ALBATROS: a new array for low-frequency observations

Nivek Ghazi for the ALBATROS collaboration
University of KwaZulu-Natal, Durban, South Africa

Measurements of the radio sky at frequencies below 100 MHz have the potential to open a new observational window in the universe's history, revealing the nature of the first stars and potentially shedding light on the cosmic "dark ages". Low-frequency observations will also provide insights into the self-absorption of Galactic synchrotron radiation. The Array of Long Baseline Antennas for Taking Radio Observations from the Sub-Antarctic (ALBATROS) will be a new interferometric array consisting of autonomous antenna stations that will map the low-frequency sky from Marion island. Operating at a frequency range of 1.2–81 MHz with baselines of $\sim$20 km, ALBATROS is designed for high-resolution exploration of the lowest radio frequencies that can be observed from Earth.

The plasma frequency of the ionosphere sets a cut-off that determines the longest wavelengths that are observable from the radio sky. There are temporal variations in the plasma frequency, and this value decreases during periods of quieter ionospheric conditions, e.g., at night and during times of low solar activity. Previous ground-based measurements conducted in the 1960s by Grote Reber from Tasmania demonstrated the ability to create maps of the radio sky down to 2 MHz. Marion Island poses a unique opportunity to explore the low frequency universe with the International Reference Ionosphere (2012) model suggesting that the plasma frequency may reach values as low as $\sim$1.5 MHz during solar minima.

Currently, a two element pathfinder deployed on Marion Island in April 2018 is demonstrating basic functionality of the hardware. I will discuss the design of the ALBATROS experiment and goals for the upcoming deployment in April 2019.