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Dating Caspian Sea Level Change
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accumulative parts. The shoreline distanced 0.5-15 km from modern shoreline in different area, which located in the area of high reverine sediment supply. Holocene shoreline in the areas with same beach slope has different distance from modern one. The greater the distance, the coast is more accumulative. Study of Iranian coastal area reveals that evolution of Holocene major morphology features are similar to what can be seen at present time. Although climate change recorded during Holocene, general wind and wave regime in the South Caspian and resulting longshore currents stayed unchanged. In consequence, the evolution of the Iranian coast during Holocene can be regarded mainly as a combined influence of falling sea-level and riverine sediment supply.

Concentration of Trace Metals in Gorgan Bay sediments, Southeast Caspian Sea

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The Gorgan bay is a semi-enclosed sedimentary basin, which is separated by a narrow sandy bar from the Caspian Sea. The Gorgan bay is under the influence of its watershed area and also the Caspian Sea basin. Studying of sediment characteristics, concentration of heavy metals in the sediments and sedimentary processes in the Gorgan bay are the main objectives of this study. Therefore 35 samples were collected from the bottom sediments. The collected samples were analyzed for carbonate calcium and organic matter content. Trace element concentrations in sediments have been measured using XRF and clay mineral content was investigated using XRD. Grain size analysis has done using sieves and Laser Particle Sizer and the grain texture has determined using the binocular microscope. Sediment grain size varies from sand to clay from the bay mouth in the east to the end of the bay in the west. The average carbonate and organic matter content is 35% and 30% respectively. Carbonate content is high in the bay mouth where the organic matter is less dominant. On the contrary the organic mater is more dominant in the inner parts of the bay where the carbonate content is less dominant. Mineralogical studies shows that whole sediment comprises Clay minerals (mainly Chlorite), terrigenous rock fragments (Igneous, Metamorphic and Sedimentary) and shell fragments. Concentration of trace elements such as Pb, Zn, Cr, Ni, Cu, V, Ba and Zr has been determined in bottom sediments. To investigate the effects of human activities on trace element concentration in sediments, core samples were collected. We assume that trace element concentrations in the bottom sediments are due to recent human activities in the area because the oldest sediments where extracted from the core samples (depth of -25cm) only shows the natural concentration. In this regard the geo-accumulation index (Igeo) were used to evaluate the effect of human activity on the trace element concentration changes. Comparisons between south Caspian sediments (Iran and Turkmenistan coasts) show that Gorgan bay sediments follow the characteristics of its watershed area (Alborz and Kopet Dagh).

Based on sediment composition, Gorgan bay sediments relative to the other part of Iranian coast (detrital sources) and Turkmenistan coast (carbonate sediments) comprise of mixture of detrital particles, carbonates and autogenous components. Although all of
the urban and industrial sewages of the region are entered directly to the Gorgan bay, but the Igeo index varies from 0 to +0.36 which indicates the unpolluted environment for the Gorgan bay.

Water Balance of the Volga River Catchment at Global Warming (using the Paleoclimatic Reconstruction)

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Attention to the water resources changes in various regions of Russia under the effect of global warming has grown for the last decades. The mean global air temperature has already grown to 0.6°C since the end of 19th century and according to forecasts of climate change the global temperature is expected to be 1°C above the pre-industrial value by 2005-2010 and 2°C by 2025 (IPCC, 1995, 2001).

The paleoclimatic reconstruction-maps for winter and summer air temperature and annual precipitation for global warming on 1°C and 2°C have been used as predicting scenarios of climate conditions in the beginning of 21 century. These scales of climate change correspond to warm epochs of the past, considered as analogs of future climate: Holocene optimum (6.2-5.3 KA B.P.) and Last Interglacial –Eem (125 KA B.P.).

The calculation of water balance parameters is made using Budyko’s method for assessment of evaporation from the land surface. Some additional assumptions have been made to adapt the method for scenarios of climate change. Based on the heat-water balance method and scenarios of global warming on 1°C and 2°C a hydrological model has been developed to calculate the changes in climate and hydrological parameters with the progress of global warming. This model allows to calculate changes in annual runoff and evaporation for the Volga river catchment.

With global warming on 1°C mean change of water balance parameters for the Volga basin are as follows: annual precipitation and evaporation would be higher on 5 mm, annual runoff does not change. The sufficient changes of water balance parameters for the Volga catchment should not occur as the modeled values evaporation and runoff are insignificant (less than calculation accuracy).

With 2°C global warming precipitations are more then mean annual on 75-150 mm over the upper and middle river and on 200-250 mm over lower river. The significant growth both of temperature and precipitation initiates in increasing of evaporation (70 mm/ year) and runoff on 30-40 mm/year over the Volga river basin.

The changes in runoff over the Volga river basin should be used for Caspian Sea level assessment in the beginning of 21 century.