



# JOB OFFER

BIRA-IASB is opening a:

## PhD scholarship in Atmospheric Chemistry Modelling Research

Deadline for applications: October 1<sup>st</sup>, 2022  
Start date: Fall 2022

### Assignment, division & context

Within BIRA-IASB, the Stratospheric Modelling Team is studying on the composition of the stratosphere and the impact of climate change on the middle atmosphere circulation. The team also produces near real time analysis of the stratospheric composition using the Belgian Assimilation System for Chemical Observations (BASCOE). More details about our activities at <http://strato.aeronomie.be>.

### Aim(s) of the research

The middle atmosphere is the region that goes from the upper troposphere (around 15 km of altitude) to the thermosphere (up to 100 km) which includes the stratosphere (between 15 to 55 km) and the mesosphere (between 55 to 90 km). This region contains the stratospheric "ozone layer" which absorbs a large portion of the solar ultra violet radiation and balance the thermal energy of the Earth atmosphere. Stratospheric ozone is thus an essential component of the Earth system. With anthropogenic emissions of greenhouse gases, the thermal balance of the Earth atmosphere is modified by changing the middle atmospheric wind circulation and the response of the ozone layer remain unclear.

The strength of the middle atmospheric wind circulation is usually measured by the age-of-air (AoA). The AoA is an evaluation of the time necessary for an air parcel to propagate from the troposphere to a given stratospheric location. AoA can be estimated by atmospheric model simulations and by observations of long-lived tracers emitted at the Earth surface. Currently, models and observations disagree: while models predict an acceleration of the middle atmospheric circulation (i.e. the AoA becoming younger), observations do not show any significant trend of AoA

### More about BIRA-IASB

The Royal Belgian Institute for Space Aeronomy (BIRA-IASB) is a Belgian Federal Scientific Institute. Since its founding in 1964, BIRA-IASB has been conducting research and providing public services in space aeronomy, i.e. the physics and chemistry of Earth's atmosphere and other planets, and outer space. The research performed at BIRA-IASB addresses issues of societal interest such as atmospheric composition changes and their link with climate.

For more information on the institute and its activities, visit our website [www.aeronomie.be](http://www.aeronomie.be)

since 1980. However, observations and models have limitations. Observations are limited to balloon profiles of SF<sub>6</sub> and CO<sub>2</sub> which are subject to large error bars (Engel et al., ACP, 2017). Models, on the other hand display a large spread in their AoA (SPARC 2021).

In this context, **we offer a scholarship contract to make a PhD** to conduct model and data assimilation studies in order to improve our understanding on the disagreement between observations and models. This will be done using the BASCOE system as well as observations from satellite and balloon instruments. To do this, **we are looking for a scientist holding a recent Master degree in Sciences or Engineering, for a duration of four years (with annual evaluation), starting from in Fall 2022.**

The successful candidate will be in charge of the

- Update of BASCOE model by including the chemistry of SF<sub>6</sub> and other long-lived tracers
- Conduct multidecadal BASCOE model simulations and comparison with independent observations
- Assimilate long-lived tracer observations and derived AoA from the analysis
- Share his research results through scientific publications, communications to workshops and international congresses
- Write a PhD thesis

The PhD will be conducted at BIRA-IASB and co-supervised by Quentin Errera (BIRA-IASB) and Emmanuel Mahieu (University of Liège).

## Qualifications

- A recent Master (less than 3 years) in Sciences or Engineering
- Having followed lectures in atmospheric science is a strong asset
- Strong motivation, initiative, scientific curiosity and team spirit
- Excellent communication skills (reading, writing, oral)
- Good sense for organization, timeliness
- Programming background in Fortran, Python and Bash
- Good level in oral and written English, knowledge of Dutch and/or French would be an asset

## We offer

- A PhD scholarship contract of four years with annual evaluation
- Pleasant working atmosphere in a scientific environment located in a green setting
- Full refund of commuting expenses when using public transportation, compensation when using the bicycle
- Possibility of training (to be followed during working hours)
- Access to special advantages arranged for the employees of the federal scientific institutions : museum card, hospitalization insurance, reductions via the Fed + card, etc



## Interested?

Send your application (CV and cover letter) to:  
[hr-ae@aeronomie.be](mailto:hr-ae@aeronomie.be) with [quentin.errera@aeronomie.be](mailto:quentin.errera@aeronomie.be) in copy  
with the reference "D33\_STRATO AoA" before October 1<sup>st</sup>, 2022