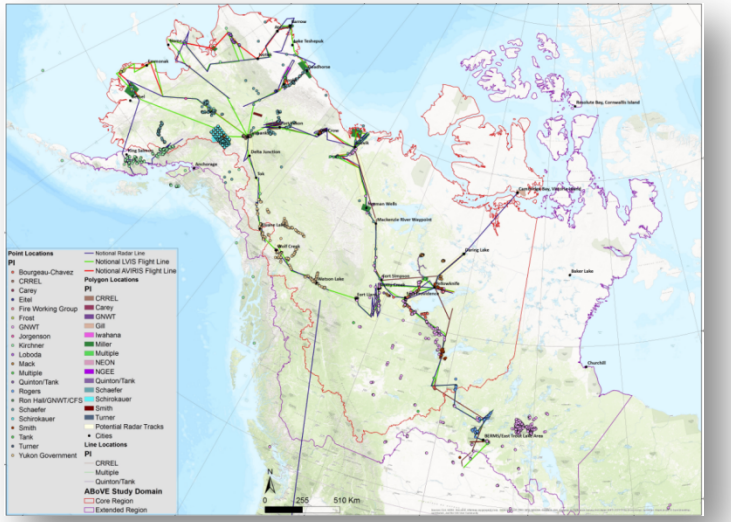
Field Operations Plan

FINAL VERSION: 5/18/17

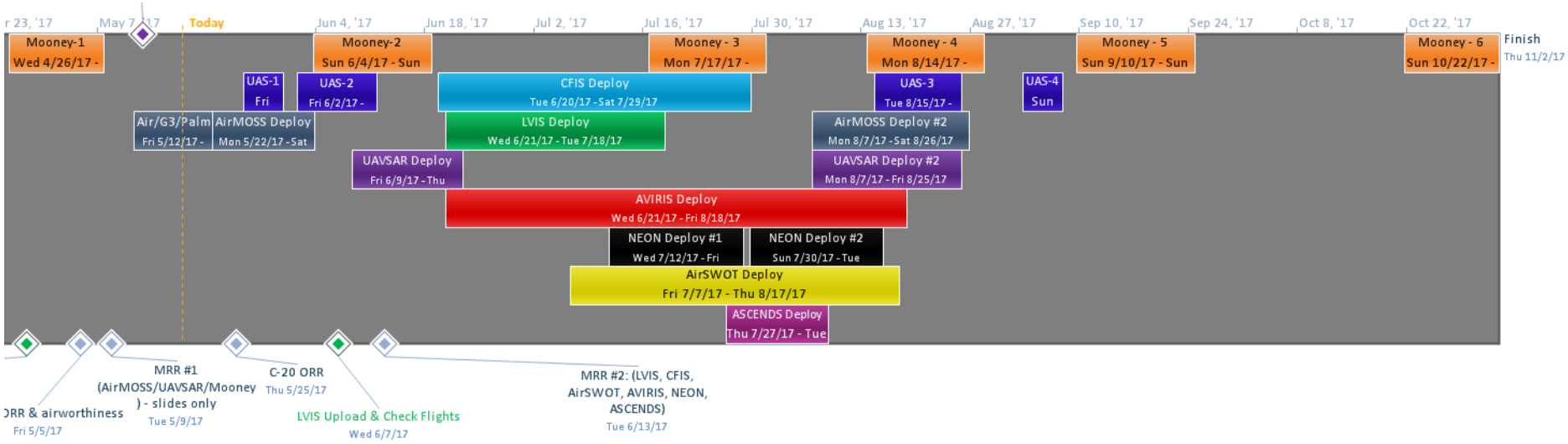
- General Comments & Reminders
- Deployment Calendar and Daily Schedule
- Field Roles & Communication
- Contact Info
- Weather Support
- Useful Links



General Comments & Reminders

1. Bring your passports on all flights
2. Review Site Orientation packets
3. Be safe. Be aware of your surroundings.
4. Chip Miller, with the support of Peter Griffith, will provide overall science team direction in the field; they will coordinate meeting times and locations, direction on science flights, communications among field teams, and reporting.
5. The Pilot in Charge (PIC) is responsible for all aircraft safety calls, and decisions for takeoff/landing
6. Please be on time for team meetings, morning prep, and flights
7. Team leads, please be sure to communicate all important messages to your team in the field
8. There should be at least 1 team rep at every meeting
9. Remember to pack your own lunch and water for flights; stay hydrated – there are extremely cold/ dry conditions on the ground
10. Prepare for cold weather conditions during flight and on the ground; also, note that summer season has mosquitoes
11. PIs/POCs (per each aircraft team) remember to submit SOFRS reports daily while in the field
12. Do not hesitate to address concerns to Chip Miller, Peter Griffith, or Dan Hodkinson while in the field
13. For any safety concerns, contact Chip Miller, Peter Griffith, or the CC&E safety email at: safety@cce.nasa.gov
14. Each aircraft team send daily summary airborne reports to both Chip and Peter

Deployment Calendar Overview



Assumptions

1. No coordinated flying
2. Instrument PIs and aircraft PIC will de-conflict flights and take-off times with each other, for PI teams and aircraft based in the same location at the same time; for issue resolution, contact Chip Miller or Peter Griffith.
3. Specific location transits dates are dependent on weather, especially for the optical instruments (LVIS, AVIRIS); info below reflects estimated locations and dates
4. Detailed schedule, showing locations breakdown, can be found here: ✓ https://above.nasa.gov/airborne/

Deployment Calendar & Locations (color font version)

LOCATION	May	June	July	August	September	October
Yellowknife	GIII/AirMOSS Mooney/ATM-C	C-20A/UAVSAR B200T/LVIS B-200/AVIRIS TOI/CFIS	B200T/LVIS B-200/AVIRIS B-200/AIRSWOT Mooney/ATM-C	B-200/AIRSWOT Mooney/ATM-C GIII/AirMOSS C-20A/UAVSAR B-200/AVIRIS	Mooney/ATM-C	Mooney/ATM-C
Fairbanks	GIII/AirMOSS Mooney/ATM-C	GIII/AirMOSS C-20A/UAVSAR Mooney/ATM-C TOI/CFIS	B200T/LVIS B-200/AVIRIS Mooney/ATM-C TOI/CFIS DC-8/ASCENDS B-200/AIRSWOT	Mooney/ATM-C DC-8/ASCENDS TOI/NEON GIII/AirMOSS C-20A/UAVSAR B-200/AIRSWOT	Mooney/ATM-C	Mooney/ATM-C
Inuvik		Mooney/ATM-C TOI/CFIS	B200T/LVIS B-200/AVIRIS B-200/AIRSWOT Mooney/ATM-C	B-200/AIRSWOT Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Deadhorse	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C TOI/NEON	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Saskatoon		B200T/LVIS	B-200/AIRSWOT	B-200/AIRSWOT		
Whitehorse	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Nome	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Cambridge Bay			B-200/AVIRIS			

Note:
Aircraft locations within any given time period may vary due to changing weather conditions; locations and months shown above reflect best estimates

Deployment Calendar & Locations (black font version)

LOCATION	May	June	July	August	September	October
Yellowknife	GIII/AirMOSS Mooney/ATM-C	C-20A/UAVSAR B200T/LVIS B-200/AVIRIS TOI/CFIS	B200T/LVIS B-200/AVIRIS B-200/AIRSWOT Mooney/ATM-C	B-200/AIRSWOT Mooney/ATM-C GIII/AirMOSS C-20A/UAVSAR B-200/AVIRIS	Mooney/ATM-C	Mooney/ATM-C
Fairbanks	GIII/AirMOSS Mooney/ATM-C	GIII/AirMOSS C-20A/UAVSAR Mooney/ATM-C TOI/CFIS	B200T/LVIS B-200/AVIRIS Mooney/ATM-C TOI/CFIS DC-8/ASCENDS B-200/AIRSWOT	Mooney/ATM-C DC-8/ASCENDS TOI/NEON GIII/AirMOSS C-20A/UAVSAR B-200/AIRSWOT	Mooney/ATM-C	Mooney/ATM-C
Inuvik		Mooney/ATM-C TOI/CFIS	B200T/LVIS B-200/AVIRIS B-200/AIRSWOT Mooney/ATM-C	B-200/AIRSWOT Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Deadhorse	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C TOI/NEON	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Saskatoon		B200T/LVIS	B-200/AIRSWOT	B-200/AIRSWOT		
Whitehorse	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Nome	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C	Mooney/ATM-C
Cambridge Bay			B-200/AVIRIS			

Note:

Aircraft locations within any given time period may vary due to changing weather conditions; locations and months shown above reflect best estimates

Daily Schedule - Notional

Notes:

1. Specific aircraft and instrument teams schedules (takeoff/landing) will vary based on location, other aircraft in the area, weather, and science goals; each instrument PI will coordinate with the In-Field Science Leads Chip Miller and Peter Griffith, as well as each other to de-conflict all operations.
2. Individual PI and aircraft teams schedule will vary; below is a sample of the general activities to occur each day

Time	Activity
T- 3-4 hours	Wake Up, Initial Wx. Checks
	Weather Briefing/Meeting
	GO, NO-GO call; inform all team(s)
	Arrive at Aircraft, Instrument Set-Up, safety briefs
Varies by team	Take Off (T)
Varies by team	Science Surveys
Varies by team	Land (L)
L+ 3-4 hours	Debrief (for that specific instrument/aircraft team)
	Dinner
	Stay Tuned for direction from Chip/Peter for evening team meetings/debrief
	Daily Reports (SOFRS, email summaries, reporting, direction, etc.)

Field Roles & Communication

For any safety concerns, contact Chip Miller, Peter Griffith, or the CC&E safety email at: safety@cce.nasa.gov

Team Communication

Daily Meetings

In general, Chip Miller and Peter Griffith will communicate locations and times for daily meetings.

Peter and Chip will determine in the field how to facilitate evening meetings, and will identify location and time, as well as call-in info for remote teams.

Example Meetings:

1. **AM Weather Meetings:** for Instrument leads, flight crew leads, flight planning team, make GO, NO-GO decisions
2. **AM Pre-flight Meeting** at hangar/TBD location – per each team as required
3. **PM Post-flight meeting** at hangar/TBD location – per each team
4. **Evening overall team meeting**: to be defined in the field by Chip and Peter (based on day length, folks schedules, etc.)

Project Ops Bases

Project Ops Centers will be in Fairbanks and Yellowknife.

Note: The Yellowknife meeting room is only reserved for ABoVE when Chip/Peter are there, but may be used other times if available

✓ Details for all FBOs are included in "Site Orientation PPT."

✓ In general, each ops center will have:

1. Meeting room
2. Printing capability
3. Internet access
4. Shipping/Receiving capability
5. Projection capability

Communication Tools

1. Daily team meetings in FBO meeting rooms (AM/PM options)
2. Email Lists:
   - Daily Email Summaries:
     A. Above_airborne_daily: daily reports of aircraft flight activities and data collection (you can opt out of this)
     B. Gmao_wx@cce.nasa.gov: text-only daily weather briefings by GMAO (you can opt out)
   - Chip Miller will be sending daily information out on these emails to keep our teams informed of what happened in the past, as well as future planning
3. Cell Phone & Texting
   - ✓ Team contact info is in the back of this PPT
   - ✓ Cell phone service is poor across the ABoVE domain, especially in remote areas. Text messages are generally more reliable than either phone calls or email. All flight and ground teams should have satellite phones or the equivalent and make sure these are fully charged and operational before each deployment/flight. Suggest frequent comms checks, especially when relocating to different FBOs during a deployment
4. Aircraft Iridium: for emergencies only
5. WebEx – consider using WebEx/adobe connect for audio vs. NASA telecom
6. Telecom: USA Toll Free #: 1-844-467-4685
   USA Local/Toll #: 1-720-259-7012
   Participant Passcode: #: 106475

ABoVE Airborne Communications Page

✓ https://above.nasa.gov/airborne/

✓ Includes aircraft tracker, daily aircraft reports, real-time a/c locations, weather products, schedule, etc.

Team Roles in the Field – High Level Summary

ABoVE Project Leadership:

- Deputy Science Lead: Chip Miller
  - Ensures ABoVE project /science goals are being met, all team members have what they need, troubleshooting, team communication, reporting, and direction/schedule for each day
- Chief Support Scientist: Peter Griffith
  - Supports Chip Miller to ensure ABoVE project /science goals are being met, all team members have what they need, troubleshooting, team communication, reporting, and direction/schedule for each day

Science & Instrument Team:

- Science & Instrument Leads
  - Responsible for flight planning each day for their instruments/aircraft
  - Status Chip and Peter every day, for team meetings and summary of flights
  - Provide quick-look data products in the field
  - Submit SOFRS reports daily (coordinate with aircraft POCs)

Flight Crew/Aircraft Offices

- PIC (pilot in command)
  - Has final say in determining whether we are GO or no-GO for flight; responsible for flight safety
- Aircraft Office Field Rep (PM/MM)
  - Key POC/rep for all aircraft related functions, can help with questions, mission flight ops troubleshooting, spare parts, etc.
  - If needed, can help as interface between crew and science team, troubleshoot as required
  - Builds flight manifest every day
  - Completes aircraft flight reports in SOFRS daily

Logistics

- Logistics plans set up and coordinated in advance
- Official Project Ops Centers will be at Fairbanks and Yellowknife
- Deputy Science lead Chip Miller and Support Scientist Peter Griffith are available to work logistics issues that may arise;
- Dan Hodkinson and John Woods are on call

Team Roles in the Field – Project Level

Project-Led Field Roles

Project Tasks	Prime POC	Names (primary, backup)	Other POC	Notes
Coordinate Field Team Meetings	Science PI/Lead or PM/ Logistics Lead	Chip, Peter (Note: Peter will cover Yellowknife, since Chip can't be there then)		Chip will tell teams of meeting location, time, purpose; includes flight crew, science/instrument teams. Meetings will be at FBOs or hotel, and a call-in # to be provided for folks not at same location.
Communicate Daily Plans to Whole Team	Science PI/Lead or PM/ Logistics Lead	Chip, Peter		To ensure everyone knows schedules, activities, locations, etc.; email/phone/texts/MTS, etc. Chip content and email; Peter Web content updates. Chip will include past, present and future plans in each email, and will give field teams 24-48 hrs. notice.There will be a master field-ops email list generated to include both ground and aircraft teams in this.
Provide daily summaries from the field - to folks back home	Science PI/Lead or PM/ Logistics Lead	Chip, Peter		Daily email summary at end of day is highly recommended; to HQ, GSFC, JPL, Univ folks, etc.
Handle any project-level payments	Science PI/Lead or PM/ Logistics Lead	Dan, Sarah, Peter		for meeting space, internet, cargo space, tables/ chairs setup, use of hanger, etc.
Provide specific "Day of" guidance to ground field teams	Science PI/Lead or PM/ Logistics Lead	Peter, Dan, project PIs		text messages and web summary
Address any non-flight safety concerns/issues	Instrument Lead/PI	Can raise concerns to Chip/Peter/Dan	Folks can email: safety@cce.nasa.gov for concerns	flight crew is resonsible for all aircraft related safety calls
Track/capture field schedule	Instrument Leads	Instrument Leads to Chip (Chip will be the central "clearing house")		To keep the Project leadership informed of individual team flights/plans, document flight days, vs. dwn days, crew rest, a/c maint. Issues,etc., track science flight hours, etc.
Handle/coordinate outreach events	Science PI/Lead or PM/ Logistics Lead	Peter, Chip	Kate Ramsayer, Patrick Lynch	lectures, aircraft tours, field blogs, media day, social media, etc.
Handle project-related FBO coordination, issues, comm., etc	Science PI/Lead or PM/ Logistics Lead	Dan, Peter		Need to have clear POC for interfacing with FBO/ field contacts on behalf of whole project

Team Roles in the Field – Science & Instrument Leads

Science & Instrument Lead Field Roles

Science & Instrument Tasks	Prime POC	Names (primary, backup)	Other POC	Notes
Lead flight planning discussions	Science Lead/PI	Chip, Peter		Science PI/Lead in conjunction with instrument PIs
Coordinate projected flight targets with instrument teams	Science Lead/PI	Chip, Peter		some instrument teams are used to doing this on their own
Provide flight plans to crew	Instrument PI or Lead	Mahta, Larry, Darren, Ian, Naiara, Bryan, etc		keep in mind required crew rest time; need to get them final plans as early as possible
Make final flight target decisions	Science Lead/PI	Chip, Peter		Science PI/Lead in conjunction with instrument PIs
Submit SOFRS science reports	Instrument PI or Lead	Mahta, Larry, Darren, Ian, Naiara, Bryan, etc		Instrument leads to work with flight crews, who also have to submit SOFRS reports (there are 2 parts; a science section, and flight summary/metrics section); instrument teams to discuss instrument performance, flight map, etc.
Check weather, visit weather office	Instrument lead/Pi and flight crew	Ex: Mahta, Larry, Darren, Ian, Naiara, Bryan, etc	Abhishek GMAO	Some teams download wx models, some use local wx office, some coord. with NWS, UAF, etc.
Coordinate takeoff/landing times	Instrument lead/PI and flight crew			Deconflict with other teams/aircraft in field
Lead science disucssions	Science Lead/PI	Chip, Peter		
Data processing	Instrument PI or Lead	Mahta, Larry, Darren, Ian, Naiara, Bryan, etc	Peter	Report on data acquisition; produce quick looks; post to ABoVE website
Instrument troubleshooting	Instrument PI or Lead	Mahta, Larry, Darren, Ian, Naiara, Bryan, etc		
Make daily Science Go/NO GO call	Instrument lead/PI working with PIC	Can chat with Chip/ Peter for advice		

Team Roles in the Field – Logistics & Aircraft

Logistics Field Roles

Logistics Tasks	Prime POC		Other POC	Notes
Local transportation logistics	each team			each traveler or team of travelers to do in advance
Meeting space issues	logistics rep	Peter, Dan, Sarah		Dan sets up in advance
Internet issues	logistics rep	Peter, Dan, Sarah		Dan sets up in advance
Shipping/Cargo logistics	logistics rep	Flight crew, Dan, Sarah, Peter		

Aircraft Field Roles

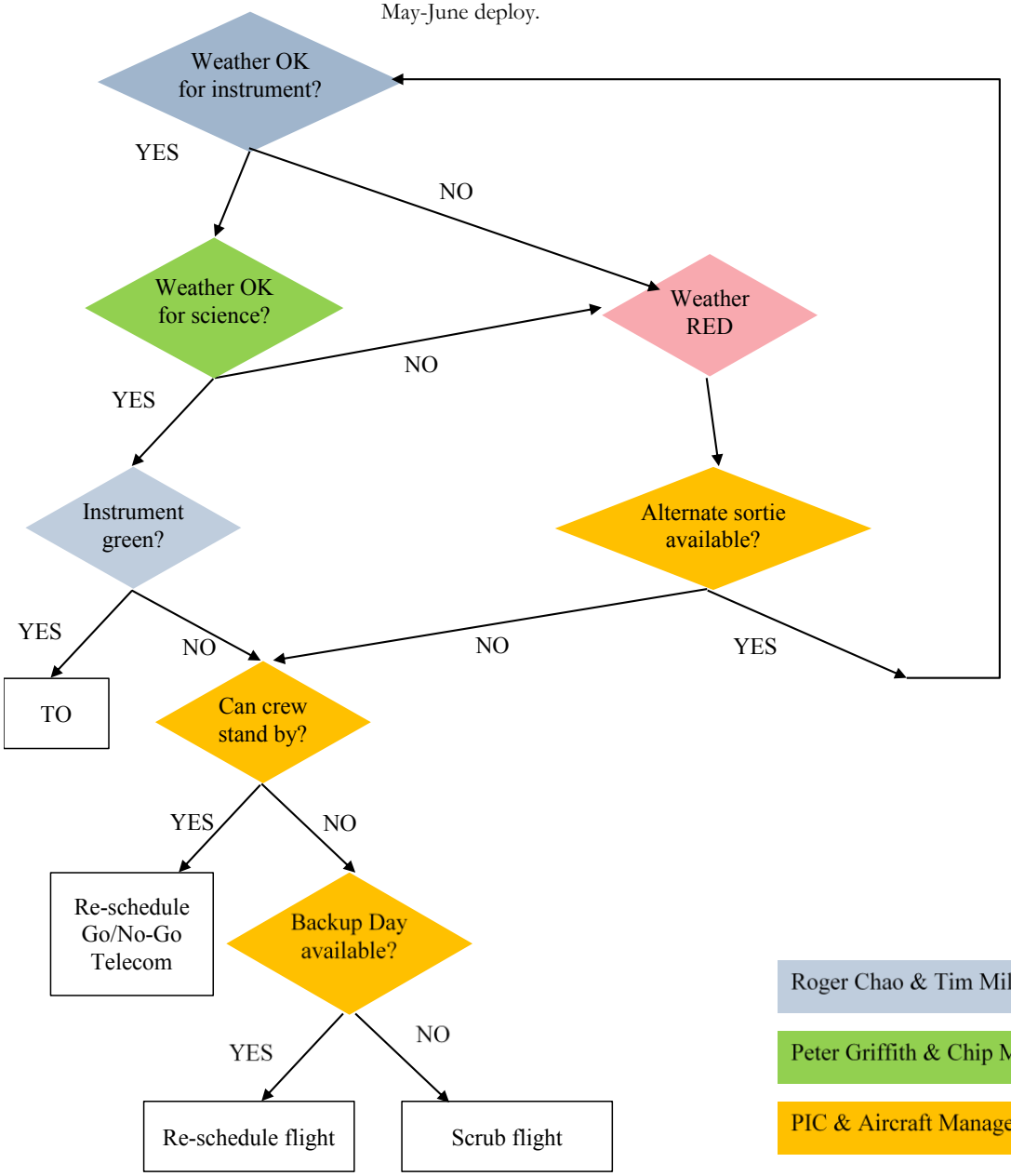
Aircraft-Specific	Prime POC		Other POC	Notes
FBO coordination; GSE, fueling, fuel payment, a/c services, etc	Aircraft PM, Pilots	flight crews		
Coordinate takeoff/landing time with airport	Pilots			work details out with science/instrument team
Coordinate air space permissions	Pilots			
Spare parts shipping - for field maint. issues	Aircraft PM, Pilots			
Make go/no-go calls for take-off and landing	PIC			
Submit SOFRS flight reports (aircraft)	Aircraft PM, Pilots	flight crews		

Radar Take-Off Decision Tree

Source: Naiara Pinto
Date: 5/17/17

TO Decision Tree

- Safety issues and Pilot In Command overrule this Decision Tree.
- Alternative sortie may be a subset of lines from the originally-planned sortie.
- There will be no coordination between L and P-band instruments for the May-June deploy.



Roger Chao & Tim Miller

Peter Griffith & Chip Miller

PIC & Aircraft Manager

Radar Take-Off Decision Tree

Source: Naiara Pinto
Date: 5/17/17

May/June (instruments operating separately)

- P Band:
  - Weather go/no-go 4 hours before TO.
- L Band:
  - Go/no-go telecom will be held on the day of the flight at 0800L.
  - ✓ *Rationale*: dynamic weather, morning fog call for a telecom in the morning of the flight.
  - Ground crew will show up before weather go/no-go.
  - ✓ *Rationale*: need to start prepping the jet to meet 1000L TO.
  - TO can slide to no later than 1300L. Aircraft must land by 1930L.
  - ✓ *Rationale*: need to meet 12-hour crew duty day.

Potential Sorties

- Pilots may shift sorties by no more than +/-1 day to adapt to weather events and restricted areas.

  Rationale: coordination with field crew.
- There is no need to notify field crew if TO is delayed.

Rationale: field crew will not be collecting data simultaneously with flights.

Weather go/no-go criteria: [Mahta et al.]:

Contact Info

This personal cell phone information has been removed from the document for public posting purposes and distributed to the team by email

OPS and Weather Support

Flight Ops

Click on Airport for SkyVector Information			Notes
Alaska	Fairbanks (FAI)	907-474-0788	NWS Aviation Weather Center provides TAFs. Alaska Flight Services Stations (phone #'s on left) operated by the Dept of Transportation. Located inside local towers, and available for flight weather briefings and flight plan filing.
	Deadhorse (SCC)	907-659-2505	
	Nome (OME)	907-443-2291	
	Barrow (BRW)	907-852-2511	
	Kotzebue (OZE)	907-451-5250	
Canada	Yellowknife (CYZF)	FIC Edmonton 1-866-541-4102	NAV CANADA supports flight planning with aviation weather, aeronautical information, and online flight planning. Flight Information Centres (FIC) provide pilots with interpretive weather briefings, as well as other advisory services, for their planned route at 1-866-WX-BRIEF.
	Inuvik (CYEV)	FIC Edmonton 1-866-541-4102	
	Saskatoon (CYXE)	FIC Winnipeg 1-866-541-4103	
	Cambridge Bay (CYCB)	FIC Edmonton 1-866-541-4102	
	Whitehorse (CYXY)	FIC Kamloops 1-866-541-4101	
	Ft. McMurray (CYMM)	FIC Edmonton 1-866-541-4102	

Weather

Useful Websites		
Aviation Weather	Alaska Aviation Weather Unit (AAWU)	Requested inputs: Date/Time of Flight, Route, Weather limitations (Visibility, Clouds (base/top?), Wind, Precipitation, etc.; **Phone Briefing Support Windows (All times AK):** 0445-0530, 0630-0645, 0745-1000, 1230-1430, 1600-1800, 2030-2230; **POC:** **donald.moore@noaa.gov** 907-266-5116
	Alaska FAA Webcams	Updated every 10 minutes
	NWS AK TAFs	Local TAFs for Alaska
	NAVCANADA Aviation Weather Website	Route Data, Regional Area Data, and Local Data
Smoke	UAF Smoke	Forecasts for up to 72 hours are updated daily with current fire and weather information.
Snow	NOAA Multisensor	Snow and ice cover over the Northern Hemisphere is derived from combined observations of METOP AVHRR, MSG SEVIRI, GOES Imager and DMSP SSMIS.
	NOHRSC	Hosted by National Operational Hydrologic Remote Sensing Center
	NATICE IMS	National Ice Center Database
	High Rez IMS	NSDIC Download Page
Goddard GMAO	Forecasts	Example Support
	ABoVE Domain	Zoomed in ABoVE Domain
Monthly NWS Climate Outlook	Alaska	Webinars and Archives

Reporting

Daily Reporting

1. **SOFRS**
   A. Each NASA-led PI/Instrument lead is responsible for submitting a SOFRS flight report within 24 hours of flight; if internet access is poor, this can be completed when possible
   B. There are 2 parts to each report; a flight ops section and science section; please work with your flight crew to determine how best to complete this
2. **Email Summaries**
   A. Deputy PI Chip Miller will send official ABoVE project summaries from the field to the wider reporting distro list, as possible; this includes (HQ, center leads, mgmt., all teams as desired)
3. **PI/Instrument Lead Reporting**
   A. PI/Instrument Leads to keep the Project leads informed daily as possible
4. **Quick-Look Products**
   A. PI/Instrument Leads to generate quick-look products as possible post flight; to share with Chip Miller/Peter Griffith (product preferred within 24 hrs. of flight).

Helpful Links

1. **ABoVE General Website:** https://above.nasa.gov/
2. **ABoVE Google Docs**: https://drive.google.com/drive/folders/0BwYIFHjggpQhV1liQ2VHYi1QTmM
3. **ABoVE Airborne Website:** (New calendar, Site Orientation & FBO packets, flight planning, KMLs, weather info, aircraft summaries, UAVSAR link, etc.): https://above.nasa.gov/airborne/
4. **ASP/SOFRS Website**: https://airbornescience.nasa.gov/flight-reports
5. **NASA aircraft tracker** public site: https://airbornescience.nasa.gov/tracker/#!/map?mapid=Dark%20Gray&zoom=6&lat=34.0000&lng=-98.5000
6. **CC&E Useful Field & Safety Links**: https://above.nasa.gov/safety/resources.html
7. **GMAO Website (Forecasts)**: https://gmao.gsfc.nasa.gov/forecasts/
8. **Snow/Ice maps** http://satepsanone.nesdis.noaa.gov/northern_hemisphere_multisensor.html
9. **Alaska Aviation Weather** http://aawu.arh.noaa.gov/index.php?tab=3
10. **Alaska Wildfire** https://akfireinfo.com
11. **NWT Wildfire** http://www.enr.gov.nt.ca/programs/wildland-fire