

In a clear sky everywhere worldwide exist an atmospheric electric field which is around a couple of hundreds of Volts per meter (V/m). This atmospheric electric field persists along the time and it is mainly maintained by thunderstorms and electric shower clouds occurring far away. This frame is known as the Global Electric Circuit (GEC). Our research aims to explore the GEC and how it interacts with space weather and climate. Essentially, we are investigating how solar events, cosmic rays from space, and climate phenomena like El Niño and the Madden-Julian Oscillation affect the electric environment of the Earth. To do this, we are using a global network of sensors to monitor the Earth's electric field and study lightning activity. This will help us to improve our model of the GEC and to improve space weather forecasting and climate prediction. Why are we doing this? Well, the model of the GEC was proposed over a century ago, but there is still a lot we do not understand about it. By studying high-energy particles and climate patterns, we hope to gain insights that can be used to better understand various natural phenomena. So far, we have found that solar events can impact the electric field in the atmosphere, potentially affecting lightning activity. Additionally, changes in cosmic ray flux linked to the 27-day solar rotation seem to influence the GEC, and energetic electrons from space can also impact it. However, there is still a lack in the understanding the mechanisms behind it and this is the main objective of our research. Of course, there are challenges, such as handling large amounts of data and ensuring our findings are shared effectively. But, by using different measurement techniques and models, we are confident that we can unravel the complex interactions within the GEC. In summary, our research is focused on deepening our understanding of how the GEC responds to space weather and climate phenomena, with the goal of contributing to international research efforts and potentially offering insights that can help us mitigate the impacts of space weather and climate changes.