity is observed at North-South direction. Diurnal constituent at East-West direction is less magnified confirming that North-South diurnal action plays a substantial role.

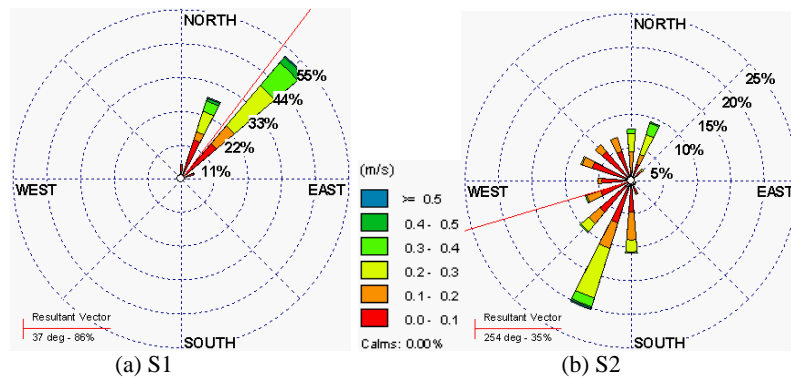


Figure 4 Current rose according to data obtained at mid layer of water column

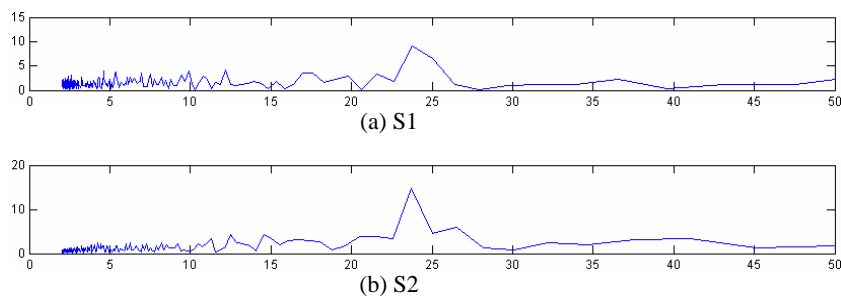


Figure 5 Power spectra in hourly series of v component at mid layer of water column

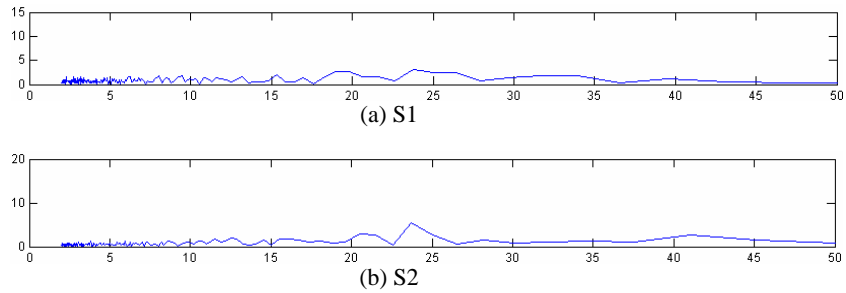


Figure 6 Power spectra in hourly series of u component at mid layer of water column

Figure 7 shows plot demonstrating various current directions. Southward domination at S2 is observed, whereas at S1 strong Northward domination is observed. Figure 8 and Figure 9 show temporal evolution of 2-dimensional current magnitude (in m/s) at T1 and T2. Greater range of current magnitude is observed at T2. The evolution of current magnitude at T2 is better detected with greater magnitude at the shallower part. This suggests evidence of Northward current that coincides with the fact that there is Northward domination at S1.

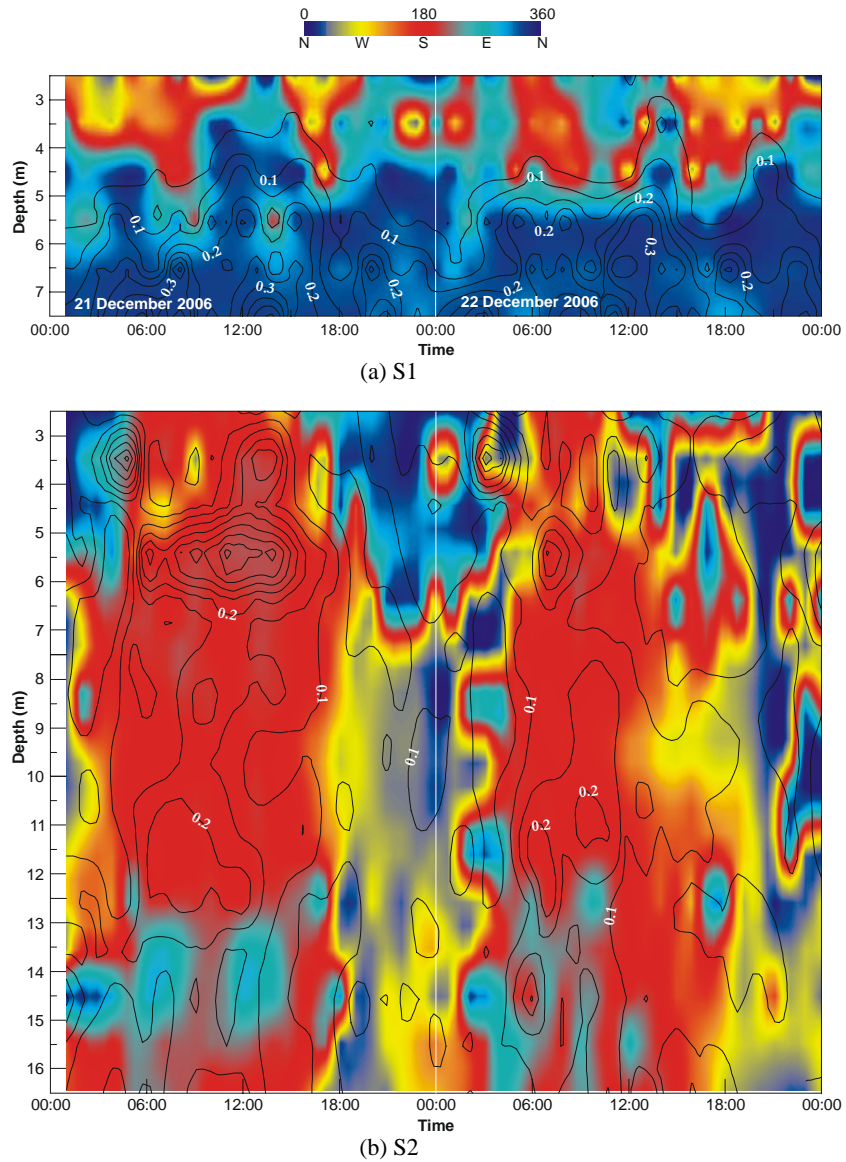


Figure 7 Temporal evolution of current direction and magnitude during spring tide

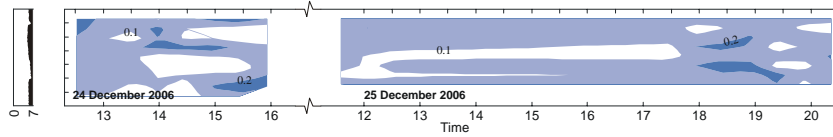


Figure 8 Spatio-temporal 2D current (m/s) at T1

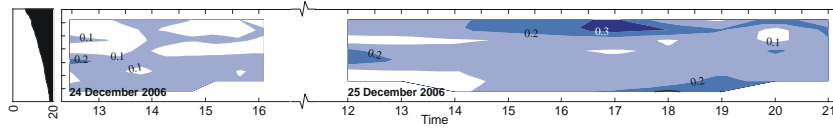


Figure 9 Spatio-temporal 2D current (m/s) at T2

In Figure 10 temporal evolution of 2-dimensional SPM concentration (in kg/m^3) observed at T2 is shown. The resulting suspended load transport is shown in Figure 11. Higher SPM concentration -and hence sediment transport- are observed at the shallower part of the cross section. This corresponds to increasing current magnitude roughly during the same period. Gap between peak current velocity and SPM concentration magnitudes is seen.

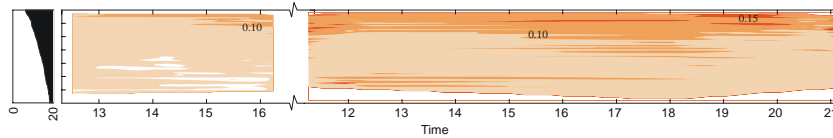


Figure 10 Spatio-temporal 2D SPM concentration (kg/m^3) at T2

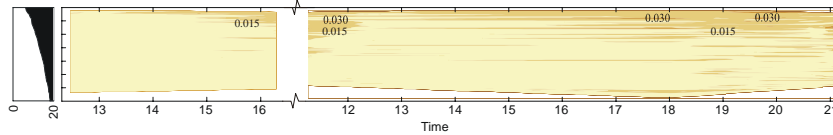


Figure 11 Spatio-temporal 2D sediment transport (kg/ms) at T2

Sediment entrainment likely locally occurs due to prevailing tide-current-induced bed shear stress, which is seen more at the shallower part. Considerably long scour lag likely occurs. Peak of suspended particulate matter concentration follows peak current magnitude event.

Acknowledgement

Sediment entrainment likely locally occurs due to prevailing tide-current-induced bed shear stress, which is seen more at the shallower part. Considerably long scour lag likely occurs. Peak of suspended particulate matter concentration follows peak current magnitude event.

Reference

Poerbandono & Mayerle, R., *Effectiveness of Acoustic Profiling for Estimating the Concentration of Suspended Material*. Die Küste 69. Hamburg, Germany, (2005).