University of Namibia
Departament of Physics, Chemistry and Material Science

Master of Science in Physics

Name: Francisco Fenias Macucule
Research Project Title: Precipitable Water Vapour Measurements for the Africa Millimetre
Supervisor: Prof. Michael Backes
Co-Supervisor: Prof. Tinus Stander and Mr. Lott Frans

1 Abstract

The Africa Millimetre Telescope (AMT) is a pioneering project set to establish the first millimetre telescope in Africa. The selection of the optimal site for the telescope construction has been a crucial aspect of this research. Among the prospective sites, Mt. Gamsberg has been identified as the suitable site for optical observations. However, it is essential to acknowledge that Mt. Gamsberg currently lacks any on-site facilities. In close proximity to Mt. Gamsberg, approximately 30 km away, lies the High Energy Stereoscopic System (H.E.S.S.), which offers a more developed infrastructure compared to Mt. Gamsberg. In this research, our objective is to assess the levels of precipitable water vapor (PWV) in the atmosphere above both the H.E.S.S. site and Mt. Gamsberg. This evaluation is based on comprehensive analysis involving ground-based measurements and satellite data. Based on preliminary findings, it is evident that the satellite data tends to overestimate the PWV measurements obtained from ground-based instruments. However, it is worth noting that both sources exhibit consistent seasonal variations. Furthermore, our analysis indicates that Mt. Gamsberg experiences relatively lower PWV, with the lowest values recorded during the winter season. By investigating the PWV characteristics and comparing them between the H.E.S.S. site and Mt. Gamsberg, this research aims to provide valuable insights for the establishment of the AMT. Understanding the atmospheric conditions and variations in PWV is crucial for optimizing the performance and reliability of the AMT.

Keywords: Africa Millimetre Telescope, Precipitable Water Vapour, Mt. Gamsberg and H.E.S.S.