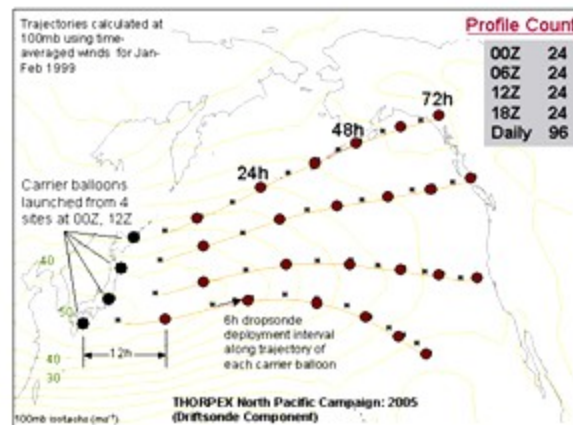
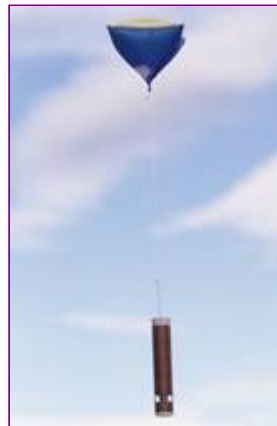


# Driftsonde Observing System Overview

**National Center for Atmospheric Research  
Earth Observing Lab  
Boulder, CO**

## Driftsonde Group

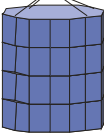
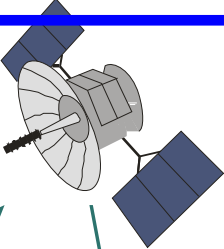
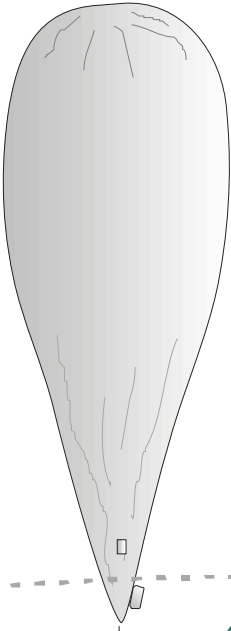
Terry Hock, Jack Fox, Keith Romberg  
Hal Cole, Mark Bradford, Joe VanAndel, Dean Lauritsen



# Driftsonde System Concept Balloon Based Dropsondes

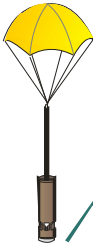
Zero-pressure  
or  
Super Pressure  
Balloon

IRIDIUM  
LEO Satellite



~58,000 ft  
50 - 100 mb

Sondes  
Commanded  
for Release



Gondola  
(20 to 50 sonde capacity)

NORTH  
AMERICA

ATLANTIC OCEAN

EUROPE

**Cost-effective dropsonde observations of wind, temperature, and humidity to fill critical gaps in coverage over oceanic and remote arctic and continental regions over days to weeks.**

# Miniature In-situ Sounding Technology (MIST Sonde)



## MIST Dropsonde

Sensors:

GPS Winds & Altitude via GPS receiver

Vaisala RS-92 PTU Sensors

Temperature

Pressure

Humidity

Sensor measurement rate:

2 Hz PTH data

4 Hz Wind data

Fall time: ~ 20 minutes from 40 mb

Fall Velocity: ~50 m/s @ 40 mb

~10 m/s @ sea surface

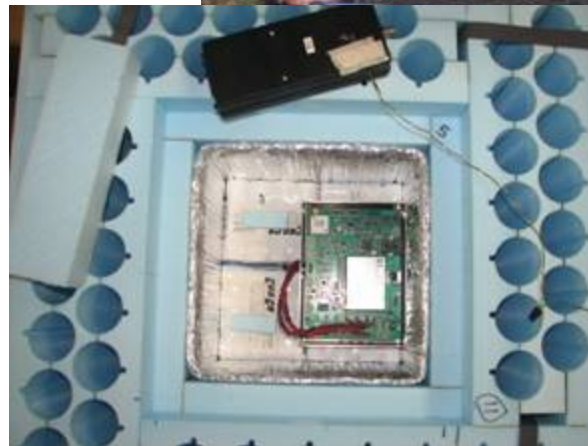
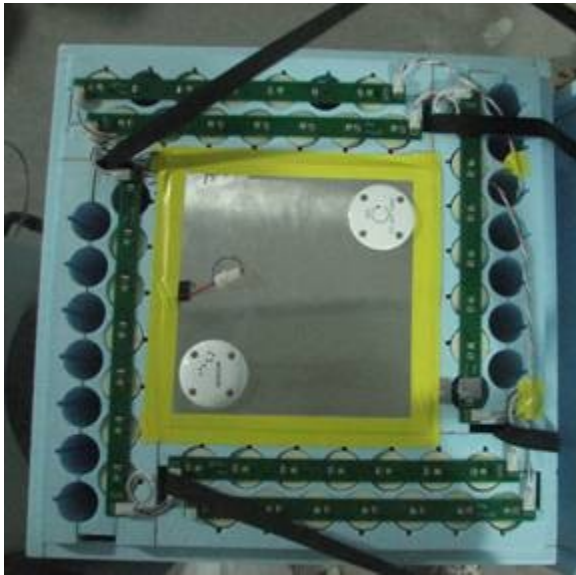
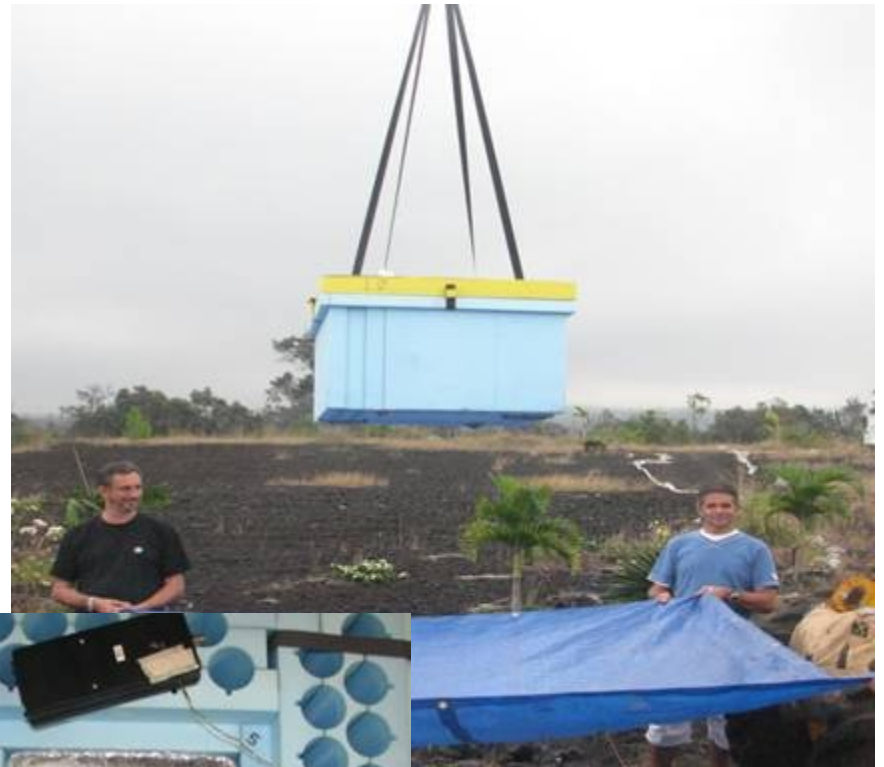
Size: 4.4 cm diameter

30.5 cm length

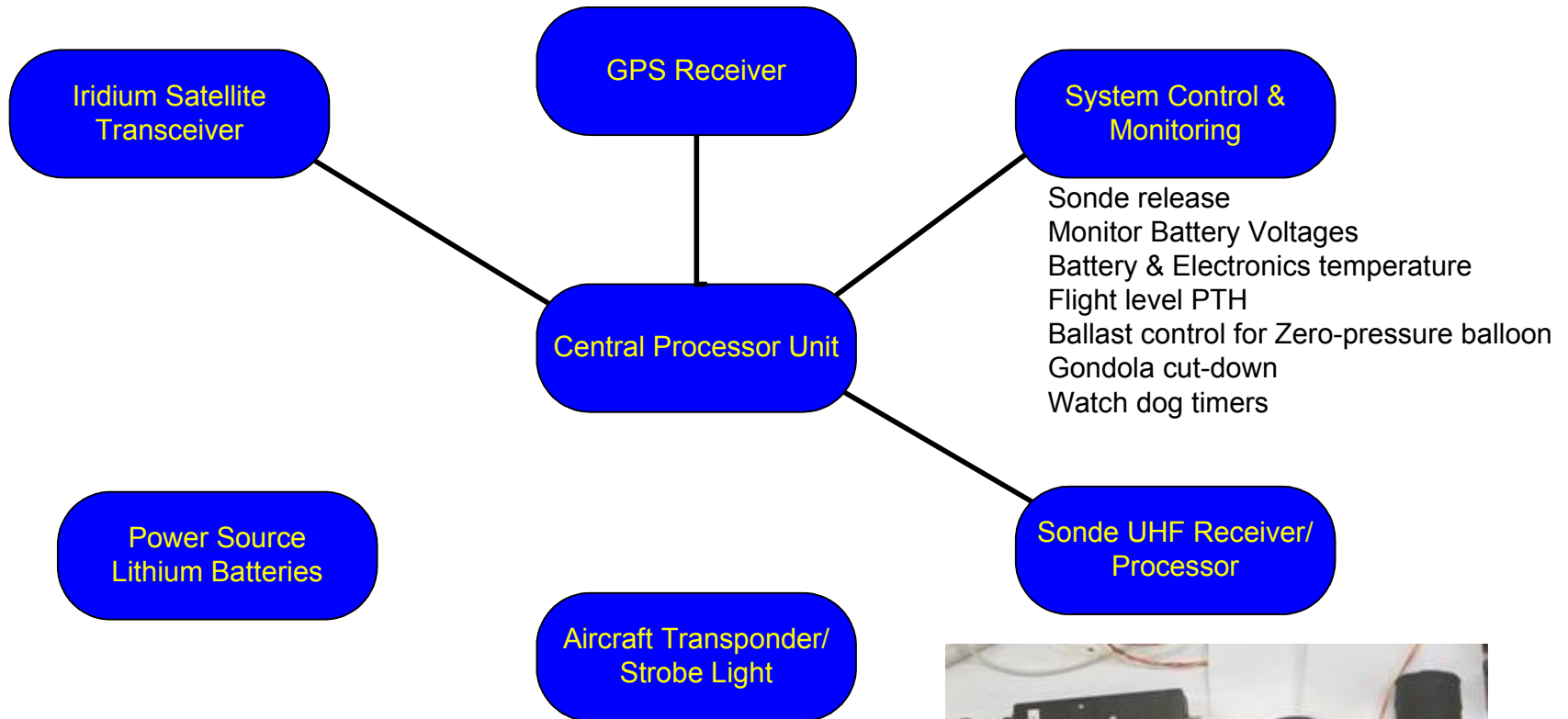
Mass: 175 grams

# Driftsonde Gondola

- Sonde Capacity: 54
- Mass: ~24kg
- Size: 71 cm x 71 cm x 45 cm
- Power: Lithium SO<sub>2</sub> Batteries
- Construction: Blue Core Foam
- Operational Life: ~ 6 weeks

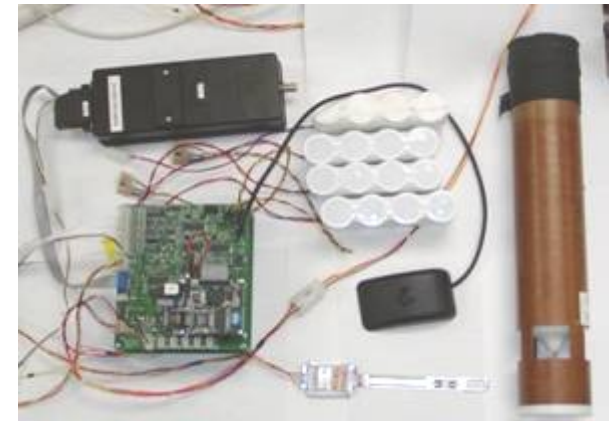


# Driftsonde Gondola Overview

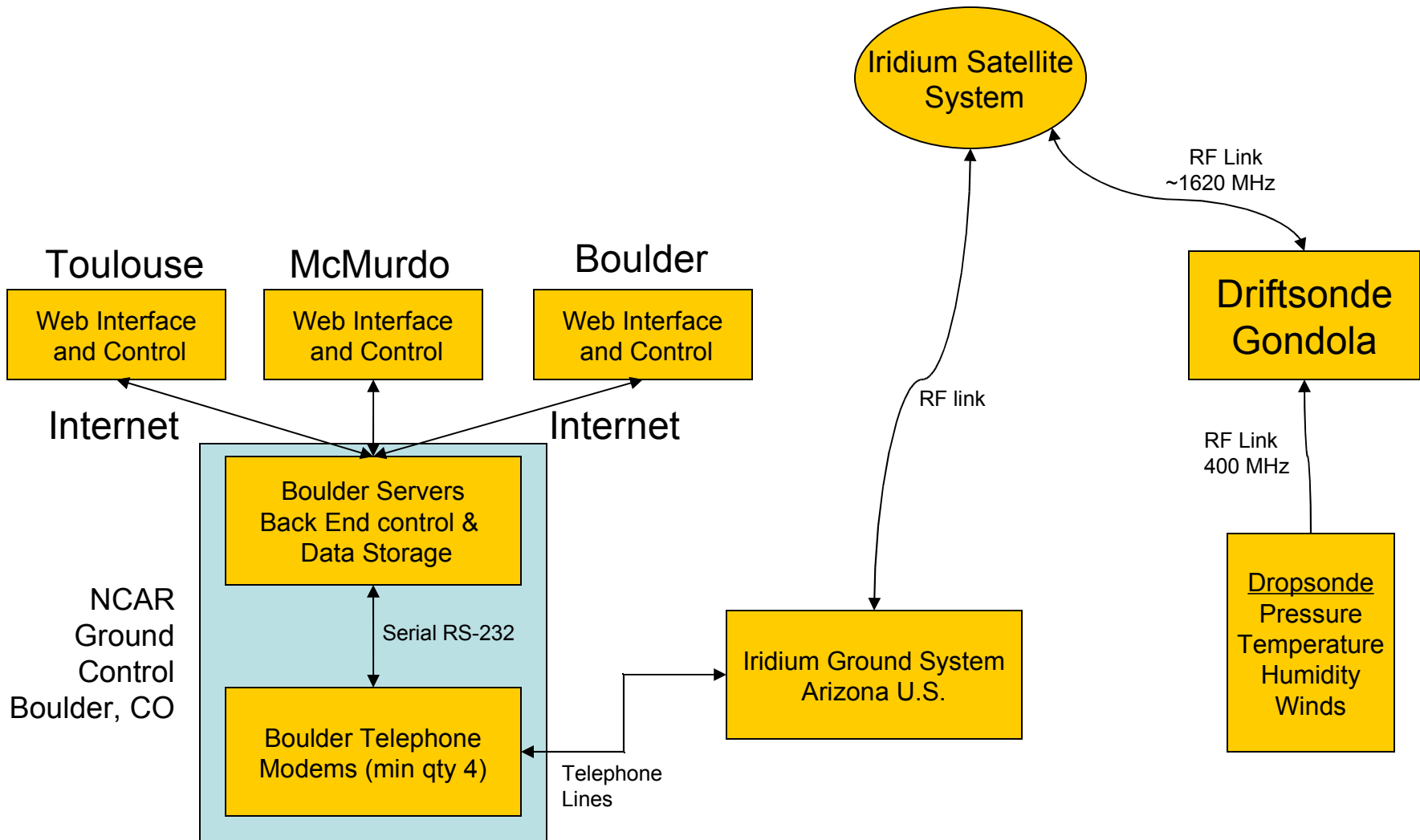


## Design Criteria

- Low Cost – Expendable Sounding System
- Low Power
- Robust High Reliability (unmanned instrument)
- Physically small - Lightweight
- Easily Deployable
- Operation in harsh environment (similar to a satellite)



# Driftsonde System Control & Data Flow



# Driftsonde WEB page Control and Data Display

**Earth Observing Laboratory**  
The National Center for Atmospheric Research

Gondola: 
Record count limit: 
Units: 

[Change Password](#) | [Log Out](#)

User	Gondola	Current time	Reset time	Lat	Lon	Alt	Latest contact
Terry Hock	T-PARC Driftsonde: TF16d27	12/10/08 08:15:11 UTC		17.399921	152.604684	2,466 m	09/29/08 11:45:54 GMT ( 2 months )

## Sounding control

Gondola	Lat	Lon	Alt	Up for	Gondola local solar time	Sondes avail	Reset in	Sonde status
T-PARC Driftsonde: TF16d27	17.399921	152.604684	2,466 m	2 months	12/10/08 18:25	0	Unknown	Inactive

Current drop limit: 8

## Sondes for T-PARC Driftsonde: TF16d27

Sonde Id	AVAIL	DROPPED	FAILED	Drop Time	Location	Files					GTS	Map	Comment
						CSV	D-file	ESF	Skew-T				
<a href="#">04E0AFEa</a>		X		09/23/08 18:04:59	19.2868 -156.142	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [smalvig] <a href="#">Edit</a>	
<a href="#">04E0B000</a>		X		09/23/08 23:55:21	19.9645 -161.137	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [jenni] <a href="#">Edit</a>	
<a href="#">04E1E50A</a>		X		09/24/08 06:11:18	20.3265 -164.129	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [smalvig] <a href="#">Edit</a>	
<a href="#">04E1E702</a>		X		09/24/08 12:06:16	20.4634 -168.052	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [smalvig] <a href="#">Edit</a>	
<a href="#">04E0AFFf</a>		X		09/24/08 15:08:22	20.7549 -170.065	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [smalvig] <a href="#">Edit</a>	
<a href="#">04E1E6F2</a>		X		09/24/08 19:59:48	20.7802 -172.138	<a href="#">View</a> <a href="#">Download</a>		<a href="#">Upload</a>	<a href="#">Upload</a>		<a href="#">Upload</a>	Error creating D-file - please check if CSV file is valid. Stuck Sonde did not release. [thock] <a href="#">Edit</a>	
<a href="#">04E1E792</a>		X		09/24/08 21:54:57	20.8849 -173.037	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [julia] <a href="#">Edit</a>	
<a href="#">04E1E74F</a>		X		09/24/08 23:57:02	20.9642 -175.098	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [julia] <a href="#">Edit</a>	
<a href="#">04E1E7E8</a>		X		09/25/08 02:59:28	21.065 -177.004	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [julia] <a href="#">Edit</a>	
<a href="#">04E1E704</a>		X		09/25/08 05:59:23	21.3566 -179.092	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Download</a>	<a href="#">View</a> <a href="#">Upload</a>	<a href="#">View</a> <a href="#">Upload</a>		<a href="#">View</a> <a href="#">Upload</a>	Sounding good. Sent to GTS. [jenni] <a href="#">Edit</a>	

Done

# T-PARC Driftsonde Operations

August 15 – Sept 26 2008

Big Island of Hawaii

Joint project with CNES Ballooning Partner– Toulouse France

15 CNES personnel on site, NCAR 2 staff, NSC 2 staff

## Goals

- 17 Flights
- 38 sondes/flight
- 6 week operation period
- NPS staff/students operate system via WEB
- Send data to GTS quasi real time
- Drop 646 Sondes (38x17)

## Reality (Preliminary)

- 16 Balloons Launched
- 2 Balloon failures
  - Flight #5 & #8
- 1 Gondola Electronics hardware failure
  - Flight #7
- 13 Good Flights
- 253 Good Soundings
- Averaged ~19.5 good sondes/flights

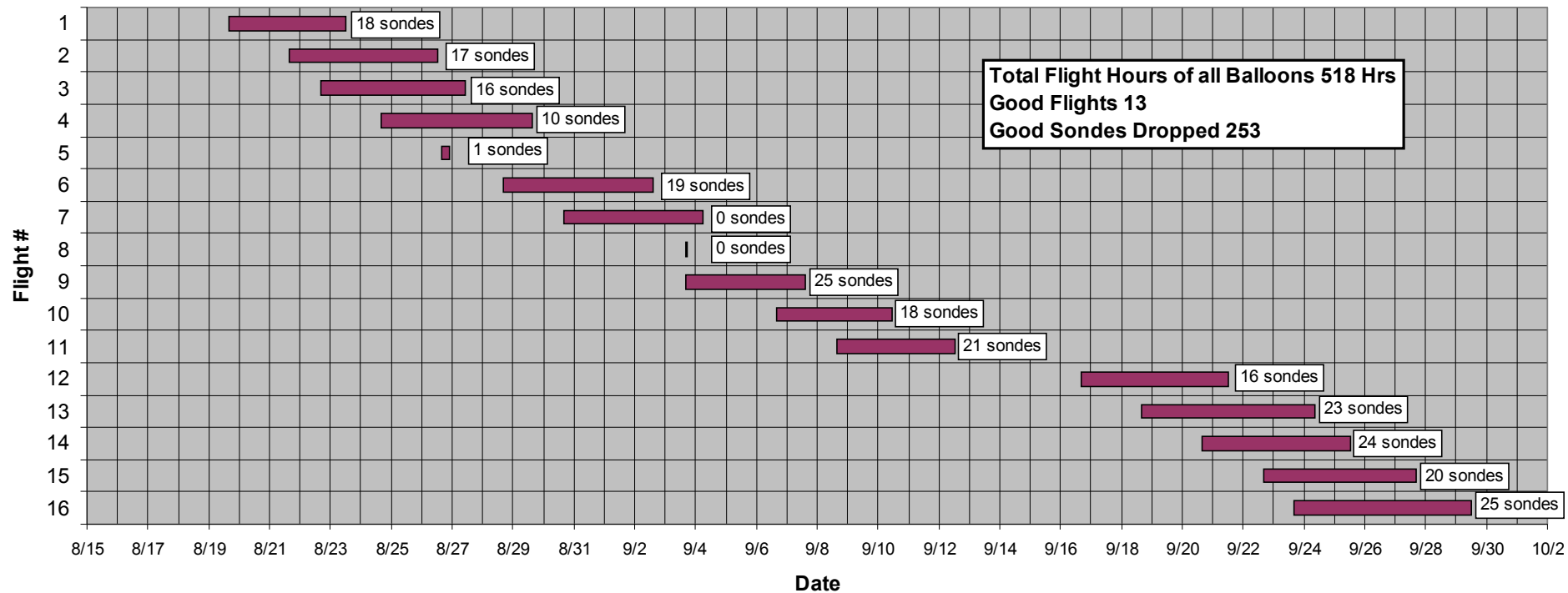


# T-PARC Preliminary Summary of Soundings

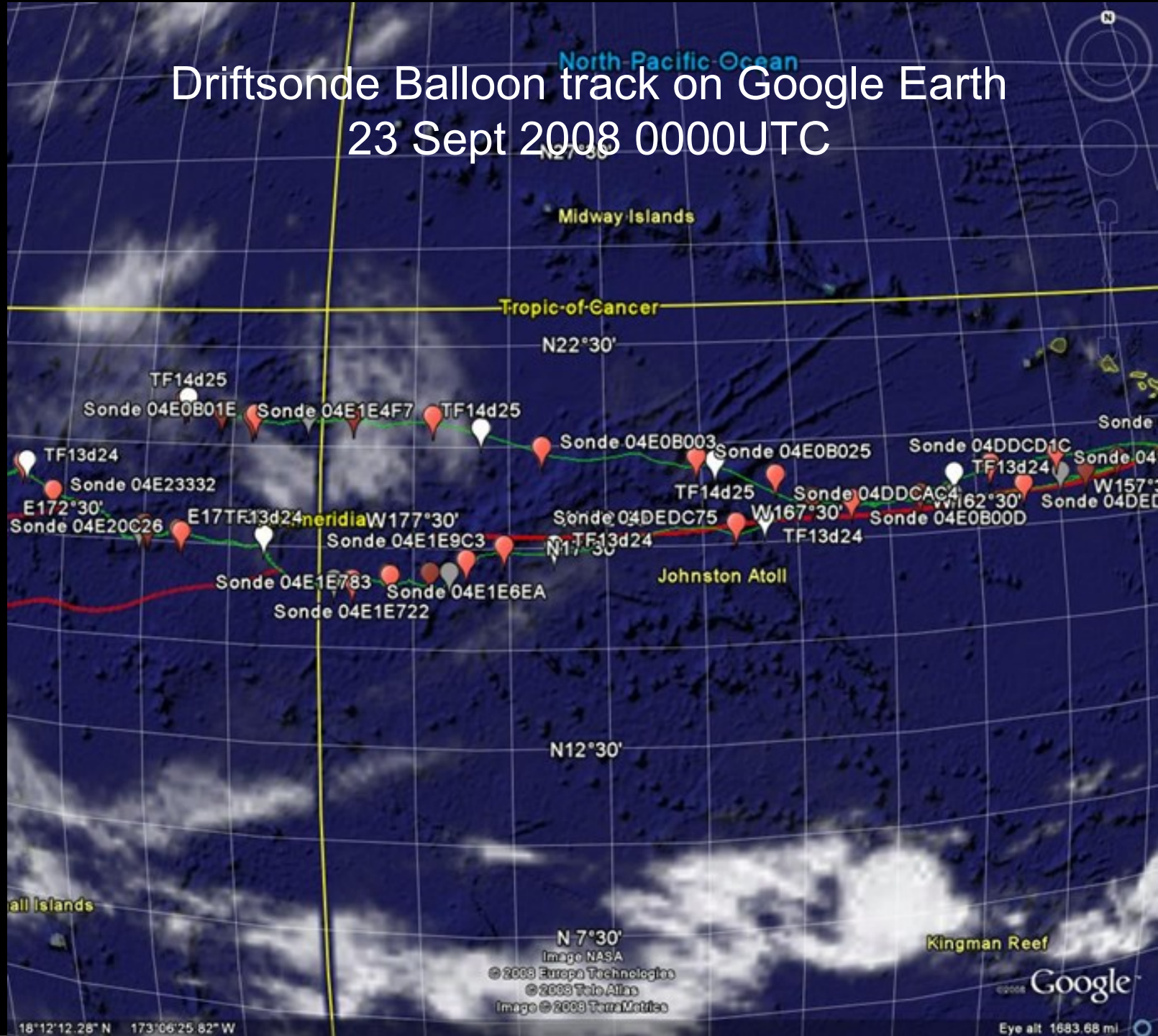
- 13 Gondolas flown ( $38 \times 13 = 494$  sondes)
  - 34 sondes ejected at launch
  - 66 sondes not attempted to drop
  - 394 sondes available to drop
- 
- Good Drops:                    253                    64% (of 394)
  - Failed to release:            117                    29.7% (of 394)
  - Questionable data:            26                     6.6% (of 394)

# Driftsonde Flight Schedule

## T-PARC Driftsonde Flight Schedule

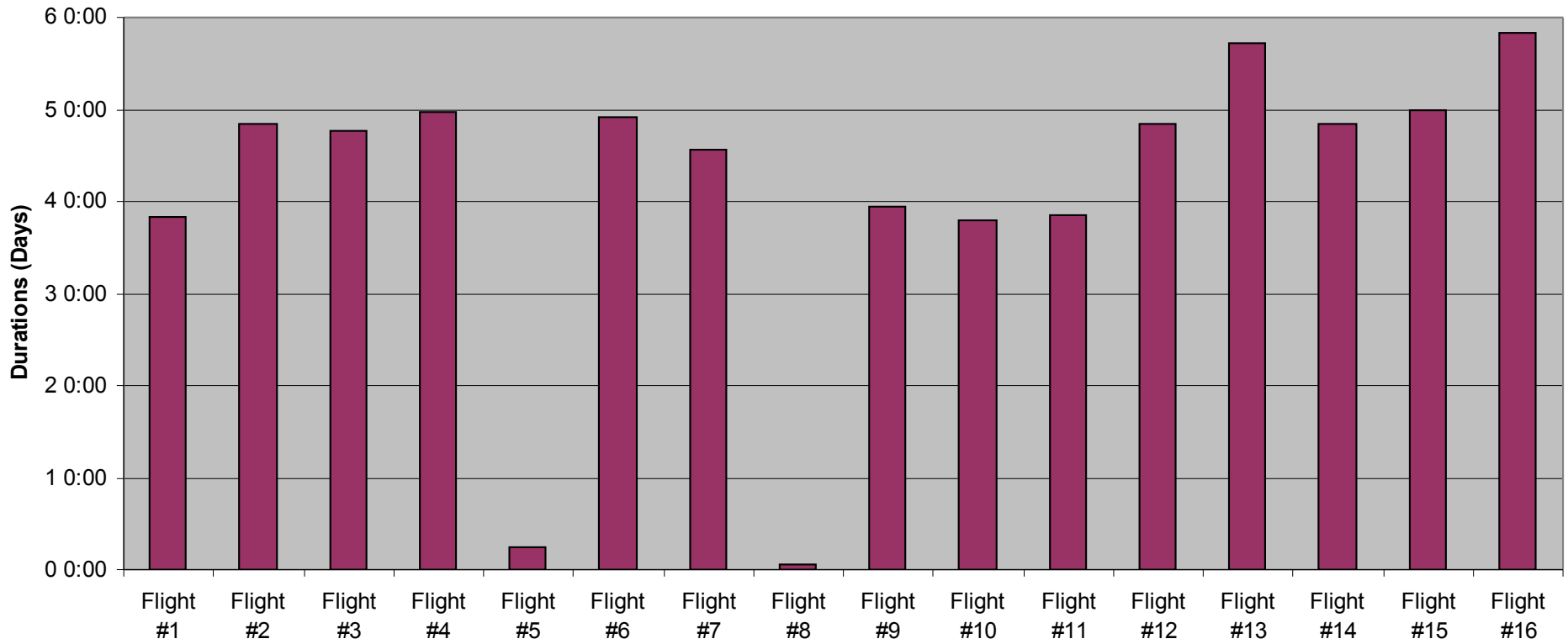


# Driftsonde Balloon track on Google Earth 23 Sept 2008 0000UTC



# Driftsonde Flight Durations

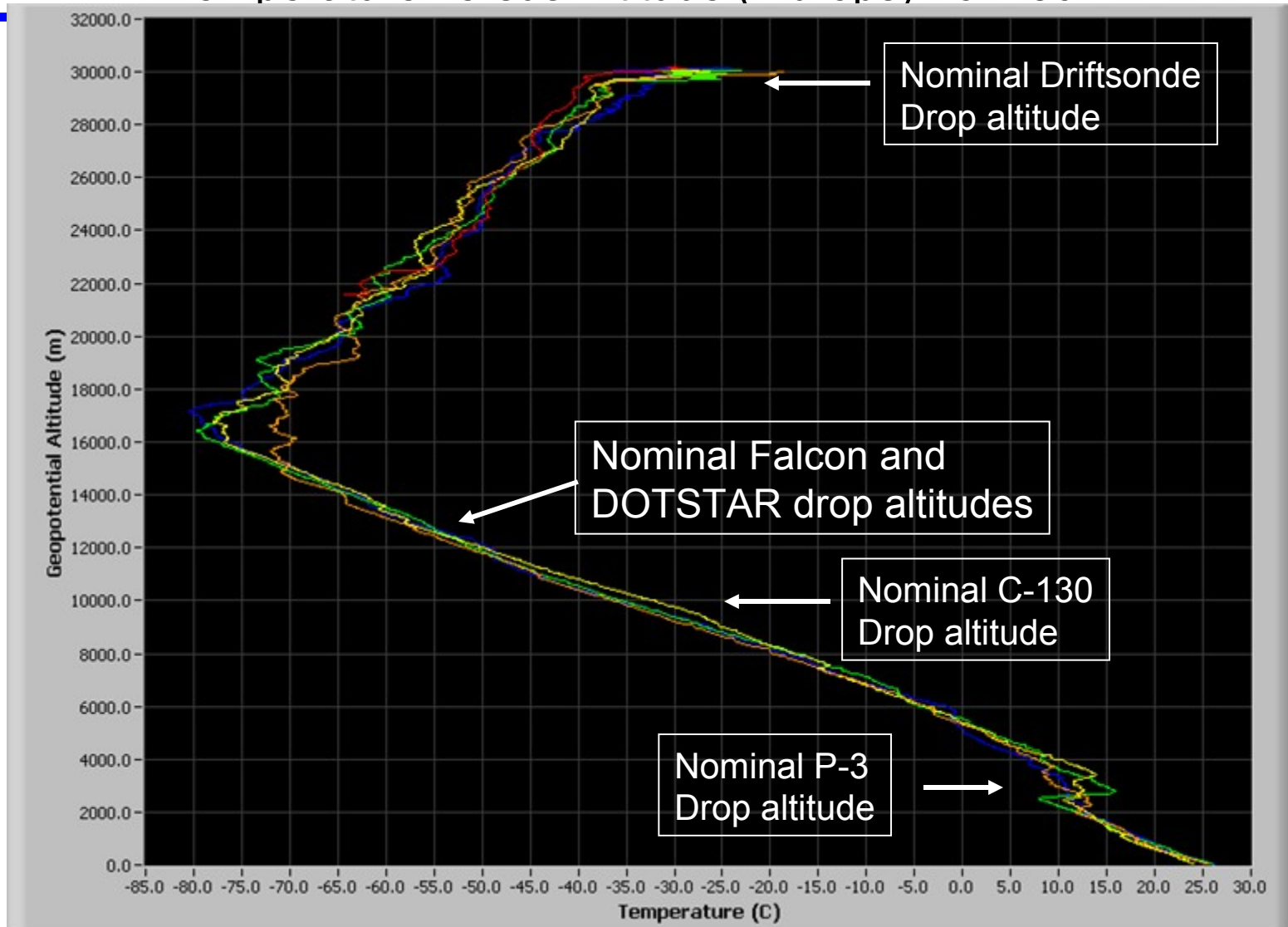
T-PARC Driftsonde Flight Durations



# T-PARC Driftsonde Soundings

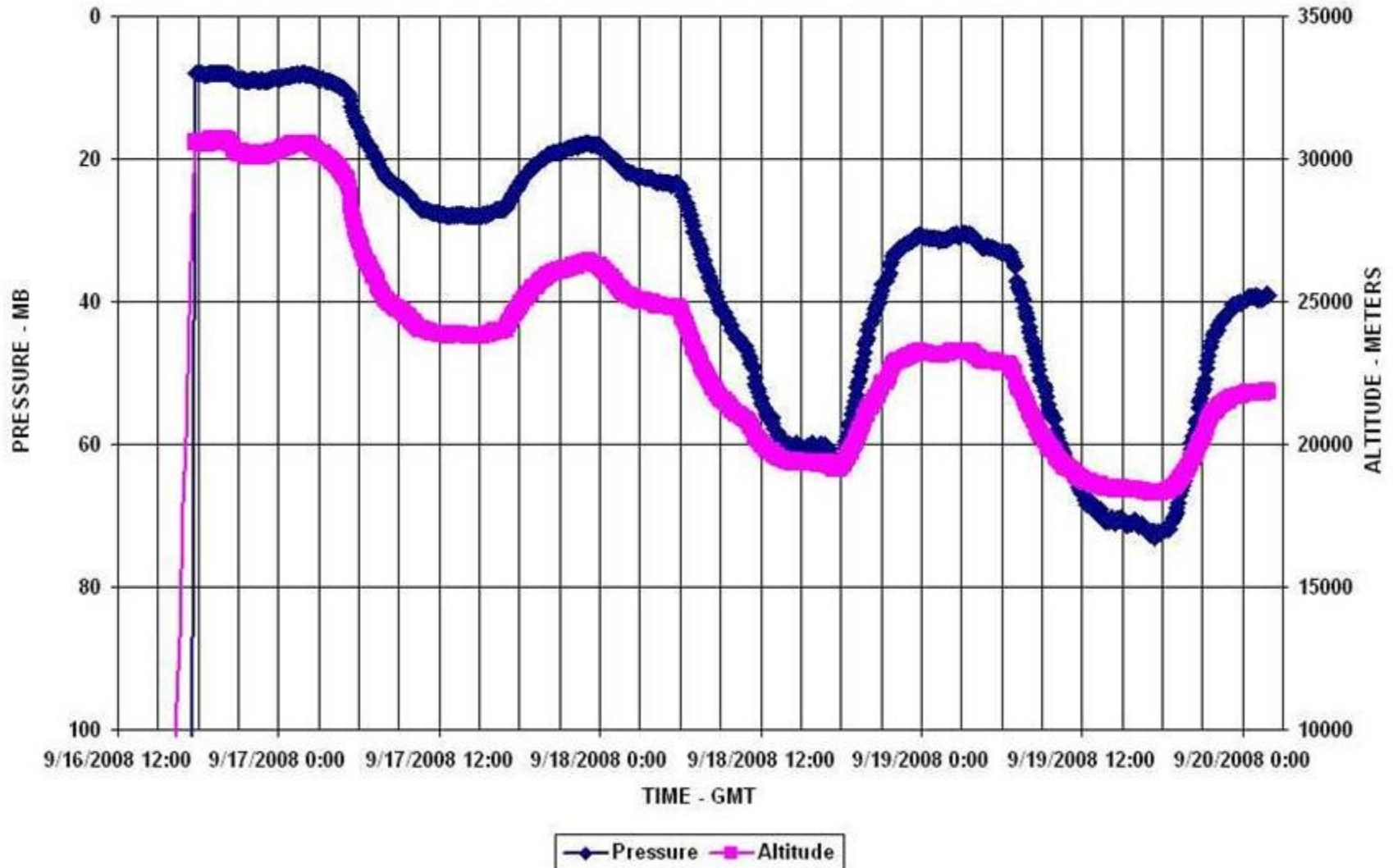
## Soundings from the lower Stratosphere

Temperature versus Altitude (4 drops) from 30km!



# T-PARC Driftsonde Flight Altitude

Drift 23 Time versus Pressure & Altitude



# Pre-Flight Integration testing with CNES

payload



# Beautiful Tropical Hawaii

## Hawaii Ocean View Estates



Driftsonde Balloon Launch Area



# T-PARC Hawaii Launch Site



# EOL T-PARC Firsts (A Truly Team Effort)

- EOL/CNES driftsonde deployment in the west Pacific (DFS, ISF, CDS)
- Autonomous Driftsonde Facility Operations via web/satellite in quasi-real time) (CDS, ISF)
  - Designed for PI & student operators
  - “Control” release of sondes
  - Engineering data for system status/health monitoring
  - Tracking data display for scientific and ATC use
  - Sounding database on the web
  - Status of sending data to GTS & QC’ed data