Facilities available for mineralogical/geochemical/isotopic research at South African universities and research institutes

Compiled by A. Hofmann (ahofmann@uj.ac.za), University of Johannesburg (May 2020)

University departments/labs

NMU – Nelson Mandela University, Centre for HRTEM (https://chrtem.mandela.ac.za/)

RU - Rhodes University (www.ru.ac.za/geology)

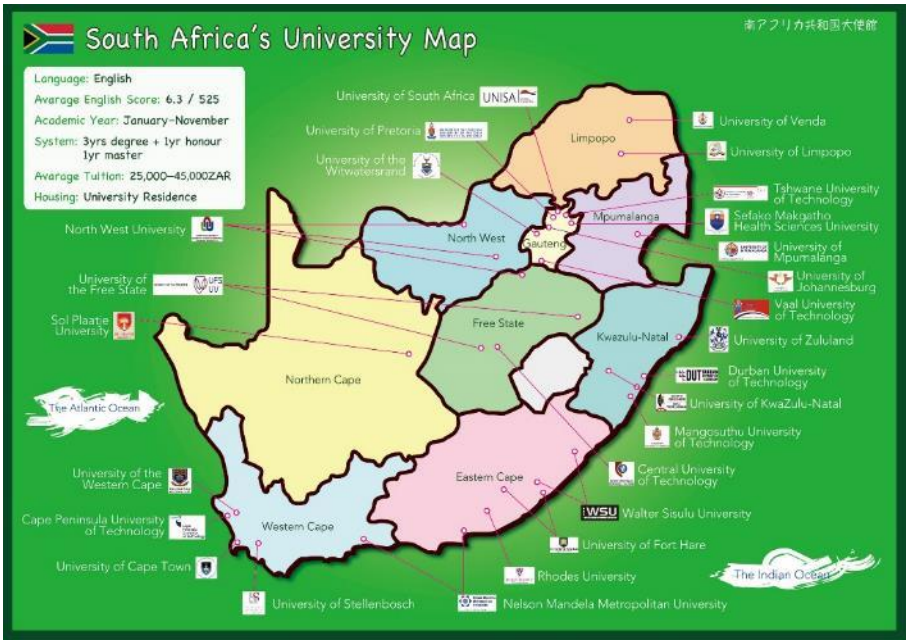
UCT - University of Cape Town (www.geology.uct.ac.za;
www.geology.uct.ac.za/overview/lab/facilities)

UJ - University of Johannesburg (www.uj.ac.za/faculties/science/geology;
www.uj.ac.za/faculties/science/Spectrum)

UP - University of Pretoria (http://www.up.ac.za/en/geology)

SU - Stellenbosch University (www.sun.ac.za/english/faculty/science/earthsciences;
www.sun.ac.za/english/faculty/science/CAF)

Wits – University of the Witwatersrand (www.wits.ac.za/geosciences)



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Research institutes

iThemba LABS - Sommerset West, Johannesburg (https://tlabs.ac.za)

MINTEK - Johannesburg (https://www.mintek.co.za)

Facilities (refer to detail below)

1. Mineral separation (e.g. zircon)
2. XRD (crystallography, mineral identification)
3. XRF, ICP-MS, ICP-OES (major/trace element analysis)
4. Elemental analysis (CHNS)
5. Electron microprobe (in-situ major/trace element analysis)
6. LA-ICP-MS (in-situ trace element analysis, dating)
7. MC-LA-ICP-MS (radiogenic isotope geochemistry, dating)
8. Noble gas MS
9. Gas source IR-MS (stable isotope geochemistry, conventional C, O, H isotopes)
10. Ultra-clean lab (elemental separation for solution isotope analysis by mass spectrometry)
11. SEM-EDS, -WDS, -EBSD,-TKD, -CL (backscatter and secondary electron imaging, element mapping, mineral analysis, CL-imaging)
12. Mineral Liberation Analyser (automated quantitative mineral analysis)
13. TEM
14. FIB-SEM
15. Raman spectroscopy (mineral identification, mapping, fluid inclusions)
16. X-ray tomography (3D scanning and image analysis, reconstruction, modelling & image based simulation)
17. Fluid inclusion lab
18. Palaeomag lab
19. Organic Petrology lab
20. Nuclear microprobe and PIXE (Particle Induced X-ray Emission)
21. Secondary Ion Mass Spectrometry via virtual SIMS facility

Points to note

- Most of the above departments have sample preparation facilities that include the preparation of thin sections and epoxy mounts as well as rock crushing, milling, sawing etc.
- Most labs have different prices depending on internal vs external users. Some labs also offer collaborative rates. Analysis on a collaborative basis expects the submission of a proposal of the work to be undertaken and the publication of the results with the collaborator as a co-author.

- MINTEK has a host of equipment for mineralogical studies available to academia, but at a cost and not for self-use. Equipment includes SEM, EPMA, XRD, XRF, micro-XRF, 3D tomography, LA-ICP-MS, FTIR, MLA, QEMSCAN (Deshenthree Chetty, deshc@mintek.co.za)

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1. **Mineral separation (e.g. zircon)**

UJ (Frantz magnetic and heavy liquid separation; Clarisa Vorster, clarisav@uj.ac.za)

UP (SelFrag, Frantz magnetic separator; Roger Dixon, roger.dixon@up.ac.za)

Wits (Wilfley table, Frantz magnetic and heavy liquid separation: Robert Bolhar, Grant Bybee, robert.bolhar@wits.ac.za, grant.bybee@wits.ac.za)

SU (Frantz magnetic and heavy liquid separation: Mareli Grobbelaar, mgrobbelaar@sun.ac.za)

2. **XRD (crystallography, mineral identification)**

UJ (Panalytical XRD; Willie Oldewage, willieho@uj.ac.za)

UP (Panalytical XRD; Wiebke Gröte, wiebke.grote@up.ac.za)

UCT (Philips XRD; Nicholas Laidler, nicholas.laidler@uct.ac.za)

Some facilities at Department of Geology, UP

3. **XRF, ICP-MS, ICP-OES (major/trace element analysis)**

UJ (PANalytical XRF, Christian Reinke, christianr@fastmail.com; Perkin Elmer NexION 300; Spectro ARCOS; Willie Oldewage, willieho@uj.ac.za)

Wits (PANalytical XRF; Perkin Elmer Elan DRC-e, Thermo iCapQ; Allan Wilson, Grant Bybee, Allan.Wilson@wits.ac.za, grant.bybee@wits.ac.za)

UCT (PANalytical XRF; Thermo-Fisher X-Series II with NewWave UP213; Phil Janney, phil.janney@uct.ac.za)

UP (Thermo Fisher XRF; Jeanette Dykstra jeanette.dykstra@up.ac.za)

SU (PANalytical Axios XRF: Mareli Grobbelaar, mgrobbelaar@sun.ac.za; Thermo iCAP 6200 ICP-OES; Agilent 7900 ICP-MS: Charney Anderson, charney@sun.ac.za; Agilent 8800 QQQ ICP-MS: Riana Rossouw, rrossouw@sun.ac.za)

Perkin Elmer Elan DRC-e ICP-MS (left) and Thermo Element XR (right) at the Earth Lab, Wits University

4. Elemental analysis (CHNS)

SU (Elementar Vario EL Cube Elemental Analyzer: Charney Anderson, charney@sun.ac.za)

5. Electron microprobe (in-situ major/trace element analysis)

UJ (Cameca SX-100; Christian Reinke, christianr@fastmail.com)

RU (JEOL JXA-8230; Deon van Niekerk, epma@ru.ac.za; Steffen Buettner, s.buettner@ru.ac.za)

UCT (JEOL JXA 8100; Nicholas Laidler, nicholas.laidler@uct.ac.za)

UP (Cameca SX-100; Roger Dixon, roger.dixon@up.ac.za)

6. LA-ICP-MS (in-situ trace element analysis, dating)

SU (RESOlution LR-M50 and SE-S155 excimer lasers; Agilent 7700 ICP-MS, Agilent 8800 QQQ ICP-MS; Thermo Element 2 SF SC ICP-MS Scientific E2 SF; Resonetics SE excimer laser; trace element analysis: Riana Rossouw, rrossouw@sun.ac.za; U-(Th)-Pb dating: Riana Rossouw, rrossouw@sun.ac.za)

Wits (Thermo Scientific Element XR single collector ICPMS coupled with ASI Resolution SE-155 excimer laser; Robert Bolhar, robert.bolhar@wits.ac.za)

UCT (Thermo-Fisher X-Series II; New Wave UP213 laser; Phil Janney, phil.janney@uct.ac.za)

UJ (Thermo-Fischer iCap ICP-MS; ASI RESOLUTION laser; New Wave UP213 laser; Clarisa Vorster, clarisav@uj.ac.za or Marlina Elburg, marlinae@uj.ac.za)

LA-ICP-MS lab at SU

7. MC-LA-ICP-MS (radiogenic isotope geochemistry, dating)

UJ (NuPlasma HR MS with ASI RESOlution excimer laser with S155 sample cell; Marlina Elburg, marlinae@uj.ac.za)

UCT (NuPlasma HR MS with ASI RESOlution excimer laser with S155 sample cell; Petrus le Roux, petrus.leroux@uct.ac.za)

MC-LA-ICP-MS facility at UJ (left) and UCT (right)

8. Noble gas MS

UJ (MAP 215-50 with Nd:YAG lasers for Ar-Ar dating; Jan Kramers, jkramers@uj.ac.za)

9. Gas source IR-MS (stable isotope geochemistry, conventional C, O, H isotopes)

UCT (O-isotopes in silicates by laser and conventional fluorination; H and O by Picarro and IRMS, C and O in carbonates, H in silicates; Access to DeltaXP and Velta dual-inlet mass spectrometers; Chris Harris, chris.harris@uct.ac.za)

iThemba LABS, Johannesburg (Thermo Delta V; Mike Butler, butler@tlabs.ac.za)

10. Ultra-clean lab (elemental separation for solution isotope analysis by mass spectrometry)

Wits (Wits Isotope Geoscience Lab; capabilities include isotope dilution and chemical separation of Rb-Sr, Sm-Nd, Lu-Hf, U-Pb, Fe-Cu-Zn, Ca-Sr, Al-Be; Grant Bybee, grant.bybee@wits.ac.za)

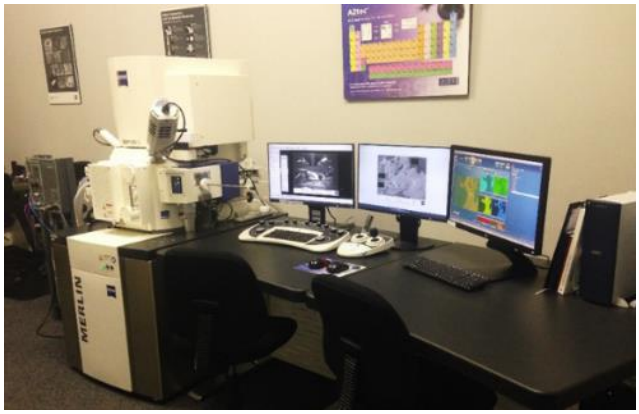
UCT (Petrus le Roux, petrus.leroux@uct.ac.za)

11. **SEM-EDS, -WDS, -EBSD,-TKD, -CL (backscatter and secondary electron imaging, element mapping, mineral analysis, CL-imaging)**

SU (Zeiss MERLIN FESEM, Zeiss EVO SEM, Zeiss LEO VP-SEM; Madelaine Frazenburg mrfsem@sun.ac.za)

UJ (Tescan SEM; Willie Oldewage, willieho@uj.ac.za)

NMU (JEOL 7001F SEM + Oxford (Aztec) EDS and WDS + Oxford HKL EBSD and TKD; Mike Lee, Michael.Lee@mandela.ac.za)



MERLIN nano-FEG SEM with EDS at SU

12. **Mineral Liberation Analyser (automated quantitative mineral analysis)**

UJ (FEI XL40 ESEM; Fanus Viljoen, fanusv@uj.ac.za)

Wits (Automated Mineralogy Lab; TESCAN TIMA; Nonkusela Madlakana, nonkuselo.madlakana@wits.ac.za)

13. **TEM**

UJ (JEM-2100; Willie Oldewage, willieho@uj.ac.za)

NMU (JEOL JEM 2100 + Gatan EELS + Oxford EDS and JEOL ARM200F + Gatan EELS + Oxford EDS; Mike Lee, Michael.Lee@mandela.ac.za)

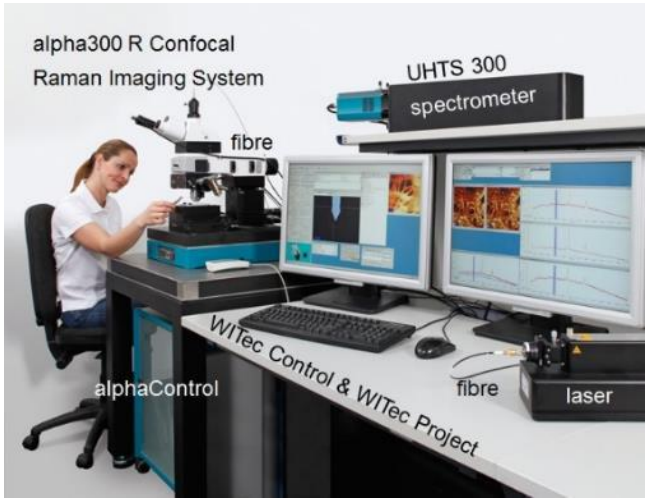
14. **FIB-SEM**

NMU (FEI Helios Nanolab 650 FIBSEM, site specific sampling applications for TEM nanoanalysis; Mike Lee, Michael.Lee@mandela.ac.za)

15. **Raman spectroscopy (mineral identification, mapping, fluid inclusions)**

UJ (WITec alpha300 R; Axel Hofmann, ahofmann@uj.ac.za)

NMU (Bruker FTIR/Raman; N Hashe, Nobom.Hashe@mandela.ac.za)

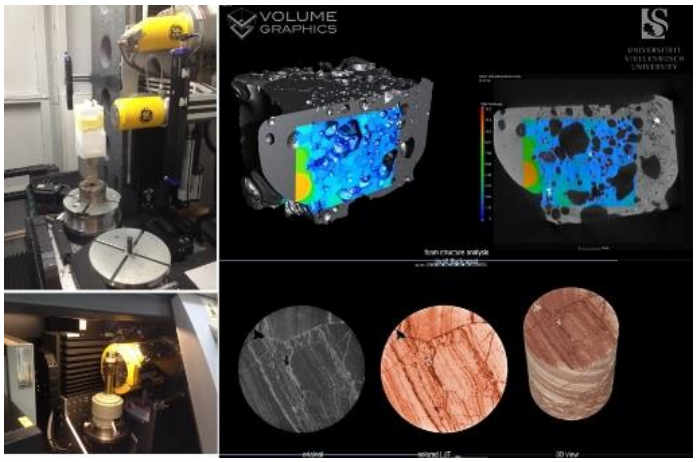


WITec alpha300 R confocal Raman imaging system

16. X-ray tomography (3D scanning and image analysis, reconstruction, modelling & image based simulation)

SU (micro and nano CT, Anton Du Plessis, anton2@sun.ac.za; www.sun.ac.za/ctscanner)

(Also available at NECSAR)



Micro and nano CT facility at SU

17. Fluid inclusion lab

UCT (Linkam THMSG600; no operator currently)

UJ (Linkam THMSG600; no operator currently)

Wits (Linkham THMSG600; Nonkuselo Madlakana, nonkuselo.madlakana@wits.ac.za)

18. Palaeomag lab

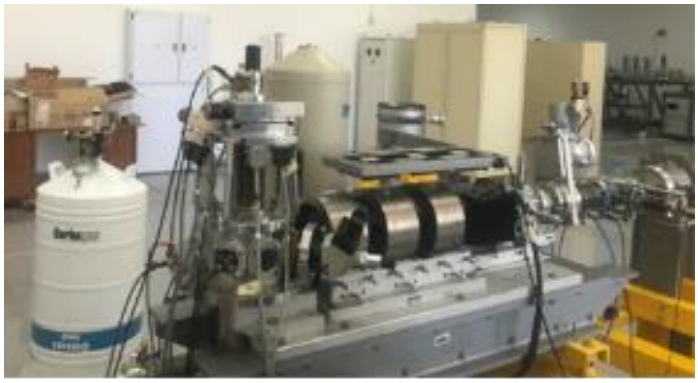
UJ (SQUID; Michiel de Kock, mdekock@uj.ac.za)

19. Organic Petrology lab

UJ (Zeiss AxioImager; Nikki Wagner, nwagner@uj.ac.za)

20. Nuclear microprobe and PIXE (Particle Induced X-ray Emission)

iThemba LABS (Somerset West; Mlungisi Nkosi, mlungisin@tlabs.ac.za)



Multi-elemental microanalysis and mapping of elements from Na to U using PIXE at iThemba LABS, Somerset West

21. Secondary Ion Mass Spectrometry (isotope geochemistry, dating, trace element analysis, depth profiling, element distribution maps) via virtual SIMS facility

Wits (virtual usage of Potsdam CAMECA 1280-HR; Sarah Glynn, Sarah.Glynn@wits.ac.za)

SIMS at GFZ Potsdam