



The climate in the Venetian and North Adriatic region: variability, trends and change

workshop

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TOPIC T2. Northern Adriatic sea level and circulation: variability and trends

Sea level trends and variability in the Adriatic

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Short abstract:

Sea level poses particular risks to the coastal zone. Mean sea level changes can slowly change the morphological features, contaminate underground water with salt intrusion and make coastal areas uninhabitable or unsuitable for cultivation. In addition, changes in extreme high waters could have a hazardous impact on coastal regions causing floods, property damage and, in some cases loss of life. The risks involved are not independent in the sense that higher mean sea levels would imply higher extremes.

Sea level is primarily measured through tide-gauges and satellites. Because sea level measurements from satellites have only become available in 1993 onwards it is tide-gauges we mainly rely upon to assess sea level rise. However sea level from tide-gauge includes local land motions. Therefore we need to synthesize sea level measurements from various locations each of which is subject to different vertical land movements. This is far from an easy task.

There are only four long sea level time series available in the Mediterranean Sea, namely, Marseille (France), Genoa, Trieste and Venice (Italy). Two are located at the north part of the Adriatic Sea and two at the north-east part of the western Mediterranean Basin. Three stations indicate sea level rise of around 1.2 mm/yr or 12 cm per century. The fourth, Venice, has been experiencing faster sea level rise for the first part of the 20th century due to underground water extraction which caused land subsidence. However, for the period after 1960 when the water extraction stopped, the rate of sea level rise in Venice is within error bars in agreement with the other three stations. To the extent that we accept these values as representative of the whole basin we can consider sea level as rising in the Mediterranean Sea by 12 cm per century during the 20th century. The values attributed to sea level rise in the open ocean for the 20th century are 1.8 mm/yr (18 cm within the 20th century). Faster sea level rise has been measured in the 1990s but these rates have become zero or negative in the period 2001-2007.

Extreme sea levels in the Mediterranean basin are in general around 60 cm with the exception of the northern Adriatic Sea where values in excess of 150 cm have occurred. The variability in time of the extremes is caused by changes in the mean sea level. Thus there is no indication increases in the extreme storms in the Mediterranean Sea in general or the Adriatic in particular.

Overall it is clear that the Mediterranean has experienced a century with very small sea level rise and small extremes. This means that, with the exception of the Adriatic the coastal societies have been developing without taking into account the risk of sea level rise.

Understanding the role of the various contributions is crucial in developing plans for coastal protection.