NCAR RAF Site Survey Report
Okinawa and Kagoshima, Japan, May 2019, ACCLIP project

Background

The NSF-approved ACCLIP project will take place in southern Japan in July-August 2020. The area of greatest interest for the research is located to the South of Kyushu and to the North of Okinawa. Several potentially suitable airports in the area were identified by the RAF flight operations:

- Iwakuni
- Nagasaki
- Kumamoto
- Yamaguchi-Ube
- Kagoshima
- Kadena
- Naha

Of these, Kagoshima, Naha and Kadena are best suited geographically. Kumamoto and Yamaguchi-Ube are reasonably close; however, preliminary contacts with FBO representatives and government officials in Japan indicated that these airports lack FBO support and don’t have the space to park the GV for an extended period of time. They were excluded from the top choice airports to visit on the first site survey. The NASA WB-57 assessment of airport suitability generally agreed with the RAF findings.

For the survey the NCAR team focused on Kadena, Naha and Kagoshima.

The site survey took place during a period of time when the US Embassy in Japan was unable to provide any assistance to the team due to the upcoming G-20 meeting in Japan, which took place on June 27-28, 2019.

The NCAR team also inquired on behalf of the NASA WB-57 aircraft, which is expected to participate in ACCLIP but likely for the reduced period of 3-4 weeks. The full set of requirements for the WB-57 science support is not well known to the NCAR team but we were aware of the basic science support needs, the hangar requirement and the need to share the AWAS analyzer between the two aircraft during the campaign.

NCAR Site Survey Team

- Pavel Romashkin, RAF Project Manager
- Chrissy Fladung, RAF Administrator, ACCLIP Lead Administrator
- Lee Baker, NCAR RAF Pilot
- Laura Pan, ACCLIP Principal Investigator
Dates

The survey was conducted on May 13-18, 2019.

Preliminary contacts

As instructed by the NSF earlier, the RAF reached out to the NSF requesting support in establishing the initial contacts with the USAF to gain access to Kadena air base. The NSF provided a contact, CMSgt Stockwell. Chief Stockwell indicated that he would be able to facilitate access to Kadena and put RAF in touch with Maj. Bills, the airfield operations manager, and several other officers. The information exchange between NCAR and USAF appeared positive until a few days before the site survey team departure, the RAF PM received a message from the Kadena Air Base Chief of Programs that read:

"Unfortunately, the 18th Wing is unable to support organizations that are not tasked by HHQ to operate out of Kadena AB. We must be provided an order (i.e. EXORD, TASKORD, OPORD) before we can begin any coordination on our end. Also, due to the on-going airfield construction, high ops tempo, and uncertainty of what units we will be supporting that time next year, I would recommend you begin coordinating elsewhere. Please feel free to reach out to me if you need any additional information.

V/r, L. Ashley Eberhart, Capt, USAF, Chief of Programs, 18th Wing, Kadena Air Base, Japan"

The RAF PM reached out to the USAF contacts and to the NSF but none of the required HHQ Orders could be issued in time for the site survey. This effectively prevented any official meetings at Kadena.

At Naha the RAF PM was able to contact the Airport Deputy Administrator Mr. Shin-ichi Nomura. Telephone conversations with Nomura-san were productive and a meeting was set up at Naha to discuss the project.

At Kagoshima, the RAF PM was able to connect with Ms. Kaori Sato, General Manager of the Noevir Aviation FBO. Noevir owns two hangars on the airfield, and Sato-san had scheduled a flight to Kagoshima from Tokyo to meet with the NCAR team to discuss the project needs. An additional requirement is to be able to launch specialized sondes from the ground, preferably from a location near the GV / WB-57 airport.

Site survey results

Kadena

The NCAR team decided to visit Kadena, even though the official contacts were declined. The RAF pilot present at the site survey used his retired USAF ID to gain access to the base and escort the other survey team members. We met with Maj. Bills, who explained to us that if the proper orders are received by the base command to authorize support to ACCLIP, there are no
principles issues to prevent the GV from operating from Kadena. There will be no hangar space unless NCAR is able to engage with other USAF units that have hangar space, but parking on the ramp and placement of sea containers in proximity can be reasonably expected.

Hangar access for the WB-57 could not be confirmed; the NASA PM would have to research and negotiate such access separately. Further, the engagement of other base offices requires orders from HHQ, specifically, if any housing for the team, space for the installation of laboratory equipment (AWAS spectrometer) or clearances for foreign national access is needed.

Housing in the proximity to Kadena is available, there are numerous hotels close to the base in the American Village and nearby.

Launching upsondes from Kadena can be supported with proper notifications. There are no air traffic control issues.

**Naha**

The NCAR team met with Mr. Nomura and two senior staff members of the Japan Civil Aviation Bureau: General Director of the Air Traffic Services Department Mr. Tateyama and Chief Air Traffic Services Flight Information Officer Mr. Miyazaki, at the Naha airport on 14 May, 2019.

The Japanese officials informed the NCAR team that at Naha in particular and most Japanese airports in general, visiting aircraft are not allowed to park for more than 2 days before having to leave. General aviation parking in the whole of Japan is on the order of 250 parking spots. None of these are at Naha.

Discussing the options further, the NCAR team inquired about the possibility to work out a contract with a private company that may own some parking space at Naha. This channeled the dialogue in a constructive direction, and the officials identified two such companies, JAL Cargo and the MRO Japan Company. The former owns a cargo hangar and two parking spots on the main terminal side of the airport and the latter owns a very large maintenance hangar on the opposite side of the airfield, with separate access gates. Mr. Nomura and his colleagues gave the NCAR team an overview of the airfield, explained that a new runway will be finished by the time ACCLIP would start and that there are no flow control issues at Naha presently, and with the new runway it will be even easier.

RAF PM suggested that he can contact the MRO Japan Company to inquire about the possible access to their large maintenance hangar. Mr. Nomura responded that he will contact the MRO Company and someone will be in touch with the NCAR team.

In the evening following the meeting at the Naha airport, the RAF PM received a call from Mr. Otsuka, Manager of Sales and Marketing for the MRO Japan Co., stating that he received a call from Mr. Nomura and is coming from Tokyo the next morning to meet with the NCAR team, to discuss the options for project support.
The NCAR team met with Mr. Otsuka the following morning. We have explained all options to Mr. Otsuka, and he indicated no principal issues with supporting the ACCLIP airplanes. Mr. Otsuka was unable to give any promises or commit the company but thought that housing the GV is not going to be a problem, and potentially housing the GV and the WB-57 is likely to be possible as well. The MRO Company requires internal meetings and discussions to determine the terms and generate a cost proposal before NCAR can proceed with this option.

(As of July 10, 2019, the MRO Company requested information on the Japanese agencies or Ministries who will approve the ACCLIP project in Japan. This is necessary so that the MRO Company can ensure that the proposal they generate does not go counter to the expectations of the Japanese sponsor of the project. The RAF PM is contacting the US Embassy in Japan to obtain this information and forward to the MRO Company).

Since the MRO Company appears to be a far superior option, we have not reached out to JAL Cargo to discuss access to one of their parking spots.

Launching upsondes from the airport proper is not possible.

Logistics on Okinawa

**Driving:** The Naha City is very busy, with narrow streets, many one-way streets, and roads not forming any mind of a grid. Getting lost would be very easy without a GPS. While rental cars all have GPS, in one of our cars the GPS was only in Japanese, making it very difficult to use. Traffic is very heavy most of the time.

Driving between Naha and Kadena takes over an hour even though the distance is fairly short. The road is very busy, with many lane changes, merges and traffic lights. Transporting AWAS flasks between Naha and Kadena is possible but will be difficult, if the GV and WB-57 are not co-located.

**Housing:** Naha City has US-style hotels. While more expensive, these have larger rooms. There are many smaller hotels in Naha that have very small rooms, which are most typical in Japan. Staying in the Naha City would not be preferred due to the heavy traffic.

To the South of the Naha Airport, the traffic essentially disappears. There are several hotels within 15 minutes from the airport. The NCAR team visited two hotels. One, the Southern Beach Resort, is a very large hotel with several ball and conference rooms of suitable sizes, should have everything needed to support the project. Another, the Ryukyu Onsen Senagajima, is a smaller resort hotel located almost within walking distance from the airport. Availability of rooms and a conference room could not be confirmed without a prior appointment.

**Supplies:** Cryogens and compressed gases are available on Okinawa. Specialty gases would have to be brought from the US as part of the sea container shipment. Sea container placement is not an issue if the project is located at the MRO Company.
Kagoshima

The NCAR team flew over to Kagoshima to meet with Saito-san of the Noevir Aviation. Ms. Saito notified the airport government officials of the NCAR visit, and they wanted to meet with Ms. Saito and the NCAR team as well, to better understand the ACCLIP requirements. Prior to the meeting on the 17 of May, the Deputy Airport Manager Mr. Minemura and Director General of the Air Traffic Services for Kagoshima Mr. Utsunomiya have called Mr. Nomura in Naha and obtained a heads-up for our visit.

The NCAR team arrived at the Noevir Aviation hangars, met with Ms. Saito and received a tour of the premises. We visited only one of the two hangars; the second one was fully occupied with small aircraft but also may be an option for the 2020 deployment. The hangar we visited is large enough for the project airplanes, and has space along the walls and in a separate room on the first and second floor for the mass spectrometer room and an office.

Following the hangar visit we met with Ms. Saito, Mr. Minemura and Mr. Utsunomiya at the Kagoshima airport office. The airport officials were very constructive and offered additional parking potions for the GV, which may be needed in case Noevir Aviation has only enough room for one aircraft inside the hangar. Both officials were supportive of the project in principle but would need more details if ACCLIP were indeed to come to Kagoshima. Same applies to the Noevir Aviation. The NCAR team and Noevir reach an understanding that Kagoshima is a secondary base for ACCLIP, and we will need to provide more details and discuss the hangar access cost later if the project operates from Kagoshima.

Launching upsondes from the airport proper is not possible.

Logistics and operations in Kagoshima

Driving: Kagoshima City is a 25 min drive from the airport with several toll gates on the highway. Each toll gate is $6 to $10 US. This will be a noticeable extra cost to the project with several rental cars traveling to the airport every day. Driving is generally problem free, other than the toll fees. An ETC card for the toll gates is essential, as it allows to pass the toll gates faster, there is a discount and the fees are charged directly to the rental car bill. The cards are offered by the rental car agency for a very small fee and installs directly into the vehicle.

Housing: Hotel options are limited. We stayed in what appears to be one of the best hotels in Kagoshima, and the rooms were quite small, although quiet. Finding ops center space will be difficult and likely expensive. Parking at the hotel is also cost, in a tall elevator-type garage, which may take 5-10 min to get the car out of, when needed. This is typical for many city hotels. There are other hotels outside of Kagoshima; most appear to be very small, with tiny rooms. There are more upscale hotels on the hot springs to the NE from the airport but room rates appear quite high.
**Supplies:** Cryogens and compressed gases are available with prior notice. Sea container placement will require some planning, as there is no room on the ramp next to the airplanes; the containers may have to be in the parking lot outside the ramp area.

**Overall impressions and conclusions**

The NCAR team thinks that operations from the Naha airport is the best option for ACCLIP. The ability to place both aircraft in the same hangar; separate access via a side road (no airport security on the entrance, a badge pass and a special clearance is all that is required); ample space for sea containers; easy access to taxiways; proximity to hotels to the South of the field with nearly zero traffic are the obvious advantages. The AWAS analyzer can be in the same building as the airplanes. The dialogue with the MRO Company leaves us cautiously optimistic. This option will result in an extra cost for the hangar space rental but it ensures airplanes safety, security and good working conditions for the crew and the instruments.

Kadena appears to be the second best option. There will be numerous small problems with operating from a USAF base, such as access; passes; deliveries; sea container delivery. There will be no hangar for the GV. Space for the AWAS mass spectrometer has to be negotiated separately and may be away from the airplanes. Lastly, there is no clear mechanism for obtaining the authorizing orders from the USAF HHQ in support of the NSF project; even though the NSF is a government agency, there is no MOU between the NSF and the USAF that we could reference. There is a possibility to leverage the contacts and the NASA MOU with the USAF that ESPO had utilized in the past; this is the option RAF will pursue if the preferred Naha location doesn’t work out.

Both locations on Okinawa will put the project in a humid and hot tropical environment. Rains are likely, moisture related instrumentation issues are likely, although at Naha this impact is minimized if hangar access is gained.

Kagoshima is the third, but possible, option. The advantages are, cooler and drier climate; ability to co-locate the two airplanes in close proximity, and there is room for the AWAS analyzer in the same building. Logistics are fairly easy, and the airport is relatively small. The drawbacks are, no very well suited hotels were identified; extra cost for tolls; there is an active volcano in the immediate proximity to the airfield. The volcano has been active over 200 times last year and although the activity is limited to smaller emission of fumes, the risk of a larger event posing threat to flight operations or to the airplanes themselves cannot be neglected.

Due to the drier climate, moisture related instrumentation problems are less likely than on Okinawa.

Tokyo Olympics in 2020 overlap with the project time window. The Japanese airport officials estimated that arriving private airplanes will exceed the Japanese combined airports parking capacity by a factor of 10. Basing out of Okinawa places ACCLIP further away from the Southern Japan busiest air traffic corridors and is likely to simplify flight operations.
Upcoming site related activities and important details

Several key elements of ACCLIP require attention in the near future:

1. **Government processes**: According to numerous discussions with the Japanese business people from the MRO Japan Company and Noevir Aviation, the degree of involvement and control of the Government in the business operations of private companies is much greater in Japan than in the US. Both companies are very cautious in offering any numbers or estimates, until they understand which Japanese Ministry or Agency will authorize the ACCLIP operations in Japan, and what are the expectations of that Ministry going to be of the MRO and Noevir. The two companies are prepared to respond appropriately and tailor their services per the expectations of the Ministry. Therefore, it is essential to establish contact with the US Embassy and through the Embassy, with the relevant Ministry(ies) in Japan, and to obtain points of contact for the project. Only then will the commercial operators be able to proceed with negotiations with NCAR. (Per request from the Embassy in Tokyo, this activity could not be initiated until the G-20 assembly was over, as the Embassy resources were all focused on the G-20. The contacts with the Embassy are starting at the time of this writing).

2. **Collaboration with the Japanese investigators**: This activity is led by the ACCLIP Investigators, who have regular communications and teleconferences with the Japanese counterparts. The importance of this collaboration cannot be overestimated; it may also become necessary to engage these collaborators when the project applies for the diplomatic permissions, to provide information to the Japanese government on the benefits of the project to Japan.

3. **Radiosonde launches**: This activity is sparse with only 12 launches, however the soundings are very expensive and important. The clearances to obtain launch permits from Japanese-owned sites are extremely complicated. There are currently no sites on Okinawa that launch any consistent soundings. Radio frequency and launch permits may take many months to clear the Japanese permissions system. Therefore, the project PIs requested the operations to look into the possibility of arranging the launch operations from a US military base. As described above, so far the communications from Kadena were not promising, however more investigating needs to be done. Since the launch operation has a much smaller footprint that the aircraft operations, this may be possible. This activity will be briefed to the Embassy separately to seek any guidance the Embassy might offer.

4. **Second site survey**: RAF expects to receive information from the Embassy in Tokyo and coordinate with the MRO Japan or Noevir Aviation in July, and finalize the basing option by the end of August. At that time the RAF will research the housing and logistical support options, and will conduct a second site survey to the chosen location in the early 2020 to confirm all arrangements.
Scientific motivation for the project location: statistical distribution of the air masses of interest, based on ~50 cases between 2005 and 2016. While some annual and seasonal changes are expected, the general area of interest is located between Kagoshima and Okinawa, and to the East over the Pacific. The feature of interest develops from the West to the East, therefore earlier stages can be studied in the general WNW direction from Okinawa.
Okinawa: the overview of relative locations and distances between Naha and Kadena. The traffic between the Naha airport, the city of Naha and Kadena Air Base is heavy with many traffic lights. American Village is the likely location for housing in case the project is based out of Kadena.
Overview of the Naha airport and the possible housing options South of Naha City. The traffic is very light, the roads are excellent and the distances are short. The MRO Company hangar is located on the West side of the airport with its own access road. The new runway is being built to the West of the MRO hangar and is visible as a series of contours; this satellite image is outdated, the runway is actually nearly complete.
Kagoshima: the overview map of the relative location of major project components. The smaller cities of Kirishima and Aira have services like fuel and food but we were unable to identify suitable housing options there in the time available on the initial site survey. Interestingly, the NCAR authorized travel agent was unable to find any housing options at all in this area. Note the location of the Sakurajima volcano in close proximity to the airport. This proximity, however, does not prevent normal daily flight operations.
The detailed view of Kagoshima airport. The airport is relatively small, has one runway but no sequencing for flight operations due to the fairly low volume of air traffic. The Noevir hangars are located on the Southern end of the airport, and the possible parking spot for the GV, if the hangars are not available for both the WB-57 and the GV, is very close to the Noevir hangars.