

# SAAO small telescopes, capabilities and Challenges

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**Abstract.** The SAAO is at a geographically crucial site in the southern hemisphere between South America and Australasia. SAAO has a long history of involvement in infrared and optical astronomy that dates back almost two hundred years. The observatory expects to continue contributing to astronomical research for many years to come, using its small (0.5m, 0.75m, 1.0m and 1.9m) telescopes and their various instruments (ranging from spectroscopy to polarimetry and high-speed photometry), together with the Southern African Large Telescope (SALT) and other hosted international telescopes. In this paper, I discuss the capabilities and uses of the SAAO small telescopes, and the challenges that threaten astronomical research at the observatory, including light pollution and other emerging threats to the usually dust-free and dark-night-sky site at Sutherland. This is mitigated by the legislation called the Astronomy Geographic Advantage (AGA) Act of 2007 that protects the observatory from these threats.

**Keywords.** Telescopes, Instruments, Protection

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## Overview of astronomy and related challenges at SAAO

**Background.** The South African Astronomical Observatory (SAAO) with its headquarters in Cape Town and the observing station in Sutherland, about 300 km from Cape Town, is the main custodian of optical astronomy in South Africa. It has operated four (1.9m, 1.0m, 0.75m and 0.5m) telescopes at Sutherland for 40 years, as well as a number of other international facilities on behalf of, or in partnership with, international partner(s). Currently, it is also home to the SALT, the largest single telescope in the Southern Hemisphere, and over half a dozen other small and mostly robotic telescopes belonging to international partners/collaborators.

SAAO telescopes' main objectives are in (i) support of SALT observations; (ii) time domain astronomy, spectroscopy and polarimetry; (iii) long-term monitoring, and (iv) postgraduate training. The main instruments include the spectrograph (SpCCD), High-speed Photo Polarimeter (HIPPO), Sutherland High-speed Optical Cameras (SHOC) and Fibre-Fed Echelle spectrograph (GIRAFFE). The Observatory is protected under the AGA Act of 2007 against mainly light and dust pollution.

**Challenges.** The main challenge relates to the emergence of wind energy developments that are required to have lighting on their turbines to address other legislation, the Civil Aviation Act of 1962, which requires that any structure taller than 45m be marked in order to warn incoming aircraft of such structures. A number of these wind energy farms are planned around Sutherland. Hydraulic fracturing in search of shale gas is another possible threat to the clear and air pollution free skies around Sutherland, given that the South African Cabinet has lifted the moratorium on hydraulic fracturing (or fracking), which is seen as a potential source that can address the country's energy demands.