

Job Description: Senior Researcher in Earth and Mars atmospheric retrievals

Revised 8 June 2021

General Information	
Job Title:	Senior Researcher in Earth and Mars atmospheric retrievals
Department:	National Space Science and Technology Center
Division:	National Space Science and Technology Center
Location:	UAE University, Al Ain, United Arab Emirates
Type:	Full time
Closing date:	The position will remain open until filled.
Length of position:	Three years in the first instance, with the possibility of renewal. The employment contract is renewed on a 1-year rolling basis.
Contact:	Dr Roland Young (roland.young@uaeu.ac.ae)

Direct Supervisor's Job Title:
<ul style="list-style-type: none"> ▪ Director of the National Space Science and Technology Center

Subordinate's Job Title(s):
<ul style="list-style-type: none"> ▪ The Senior Researcher will be responsible for day-to-day supervision of a Postdoctoral Fellow working on the same project.

Overall Objective of the Job
<p>The National Space Science and Technology Center (NSSTC) at the United Arab Emirates University (UAEU) in Al Ain, UAE invites applications for a Senior Researcher in Earth and Mars atmospheric retrievals. The anticipated start date is as soon as possible but is likely to be sometime during Fall 2021.</p> <p>The UAE is developing a research base in space science, and the main goal of this position is to build expertise within the UAE in the area of planetary atmospheric retrievals. This will maximise the scientific return from the Emirates Mars Mission, prepare Emirati researchers for future space missions, and familiarise them with the tools and principles used in atmospheric remote sensing. This will require training research assistants, students, and postdoctoral researchers. The project also aims to enhance the international status of the UAE within the Mars research community</p>

Overall Objective of the Job

by dissemination of this work via conferences, high-quality journal articles, and datasets.

The Emirates Mars Mission (EMM, <https://www.mbrsc.ae/emirates-mars-mission>) reached Mars in February 2021 to study the influence of Mars' climate and lower atmosphere on the escape of hydrogen and oxygen from its upper atmosphere, what atmospheric processes drive diurnal variations, and how energy is transferred from the lower-middle atmosphere to the upper atmosphere.

We are looking for an experienced scientist with demonstrated expertise and experience in ultraviolet/visible/infrared and thermal infrared/microwave atmospheric retrievals from passive remote sensing instruments. They will develop the following program within the existing Planetary Science and Earth Observation groups at NSSTC. This will involve software development, retrieval product generation, student training, and scientific analysis. There are three major aspects to the position:

1. Develop algorithms to convert EMM L2 data (calibrated spectra) into L3 data (atmospheric quantities). This will use EMM's publicly available dataset. L3 data will already be produced by the EMM team, so the point of this work is to build expertise among Emirati students and researchers in the methods and mathematical principles of atmospheric retrievals, radiative transfer modelling, and scientific programming, by involving them at all stages of the process.
2. Build a research program studying certain aspects of the lower Martian atmosphere based on these data products, involving students and junior researchers.
3. Contribute to NSSTC's operational Earth Observation objectives where atmospheric retrievals are required.

The "Tasks and Responsibilities" section below lists the specific tasks that the Senior Researcher will be expected to lead with respect to EMM data analysis. We are also recruiting a Postdoctoral Fellow who will assist with these tasks, and the Senior Researcher will supervise their work.

A short research proposal should be included with the application that describes a research program that the Senior Researcher will develop related to items (2) and (3) above. We anticipate the Senior Researcher applying for their own funding to expand their research program, and supervising additional research assistants, students, and postdoctoral researchers in due course.

The National Space Science and Technology Center, Al Ain

NSSTC is a research and development institute of some 50 staff located on the UAEU campus in Al Ain, about 90 minutes' drive from Abu Dhabi and Dubai. UAEU is the largest and highest-ranked public university in the UAE.

Overall Objective of the Job

The Center was established jointly by UAEU, the UAE Space Agency, and the UAE Telecommunications Regulatory Authority (ICT-Fund), motivated by UAEU's desire to strengthen its role in and contribute to the needs of the nation in Space Science and Space Technology, and to become a Space Science and Technology hub for the region. NSSTC focuses on research and development, higher education, and community outreach. The Center's priorities are three-fold: excellence in Space Science, leadership in Space Technology, and providing innovative solutions to a broad spectrum of societal challenges.

Recently completed at UAEU is NSSTC's Assembly, Integration, and Testing facility for satellites up to 250 kg, which will also support UAEU students' CubeSat projects with the capability of building multiple satellites at a time. The facility includes a cleanroom, thermal vacuum chamber, vibration system, anechoic chamber, ground station, and mission control room. The Center's other upcoming facilities include Global Navigation Satellite System and Propulsion laboratories, a Radio-Array Observatory for Astronomy, Space Situational Awareness and multidisciplinary space science research, and NSSTC's research staff also have access to UAEU's High-Performance Computing cluster.

NSSTC has expertise in spacecraft communications and precision positioning, on-board real-time systems, space situational awareness, global navigation systems, space resource utilization, Geospatial Information System, Earth Observation, and Planetary Science. The Planetary Science Group currently includes two faculty, one senior researcher, two research assistants, and several MSc students. Alongside Mars, its members have expertise in modelling giant planet atmospheres, geophysical fluid dynamics laboratory experiments, visible and radar remote sensing, and small satellite spacecraft. The group members have ongoing collaborations with the EMM Science Team, Oxford University, the Laboratoire de Météorologie Dynamique (LMD), the Space Science Institute, the ExoMars Trace Gas Orbiter ACS instrument team, and Aeolis Research.

Application instructions

To apply, please submit the following via UAE University's jobs portal at <https://jobs.uaeu.ac.ae/>:

- (1) Cover letter
- (2) CV
- (3) Short proposal (3 pages maximum including references)
- (4) Publications list
- (5) Copies of three recent research papers
- (6) Contact details of three professional references

Tasks and Responsibilities

The research will use EMM's publicly-available datasets from the EMIRS (thermal infrared spectrometer) and EXI (visible/UV camera) instruments. Existing datasets from other spacecraft can also be used, as required. The successful candidate is expected to:

Tasks and Responsibilities

- Develop open source tools for data reading and handling, data archiving and user access, data analysis, and visualization, that will support and validate L3 data from EMM
- Develop open source tools to validate EMM data against other mission data
- Train and build the capabilities and skills of local researchers, academics, and students associated with EMM in various capacities, including them in all stages of the process.
- Build a sequential software pipeline that will continuously produce EMM L3 data products and archive them locally
- Conduct independent Mars atmospheric research based on EMM data products
- Contribute to NSSTC's operational Earth Observation objectives where atmospheric retrievals are required, including project management as necessary.
- Develop internal and external collaborations to meet the goals of the research program.
- Publish research work in the open scientific literature.
- Present research work to a variety of audiences within the University, the UAE, and at international conferences.
- Supervise research assistants, postdoctoral researchers, and research students.
- Apply for funding to grow the research program.
- Contribute to NSSTC capacity building, outreach events, and other community services.
- Take part in NSSTC research group and business meetings.
- Represent NSSTC and UAE University within the UAE and internationally.

This is not intended to be an exhaustive list of tasks and responsibilities and will be subject to periodic review by NSSTC.

Organizational Relationships & Communications

Internal Communications:

- NSSTC Planetary Science Group
- NSSTC Earth Observation Group
- NSSTC Earth and Planetary Science Unit
- UAEU Department of Geography and Urban Sustainability
- UAEU Department of Physics

External Communications:

- National and international project partners

Job Requirements

Educational Level/ Required Certificates:

- Undergraduate degree in Physics, Mathematics, Physical Earth Science, Engineering, Computer/Data Science, Astronomy, or a related subject.

- PhD degree in Physics, Atmospheric Science / Retrievals, Planetary Science, Meteorology, Physical Earth Science, Computer/Data Science, Astronomy, or a closely related field.

Experience:

Essential:

- Several years' experience in a relevant area post Ph.D.
- Experience in atmospheric remote sensing (Earth or other planets), including data processing, analysis, and interpretation, and related scientific programming
- Proven expertise in atmospheric retrievals methods and mathematical principles, and radiative transfer modelling
- A strong track record of published work in a relevant field.
- Experience presenting your work at national and international conferences.
- Experience supervising research staff or students.

Desirable:

- Experience on one or more spacecraft mission science teams.
- Proven ability to attract research funding.
- Experience leading research projects.

Recommended Training Courses:

- None

Required Knowledge, Skills, and Competencies

- Have excellent communication skills in English, both verbal and written.
- Expertise in software tools for planetary data processing, analysis, and visualisation.
- Expertise in scientific programming codes (e.g. Fortran, Python, IDL) used in the field.
- A strong desire to contribute to cutting edge research on Earth and Mars.
- Self-motivated with the ability to work independently on a research project.
- The ability to lead and work within a team.
- Ability to write high-quality research papers and grant proposals.
- Ability to accomplish goals within expected timelines.
- Willingness to travel overseas when necessary.