HERO Operations Plan

MET 628
December 8, 2013

1 General infos

1.1 Emergency information

Local hospitals:

- Castle Medical Center, Kailua (640 Ulukahiki Street, 808-263-5400)
- Hawaii State Hospital, Kaneohe (45-710 Keahala Road, 808-247-2191)
- Kaiser Foundation Hospital, Honolulu (3288 Moanalua Road, 808-432-0000)
- Kapiolani Medical Center at Pali Momi, Aiea (98-1079 Moanalua Road, 808-486-6000)
- Kokua Kahili Valley Hospital, Honolulu (2239 North School Street, 808-848-0976)
- Kuakini Medical Center, Honolulu (347 North Kuakini Street, 808-536-2236)
- Leahi Hospital, Honolulu (3675 Kilauea Avenue, 808-733-8000)
- Maluhia Hospital, Honolulu (1027 Hala Drive, 808-832-5874)
- Queen’s Medical Center, Honolulu (1301 Punchbowl Street, 808-538-9011)
- Saint Francis Medical Center, Honolulu (2226 Liliha Street, 808-547-6883)
- Straub Hospital, Honolulu (888 South King Street, 808-522-4000)
- Wahiawa General Hospital, Wahiawa (128 Lehua Street, 808-621-8411)
2 Daily operations

2.1 Daily Weather Briefing and Operations Meeting

Mo-Fri: 9 - 9:30 am in HIG310
During operations: Support crew in Meteorology “Zoo”

2.2 Forecasting

Student forecast teams are responsible for delivering a short 15-minute weather briefing each day. They should meet at 8:00 am in HIG310 to prepare a forecast for rainfall placement on or near Oahu during the next 48 hours, with an outlook for any potential major events out to approximately 5 days. NWS Advisors will assist the students as necessary.

Suggestions for the forecast teams:

1. Show a satellite loop and a radar loop over the islands. Note the direction from which the low clouds are coming. This will help determine the best orographic lift (if the 850 hPa flow is 8 kt or stronger).

2. Be sure to evaluate the current and forecast moisture and stability for Oahu using recent past and current soundings, and look at how things are expected to change with time. How active things are at the low levels is often dictated by the amount of mid-upper level support available.

3. If the low level (850 hPa) flow is weaker than 8 kt, clouds and precipitation tend to form over the interior and downwind sections of Oahu. For example, SE wind of 4 knots would favor clouds and showers over central and NW part of Oahu.

4. The amount of cloud and precipitation development you get during light wind patterns is highly dependent on how moist and unstable the atmosphere is. Synoptic scale forcing mechanisms can enhance development further, but even in the absence of synoptic lift, mesoscale lift can be provided by upslope/upvalley flow, sea breeze convergence, and convergence downwind of the islands.

5. High resolution models can give you the “flavor of the day,” and some insight into where convection might develop (and how strong it will be) if winds are light. Timing and placement of features is often off.

6. Watch for changes in synoptic patterns as depicted by the global models (change from trades to light wind, or SE flow to Kona winds, etc.). The global models will often do a better job than the high resolution models with the synoptic scale background flow.

7. Moist layer depth up to 700 hPa or 500 hPa or higher is indicative of a relatively unusually deep moist layer for Oahu and should be considered significant. Generally, top of moist layer in Hawaii is near 750-800 hPa. Moisture fields at 850 hPa and 925 hPa are not as helpful here unless there are airmass boundaries nearby.

8. Approximate PHLI sounding climatology for November: Average 500 hPa T: -8.5°C
   Coldest 5% 500 hPa T: -11.5°C or lower
   Coldest 1% 500 hPa T: -13.1°C or lower
   Average 700 hPa T: +8.4°C (1 sigma = +/- 2.1°C)
   Average TPW: 32.5 mm +/- 7.9 mm (1 sigma) (1.28” +/- 0.31”)

9. “Typical” values for deep convection in Hawaii (use with caution!):
   500 hPa T: -10°C or colder (unless airmass is very moist)
   700 hPa T: +6°C or colder (unless airmass is very moist)
   Total Precipitable Water: 41 mm or higher (unless mid-levels are very cold)
   50 hPa Mixed Layer CAPE: 1000 J/kg or higher (unless forcing is strong)
   Lifted Index: -3 or lower
   K-index: 31
Table 1: Forecast team schedule

<table>
<thead>
<tr>
<th>Dates</th>
<th>Danny Makalena</th>
<th>Anthony Chang</th>
<th>Vanessa Almanza</th>
<th>Andre Pattantyus</th>
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<tr>
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<td>10/27-01</td>
<td>Magnus Haukeland</td>
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<td>11/02-07</td>
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<td>Rachel Johns</td>
<td>Kelly Lance</td>
<td>Liye Li</td>
<td>Tom Robinson</td>
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2.3 Hours of Operation

Intensive Observing Periods (IOPs) will be typically centered on 1800 or 0000 UTC, and will be approximately 6 hours on station. IOPs at non-standard times may occur in the event of interesting weather. Teams will be assigned on a rotating schedule based on availability. On station times are 5am – 11 am (18Z) and 11am – 5pm (00Z). 4-5 person Support Teams will accompany the truck in private vehicles.

HERO Deployment Summary

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<thead>
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<th>ZDR</th>
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<td>Shannon</td>
<td>Bob</td>
<td>Vanessa</td>
<td></td>
<td></td>
</tr>
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<td>Kavina (Backup)</td>
<td>Yu-Du (backup)</td>
<td>Brandon (back-up)</td>
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<td></td>
<td></td>
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<td>Yes</td>
<td>Yes</td>
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</tr>
</tbody>
</table>

2.4 Pre-Operations

Refill radiosonde supplies (4 sondes, 4 dereelers, 4 balloons)
Swap external drive

2.5 Post-Operations

The student teams should ensure that all data is copied from the DOW to an external drive, including radiosonde data. A science report should be prepared by the lead scientist of the day (a rotating position) using the template provided in the appendix. The report should be emailed to Prof. Bell for inclusion on the HERO website. The external drive should be returned to HIG310.
3 Radar characteristics

Table 2: DOW 7 radar specifications.

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<th>Transmitter</th>
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<tr>
<td>Frequency 1</td>
<td>9.35 GHz</td>
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<tr>
<td>Frequency 2</td>
<td>9.50 GHz</td>
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<tr>
<td>Transmitter Type</td>
<td>Magnetron</td>
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<tr>
<td>Peak Power</td>
<td>500 kW</td>
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<tr>
<td>Pulse Length</td>
<td>150 - 2000 ns</td>
</tr>
<tr>
<td>PRF</td>
<td>up to 5000 Hz and staggered</td>
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<td>Nyquist Interval</td>
<td>up to 78 m/s</td>
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<table>
<thead>
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<th>Antenna</th>
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<td>Diameter</td>
<td>2.44 m parabolic</td>
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<tr>
<td>Beam Width</td>
<td>0.93 deg</td>
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<tr>
<td>Peak Scanning Rate</td>
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<tr>
<td>Polarization</td>
<td>H or V</td>
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<tr>
<td>Controller Software</td>
<td>ARC ACU</td>
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<table>
<thead>
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<td>Processor</td>
<td>Pentak</td>
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<tr>
<td>Gates</td>
<td>up to 1000</td>
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<tr>
<td>Gate Length</td>
<td>as low as 15 m with range over-sampling</td>
</tr>
<tr>
<td>Equivalent A/D bits</td>
<td>14</td>
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<tr>
<td>Clutter Filtering</td>
<td>35 dB 4 pole IIR</td>
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<td>Recorded Products</td>
<td>A, B, P, IQ’s</td>
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4 Deployment strategies

4.1 General principles

17 sites around O’ahu have been identified to observe different types of weather conditions. A combination of PPI and RHI scans will be used to observe clouds and precipitation. The default scan mode is “D” as this strategy offers a good balance between range, velocity, and spatial resolution. “H” modes have higher spatial resolution through the use of range over-sampling. “U” modes have unstaggered pulses and lower Nyquist velocities. For a general strategy, PPI scans up to 10 degrees elevation should be used to document the broad local environment. In the event of severe terrain blockage, sector scans may also be used to increase the temporal resolution. As specific cloud features of interest come closer in range, “DH”, “E”, or “EH” modes can be used to collect high resolution data. RHI slices through the clouds are of particular interest to document the vertical structure over time. Longer range scan modes can be used if features of interest are far off-shore.

4.2 Tradewind showers

4.2.1 Windward

The primary sites are Laie, Chinaman’s Hat, Kanehoe, Kailua, Waimanalo, and near Rabbit Island. Scientific interests in this region are on orographic forcing mechanisms and warm rain precipitation processes. Southern windward sites (Waimanalo and Rabbit Island) are primarily for viewing offshore, undisturbed trade wind conditions. Central windward sites (Chinaman’s Hat, Kanehoe, and Kailua) are for studying orographic enhancement of trade wind showers. The northern windward site (Laie) is for orographic precipitation and observing offshore features northeast of O’ahu.
Table 3: DOW scanning modes. Ranges plotted for each deployment site, see Appendix (11.49 km (red), 22.98 km (orange), 45.99 km (yellow), 58.62 km (light green), 73.575 km (dark green), 118.56 km (light blue), 148.5 km (magenta)).

<table>
<thead>
<tr>
<th>Scan Mode</th>
<th>Pulse Width (ns)</th>
<th>PRF</th>
<th>Stagger</th>
<th>Length (m)</th>
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4.2.2 Mauka

The primary sites are Manoa Valley Park and Sand Island. These sites are best for training due to their close location to the Marine Center. They can also be used to document the changes in trade wind showers as they cross the Ko‘olau range. Investigation of which clouds survive and continue to rain on the leeward side or dissipate is of interest.

4.3 Mountain/Valley circulation

The primary sites are Wahiawa and the Central Valley. Scientific interests are on terrain and diurnally induced circulations, particularly those that lead to heavy thunderstorms over the Waianae and Ko‘olau ranges. These sites are preferred on weak trade wind days when a sea breeze and inland convection are expected.

4.4 Frontal passage

The primary sites are North Shore, Kaena Point, Maili, Kapolei, and Sand Island. These sites offer a good view of an approaching front from the southwest or northwest. A two site deployment may also be considered in this case, following the precipitation associated with the front to the windward side.

4.5 No weather

Education and outreach will be conducted in the event of extended clear conditions.

4.6 Special operations: Hurricane or other special weather

Special plans would be discussed for extended operations during a hurricane landfall or other significant weather event.

5 Radiosonde launch

6 Materials

laptop with charger, helium, hose, 4 balloons, cable ties, de-reelers, 4 sondes, antenna, receiver, cords, wire cutters or scissors
7 Set Up

1) Turn on laptop and open PCR receiver software.
2) Set up antenna in an open space where it can see the sonde and the sky, screw in the top
3) From Pelican cases, take the reels of cord and attach both to antenna (make sure input end of silver connector faces towards the antenna)
4) From Pelican case, take the receiver out, attach power cord, antenna cords, laptop, and GPS amplifier (small box)
5) Open and turn on the sonde by plugging it in and switching to the chosen frequency (keep it out of the sun and rain)
6) Check to see if the laptop is getting signal from the sonde on the receiver.
7) On laptop, adjust dial until it is centered between the two peaks, to match the frequency
8) Turn on iMetOS software.
9) Check to see that the sonde is sending accurate ground observations to the screen (use handheld instrument to check)
10) Select "File" -> "New" and record the surface observations, location, ascension and release number, and sonde serial number. Save and ensure that the display reads "Flight Ready".
11) Attach sonde to de-reeler
12) Two people put the balloon neck around the hose and fill it with helium (do not touch balloon other than on the neck)
13) When the balloon is about 5 ft in diameter, test with the weight to see if it has lift
14) When full, seal balloon by folding neck over and using a zip tie (trim ends if needed to keep zip tie from poking balloon)
15) Use another zip tie to attach the de-reeler to the balloon

8 Launching

14) Again check to see that the software is receiving data from the sonde and you have a GPS signal (View -> GPS Information)
15) Find a clear area and let the balloon go while holding the sonde in an open palm (the sonde will be pulled up a few seconds later)
16) The software should start recording data automatically say "Flight in Progress" (if this does not happen within one minute, contact the Professor)
17) Continue to track the balloon and check the quality of incoming data
18) Check frequency and sonde data for adjustments every 15 minutes.

9 Clean Up

19) When the launch is done (balloon burst or lost signal for more than 5 minutes), confirm Termination or press "Stop Flight".
20) Follow procedures to send data to NWS (TBD)
21) Switch off and unplug receiver the receiver
22) Break down the antenna and put it in its case
23) Re-coil the cords and stow them under the seat.
24) Close laptop and put it under the seat.
A Template Mission Summary Report

Author of report:
Participants:
Mission Number:
Type of Mission:
Start of Mission(UTC):
End of Mission(UTC):
Submitted at(UTC):

MISSION REPORT:
1. Scientific background
2. General description of the mission
3. Report on the Scanning strategy
4. Report on the Radiosonde system
B Deployment locations
B.1 Windward Coast

B.1.1 Rabbit Island View
B.1.3 Kaneohe
B.1.5 Chinaman’s Hat
B.1.6 Laie
B.2 South Shore

B.2.1 Winners’ Camp
B.2.2 Hanauma Bay

![Google Earth Map of Hanauma Bay](image1.png)

![Google Earth Map of Hanauma Bay](image2.png)
B.2.3 Sand Island
B.2.4 Manoa Park
B.3 Central Valley/North Shore

B.3.1 Waipio
B.3.2 Wahiawa
B.3.3 Dole
B.3.4 North Shore
B.4 Leeward Coast

B.4.1 Kapolei
B.5 Directions

B.5.1 Laie
- Go to the windward coast (Pali Hwy (61) or H-3) and then go northbound on Kamehameha Hwy (83)
- In Laie, opposite of the market place, turn right onto Anemoku St
- Turn right onto Naupaka St
- Go all the way to the end of the street

B.5.2 Chinaman’s Hat
- Go to the windward coast (Pali Hwy (61) or H-3) and then go northbound on Kamehameha Hwy (83)
- North of Waikane, turn right to Kualoa Beach Park
- Set up in parking lot

B.5.3 Kahaluu
- Go to the windward coast (Pali Hwy (61) or H-3) and then go northbound on Kamehameha Hwy (83)
- North of Kaneohe, turn right onto parking lot (boat park) across from Kahaluu Regional Park

B.5.4 Kaneohe
- Go to the windward coast (Pali Hwy (61) or H-3) and then go northbound on Kamehameha Hwy (83)
- Turn right onto Kaneohe Bay Drive (65)
- Turn left onto Puohala St
- Turn right onto Kulauli St
- Set up towards the end of the road

B.5.5 Kailua
- Go to the windward coast on Pali Hwy (61)
- Turn left onto Kapaa Quarry Rd
- Turn left to the Sports Facilities
- Set up in one of the parking lots

B.5.6 Rabbit Island
- Go to Hawaii Kai on H-1 and then on Kalanianaole Hwy (72) towards Waimanalo
- Set up in parking lot, opposite of Sea Life Park

B.5.7 Winners’ Camp
- Go to Hawaii Kai on H-1
- In Hawaii Kai, turn left onto Lunalilo Home Rd
- Turn right onto Hawaii Kai Dr
- Turn left onto Maunanani St
- Turn right onto Kamehame Dr
- Go all the way to the end of the road
B.5.8 Hanauma Bay
• Go to Hawaii Kai on H-1 and then on Kalanianaole Hwy (72) towards Waimanalo
• Turn right onto Hanauma Bay Rd
• Immediately turn right again towards gated road
• Pass gate (needs key) and set up near the highest point of the ridge

B.5.9 Manoa Park
• Go up University Ave, continue onto Oahu Ave
• Turn right onto Lowrey Ave
• Turn left onto Kaaipu Ave
• Set up in parking lot

B.5.10 Sand Island
• Pass DOW Parking on Sand Island Access Rd (64)
• Go over the bridge and all the way to the end of Sand Island Parkway
• Set up in parking lot

B.5.11 Kapolei
• Go westbound on H-1
• Take exit 2
• Turn left onto Makakilo Dr, continue on Fort Barrette Rd
• Turn left onto Franklin D Roosevelt Ave
• Turn right onto Coral Sea Rd
• Set up next to the road

B.5.12 Maili
• Go westbound on H-1
• Continue on Farrington Hwy (93)
• In Maili, set up in parking lot opposite of Gilipake St and Palakamana St

B.5.13 Kaena Point
• Go westbound on H-1
• Continue on Farrington Hwy (93)
• Turn right onto Satellite Tracking Station Rd (needs permit)
• Set up next to the road near the end of the road
B.5.14 Waipio
- Head north on H-2
- Take exit 2
- Turn left onto Ka Uka Blvd
- Enter Central Oahu Regional Park and go all the way to the end of the road
- Continue on the dirt road, turn left at the first chance and then right

B.5.15 Wahiawa
- Head north on H-2
- Continue on Wilikina Dr (99/803)
- Set up at pullout left of the road

B.5.16 Dole
- Head north on H-2
- Take exit 8 toward Wahiawa
- Merge onto HI-99 N
- Pass the Dole plantation, set up left of the road

B.5.17 North Shore
- Go up to the North Shore on H-2
- Continue on Kamehameha Hwy towards Waimea Bay
- Turn right onto Ashley Rd
- Go up Ashley Rd past the wind turbines
- Set up next to the road