AWSFL008-DS3

# NSF Award Abstract - #0203577

## Collaborative Research - Processes Controlling Depositional Signals of Environmental Change in the Fly River Sediment Dispersal system:Rates and Mechanisms of Floodplain Deposition

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| **NSF Org** | EAR |
| **Latest Amendment Date** | May 21, 2002 |
| **Award Number** | 0203577 |
| **Award Instrument** | Standard Grant |
| **Program Manager** | David Fountain<br>EAR DIVISION OF EARTH SCIENCES<br>GEO DIRECTORATE FOR GEOSCIENCES |
| **Start Date** | July 1, 2002 |
| **Expires** | June 30, 2005 (Estimated) |
| **Expected Total Amount** | $338133 (Estimated) |
| **Investigator** | William E. Dietrich (Principal Investigator current) |
| **Sponsor** | U of Cal Berkeley<br>Berkeley, CA 94720 415/642-6000 |
| **NSF Program** | 1572 TECTONICS |
| **Field Application** | 0000099 Other Applications NEC |
| **Program Reference Code** | 0000,OTHR, |

# Abstract

EAR-0203577 William E. Dietrich This project focuses on two fundamental questions: 1) How does flow and sediment routing through a lowland floodplain system moderate short and longer-term variations in sediment delivery towards offshore depositional environments? and 2) What controls the proportion of a river's sediment load that is deposited on its floodplain? It is hypothesized that net sediment loss to the floodplains was highest during Holocene sea-level rise and, after near stabilization of sea level, the proportion of the sediment load deposited in the floodplain has progressively declined.

These two basic question are being addressed by comparing the flow and sediment routing processes, and the proportion of sediment lost to floodplains on the middle Fly and lower Strickland Rivers. Historically, the Strickland carried about 7 times the load of the Fly and it is hypothesize that this larger load has led to greater channel dynamics, steeper slopes, coarser bed, more elevated floodplain and possibly a lower trapping efficiency than the Fly. A numerical model is being developed that is sufficiently mechanistic that it can address the questions of damping and trapping efficiency on the event and seasonal scale, yet simplified enough that it can also model the co-evolving bed grain size, channel slope and floodplain topography, a crucial capability for understanding the time evolution of trapping efficiency. Though ambitious, many parts of the model have been assembled in previous research. The hydrodynamic model accounts for the effects of floodplain morphology and hydrology. The sediment routing includes effects of channel migration and accounts for the deposition and

erosion of sediment by grain size.

A field program is being conducted to document the flood wave damping rates, the sediment trapping efficiency of the Strickland and Fly Rivers, and to parameterize the numerical model. Quantification of floodplain morphology is being done through topographic surveys and analysis of remote sensing imagery. Intensive surveys of the velocity and suspended sediment fields are used to motivate and parameterize the hydraulics and sediment transport model. Short and longer-term (less than 100 years) rate of floodplain deposition is being documented from shallow cores. Extensive flow and sediment monitoring data are being provided by Ok Tedi Mining, Ltd. on the Middle Fly and by Porgera Joint Venture on the Strickland. Previous research on the Fly River enables the research focus to be on the Strickland River.

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