PhD Project: Extended radio sources in the SMC

Supervisor: Vanessa McBride
Registration: University of Cape Town

vanessa@astro4dev.org

Background:
The Small Magellanic Cloud (SMC) is a nearby (66 kpc) irregular dwarf galaxy. The SMC has been extensively studied in the X-ray, optical and radio regimes over the years, revealing populations of radio pulsars, supernova remnants, planetary nebulae and X-ray binaries within the galaxy. However, the vast majority of sources detected in the direction of the SMC are actually background galaxies. A recent survey of the carried out with SKA precursor ASKAP has revealed over 8000 sources within and behind the SMC (Joseph et al. 2019).

In 2019 May, we observed two areas of the SMC with MeerKAT (see Fig. 1). These images are centered on young high mass X-ray binaries within their natal supernova remnants. Many radio point sources as well as extended objects are also observed within these images, thanks to the large field of view of MeerKAT. With a sensitivity (<20 MicroJy/beam) and resolution four times higher than that of the ASKAP observations, we expect to uncover a wealth of interesting objects in our two observations.
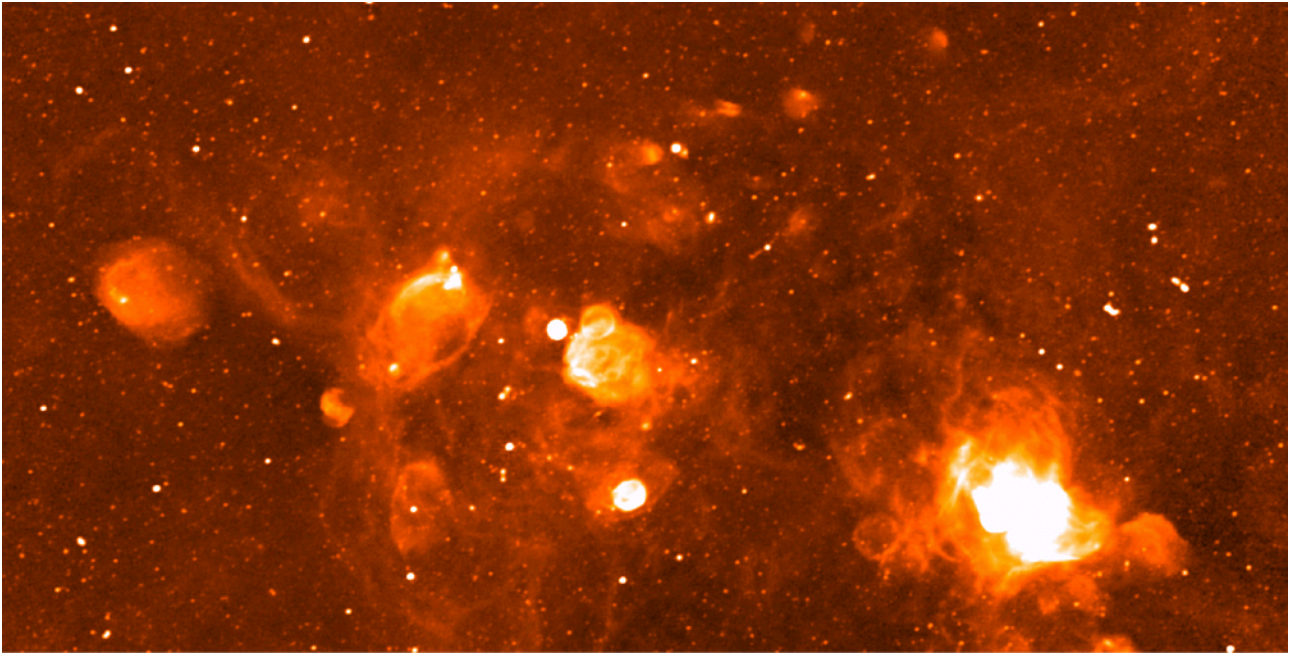

Figure 1. MeerKAT image of the one the fields in the Small Magellanic Cloud.

Aim:
For this project we are interested in cataloging and classifying the extended sources in our MeerKAT observations of the SMC. This will include primarily intrinsic SMC sources, such as supernova remnants, planetary nebulae and superbubbles and may include as well as background galaxies that show jet or lobe structures.

The aim of this project will be to compile a catalogue of extended sources in the direction of the SMC using our MeerKAT data, and to utilise imaging in shorter spectral bands to help with source classification. Cross correlation with data from ASKAP, ATCA, optical emission line imaging and

other multi-wavelength data sets, will also be used to determine the nature of the sources and explore those of particular interest in further detail.