

Data-intensive Astronomy for Teaching and Research in South African Universities

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The Changing Face of South African Observational Astronomy



Optical & NIR Observing Facility-

- Telescopes - SALT (11m), 1.9m, 1.0m, 0.75m, 0.5m, 1.4m(IRSF), 1.0m robotic, 4.0m (in near future)
- International Telescopes - BISON, SuperWASP, MONET, KELT, LCOGT, SOLARIS, KMTNet
- Instruments - SALTICAM, RSS, SpCCD, HIPPO, GIRAFFE, STE4, STE3, UCT CCD, SHOC, SIRIUS

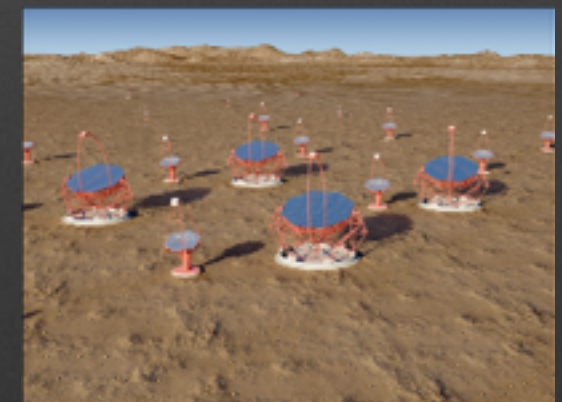
Radio Observing Facilities-

- KAT - 7 dishes
- MeerKat - 64 dishes with baselines of 20 km
- SKA - 3 000 dishes with baselines of 3000 km
- Hartebeesthoek Radio Astronomy Observatory (HartRAO)



South African Gamma-ray Astronomy programme

- High Energy Stereoscopic System (H.E.S.S.) in Namibia
- Cherenkov Telescope Array (CTA)



North-West University, University of the Witwatersrand, University of the Free State and University of Johannesburg.



South African Astro-informatics Alliance (SA³)



SA³ is collaborative initiative-

- South African Astronomical Observatory (SAAO)
- South African Square Kilometre Array (SASKA)
- Hartebeesthoek Radio Observatory (HartRAO)

Team - Lindsay Magnus (SA³ Chairperson, SKA-SA), Patricia Whitelock (SAAO),
Sudhanshu Barway (SAAO)



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Activities

- Data archive system development
 - SALT VO DATA Archive - <http://vodas.salt.ac.za/>
- VO tools development
 - SALT Visibility Calculator Android App
- Astronomical data Mirror
 - ADS - <http://saaoads.chpc.ac.za/>
 - Vizier - <http://viziersaao.chpc.ac.za/viz-bin/VizieR>
- Teaching, education and public outreach

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Teaching, education and public outreach

AstroVARSITY Project

(IAU- OAD - IAU's Office of Astronomy for Development)

Targeting historically black Universities in South Africa

- Maths & Physics lecturers at undergraduate/graduate level
- Provide course and tutorial resources to use astronomy to enhance science teaching
- Start Astronomy module within Maths & Physics department
- Offer hand-on activities and exercise based on Telescope/Instrument/VO package to conduct practical experiments and research by conducting workshops -
 - ★ Astronomy Teaching and Research Orientation Workshop (AsTROW), October 2012
 - ★ University of Zululand (UniZulu), July 2013

Also conduct VO workshops at various places - SAAO, UCT, UKZN, UWC, MEARIM, ISYA.....

Teaching, education and public outreach

- SA³ has started programmes to train students with National Astronomy and Space Science programme (NASSP)
- Student projects/exercises to demonstrate the interesting and latest results astronomy using variety of online data archives and VO tools/applications
- Teaching material for VO -
SDSS, CDS, Aladin, EuroVO Aida/WP5, Chandra Education materials,
Euro VO Scientific Tutorials.....

Teaching, education and public outreach

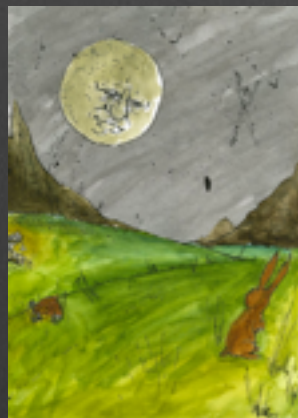
- VO exercises divided into three types -
 - ★ Beginner level - summer/winter schools, workshops
 1. Explore NED, SIMBAD, SDSS & IPAC data archives, Aladin....
 - ★ Intermediate level - lab course for NASSP honours students
 1. X-ray Spectroscopy of Super Nova Remnants using ds9 & Chandra data
 2. Looking for optical counterparts of Xray sources using Aladin
 3. Globular Clusters, Galaxy Clusters, Quasars in SDSS
 4. Classifying the SEDs of Herbig Ae/Be stars using TOPCAT
 5. 15-16 exercises
 - ★ Advance level - small research project (3-4 weeks) for NASSP honours
 - Luminosity dependent star formation history of S0 galaxies in the Virgo cluster*
 - using -
 1. GALEX, SDSS, 2MASS and WISE data archives
 2. Vizier and TOPCAT

*Based on Barway et al. 2013, "Luminosity-dependent star formation history of S0 galaxies: evidence from GALEX-SDSS-2MASS-WISE colours"

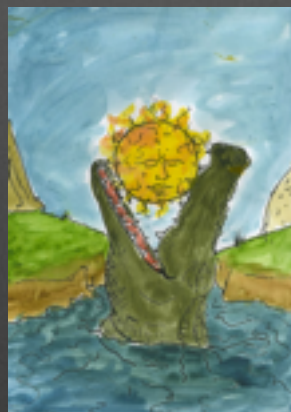
Teaching, education and public outreach

- VO news e-letter - to update SA astronomers about latest developments in field of VO and IT driven astronomy
- Public Outreach activities -
Galaxy Zoo, Google Sky, Microsoft World Wide Telescope (WWT)
- WWT workshop (SAAO-OAD-Microsoft Research)

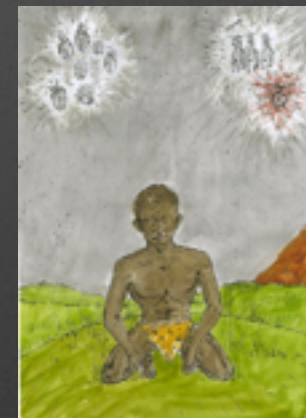
WWT lets users create their own guided tours of the deep sky
WWT tours of Indigenous African Stories



The Moon, The Hare,
The Tortoise



The Crocodile Who
Swallows The Sun



The Hopeless Hunter

WWT Tour - The Hopeless Hunter

Credits - Troshini Naidoo, Veronique Kazie-Ravet, Francois Taljaarad, Temba Matomela
(SAAO, SAASTA, Iziko Musuem, EU-UNAWWE & Stellenbosch University)

The Hopeless Hunter



ORION

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Thank You

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