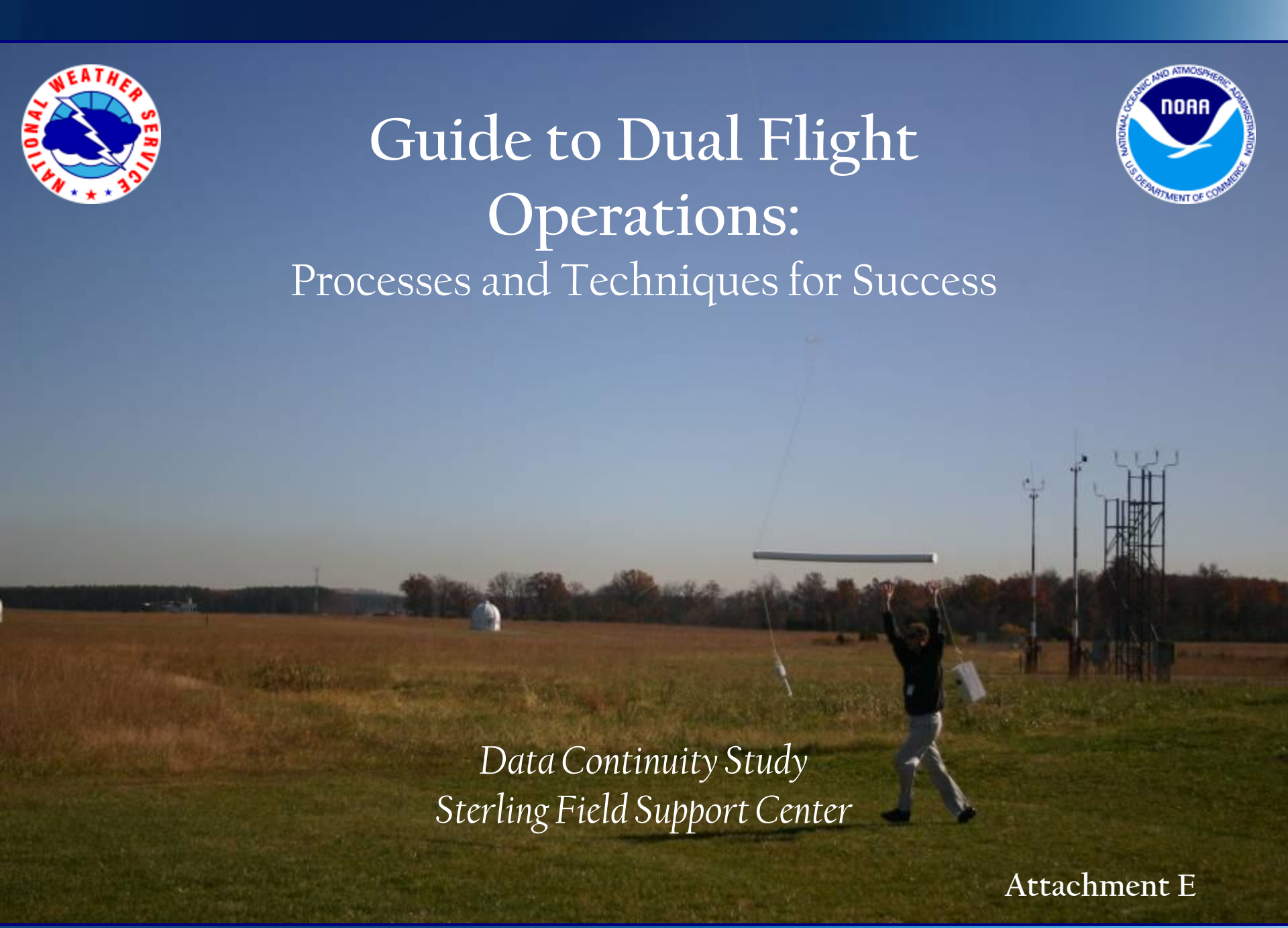
Guide to Dual Flight Operations:

Processes and Techniques for Success



Data Continuity Study
Sterling Field Support Center

Attachment E

Data Continuity Study

The DCS flight configuration will consist of two radiosondes tethered to the same balloon during the 12z and 00z synoptic windows once a week. The day that flights occur will be at the site's discretion; however, once the DCS flights begin, the site should continue with that scheduled day. It is suggested that the scheduled day be a Tuesday, Wednesday or Thursday to alleviate potential holidays.

Sippican B2

Vaisala RS92-NGP

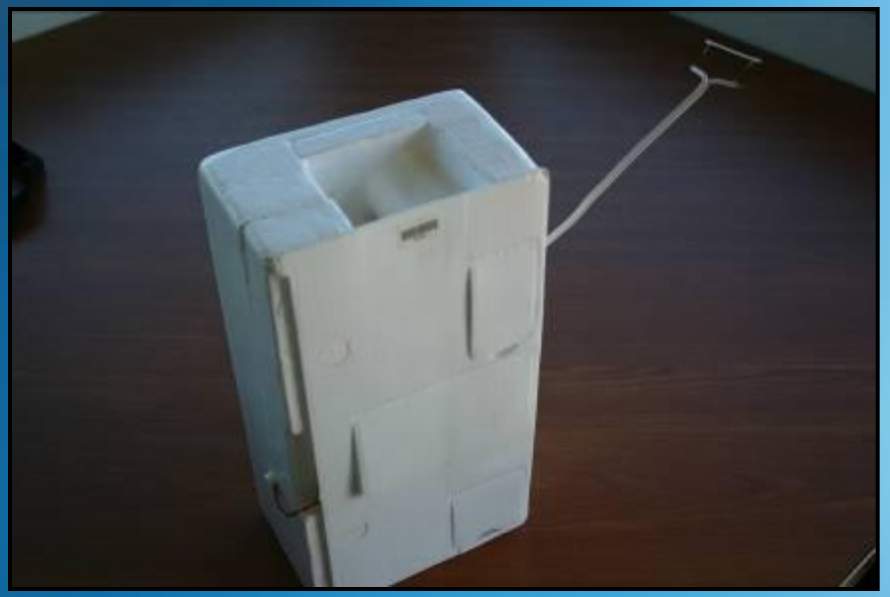
Weights for Flight Bar Assembly

- Balloon
  - 1200 grams
- Vaisala RS92-NGP
  - 305 grams
- Sippican B2
  - 475 grams
- Flight Bar
  - 214 grams
- Parachute
  - 75 grams
- Glow Stick
  - 24 grams

Total Weight of Dual Flight Assembly: ~2392 grams

Setting Radiosonde Frequency

- Because the frequency on the Sippican B2 radiosonde could drift upwards during the flight, set its frequency at 1680 MHz.
- The recommended frequency for the Vaisala RS92-NGP is 1676 MHz. This is Channel 1 (CH1) on the Vaisala Frequency Setting Device.



Radiosonde Preparation

- Prepare the radiosondes according to supplied documentation.
- While indoors, specifically during the baseline process, keep the radiosondes at least 6 feet apart. This will help to eliminate interference between the frequencies.
- Plug in and lock on to the B2 radiosonde prior to powering on the RS92-NGP.

Ground Equipment Preparation

- Important to Remember
  - Allow at least **30 minutes** prior to baseline for the TRS to warm-up. Antenna Orientation Display & Status Messages will indicate "TRS is Ready."
  - Once the Baseline Display window has appeared and started populating, wait at least **5 minutes** before accepting. Time is needed for the sensors to stabilize and for a proper pressure correction to be calculated.
  - Baseline *MUST* be accepted before releasing the balloon. Failure to do so will result in a required termination of the flight.

The following chart lists pressure discrepancy thresholds and orientation of the antenna for the flight:

	Pressure Discrepancy	Antenna - North
TRS	Vaisala RS92-NGP: ± 3 hPa	Azimuth of 0 degrees
MicroART	Sippican B2: ± 5 hPa	Azimuth of 180 degrees

Determining Additional Weight for Balloons

Liquid Precipitation		Freezing/Frozen Precipitation	
Type	Additional Weight (g)	Type	**Additional Weight (g)**
Light	+ 1100-1300 g	Light	+ 1200-1400 g
Moderate	+ 1300-1500 g	Moderate	+ 1400-1500 g
Heavy	+ 1500-1800 g	Heavy	+ 1700-1900 g
No Precipitation: 800-1000 g			

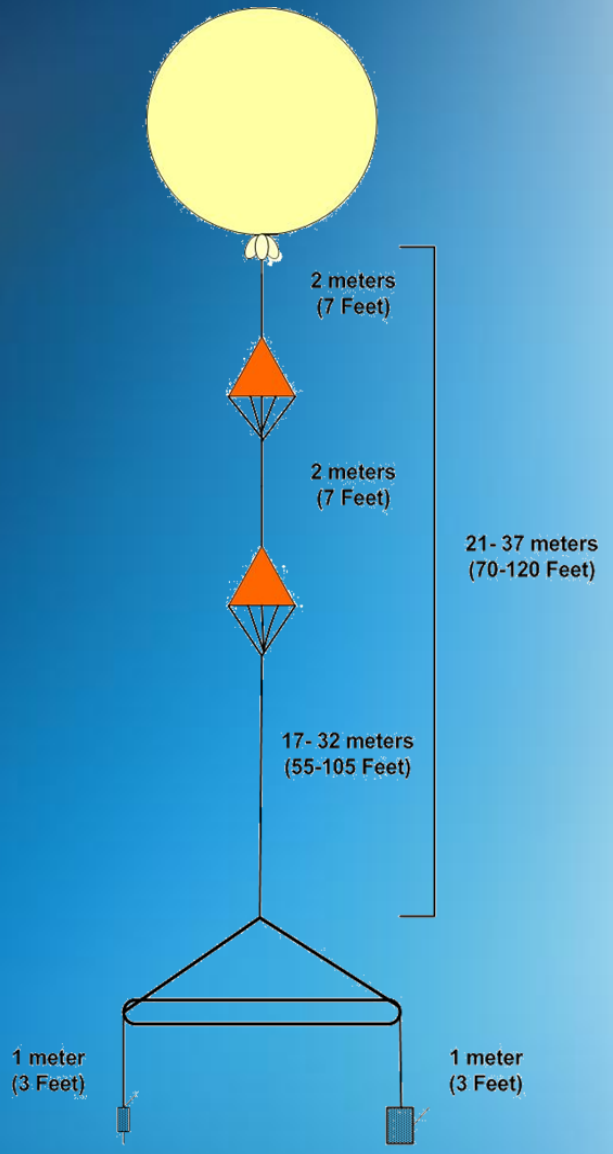
Note: This table is only meant to provide suggested values. Each site might experience different results.

- It is important to determine the appropriate amount of weight to keep ascent rates in target range. The addition of weights should be based primarily upon the present weather conditions.
- If winds are strong, tend towards the higher side.
- Ascension rates should be between 275-350 m/min.
- Be mindful of inflation bay height and other surrounding obstacles when adding weights and filling the balloon!

Determining Train Length

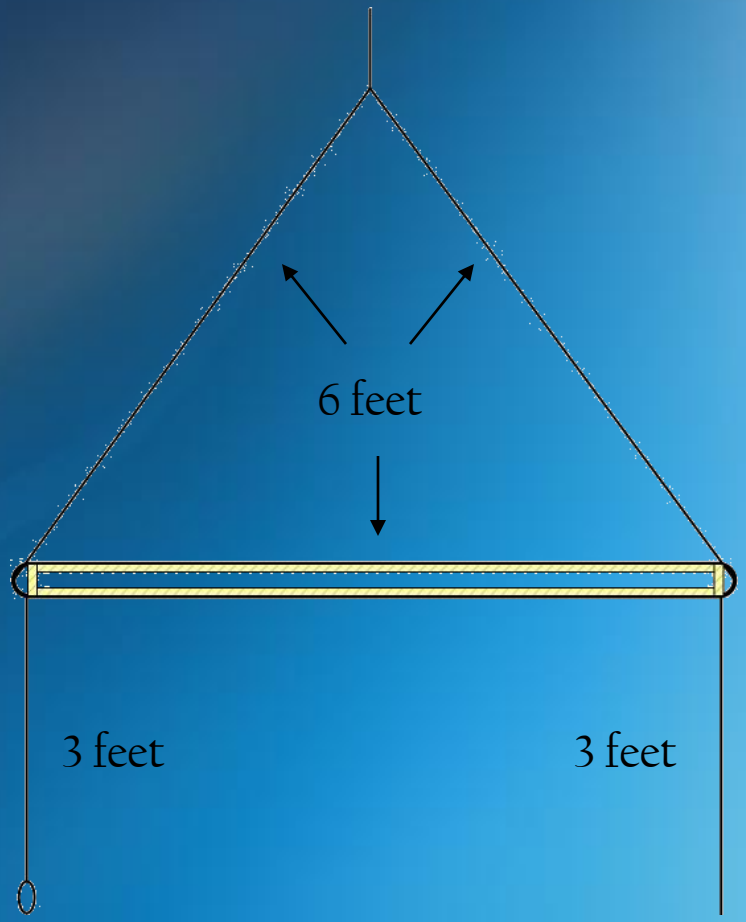
Wind Speed (knots)	Train Length (meters)	Train Length (feet)
0-5	37	120
5-10	27	90
>10	21	70

- Prepare the train using two parachutes when performing a dual flight. The increased weight from an additional radiosonde and a flight bar makes this second parachute necessary to sustain the weight while descending.
- There should be approximately 7 feet between the top parachute and balloon neck, and between the top and bottom parachutes.
- Total train length should be between 70-120 feet. Trains shorter than this length increase the risk of the radiosonde being too close to the heat radiating from the balloon or from the balloon's wake as it ascends.
- No dual flights should be released when winds are greater than 20 knots.



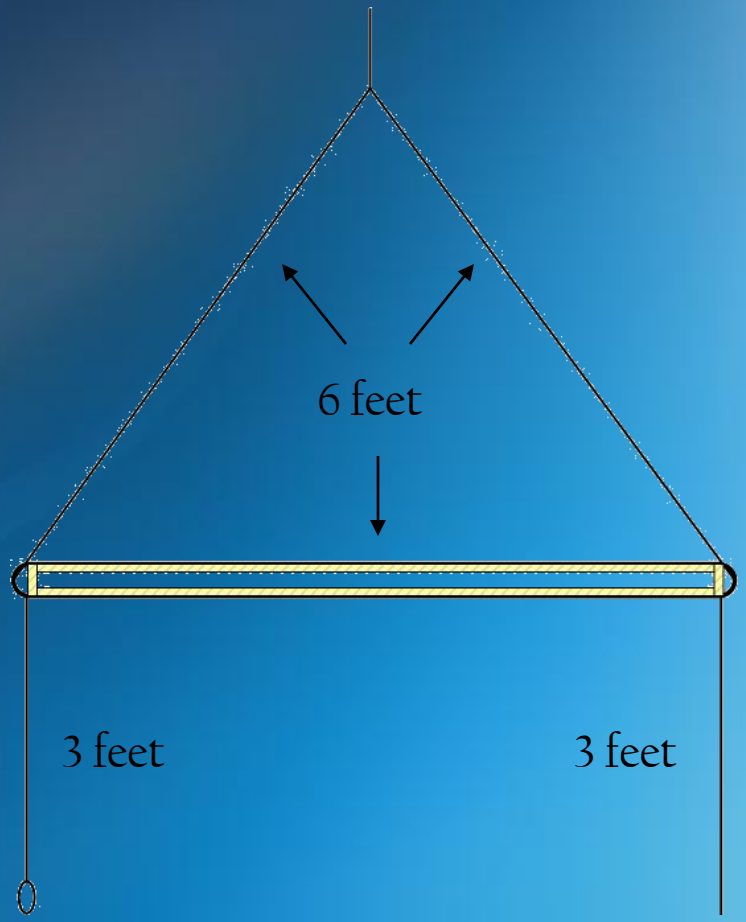
Preparing a Dual Flight Bar

- The flight bar is 6 feet long to allow adequate spacing between the radiosondes.
- Radiosondes are attached 3 feet below the bar to reduce solar influences.
- The entire length of the bar is taped for added strength.
- Additional tape is applied to the ends of the bar to protect the Styrofoam.



Preparing a Dual Flight Bar

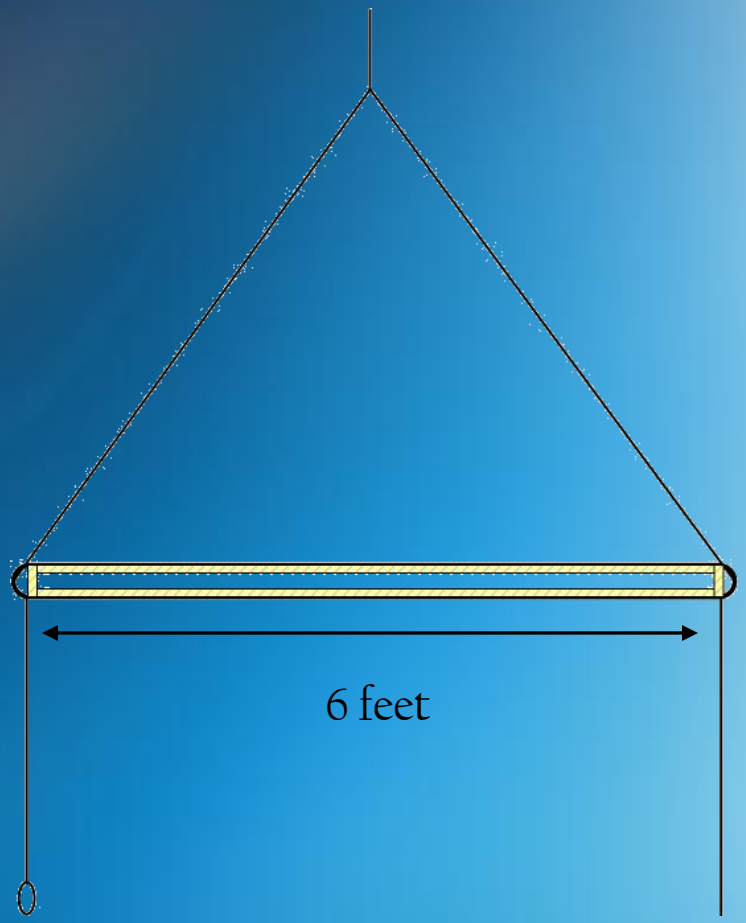
- When preparing the flight train, ensure the radiosondes are hanging at the same height.
- This enables the radiosondes to measure the same atmospheric column, yielding a more precise data comparison.



If Applicable: Call the airport control tower to request flight clearance!

Launching a Dual Flight Bar

- More concern should be taken when launching a dual flight bar. The flight assembly is more likely to become tangled or obstructed during the release process.
- Position the balloon upwind from the radiosondes in order for it to pass overhead. The observers should be facing one another.
- Keep a loose grip on the flight bar, cradling it above and away from the body. Holding the bar tightly will cause the radiosondes and bar to spring/break upon release.
- The observer with the bar should move in the direction of the balloon during release.




1.


2.


3.

Monitoring & Tracking a Dual Flight

RWS

- Utilize the RCDU to ensure frequency has not shifted off the radiosonde and that signal is strong.
- Check the TRS Antenna position and direct it to the appropriate azimuth and elevation.
- Turn AutoTrack and AFC ON.
- When returning to the workstation, check to make sure release was detected (RWS should automatically detect release). Update Surface Observation as necessary.
- Verify release time and update if needed.

MicroART

- Turn on the remote release panel and check for a clean signal.
- Initiate release, then adjust the position to acquire and maintain a lock to the radiosonde.
- Turn AutoTrack and AFC ON.
- At the PC, enter the time the antenna locked onto the radiosonde.
- Verify signal is strong and delete position data up to the point lock-on occurred. Verify the Surface Observation screen as necessary.

Monitoring & Tracking a Dual Flight

- Monitor the flights using displays and plots.
- Always look at Check and Status Messages, incoming meteorological data and verify the ascent rates are realistic (averages approximately **5 m/sec** or **275-350 m/min**).
- Verify RADAT and Coded Messages appear to be correct, especially before message transmission.

Upon Termination:

RWS

- RWS will automatically detect termination.
- Transmit all remaining messages.
- Close the flight, turning OFF the UPS when prompted.
- Make any necessary edits and archive the flight.

MicroART

- MicroART will automatically detect termination.
- Transmit all remaining messages.
- Exit the ART Observation option by typing EXIT at the ?› prompt.
- Remove the Log diskette from the diskette drive and insert the Store diskette currently in use.

General Test Policies

- The Vaisala RS92-NGP radiosonde will serve as the operational sounding when the dual flights take place. It is necessary that erroneous data in RWS be marked according to operational practices in order to maintain quality control.

- MicroART products will not be transmitted but will be archived using existing procedures. Edits to the MicroART data are not required but are desirable if not impacting operations.

- Both the RWS and MicroART flights should be archived according to current methods in use at each individual site.

Additional Test Policies

- No second releases will be performed for a dual flight
  - If the B2 radiosonde fails and the RS92-NGP does not, continue to fly until termination occurs.
  - If the RS92-NGP fails to make 400 hPa, follow station policy for a second release **without** the B2.
  - Missed or unsuccessful DCS flights will be appended to the end of the test period.
  - Continue the 7-day interval until 120 good paired flights are acquired.

- Criteria that qualifies a successful flight:
  - Minimum pressure requirement of 30 hPa
  - Target pressure of 10 hPa

Additional Test Policies

- If it becomes apparent that two or more consecutive test flights will be missed, the SFSC should be notified. All missed flights will be recorded on the DCS web site. Plausible reasons for missing a test flight are as follows:
  - Office operations would be adversely impacted if site performs DCS flight as scheduled.
  - Conditions exist which may result in injury to personnel or property if the DCS flight is attempted.
  - One or both ground stations are working improperly.
  - Weather conditions are such that a successful release would not be likely.
  - At the request of the SFSC or NWSHQ.

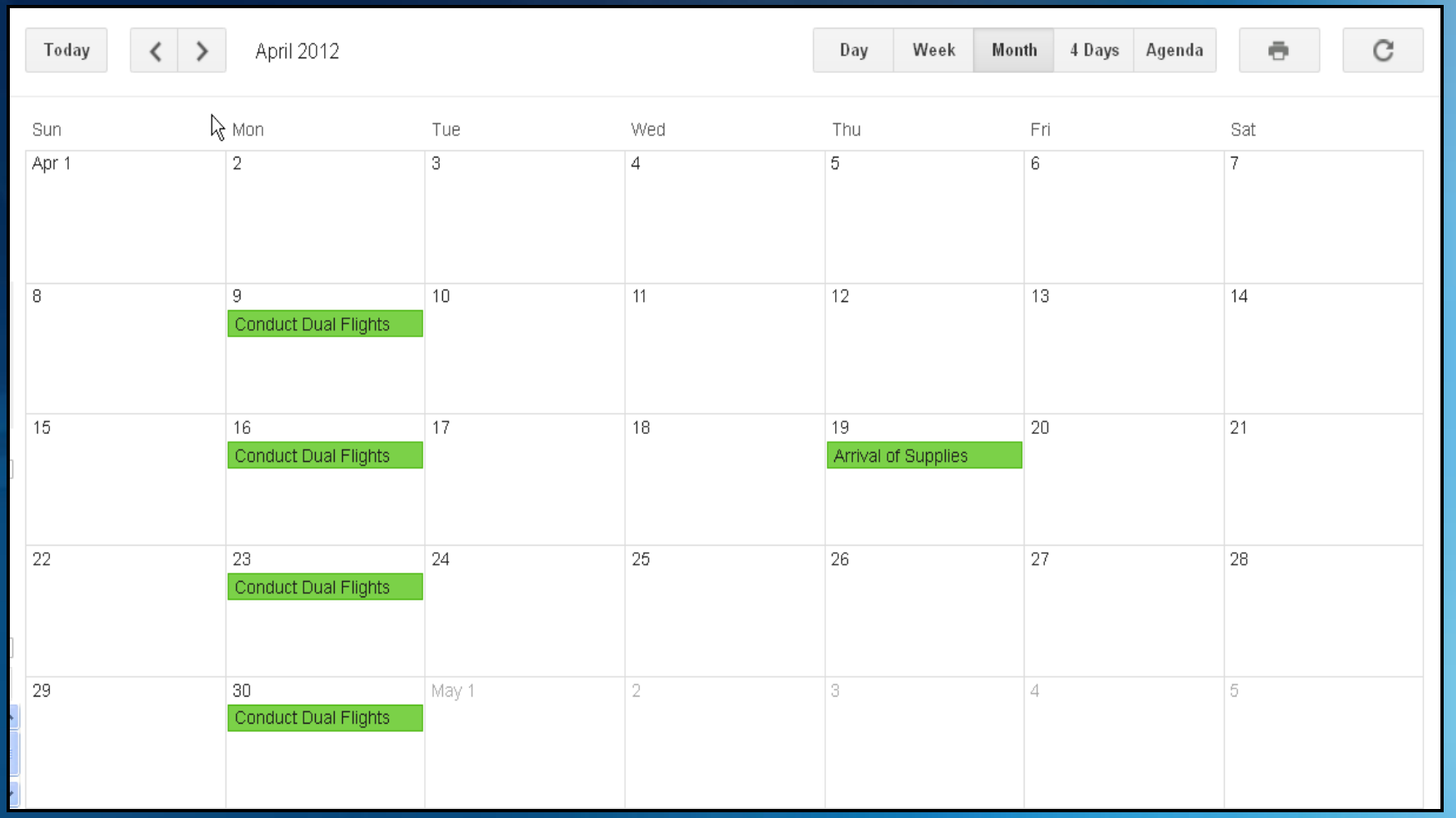
Delivery Schedule For SFSC Supplied Resources

- Initial supplies will be shipped to each site 60-90 days prior to the start of DCS
- Additional resources will be sent every 90-120 days
    1. Radiosonde Test Stand (one time)
    2. Flight spreader bars
    3. Balloons
    4. Extra Parachutes

Monitoring of Activities

- A schedule for each site will be created in order to keep track of scheduled flight days, arrival of supplies, and other reminders for both the site and SFSC.
- Monthly progress reports will be issued and available via the Web.

Google Calendar Example



Field Support Resources

- SFSC Guides to Dual Flight Operations
  - "Preparing & Releasing a Dual Flight Bar" Procedures
  - RS92-NGP and Dual Flight Performance Checklist
  - "Techniques & Processes for Success" Training Presentation
  - "Vaisala RS92-NGP Preparation and Performance" Training Presentation
- DCS Training Video
  - "How to Perform a Successful Dual Flight"
- DCS Website
  - http://www.nws.noaa.gov/ops2/ops22/sfsc%20html/DCS_new.htm
- SFSC Helpdesk Operations

NWS Sterling Field Support Center

The NWS Sterling Field Support Center serves to provide operational assistance to National Weather Service field personnel with questions that pertain to the operation of a new RWS system, including pre-flight and flight assistance during synoptic soundings. The SFSC assists users in order to ensure continuity in understanding of the RWS system and quality data collection among all operating deployment sites.

Hours of Operation

M-F

10:00-02:00 UTC

Excluding Holidays

Contact

(703) 661-1268

(703) 661-1293