

# **Cooperation between the Royal Belgian Institute for Space Aeronomy (BIRA-IASB), and the Indian Institute of Science Education and Research Kolkata (IISER Kolkata)**

## **COOPERATION AGREEMENT**

### **PREAMBLE**

BIRA-IASB and IISER Kolkata wish to enter in a cooperation for the installation of (a) spectrometer(s) at the campus of IISER Kolkata for the observation of the atmosphere above the location. Both institutes agreed to start this cooperation through the signature of a Memorandum of Understanding. University of Bremen (UBremen) will be a collaborating partner.

The Parties agree to start the cooperation with the signing of this MoU and for a duration of three years. The Parties celebrate this new Cooperation Agreement, according to the valid legal rules, through the following clauses and conditions:

### **MEMORY OF UNDERSTANDING**

The Parties:

The Royal Belgian Institute for Space Aeronomy or BIRA-IASB, located at Ringlaan 3, 1180 Brussels, Belgium, Represented by Prof. Dr. Martine De Mazière, Director general a.i.,

And the

Indian Institute of Science Education and Research Kolkata or IISER Kolkata, located at Mohanpur, Nadia – 741 246, West Bengal, India;  
Represented by Prof. Dr. Saurav Pal, Director

agree to establish a scientific collaboration in the field of atmospheric chemistry and physics research, and more particularly in the field of carbon cycle and climate research.

#### **Clause 1**

The essential objective of this cooperation is to perform column-averaged abundances of methane, carbon monoxide and carbon dioxide at a site located close to Kolkata, India (22°57'50" N, 88°31'28" E).

Therefore BIRA-IASB will deploy a ground-based low-resolution Fourier transform infrared (FTIR) spectrometer of the type Bruker Vertex70 in the campus of the Indian Institute of Science Education and Research Kolkata (IISER Kolkata). BIRA-IASB will take the responsibility of the deployment of the spectrometer, which belongs to BIRA-IASB and UBremen; the infrastructure for the installation (refer to clause 3 for infrastructure) will be the responsibility of IISER Kolkata.

The deployment of the instrument for the campaign 'SVANTE' (Sentinel 5p Validation and Calibration Experiment) supported by ESA is planned to be middle of 2021 or end of 2021 but this may be further delayed due to the current COVID-19 situations causing delays in the

preparation and transport of the instrument, as well as travel restrictions and associated delays in the installation. The measurements are planned to be performed for one year. After the end of the measurements campaign, nominally end of 2021 – early 2022, the instrument will be shipped back to BIRA-IASB, unless this collaboration is extended (see Clause 4).

## **Clause 2**

This partnership enables that the scientific data obtained from the measurements will be shared between the IISER Kolkata, UBremen and BIRA-IASB, with BIRA-IASB being the owner, and that each Party as well as UBremen (the latter already having an agreement with BIRA-IASB, vide Annex A) have the right to carry out scientific research using the data. A mutual agreement is required to disseminate the data obtained at IISER Kolkata. The co-authorship of any scientific publications and presentations/ communication using the data will require the agreement by BIRA-IASB, IISER Kolkata and UBremen. The memorandum is signed and executed with a view to inclusive growth by joint collaboration in academic and scientific research having no commercial implication.

BIRA-IASB commits itself to provide training for operating the Vertex70 and for the data acquisition, on a best effort basis.

## **Clause 3: Financing, responsibilities and conditions**

The complete costs of importing, installing, running the experiment, maintaining the instrument hardware and software during its stay at IISER Kolkata, and the costs of the liquid nitrogen will be borne by BIRA-IASB. The costs for any possible adaptation and maintenance of the laboratory infrastructure, electricity and internet access will be carried by IISER Kolkata.

A scientist and a PhD student from IISER Kolkata will be direct collaborators in the project who are hence-forth called as local manpower. IISER Kolkata will provide the local manpower to monitor the instrument's operation and to carry out some basic maintenance actions like the replacement of the sun tracker mirrors upon degradation caused by the environmental conditions. The local manpower will be trained as per the requirement to manage and maintain the instrumentation at IISERK. The local manpower will fill the liquid nitrogen dewar, for cooling the InSb detector, depending on the need (every 2 - 3 weeks). IISER Kolkata will provide laboratory space for the deployment of the instrument (1 m x 0.5 m) and space on rooftop (3 m x 3 m) for the installation of a small meteo station and the solar tracker. The provided space should be viable to make a hole in the roof of approximately 25 cm diameter for passing the sunlight through it via a tube, as well as a small hole to pass the connections and cables. The costs for hole will be borne by BIRA-IASB. IISER Kolkata will provide electricity, and internet connection, of sufficient power to operate the instrument and its accessories (meteo station, suntracker, spectrometer and commanding PC). The costs for air conditioning will be borne by BIRA-IASB. The operation of the instrument when required will be performed by manpower of IISERK under the remote guidance and surveillance of the BIRA-IASB.

BIRA-IASB in cooperation with UBremen will collect and process the spectra and ancillary data to retrieve column-averaged abundances of methane, carbon monoxide and carbon dioxide. These data will be used for scientific research and the validation of the TROPOMI level-2 products.

The measurements will be fully automated with the possibility of remote intervention by BIRA-IASB scientists or manual intervention by local scientists if needed. The local scientist in charge will support technical interventions in case of problems which can be solved with remote guidance from experts at BIRA-IASB. If a technical failure of the Vertex70 happens that cannot be solved remotely, then a BIRA-IASB or UBremen employee will travel there on their own resources to solve the problem.

BIRA-IASB will be responsible for the insurance of the equipment. Neither BIRA-IASB nor the University of Bremen will carry any responsibility for any accident that may arise during the operation or any manipulation of the instrument by IISER Kolkata personnel. In case degradation or failure of the instrument due to mishandling by the local manpower without the knowledge or intimation to BIRA-IASB causes repair costs, these costs will be charged to IISER Kolkata.

Unless otherwise notified in writing from one Party to the other, this cooperation will be carried out under the responsibility of Prof. Dr. Martine De Mazière (BIRA-IASB) and Prof. Dr. Sourav Pal (IISER Kolkata). The collaborators at UBremen are Prof. J. Notholt and Dr. T. Warneke.

#### Clause 4: Timing; termination

This Cooperation Agreement becomes effective from the time of signature. Nominally, this Cooperation will be valid until 3 years after its signature by all Parties, but it is understood that the collaboration can be continued if agreed by all Parties.

Any Party may cancel the cooperation when another Party has not complied with its responsibilities, doing so with 6 (six) months' notice.

#### Clause 5

The Parties agree to exhaust every means to amicably settle their disputes in case any controversy or doubt arises through this cooperation agreement. They shall resort preferably to the use of direct settlement mechanisms of disputes, or to a Belgian tribunal for settlement.


Signed in three copies in Brussels and Kolkata.

**Martine De  
Mazière  
(Signature)**

Digitally signed by Martine De Mazière (Signature)  
DN: c=BE, cn=Martine De Mazière (Signature), sn=De Mazière, givenName=Martine Maria, serialNumber=60022534483  
Date: 2021.07.07 18:37:00 +02'00'

For BIRA-IASB

Uccle, July 7, 2021  
M. De Mazière  
Director general a.i.



For IISER Kolkata

Kolkata, 01/07/2021  
Prof. Dr. Sourav Pal, Director

**Prof. Sourav Pal**  
निदेशक - Director

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान कोलकाता  
Indian Institute of Science Education and Research Kolkata  
(Under Ministry of Education, Govt. of India)  
मोहनपुर/Mohanpur -741246, पश्चिम बंगाल/West Bengal



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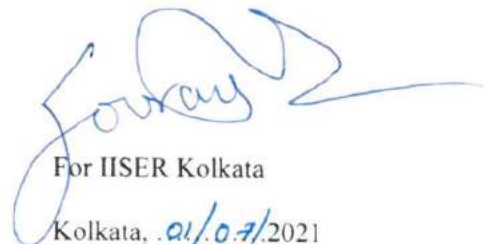
Signed in three copies in Brussels and Kolkata.

Martine De  
Mazière  
(Signature)

Digitally signed by Martine De Mazière  
(Signature)  
DN: c=BE, cn=Martine De Mazière  
(Signature), sn=De Mazière,  
givenName=Martine Maria,  
serialNumber=6022534483  
Date: 2021.07.07 18:36:17 +0200

For BIRA-IASB

Uccle, July 7, 2021  
M. De Mazière  
Director general a.i.



For IISER Kolkata

Kolkata, 01/07/2021  
Prof. Dr. Sourav Pal, Director

Prof. Sourav Pal

निदेशक Director

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