Luminescne Dating of Ceramics from the Sinop Promontory

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Background

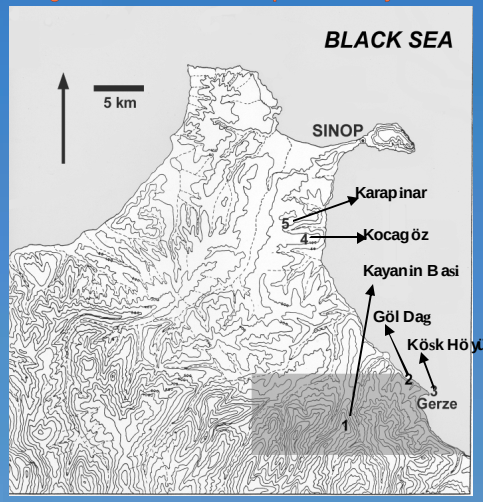
Over the course of the last eight to ten years, archaeologists, led most recently by Dr. Owen Doonan of the California State University at Northridge, have been surveying the Sinop promontory, in north-central Turkey, along the Black Sea coast. Know as the Sinop Regional Archaeological Survey (part of the larger Black Sea Trade Project), Doonan's team has been documenting settlement in the hinterland of the Sinop promontory from the Middle Paleolithic period (50,000 B.P.) through Ottoman occupation beginning in the 13th century.

One product of this extensive survey has been the creation of the Sinop Museum Archaic and Classical Ceramics Catalogue. This catalogue represents an effort to identify ceramic types for comparison with sherds found in the field. Fully dependent upon stylistic seriation for chronological interpretation, this region lacks a developed absolute chronology.

In an effort to root the Sinop ceramic collection onto an absolute calendar, 13 ceramic sherds from the most recent survey (2003) have undergone thermoluminescence (TL) dating at the University of Washington labs by team member Aksel Casson under the supervision of Dr. James Feathers. This research is establishing the first absolutely dated ceramic sequence from the Turkish Black Sea coastal region.

UW SAMPLE #	SITE PROVENIENCE	LUMINESCENCE AGE	EXPECTED AGE	EXPECTED PERIOD
U1120	Kayanin Basi	59 AD ± 228	3rd Millennium BC	Early Bronze Age
U1121	Kayanin Basi	1870 BC ± 319	3rd Millennium BC	Early Bronze Age
U1122	Kayanin Basi	5699 BC ± 630	3rd Millennium BC	Early Bronze Age
U1123	Kayanin Basi	3943 BC ±427	3rd Millennium BC	Early Bronze Age
U1124	Kayanin Basi	4117 BC ±669	3rd Millennium BC	Early Bronze Age
U1125	Kayanin Basi	727 AD ± 122	3rd Millennium BC	Early Bronze Age
U1126	Göl Dag	3079 BC ± 374	3rd Millennium BC	Early Bronze Age
U1127	Göl Dag	2857 BC ± 396	3rd Millennium BC	Early Bronze Age
U1128	Kocagöz	2200 BC ± 280	2700-2300 BC	Early Bronze Age
U1129	Kocagöz	2194 BC ± 312	2700-2300 BC	Early Bronze Age
U1130	Karapinar	2410 BC ± 402	Pre-3000 BC	Late Chalcolithic – Early Bronze Age
U1131	Kösk Höyük upper	3158 BC ± 279	1600 – 1700 BC	Late Bronze – Early Iron Age
U1132	Kösk Höyük lower	2525 BC ± 324	1600 – 1700 BC	Late Bronze – Early Iron Age

Figure 1: Sites on the Sinop Promontory



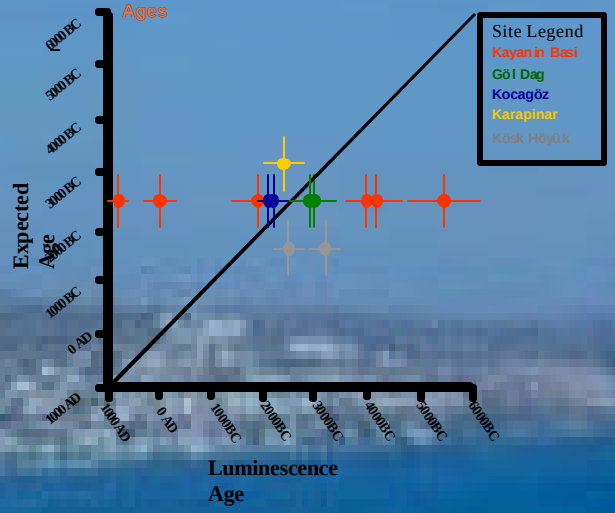
Methods

13 ceramics from 5 locations within the Sinop promontory were dated. Fine grains, the 1-8 micron fraction, were used for dating. Luminescence was measured using thermoluminescence (TL) for all samples. These measurements were supplemented, where possible, with optically simulated luminescence (OSL) and infrared stimulated luminescence (IRSL). Equivalent dose was determined by the slide method (Prescott *et al*. 1993) for TL and by the single aliquot regenerative dose (SAR) method (Murray and Wintle 2000) for OSL and IRSL. Radioactivity was measured by alpha counting, flame photometry (for potassium) and beta counting.

OSL and IRSL have not been used much for dating ceramics. OSL and IRSL was measured to increase precision associated with each sample through the use of weighted averages, essentially offering multiple lines of evidence for each single date. In particular, the use of single aliquot methods for determining equivalent dose, not practical for TL, was used to improve precision. Some ceramics, however, had little or no response to optical or infrared stimulation, at least with the detection windows used in this study.

Another possible advantage of using OSL and IRSL is the reduction of the influence of anomalous fading, which often results in age underestimates. Anomalous fading was measured using TL and corrections were attempted following Huntley and Lamothe (2000), where possible.

Figure 2: Expected vs. Luminescence Ages



Results and Discussion

There is excellent agreement between the expected and luminescence ages for a majority of the samples, with the notable exception of the ceramics collected from within Kayanin Basi. Many of the samples were expected to be Early Bronze age (ca. 3rd Millennium BC), and though many of them do cluster around this value, there exists a roughly equal number of samples on each side of this estimate. The absence of a unidirectional bias in the luminescence dates warrants exploration into the possibility of a longer period of occupation (before and after) this estimate.

Sherds from Kayanin Basi range in age from the 8th century AD to 8000 years before present. The younger samples (U1120 and U1125) may represent Hellenistic pottery intruding into the prehistoric component of the site. The presence of Hellenistic pottery had been documented in the 2003 survey. The older samples may represent Chalcolithic or earlier settlements into this part of the promontory. These data suggest a long and continuous occupation of Kayanin Basi, inconsistent with the proposed seriation.

The Kösk Höyük samples cluster significantly older than their expected ages. This too warrants further investigation, particularly as their expected ages were ~500 years before the 3rd Millennium.

The absolute chronology begun in this study is clearly a first-step towards characterizing the occupation of the Turkish Black Sea coast. General agreement between luminescence and seriation data is certainly encouraging, though more work clearly needs to be done before a comprehensive catalogue can be said to exist. Future research will continue toward this goal.

Acknowledgements and Thanks

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