

Annual Report Summary

Period Covered by the Report: July 1, 2000 to May 1, 2002

Date of Report: April 1, 2002

Title: Resolution of sedimentation rates in impacted coastal environments using ^{137}Cs and ^{210}Pb markers: Dog River and Fowl River embayments.

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Research Category: SGER

Project Period: July 1, 2000 to June 31, 2002

Objective(s) of the Research Project: This project seeks to determine sedimentation rates for multiple sites on Dog River and Fowl River using the technique of high-resolution gamma-ray spectrometry. The sampling sites have been chosen to allow different tributaries of Dog River to be compared regarding the degree to which development in west Mobile County has affected run-off sedimentation in the river.

Progress Summary/Accomplishments: Cores have been extracted from six sites on Dog River and its tributaries. Four sites were in the main channel of the river at its mouth, upstream of the mouth, at the mouth of Moore's Creek, and downstream of Luscher Park. The two sites in tributaries were in Rabbit Creek and Hall's Mill Creek. In Fowl River, cores were taken from three sites extending from upstream of the Fowl River Bridge to well upstream of the Bellingrath Estate. Finally, cores were extracted from two sites in Converse Reservoir (Big Creek Lake) to provide a contrasting sediment environment to the two rivers. Duplicate archival cores were taken at each site. The sample cores were extruded and sliced into 2-cm slices and air-dried.

In the summer of 2001, the high-purity germanium (HPGe) spectrometer arrived and was set up for initial data taking. A low-background radiation shield was fabricated for the detector. An energy calibration was performed and analysis of the samples for ^{137}Cs was begun. Cores from three of the Dog River sites and one of the Fowl River sites have been analyzed for ^{137}Cs . We are, therefore, approximately half way through the analysis of the cores for ^{137}Cs . The preliminary results indicate that Dog River near Moore's Creek has suffered rather higher sedimentation rates since 1954 than upstream near Luscher Park or in Rabbit Creek. Gamma-ray analysis for ^{210}Pb requires a special calibration source, which is currently on order, and the analysis of samples for ^{210}Pb can proceed upon its arrival.

Grain-size analysis has also been performed on most of the samples following gamma-ray analysis.

Publications/Presentations: Some results from this work formed part of a presentation at the 98th Annual Meeting of the Association of American Geographers, March 19-23, 2002, Los Angeles, CA:

“Estuarine Paleocology: a Study of Weeks Bay, Alabama,” Dr. Miriam Lee Fearn, Jennifer H. Hathorn, Chuck Stapleton, Dr. Douglas Haywick, and Dr. Justin M. Sanders.

11th Annual USA/USM Mini-conference on Undergraduate Research in the Mathematical Sciences (Invited Faculty Presentation), Apr 5, 2002, Mobile, AL:

“Use of Gamma-ray Spectroscopy for Radioactive Dating,” J.M. Sanders

9th Annual USA Research Forum, Apr 9, 2002, Mobile, AL:

“Gamma-ray Analysis of Sediment Cores from Dog River and Fowl River, Mobile County, AL,” J.M. Sanders, M.D. Williams, A.J.K. Pearce, D.W. Haywick, M.L. Fearn

Future Activities: Continuation and completion of the ^{137}Cs analysis and initiation and completion of ^{210}Pb analysis will be the major goals of the project. An estimated 160 days is required to complete the ^{137}Cs analysis on the remaining cores. The ^{210}Pb analysis will begin as soon as the calibration source arrives. It is expected that many of the previously analyzed samples will be re-analyzed to insure quality control for the ^{210}Pb analysis. Consequently, rather more than 160 days will be required to complete the ^{210}Pb analysis. Grain-size analysis will also be continued on remaining cores.

Supplemental Keywords:

Relevant Web Sites: Web sites that reflect related research and publications associated with the principle investigators are:

<http://www.usouthal.edu/geography/haywick/weeksbay.htm>

<http://www.usouthal.edu/geography/fearn/research.htm>

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