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INVESTIGATION OF PEAT STRATIGRAPHY IN ESTUARINE FLATS NEAR ANCHORAGE, ALASKA, AS A MEANS OF DETERMINING RECURRENCE INTERVALS OF MAJOR EARTHQUAKES

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Investigations

The goal of this project is to investigate the subsurface stratigraphy and sedimentology of estuarine deposits along the eastern shore of Cook Inlet (fig. 1) to obtain a record of subsidence events associated with major earthquakes. The results of this study, together with results of similar studies in the Prince William Sound, Copper River delta, and Middleton Island areas, should help develop a regional chronology of coseismic vertical tectonic displacements during the late Holocene.

Borehole drilling along Turnagain and Knik Arms in upper Cook Inlet revealed multiple submerged peat layers, possibly associated with six to eight coseismic subsidence events during the past 4,700 calendar years, which corresponds to a recurrence interval of 590 to 780 years (Combellick, 1990). The current program involves drilling and examination of tidal-channel exposures in estuaries of Fox River (Kachemak Bay), Kasilof River, and Kenai River.

Results

During 1991, we drilled nine hollow-stem boreholes and eight hand-auger holes at Fox River Flats near Homer, four boreholes at Kenai River flats, and two boreholes at Kasilof River. Additionally, we examined extensive river-bank exposures at Kenai and Kasilof River Flats and at Girdwood. Since November 1991, we have prepared and submitted 54 peat, wood, and organic silt samples for radiocarbon dating, and have completed grain-size analyses of 83 samples to assist in interpreting depositional environment. We are currently analyzing these results.

In the Kenai and Kasilof estuaries, we discovered several prominent tephtras interbedded with peat in stratigraphic positions that should provide corroborative age control on the peats and buried forest layers. From our preliminary radiocarbon dates above and below these tephtras, we believe that one is probably the Hayes tephtra, which numerous other studies date reliably at about 3,660 yr B.P. Positive identification of the Hayes tephtra by electron-microprobe analysis (planned in 1992), together with other known tephtras that are probably represented in the sections, will improve age control and help resolve discordances that may arise in the age data.

Tidal erosion at Girdwood has exposed numerous tree stumps rooted in a buried peat layer about 1 m below the layer that was buried following subsidence during the 1964 earthquake. This presents an excellent opportunity to accurately date and describe a burial event that was probably associated with the penultimate great earthquake in the region. We have dated several wood and peat samples from this lower layer that indicate that this event occurred between 700 and 900 years ago (Combellick, in press). These ages correlate well with data from Portage, Knik Arm, Copper River delta, and Cape Suckling that provide strong regional evidence of a major event during that period. In 1992, we plan to obtain up to three precise radiocarbon dates on carefully

selected growth-ring intervals to more precisely date this event, and to carefully examine the section for positive evidence of strong ground shaking and rapid burial.

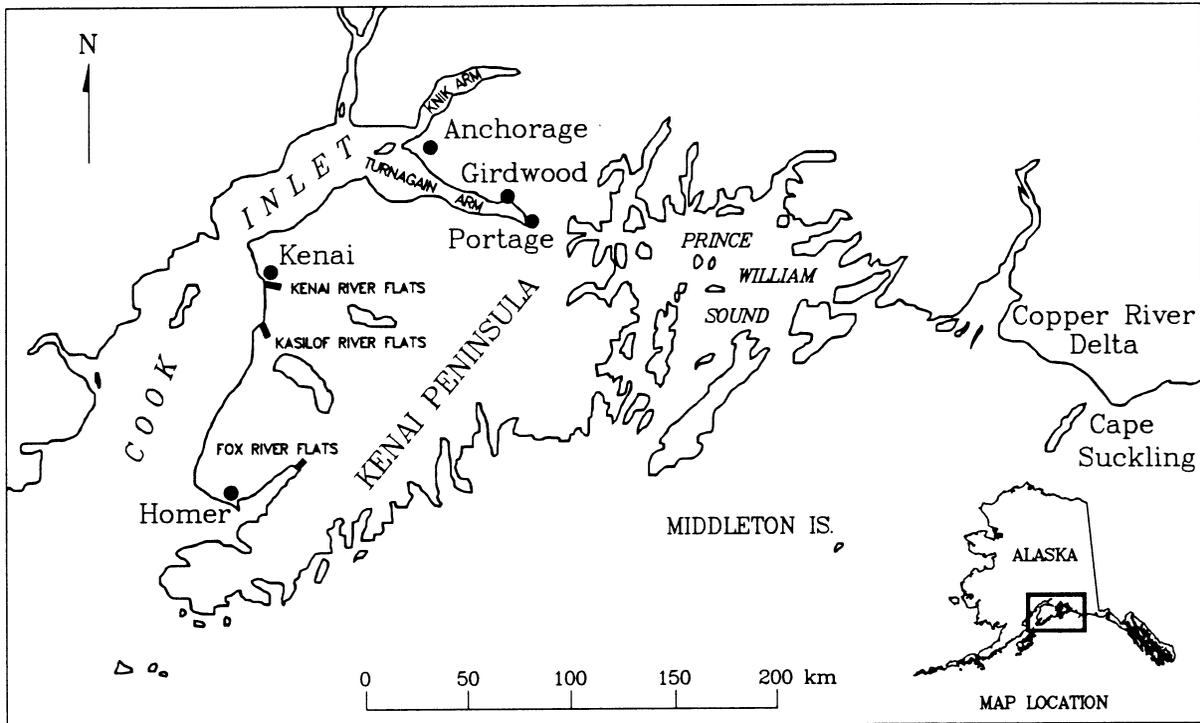


Figure 1. Southcentral Alaska.

Reports

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