

SPACE PHYSICS: CONDUCTING BIG SCIENCE WITH SMALL BUDGETS IN AFRICA.

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The near-Earth space environment is a natural laboratory fostering complex and often violent solar radiation and electromagnetic (EM) interactions with the Earth's magnetosphere and upper neutral atmosphere and which hold potential catastrophic consequences to communication systems and power distribution networks. These interactions are EM in nature and span broad frequency scales representing phenomena occurring at distance from tens of kilometres to several earth-radii from the Earth. Knowledge of the state of the ionosphere especially, is of great importance as it significantly affects HF radio communications and satellite navigation, which are more pronounced under geomagnetically disturbed conditions associated with erratic solar activity. Investigating phenomena in the near-earth space environment involves passive and active EM sounding, *e.g.* magnetometer-observed Ultra Low Frequency (ULF) pulsations associated with magnetic field line resonance (passive); Very Low Frequency (VLF) whistlers – waves associated with EM shocks propagating along magnetic field lines through the Earth's electrically charged ionosphere (passive); High Frequency (HF) soundings of electron density distribution in the ionosphere (active) and total electron content (TEC) measurement of the ionosphere using microwave dual frequency GPS receivers (passive). Although space physics is an exciting, challenging and relevant research field to Africa, it is also an attractive option when comparing instrument and operational cost to other space sciences *e.g.* astronomy and radio astronomy. This presentation gives an overview of the Hermanus Magnetic Observatory's experiences in conducting internationally-recognised space physics research in Africa using a small budget and their program for training high quality African space physicists with strong backgrounds in EM theory, plasma physics, magneto-hydrodynamics, aeronomy and EM observation techniques.