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Climate change assessment: proposal for a standardized index

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Scientific observations unanimously confirm atypical climate signals at global and local scales during the past few decades. In such framework, the meteorological events and the weather variability converge on long-term trends prefiguring future scenarios very different by the current reference climatic parameters. Despite the numerous forms that describe climate change around the World, the phenomenon is mainly characterized by a significant increase in temperature (global warming) often associated with a decrease and/or serious alteration of rainfall regimes. The average surface temperature increased by 0.74 ˚ C over the last 100 years, mainly due to the contribution of the years between 1995 and 2007, the warmest since 1850 to present. In consideration of further temperature increases, equal to 0.2 ˚ C for each of the next two decades, it is possible to assume that temperature will increase between 1.8 and 4.0 ˚ C, up to 6.4 ˚ C in the worst cases. The climate changes are not, however, a novelty of our time. According to some studies, over the past 2000 years the climate has experienced alternating phases of "cold" phases and "hot", with deep effects on ecosystems and society equilibrium. According to other studies, the temperature trend over the last 2000 years was characterized by an uninterrupted downward trend until the middle of the twentieth century when there was a reversal remarked in the four decades between 1950 and 2000, warmer than the whole period. Compared to the past, however, the most distinguishing connotation of the current climate trends is represented by the unusually rapid pace of change as witnessed in particular by the increase in temperature. Climate change and some of its consequences, are strongly pronounced in marginal areas where the environmental equilibrium is more fragile and the demographic pressure is high. In the Mediterranean basin and also in Italy, the climate change has clear implications mainly related to heat waves, heavy rains, floods, landslides, long drought periods, etc. Regarding the agro-forestry sector, the Italian vulnerability is particular and mainly depends on the production addressed to specialized and typical crops, of highest quality and strongly related with the territory. This kind of productive organization, in order to be economically convenient, requires optimal climatic conditions and massive investments in terms of economic, technological and natural resources. In this way, beyond the risks due to bad weather events, it is very easy to exceed the threshold of sustainability and generate an environmental pressure able to trigger land degradation processes. The immediate and future consequences of climate change are not easy to predict because there are several scaling factors and not well defined interrelationships between each climatic variables (temperature, precipitation, etc.) and the different climatic factors (landscape, topography, vegetation, latitude, etc.): alteration of the hydrological cycle with destabilization of the ecosystem equilibrium and less availability of water for human needs; high frequencies of extreme events (floods, droughts, hurricanes, heat waves, heavy rain); sea level rise determining the salinization of coastal aquifers, etc. Because of the nonlinearity of the phenomena, quantifying climate change can help to better understand the extent of its impact and to mitigate its effects. The aim of this study is therefore to propose a procedure for a quantitative assessment of the impact of climate change in Italy at the local level and on a national scale detail, using some variables as temperature and precipitation. The results of this study will be discussed by several point of view: agro-ecological, geographical and territorial.