

Invitation to participate in NERC IOF “Demonstration Activity” at Bachok, Malaysia in January/February 2014

This is a follow-up from the meeting at St. Catherines College, Cambridge, 4th October 2012 on the NERC IOF project “International Collaboration on Measurement of Globally-important Gases in the Atmosphere of the Tropical Maritime Continent”.

Related documents and photos are in the Dropbox folder called “Bachok”. Contact Bill Sturges if you have not yet been granted access and need it.

A list of measurements suggested by the NCAS community is given in Table 1.

We urgently need to assemble a list of those wishing to commit instruments and personnel to the campaign in January 2014. We can pay basic travel and accommodation costs for three or four additional UK NCAS personnel to attend the campaign. These will be in addition to UEA and Cambridge and University of Malaya/Institute of Ocean and Earth Sciences (UM/IOES) personnel.

We may be able to assist to a limited extent with some running costs (e.g. standard carrier gases). Please let us know your requirements.

We will have a planning meeting at UEA in the autumn for UK NCAS participants.

In the meantime please can you list the following **no later than the end of July**:

1. Weight and approximate dimensions of equipment to be shipped
2. Gases that you would prefer to source in Malaysia (type, grade and quantity)
3. Bench or floor space needed
4. Power consumption
5. Any special requirements for locating or operating
6. Staff who will attend the campaign (including short term visitors)

Some notes follow below.

Campaign dates

Shipment from UK: freight to be at UEA by **9th November** (to be confirmed)

Science teams on site for Monday 13th January (set up week)

Measurements begin Sunday 19th January (n.b. weekend locally is Friday/Saturday)

Measurements end Sunday 9th February

Week beginning Monday 10th February for overrun/ packing

Return shipment leaves Malaysia Sunday 16th February

Equipment shipping

There will be a single combined (possibly a sea container) shipment from the UK to Malaysia in October paid for by the project, with equipment arriving back in the UK in late March/early April 2014. Alternative arrangements or air freight will be at the expense of individual institutes.

Power outages

These occur frequently. A generator will be available on site, with automatic (or more likely manual) change-over. **UPSs will be required for all instruments** (not provided).

Security

The station is fenced and gated and has guards on duty 24/7. Thefts from vehicles are a concern in the nearby capital of Kota Bharu, so leave nothing of value in cars, but otherwise it is a very safe and friendly environment.

Accommodation (see photos on Dropbox)

Options include:

Male and female temporary dormitories at the station. Just bunk beds and lockers. Spartan but spotlessly clean and good air con. Nice views out to sea. Cold water only in showers, but this is the tropics. Wi-fi. No charge for accommodation.

Guest house. 5 min by car, 15 minute walk (but not suitable for walking after dark). Three bedrooms but only one with air con. Probably more ideal for short-term visitors. No wi-fi (buy cheap mobile internet instead). No charge.

Sudara Beach Resort. Typical Malaysian family beach resort. Newly built motel-style units and older funkier chalets with verandas and sea views. 10/15 minutes by car. £25 - £35 pppn including breakfast. Recommended option.

There are bigger western-style hotels in Kota Bharu, but traffic can make this a long commute.

Vehicles

IOES, our hosts, will provide vehicles. The project will rent more if needed. Daily runs between Sudara and the Station.

Facilities at the Station

Very spacious and pleasant environment. Large meeting rooms, smaller offices, labs, etc. Wi-fi and wired LAN throughout.

Weather

This is late winter monsoon, but in transition. Should be considerably drier than mid-monsoon in December, but expect heavy downpours and strong winds. This may be taxing on instruments and humans. Daytime average high 30°C, nighttime lows 24°C, high humidity.

Instrument locations

Tower

Most instruments will be located in lab at top of the tower. Has air con, ample power and multiple LAN lines. Concrete stairs. NO LIFT.

There is a walk-up to a flat instrument roof for inlets and instruments that need to be outdoors. There is further open ground with power receptacles at ground level below the tower.

Access to the tower is by a concrete staircase. Heavier equipment can be hoisted on an electric winch in the centre of the tower. This is not allowed for compressed gas cylinders. Provision will be made to locate pressurised gases at the base of the tower; location is semi-sheltered but will still get wet in blowing rain. It will require a 20 m long gas line up to the lab on the tower (let us know your requirements).

Main building

A 3rd floor lab has been identified for larger instruments or for overflow from tower lab (see photos). This will require stringing an inlet line from the tower roof across to the lab. This will require something in the order of 80 m of air inlet line. The lab itself is very large, with air con and ample power and LAN sockets. Let us know if this would not be suitable for your measurements. NO LIFT! Not suitable for heavy equipment or large gas cylinders.

Central server

The tower and the rest of the site are LAN connected to a central server in the same 3rd floor lab.

Inlet lines

Inlet lines can be easily run through roof ports from the tower lab, and from there up the 6m wind-up mast. Allow about 12 - 15 m of inlet tubing in total.

Water control is a major problem. The humidity is very high and the lab is air conditioned, so at high flow rates expect the lines to begin filling up with water. Recommend limiting inlet flow rates where possible, and bring catch-pots or other bulk water collectors. Can seem to get away with flows of a few hundred ml/min just using a coil of several loop of inlet line inside the room to catch droplets.

Inlets (and other probes) can be positioned on the wind-up mast (see photos). Rain shields and insects screens recommended.

Power outlets

Standard UK-type plugs inside. Same UK-sockets but in waterproof enclosures on the roof. A single 15A standard outlet is available at ground level in a sheltered area at the base of the tower.

Local support

We will be ably supported by a number of UM/IOES staff, including permanent station staff, as well as scientists and graduate student from the Kuala Lumpur campus. Expect quite a crowd of willing and friendly faces!

Training and Knowledge Exchange

The IOF project's stated primary goal is networking, capacity building, and development of international linkages, more than it is research (although we naturally hope to achieve the latter as well). Consequently we hope to encourage young Malaysian students and scientists to take an active interest in our measurements. Hopefully we can pair some of these with individual investigators to 'ghost' their work, and we will also try to schedule some training and educational events. Data might possibly be requested for undergraduate or graduate projects at UM. There may be some sort of open day event or workshop/mini-seminar during or at the end of the campaign either at Bachok or in KL.

Instrumentation

(UM = University of Malaya; UEA = University of East Anglia; UCamb = Cambridge University; York = York University; Leeds = Leeds University; UKM = National University of Malaysia; MMD = Malaysian Meteorology Department; NIWA = National Institute of Water and Atmospheric Research/Boedecker Scientific (New Zealand); CSIRO = Commonwealth Scientific and Industrial Research Organisation (Australia))

UCamb microDIRAC for halocarbons

UCamb Geotech AQMesh chemical sensor array (NO, NO₂, O₃, CO, SO₂)

UM ozone

UM sonic anemometer

UM AWS

UM Los Gatos CO₂/CH₄/H₂O

UM/MMD radiosonde flights from Bachok

UEA/York TA3000 CO H₂

UEA SO₂

UEA NO, NO_x

UEA ozone

UEA formaldehyde

UEA PTRMS VOCs/OVOCs

UEA whole air sampler for halocarbons

York GC-FID VOCs/OVOCs

York low volume filter collection

Leeds spectral radiometer (J(O₃), J(NO₂), etc.)

UKM Grimm aerosol analyser

NIWA/Boedeker MAX-DOAS for halogen oxides

CSIRO flask sampling for CO₂, δ¹³CO₂, CH₄, H₂, N₂O

MMD rain water sampling for acidity and major ions

Full met data will also be available from the MMD Kota Bharu met station (about 30 km away)

Please see the report of the St Catherine's meeting for other instruments that have been proposed for use during the campaign

Radiosondes

Personnel from the Malaysian Meteorology Department at Kota Bharu will come to Bachok to assist with flying radiosondes at 3-hourly intervals on three separate days. Enquire if you have a specific requirement to coordinate with these releases.

Getting to Bachok

Usually one or even two flights per hour from Kuala Lumpur to Kota Bharu. Airlines are Malaysian (from KLIA), AirAsia (from LCCT), and Firefly (a Malaysian Airlines subsidiary) and Air Malindo from Subang (KL's city airport). KLIA is easy to get to via the superb KLIA Express train, Subang is convenient from the University of Malaya and downtown (30 minutes by taxi, no rail), but LCCT is a bit more of a chore to get to (taxi or combination train/shuttle bus). I have not travelled Malindo, but all three other airlines are very good indeed; they all beat Ryanair hands down. Airfares are cheap, even booked at short notice. Expect to pay £20 - £40 each way including taxes.

International arrivals/departures are from KLIA, so if connecting directly with an international flight recommend using Malaysian Airlines to Kota Bharu.

Kota Bharu to Bachok it is about 30 – 60 mins by car depending on traffic. There is no local transport and taxis are not very reliable to/from Bachok.