Sea-level Changes during 2600 BP and Little Ice Age and its Impacts on Iranian Coast

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Extended Abstract

Introduction

The Caspian Sea (CS) can be subdivided into three parts: North, Middle and south parts. The sea experienced many cycles of Sea-level changes with vast emerged and submerged areas. In the terraces in Dagestan, two major phases have been distinguished. The Early Khvalyn transgression is represented by five successive marine terraces between +50 and 0 m at absolute height. Furthermore, at the boundary of Late Pleistocene and Holocene a -50 and by other researcher a -113 sea level record has been identified. This is why many researchers call it as a capricious level due to great sea level changes. Recent sea-level changes also got attention, experienced around 3 m sea-level changes between 1929 and 1977 and rose back in 1995. Five late Holocene records have been identified at least up to -22 absolute elevation. Present work aims at showing two phases of transgression and its impact on Iranian coast by Arial photograph and radiocarbon dating, a 2600 BP and Littlie Ice age.

Radiocarbon dating

Radiocarbon dating results are available now from all over the CA along the Iranian coast. Further radiocarbon dating is also needed to achieve better understanding of sea level change. The crucial thing is that the samples must not be reworked and then it is important to take samples from marine environment. Otherwise, the results are not accurate and sometimes in a wrong way. The marine environment far away from the wave is the best target to take the samples. The absolute elevation is also important, unreported elevation of the samples might indicate different data and should consider the same coordinate systems for all data. In this work, nearly all sample elevations have been measured by DGPS device based on the mean sea –level of the Persian Gulf. Table 1 indicates the radiocarbon dating data along the three parts of the Sea, East, Middle and West parts.

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The southeastern part of the CS

The south-eastern part of the CS is one of the best targets to reconstruct the sea-level curve and coastal evolution. An overall study of the past and recent sea-level changes has been done in this part as a PhD thesis. The dominated coastal features in this part are characterized by Barrier-Lagoon and delta deposits. This part is very sensitive to sea level changes due to low angle coast and any minor sea-level change will have its own impact on the coast.

Based on Arial photograph and field data, two high stands at -22 and -24 were distinguishable, Old Miankaleh spit and old delta deposits. Linear old shoreline and old Gorgan delta is well observed by aerial photograph and confirmed by field works. They are placed at absolute elevation of around -24.

In the southern part of Gorgan Bay, the Bagho outcrop presents marine deposits similar to present Miankaleh spit characterized by crossbedding, medium to coarse sand and Caspian fauna. Eastward, it has been buried by Qareh Su and Gorgan Rivers and their deposits.

The middle part of the CS

Because of short distance of the Alborze Mountains and the sea and high energy environment, the coast characterized by gravel and coarse sand is known as erosional coast not sensitive to sea level changes as it was observed at the eastern part. However, there is a small old elongated lagoon indicating a Lagoon- barrier system in this part. Also, results of a core study indicates a lagoonal deposits further south at the foot of Alborz mountains and overlaid now by fluvial and organic rich layer. This organic layer was dated around 500 BP which probably is an evidence of little ice age high stand. The lower part of the mentioned core, also Lagoonal deposits, a sample dated around 2500 BP at the depth of 3.6 m. Two highstands at -24 and 19 absolute elevations were identified in this part.

The Western and East Sefidrud delta

The impact of sea-level change in this part is more studied than the other part of the CS. Sefidrud delta is the biggest river in the southern part of the CS originating from Zagrous Mountains and crossing Alborz mountains to the CS. Due to high sediment supply in this part, the impact of sea-level change is different from the other parts.

Recent study of sea-level rise between 1977 and 1995 indicates that 3 m sea level rise on the coast has not been changed. This is because the coast will be developed in 3 dimensional direction not just a simple linear trend. Therefore, accommodation space resulted from sea level rise is compensated by sediment supply and other process like longshore currents. Many papers have been published recently about the effects and most of them concentrated on Little Ice Age impacts on the coast. Present morphological features include a series of beach-barrier, Lagoons, modern delta and old delta.

Conclusion

Rapid sea level change is unique in the Caspian Sea and therefore coast response against this change get attention of many researchers. A real observation of coastal response to sea-level change instead of using mathematical model enables us to predict coastal behavior. The CS experienced many cycles and in the late Holocene two highstands, a 2600 BP and Little Ice age,

had strong impacts on the coast. These two highstands were synchronized with cooling periods of Northern hemisphere. Now the level of the Caspian is situated around -28 below sea level and considering the elevation -24 and -22 at the periods of two mentioned highstands. Large area of the southern Caspian was submerged at those periods. Any model should consider these highstands.

Keywords: Rapid Sea level change, Sefidrud Delta, The Caspian Sea, Transgression.