Biosignatures across time

E. Palle[1*]

[1]*Instituto de Astrofísica de Canarias, Spain*

Introduction

Over the past two decades, enormous advances in the detection of exoplanets have taken place. Currently, we have discovered hundreds of earth-sized planets, several of them within the habitable zone of their star. In the coming years, the efforts will concentrate in the characterization of these planets and their atmospheres to try to detect the presence of biomarkers. However, even if we discovered a second Earth, it is very unlikely that it would present a stage of evolution similar to the present-day Earth. Our planet has been far from static since its formation about 4.5 Ga ago; on the contrary, during this time, it has undergone multiple changes in it's atmospheric composition, it's temperature structure, it's continental distribution, and even changes in the forms of life that inhabit it. All these changes have affected the global properties of Earth as seen from an astronomical distance. Thus, it is of interest not only to characterize the observables of the Earth as it is today, but also at different epochs.

Contents

Here we review the detectability of the Earth's globally-averaged properties over time. This includes atmospheric composition and biomarkers, surface properties that can be interpreted as sings of habitability or biomarkers, and the overall photometric, spectroscopic and polarimetric features detectable on the Earth's reflected/emitted light. We particularly focus on the detection of possible signs of life, and how these different biomarkers have appeared or disappeared in time.

Short Summary

Our planet has been far from static since its formation about 4.5 Ga ago; on the contrary, during this time, it has undergone multiple changes in it's global properties. Here we review the detectability of the Earth's globally-averaged properties, focussing on biomarkers detection, over time.