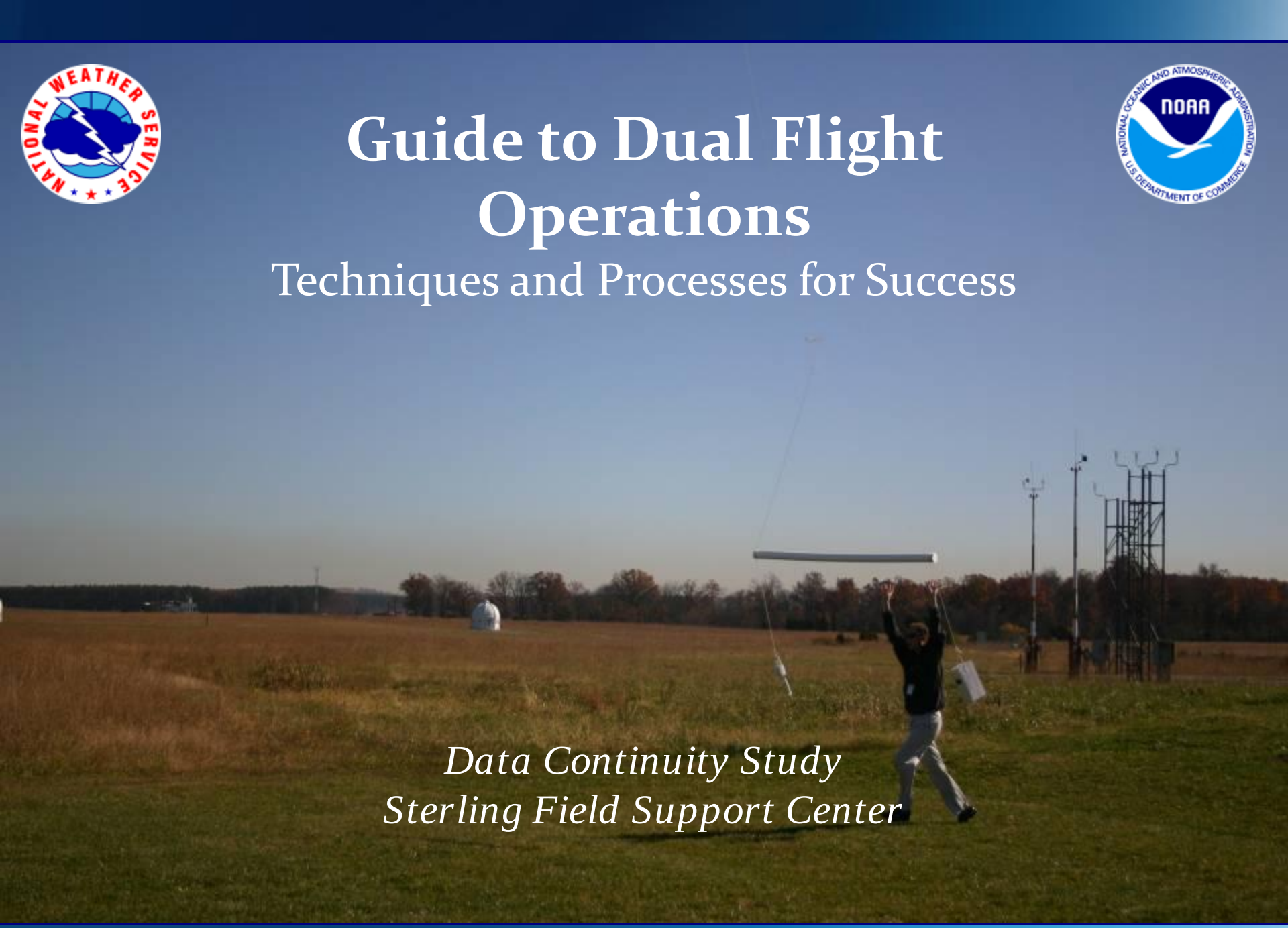
Guide to Dual Flight Operations

Techniques and Processes for Success



Data Continuity Study
Sterling Field Support Center

Data Continuity Study

The DCS flight configuration will consist of flying two radiosondes on 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 must continue with that scheduled day.

Sippican B2

Vaisala RS92-NGP

Weights for Bar Assembly

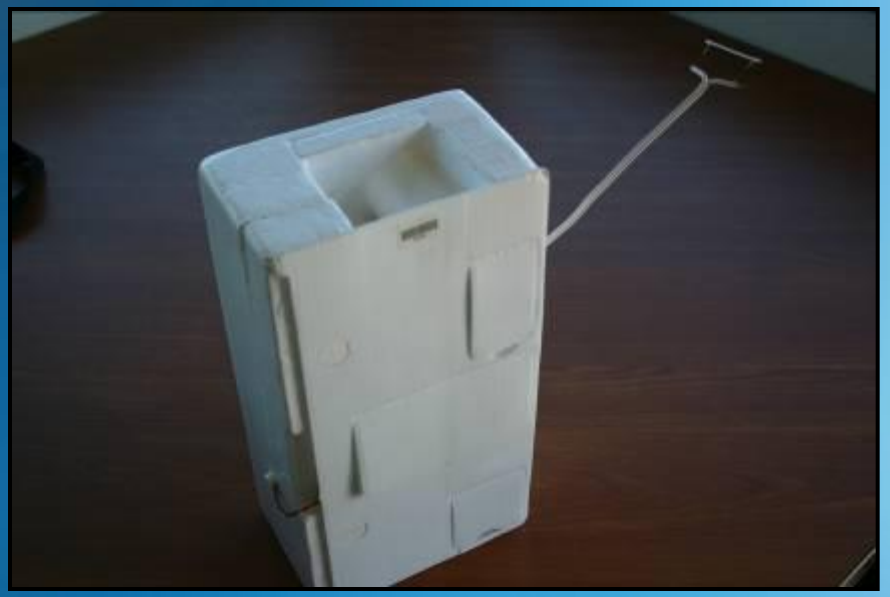
- Balloon
  - 1200 grams
- Vaisala RS92-NGP
  - 305 grams
- Sippican B2
  - 475 grams
- Flight Bar
  - 214 grams
- Parachute
  - 75 grams
- Light Stick
  - 24 grams

-Use of steel dereelers is being investigated-

Total Weight of Dual Flight Assembly: ~2392 grams

Setting Radiosonde Frequency

- Because the frequency on the Sippican B2 radiosonde tends to drift upwards during the flight, set its frequency at **1680** MHz.
- The recommended frequency for the Vaisala RS92-NGP is **1676** MHz.



Radiosonde Preparation

- Prepare the radiosondes according to supplied documentation.
- While inside, 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.

The following chart lists pressure discrepancy thresholds and orientation of the antenna before and during 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

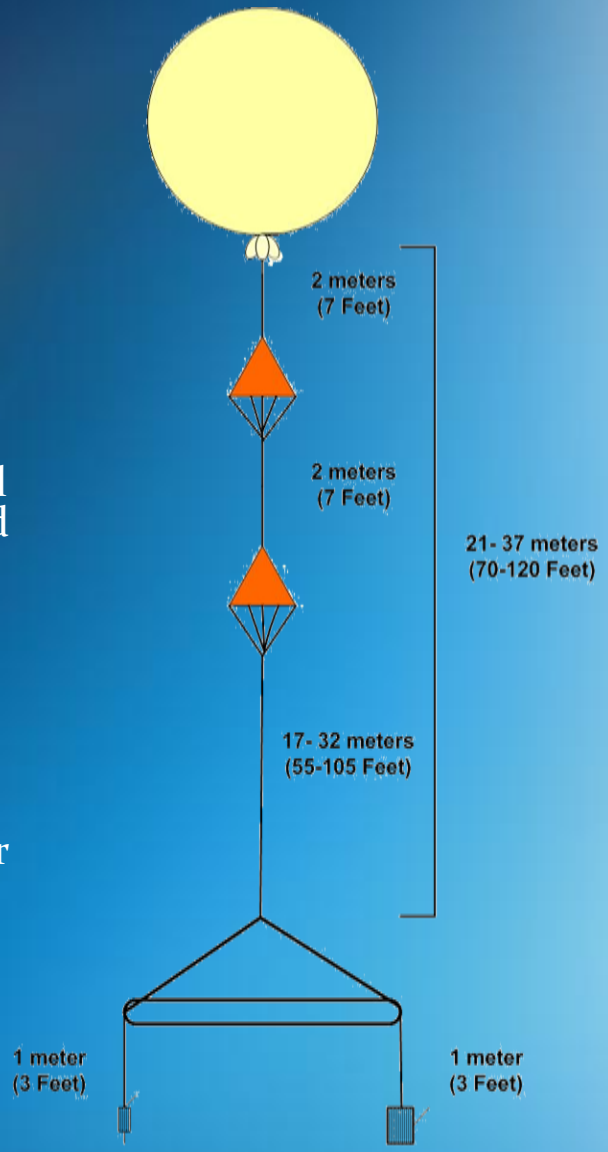
Liquid Precipitation		Freezing/Frozen Precipitation	
Type	**Additional Weight (g)**	**Type**	**Additional Weight (g)**
Light	+ 1100-1300 g	Light	+ 1200-1400 g
Moderate	+ 1300-1500 g	Moderate	+ 1400-1500 g
Heavy	+ 1500-1800 g	Heavy	+ 1700-1900 g
No Precipitation: 800-1000 g			

- 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

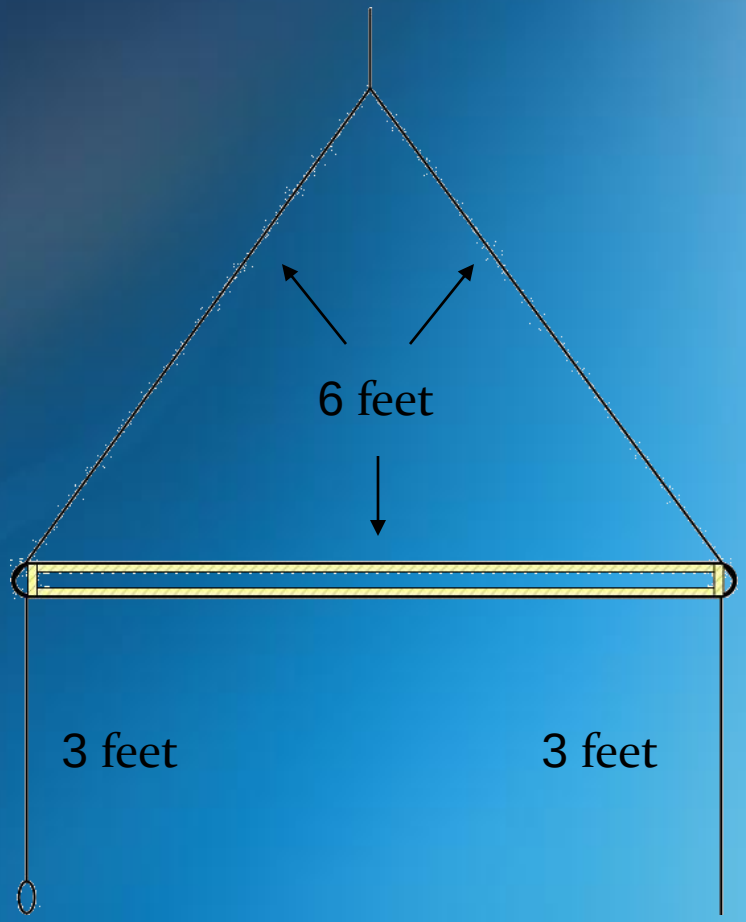
Wind Speed (knots)	Train Length (meters)	Train Length (feet)
0-5	37	120
5-10	27	90
>10	21	70

- 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 when descending.
- There should be 7 feet from the first parachute and balloon neck and from the first parachute to the second.
- Total train length should be between 70-120 feet. Trains shorter than this length increase the risk of the radiosonde being too close to heat radiating from the balloon or of encountering the balloon's wake as it ascends.
- No dual flights should be released when winds are >25 knots.



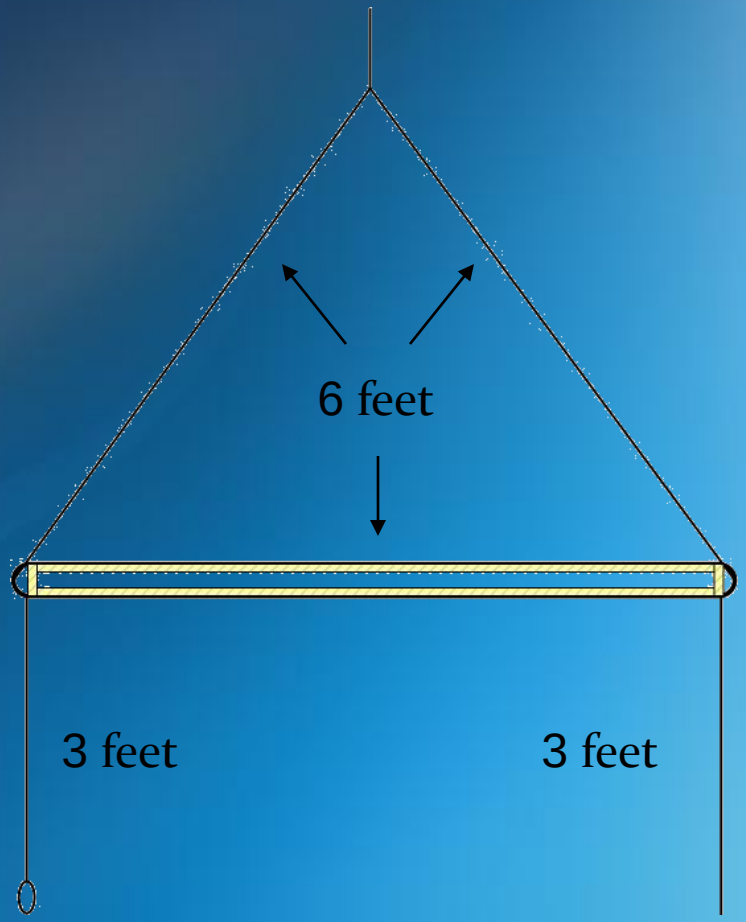
Preparing a Dual Flight Bar

- The flight bar is 6 feet long to allow adequate space 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

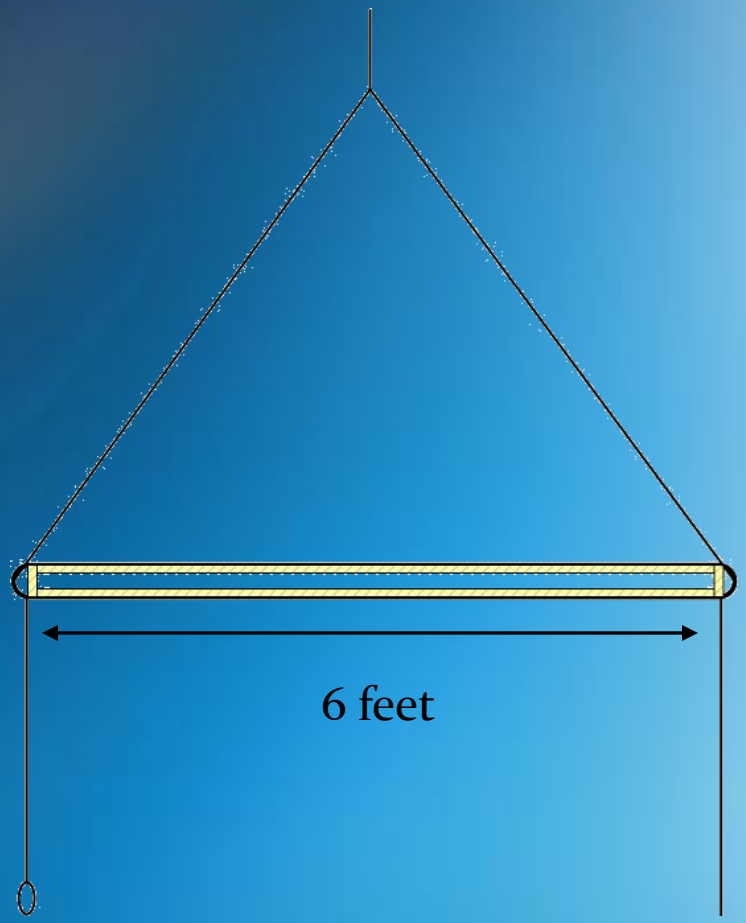
- When preparing the flight train, ensure the radiosondes are hanging at the same height.
- This enables the radiosondes to collect data at the same points and time, yielding a more precise data comparison.



<u>If Applicable:</u> Call the airport control tower to request flight clearance!

Launching a Dual Flight Bar

- More concern should be taken when releasing a dual flight bar. The flight bar with attached radiosondes are more likely to become tangled or obstructed during the release process.
- Keep the bar and radiosondes as level as possible during the release.
- Do not grip the bar tightly as this will cause the radiosondes and bar to spring/break upon 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.

- Edits to the MicroART data are not required but are desirable if no impacts to operations occur.

- 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 the balloon bursts.
  - If the RS92-NGP fails to make 400 hPa, follow station policy for a second release **without** the B2.
  - If one of the synoptic flights in the normal sequence fails, perform the next scheduled flight.
  - 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

Public page which will provide training resources (videos, documents, etc.) and vendor supplied documentation

Public page which will provide general information on the Data Continuity Study

Resources for Performing a Dual Flight

Site Login

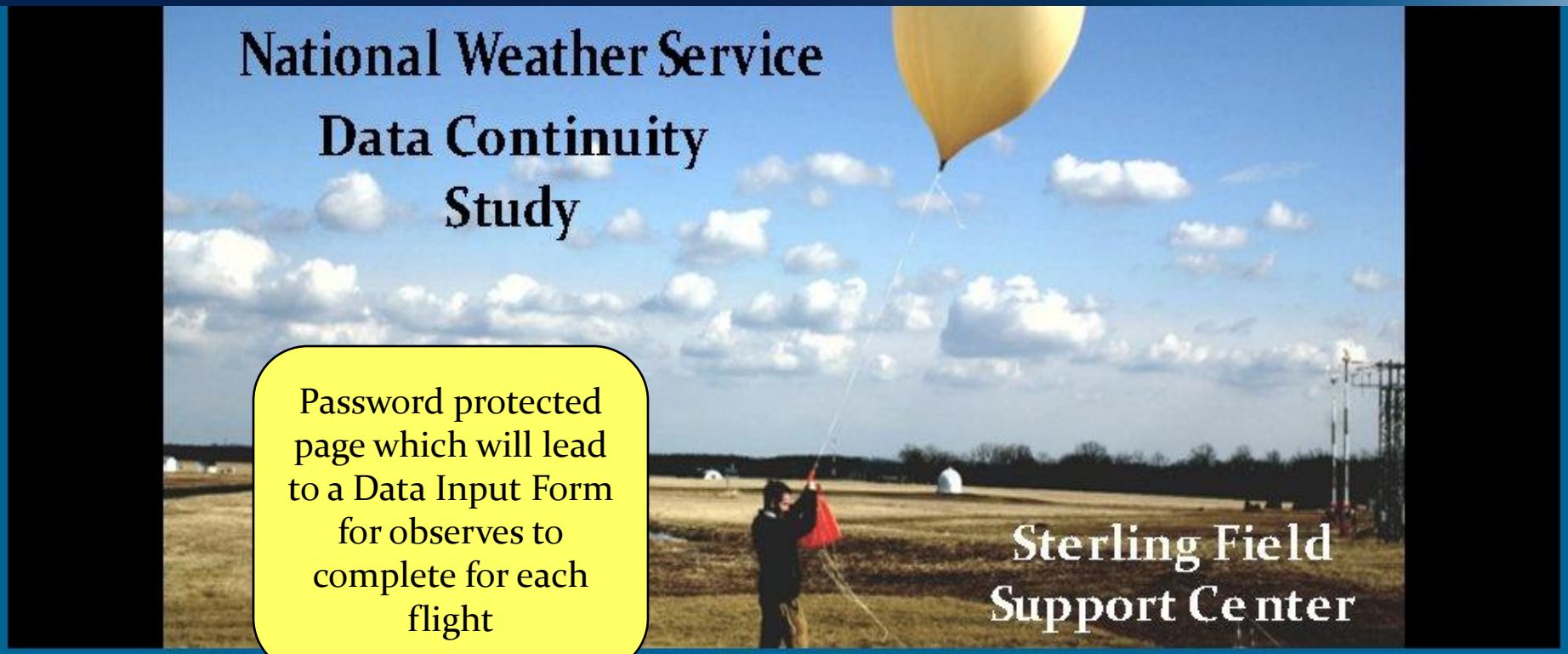
--Select Site Location-- GO

General Test Information

Radiosonde observation systems have become one of the largest and most respected sources of upper air information, supplying an abundance of data which is an extremely valuable resource to the National Weather Service and other meteorological resources around the world. These balloon borne instruments provide observations on pressure, ambient temperature, relative humidity, and wind speed and direction and are understood to be a source of quality upper air data. Through these instruments, the understanding and evaluation of atmospheric processes has dramatically improved. The National Weather Service has conducted extensive tests on the new generation of "climate-quality" radiosondes that will be used during this study to insure accurate climate and meteorological monitoring of the upper atmosphere.

With intentions of acquiring reliable and thorough data sets, the National Weather Service has established the Upper Air Data Continuity Study in order to assess climate variability and change. Data continuity is defined as the compatibility of past, present and future data in a manner from which observational records are free of inhomogeneities resulting from instrument changes, launch and sampling procedure changes, or data processing changes. The Upper Air Data Continuity Study will be useful for understanding the relationship between climate variation and change due to measurement error. The DCS flight configuration will consist of flying two radiosondes on the same balloon every four days during the 00z and 12z synoptic windows utilizing the RRS and MicroART tracking systems. This study is projected to last approximately one year and will entail a data collection process at four appointed sites: Sterling, Virginia, Caribou, Maine, Barrow, Alaska and Barrigada, Guam.

The study needs to determine what component of the total change seen in the climatic data is a result of true climatic variation and what component is related to sensor characteristics changes due to change in sensor technology, algorithm change, and new processes and procedures. This approach will allow for the elimination of other factors when analyzing climate change, including seasonal and annual effects and measurement error.



Password protected page which will lead to a Data Input Form for observes to complete for each flight

Resources for Performing a Dual Flight

Site Login

--Select Site Location-- GO

General Test Information

Data Continuity Input Form
Sterling, VA

Observer:

Release Date:

Release Time:

Weather Code:

RRS Data Input

RS92-NGP Serial Number:

Termination Pressure: 30 hPa

Termination Reason: Balloon Burst

MicroART Data Input

B2 Serial Number:

Termination Pressure: 30 hPa

Termination Reason: Balloon Burst

Termination Information

Flights Terminated Simultaneously

Comments:

Submit

- Form layout is subject to change -

Delivery Schedule For SFSC Supplied Resources

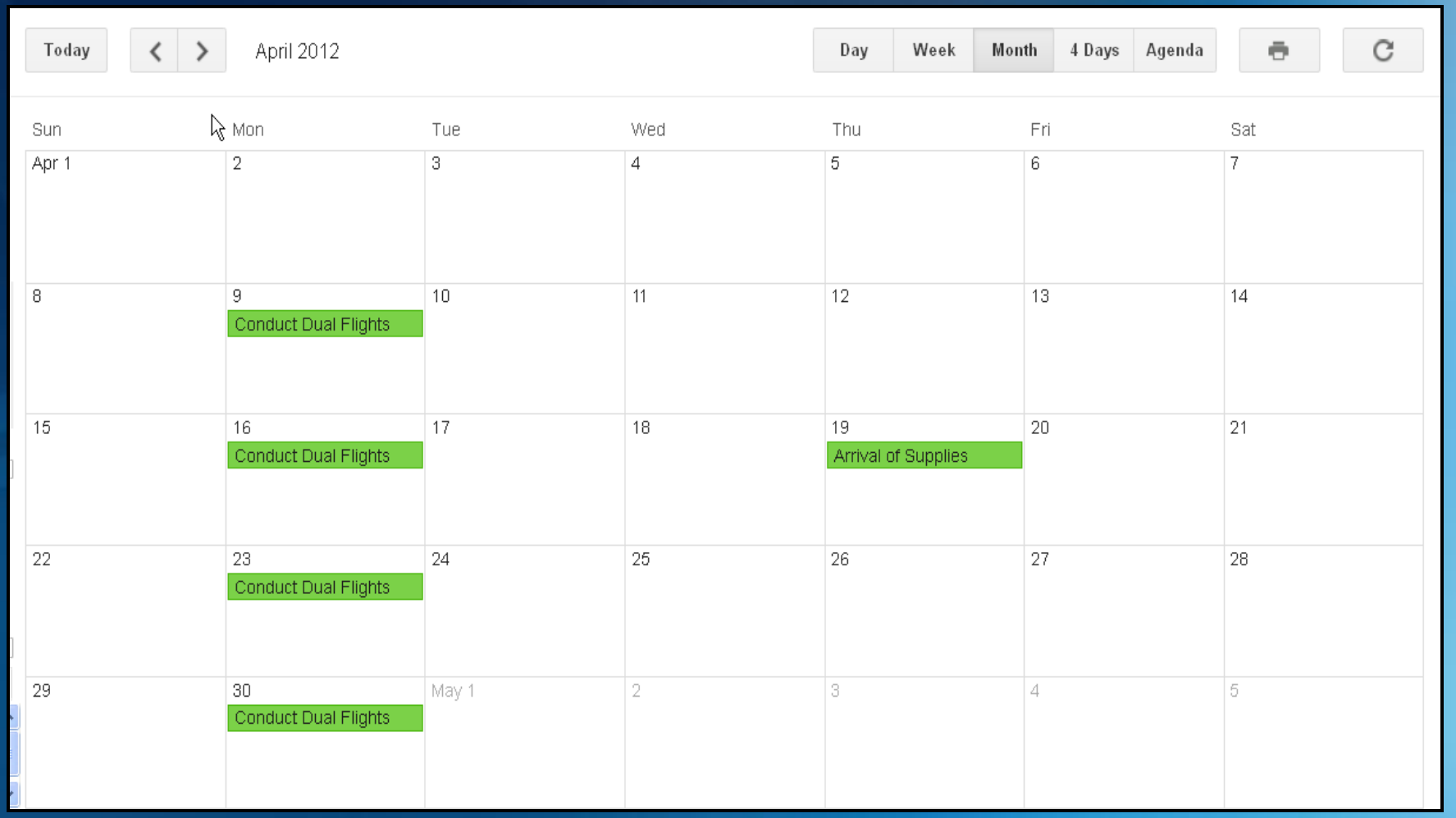
- Initial supplies will be shipped to each site 60-90 days prior to the start of DCS
- Additional resources will be sent every 90-120 days
    1. Radiosonde Test Stand (one time)
    2. Flight spreader bars
    3. Balloons
    4. Extra Parachutes

- 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.

Monitoring of Activities

- A Web based 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
  - Dual Flight Performance Checklist
  - "Techniques & Processes for Success" Training Presentation
- DCS Training Videos
  - "How to Perform a Successful Dual Flight"
- DCS Website
- SFSC Helpdesk Operations

NWS Direct Field Support

The NWS Direct Field Support Help Desk 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 Radiosonde Replacement System (RRS) Help Line 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

No Holidays

Contact

(301) 713-9800
(703) 661-1293