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## Climate Change and the Evolution of Phytoplankton (Abundance) in Some Lagoons on the São Miguel Island – Azores

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Climate change cause large, long-term impacts on human well-being and adds more pressure to terrestrial and marine ecosystems. The archipelago of the Azores is located in the subtropical region of the North Atlantic and is therefore highly influenced by the North Atlantic Subtropical Anticyclone. As it is an almost stationary high pressure system, whose development and orientation determine the nature and characteristics of the air masses that reach the region. The motivation for this research has two phases; the first was to study the effects of some meteorological parameters (temperature, radiation, wind speed, humidity, precipitation, evaporation, tank temperature and tank level) for the period 2010-2012, on the biodiversity of phytoplankton communities in relation to the abundance of these organisms in the lagoons of Fogo, Furnas, and Sete Cidades of the island of São Miguel - Azores, for the period 2010-2012, using an analysis in Principal Components, which will allow correlating the meteorological parameters and the abundance of phytoplankton. The phytoplankton and meteorological community data were obtained from the website of the Regional Secretariat for the Environment and Climate Change of the Azores Government. In a second phase, the European Center for Medium-Range Weather Forecasts (ECMWF) reanalysis of the ERA5 project (ECMWF Re-Analyzes) was used for the 1979-2019 observation period and for the Azores region. For this region, the deviations of the surface air temperature, average annual precipitation and climatological extremes were calculated, this referring to the maximum number of consecutive days with precipitation <1 mm, and also, the number of tropical nights using the ERA5 reanalysis series in the period 1979-2019 with reference to 1961-1990. Projections were also estimated up to 2100 and according to scenarios RCP 2.6, 4.5 and 8.5 for the referred parameters. Finally, variations for the end of the century (2071-2100) were estimated with reference to the most recent situation of 1991-2020.

The thermal balance of a lagoon is associated with climatic and meteorological conditions. Much of the biological processes in the lagoons are directly affected by thermal changes in the water, and therefore, indirectly affected by climatic variation. Understanding the interaction between the lagoon-atmosphere system is important to predict the consequences of the effects of climate change on the abundance of phytoplankton. In this study, a positive correlation was verified between precipitation and abundance of Bacillariophyta, Dinophyta and Cryptophyta. From the calculations performed, the average of the models results in an increase in the maximum number of consecutive days with low rainfall (<1mm) from + 0.2 to 4.8 days / year until the year 2100, with

a lower abundance of these algae being expected. On the other hand, Cyanophyta, Chlorophyta and Chrisophyta are well correlated with high values of air temperature, lagoon water temperature and solar radiation. Thus, it is estimated an increase in the abundance of these algae, due to the forecasts of several models, that point to an increase in the average annual temperature in this region between 1 and 3 K until the year 2100, with reference to the period from 1961 to 1990.