RACEMIZATION-INFERRED AGE DISTRIBUTION OF MOLLUSKS IN THE US ATLANTIC MARGIN COASTAL SYSTEM

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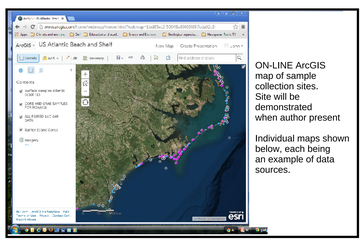
Summary of abstract:

Geologic ages of shells on inner shelf and beaches represent integrated effect of sediment sources, shell survival rates, and anthropogenic activities.

Amino acid racemization (AAR) analyses of ~ 900 samples (primarily Mercenaria, a robust bivalve) from Atlantic margin beach and shelf localities, with emphasis on NC Outer Banks.

Aminozones (clusters of D/L values) permit correlation of shelf or beach samples to onshore in situ units. Age calibration is facilitated with 14C and U-series results. Occurrence of Pleistocene shells on beaches in non-uniform: localized concentrations indicate local source regions and/or proximal sediment-starved inner shelf, Onslow Bay NC being a prime example.

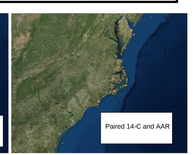
SOURCES OF DATA



ON-LINE ArcGIS map of sample collection sites. Site will be demonstrated when author present

Individual maps shown below, each being an example of data sources.

Beach samples



Paired 14-C and AAR

Core and grab samples

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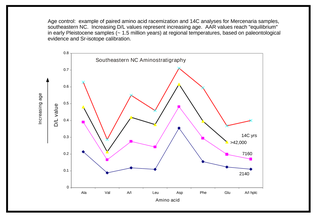

THE USE OF BEACH SHELL AMINOSTRATIGRAPHY IN COASTAL PLAIN STUDIES

These shells were collected at Fort Fisher, NC, north of Cape Fear. All but two of these shells are Pleistocene based on AAR data (confirmed with 14C analysis of selected shells). High frequencies of occurrence of Pleistocene shells are found at sites of "submerged headlands" (Riggs et al., 1995) along the NC coast, including Capes Fear, Lookout, and Hatteras, as well as Rodanthe, a "minor" cape in the Outer Banks system. The relatively thin Holocene cover on the Pleistocene strata of the shoreface and inner shelf is the primary reason for the mixing of Pleistocene and Holocene ages on the NC beaches, and the presence of Pleistocene shells on the beach. Such mixing would not occur if the Holocene cover on the shelf were not available. The Fort Fisher site is the Holocene analog for the nearby Snows Cut (SC#1) site, where a Pleistocene spit-tip (elevation <2m) with numerous transported shells (as seen in the stratigraphy and taphonomy) has at least two Pleistocene aminozones preserved in the unit (Wehmiller et al., 1999).

Mercenaria shells from South Core Banks, NC. Fragments cut from hinge area for HPLC analysis; numbers on lower right label are D-alloisoleucine/ L-isoleucine values. At least two aminozones represented (0.24 to 0.30, 0.65-0.70). The younger aminozone would have infinite 14C dates, based on data from elsewhere in the region.

Legend Shell Form
(Relative Age)
Modern Inlet
Pleistocene
Holocene
Pleistocene
Holocene
Pleistocene
Holocene