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Climate Change and its Impact on the Recent Geological Past and today; the Role of Earth Scientist

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Introduction

In the last years the impacts of the climate change are repeatedly discussed and /or analyzed in either daily news or scientific presentations. Therefore we have to describe this subject and discuss the changes are expected to take place today or at the near future.

History of Quaternary – Holocene cold / warm climate periods. Regional setting

The Earth has undergone in the last about 500 000 years four significant climate changes. This time includes three cold periods, lasting about 100 000 years each, with a warm period between them, lasting about 12 000 years (Chappel and Shackleton, 1986). Today we are living in the last warm period that started about 12.000 years ago and is expected to end in about 2.000 years from now (Fairbanks, 1989) when the next cool period will start again. The cause of these cycles is the variability of the solar radiation reaching the earth.

One of the first areas to be studied were, two areas in Greece the greater city of Thessaloniki, in Thermaikos Gulf, northwestern Aegean as an estuarine, (Georgas and Perissoratis, 1989), and the Rhodes Island, southeastern Aegean, as an insular sector (Perissoratis, et al., 1996). According to the expected impacts, a series of actions were proposed, described and presented to the local and regional organizations. The main suggestions were referring to the impacts expected from two scenarios, as depicted by the IPCC working Group for southern Europe (Gue et al 1991). In the first scenario by the year 2030 it is expected a temperature increase of 1,8°C and sea level rise by 18cm (+/- 10cm) and, in the second scenario, by the year 2100, the estimations were respectively increase 3° C and 65 cm (+/- 35cm),

Predictions of future increases in Earth temperature and sea level rise.

Sea level increases as a result of a future temperature increase was and has been in research continuously by many researchers. At the same time the study of the sea level rise, especially in the last two hundred years and, further earlier, in the last two thousand years has been carried out. Thus according to Jevrejeva et al (2006) the sea level during the periods years 1850 to 2000 the global sea level rise was in the order of 20 mm/year, while according to Grinsted et al (2009) during the last 2000 years the minimum sea level rise was about 15mm/year and the maximum on 23mm/year. These estimations are within the known estimations during the Holocene period. As for the future estimations, for the year 2100 both ideas are different as it is presented in fig 1. The IPCC model consider a rise of 35 cm , that is a rate of 35mm/year while that of Grinsted et al, (2009) the expected rise will be to about 1.2 m that is 120 mm/year, an increase of the order of 3.5 times.

The impact by using the future predictions and the suggested actions

The above overestimations that certainly are based in hypotheses, without related to the presence of an ongoing event, and have been used by many research groups that deal with the expected impacts. As a consequence they usually suggest the carrying out of the necessary actions very soon. This is mainly because the predictions and the impacts if publicized are useful method for impressing the greater public, via the various media, and especially in western counties. In Greece particular two extensive analyses on the forthcoming impacts of the expected climatic change was carried out recently. In 2009 the National Bank of Greece established and funded the Committee on Impacts of the Expected Climate Change in Greece, that presented its reports in 2015 (CCISC, report 2015), presented and published in daily newspapers. The conclusions and suggestions of this committee were based, among other impacts, on an expected 1 m sea level by the end of 2100. As a conclusion a series of actions to be carried out soon was suggested. Otherwise the impacts will be disastrous, estimating also the economic cost.

Similar ideas in Greece were also presented by diaNEOsis a non-profit research organization that studied, among other, the impacts of climate change in the Greece economy (Georgakopoulos, 2017). The study, partly presented in daily newspapers and available to the public, considers the IPCC 2007 report and the values from 20 to 59 cm by the year 2100 as very moderate and accepts a sea level rise from 0.80 m to 2.0 meters. The study suggests a transition by 2050s to the low carbon economy, organizing meetings for the future impacts but, mainly, within the next four years, special plans for the Tourism and Agricultural sector. No evaluation of costs for these actions were presented.

It is well accepted that tourism is the main economic source of Greece. Therefore, the predicting by these studies that eventual impacts of an eventual climatic change will take place soon in Greece, the impression for the ordinary people are very negative and disappointed.

Even more very often many physical events that have been taking place in Greece , are related to consequences of the climate change without any scientific explanation, as was the case in the disastrous fire it the Mati location nearby Athens (23 July, 2018, with over 100 people dead).

Disaster amendment and mitigation policies – Conclusions

The impacts on the human environment are from natural events, that are mainly Coastal Erosion, Earthquakes, Tsunamis, Floods, and Active Faults The earth scientists have already knowledge and experience on the impacts of these natural events and have to deal with these regardless of the eventual climate change. At the same time the increased use, for various purposes, of the coastal region by the human population, in many aspects, degrade the coastal zone. The alternation of cool and warm periods in the latest geological past, are still ongoing, and all the available scientific knowledge should be used to see, in a more clear way, the impacts in an eventual climate change. An event that has not been recorded yet.

In conclusion since the natural events will always happen in human life, they require relevant actions both before and/or after their occurrence

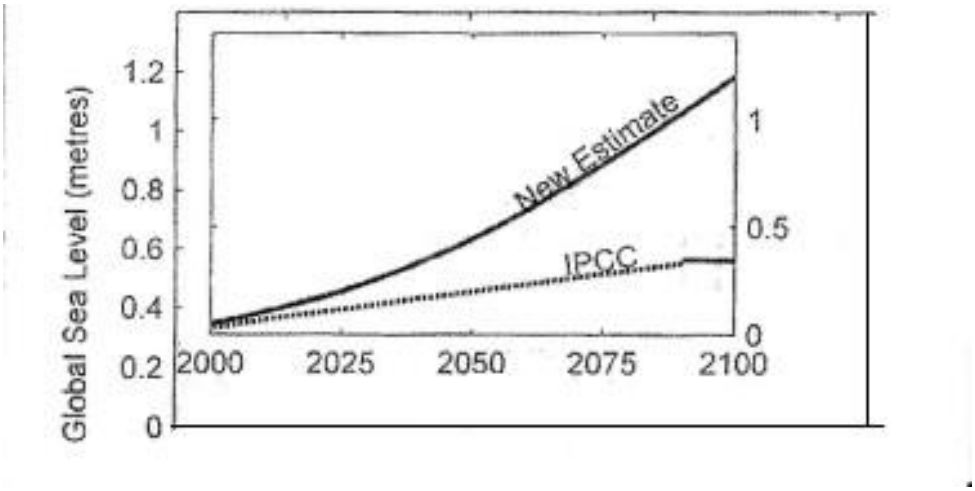

Figure 1. Global sea level (Grinsted et al. 2009) depicting the expected change between years 2000 to 2100 (2009 New Estimate) and IPCC (2007).

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