Geophysical Research Abstracts
Vol. 17, EGU2015-10300-2, 2015
EGU General Assembly 2015
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Climate change and Sea level rise: Potential impact on the coast of the Edremit Plain, NW Turkey.

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Over the past century, most of the world's mountain glaciers and the ice sheets have lost mass due to global warming. When the temperature exceeds a particular level, glaciers and polar ice caps will continue to lose mass. Recent studies report that low-lying coastal areas will be seriously affected by sea level rise. Changes in the amount of natural and anthropogenic greenhouse gases and aerosols had a warming effect on the global climate during last century. Thus, the pace of melting of ice sheets increased, and, accordingly, sea level began to rise faster. Rise in sea level between 1961 and 2003 was equal to 1.8 mm/year while it was 3.1 mm/year between 1993 and 2003. The total rise in the 20th century is estimated to be between 17 and 19 cm.

The models based on the sea level change indicate that the average global temperature at the end of the 21st century will increase by 0.3°C - 6.4°C. Global sea level is projected to rise 8-25 cm by 2030, relative to 2000 levels, 18-48 cm by 2050, and 50-140 cm by 20110.

The Edremit Plain lies between Mount Madra and the Kaz Mountains on the coast of Aegean Sea in NW Turkey. It is lowland with an area of 141 km2. The widest part of the plain is 16 km along the E - W direction. The N - S direction amounts to a width of 15 km. The plain is covered with alluvial deposits that settled in the Quaternary Period. The elevation ranges from 0 to 50 m a.s.l. in the plain.

This study aims to determine how the low-lying coastal land areas of the Edremit Plain may be affected by possible changes in sea level. Elevation dataset is based on the digital elevation model (DEM) of Landsat ETM + satellite images. To that end, satellite images were used to draw the current coastline. Curves of 2.5, 5, and 10 m were drawn through the use of maps with a scale of 1/25.000. Later on, the areas of the fields between these points were calculated.

Current estimates show that 2.5 m rise in sea level will cause sea water to cover an area of 8.6 km2 (%14.0), 5 m to 28.4 km2 (%21.2), and 10 m to 58.3 km2 (%41.2) on the coastal land. In such cases, a +2.5 m change will trigger the current coastline to regress by 1.3 km while a +5 m change will lead to 3.4 km, and a +10 m change will cause 5.2 km.

As a result, residential, agricultural, and wetlands on the coastal land of the plain will be submerged by rising sea levels, leading to significant habitat loss and changes in the ecosystem. The creation of detailed elevation may reveal more clear effects of the changes in sea level.

Key Words: Climate change, coastline, Edremit plain, global warming, sea level rise.