



PolySat

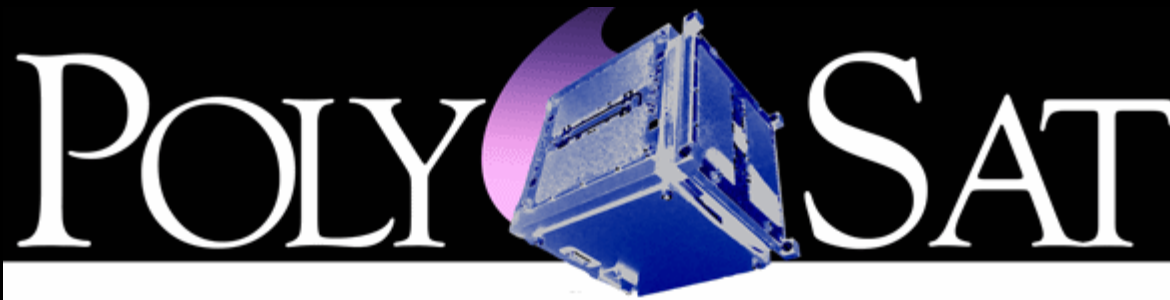
Building on Success

CubeSat Developers' Workshop
Logan, Utah
25 August 2008

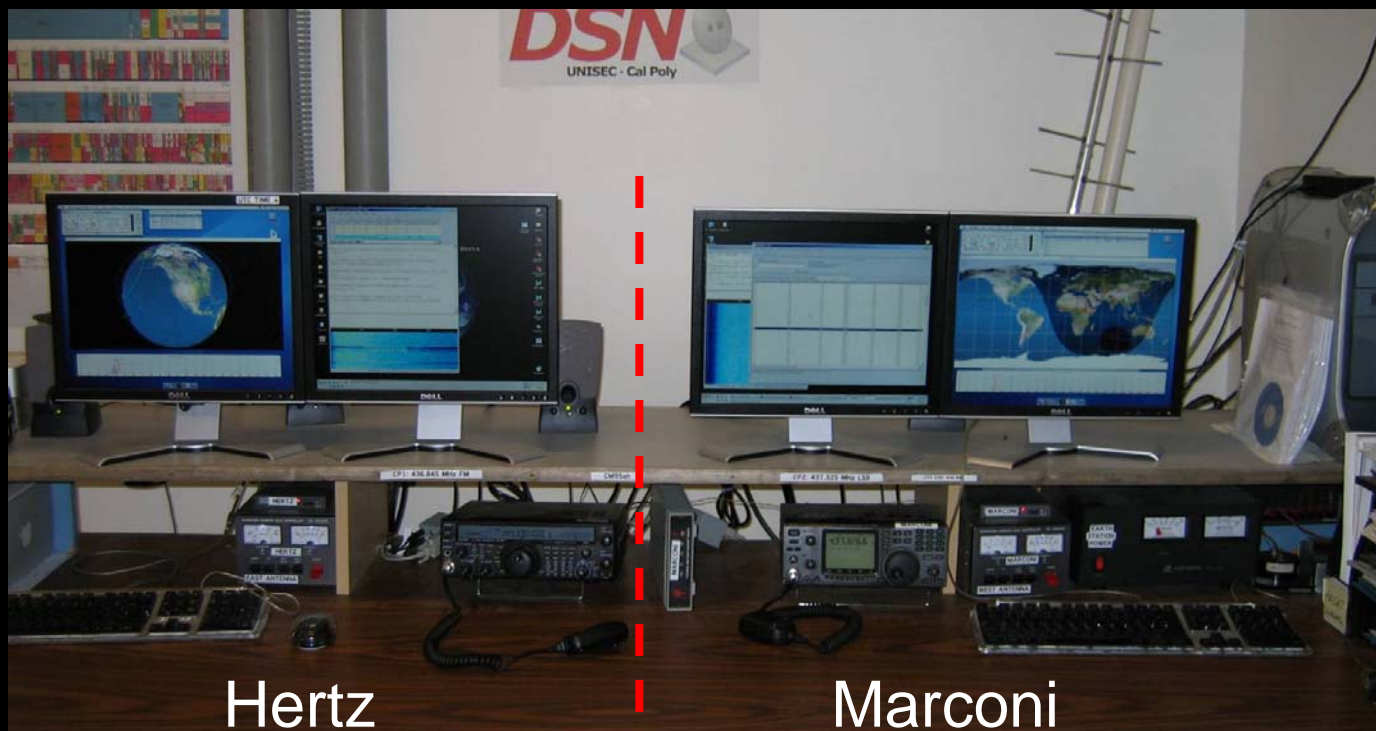
CAL POLY

PolySat

- Objective: Engineering Education
- Objective: Provide a reliable bus system to allow for flight qualification of a wide variety of small sensors and attitude control devices.



Earth Station

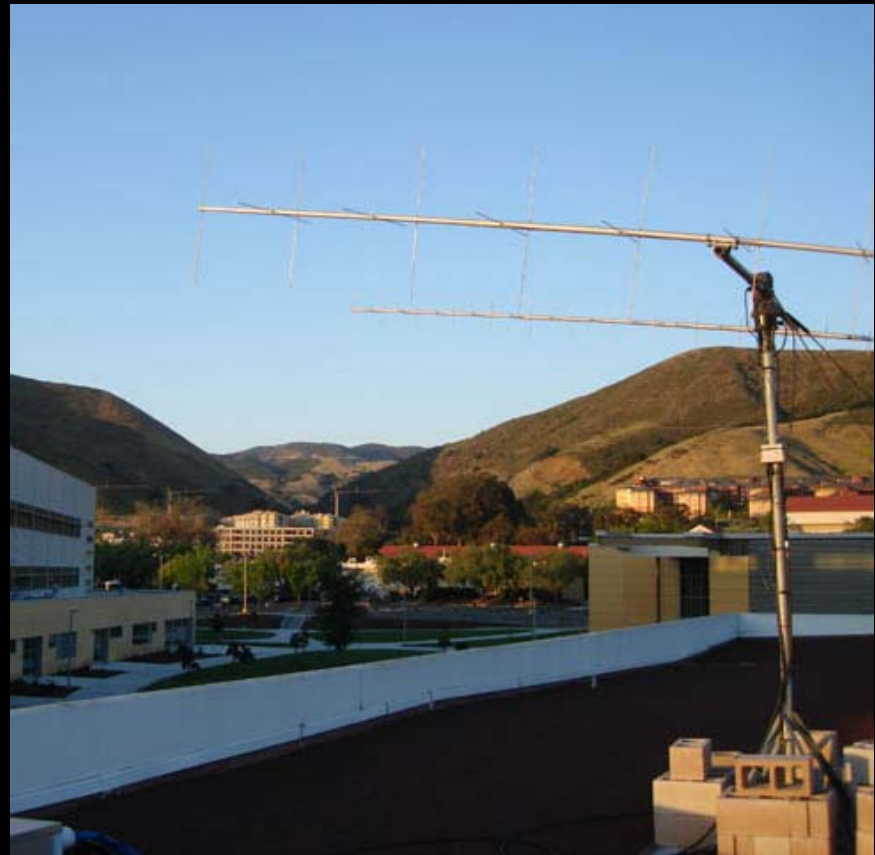


- Yaesu FT-847 and Icom IC-910
- Yaesu G-5500
- MixW Software TNC
- Mac Doppler Pro for tracking

Earth Station



Marconi
dual phased 70 cm yagis



Hertz
2 m yagi
70 cm yagi

CP1

- Magnetorquer developed by Cal Poly
- Third party Sun Sensor
- Valuable lessons learned
 - CubeSat development: challenges & logistics
 - Multiple Flight Units



DNEPR 2 – April 17th 2007

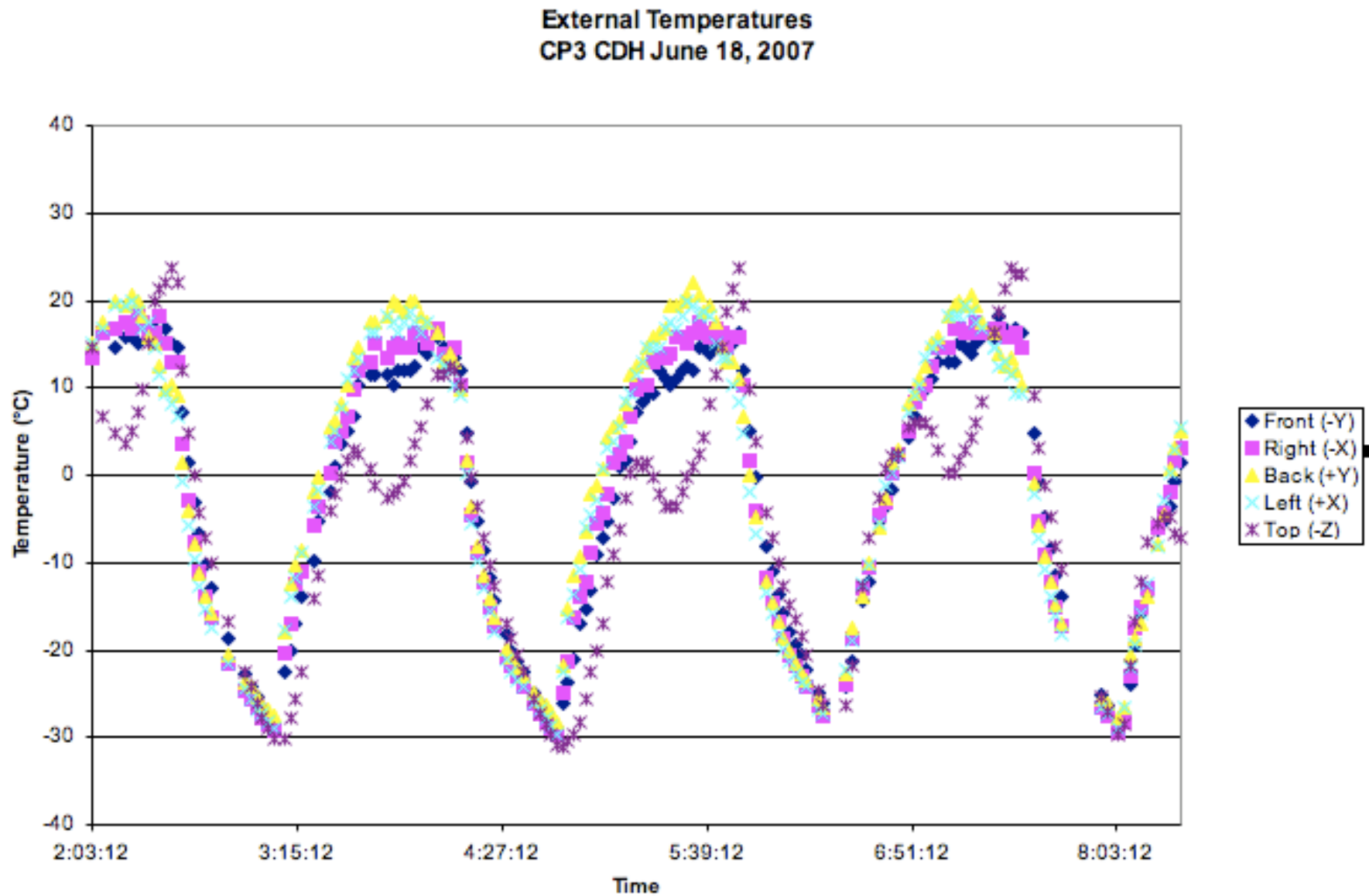
- CP2.1 manifested as CP4
 - Energy Storage and Dissipation Experiments
 - Test and Characterize CPBus



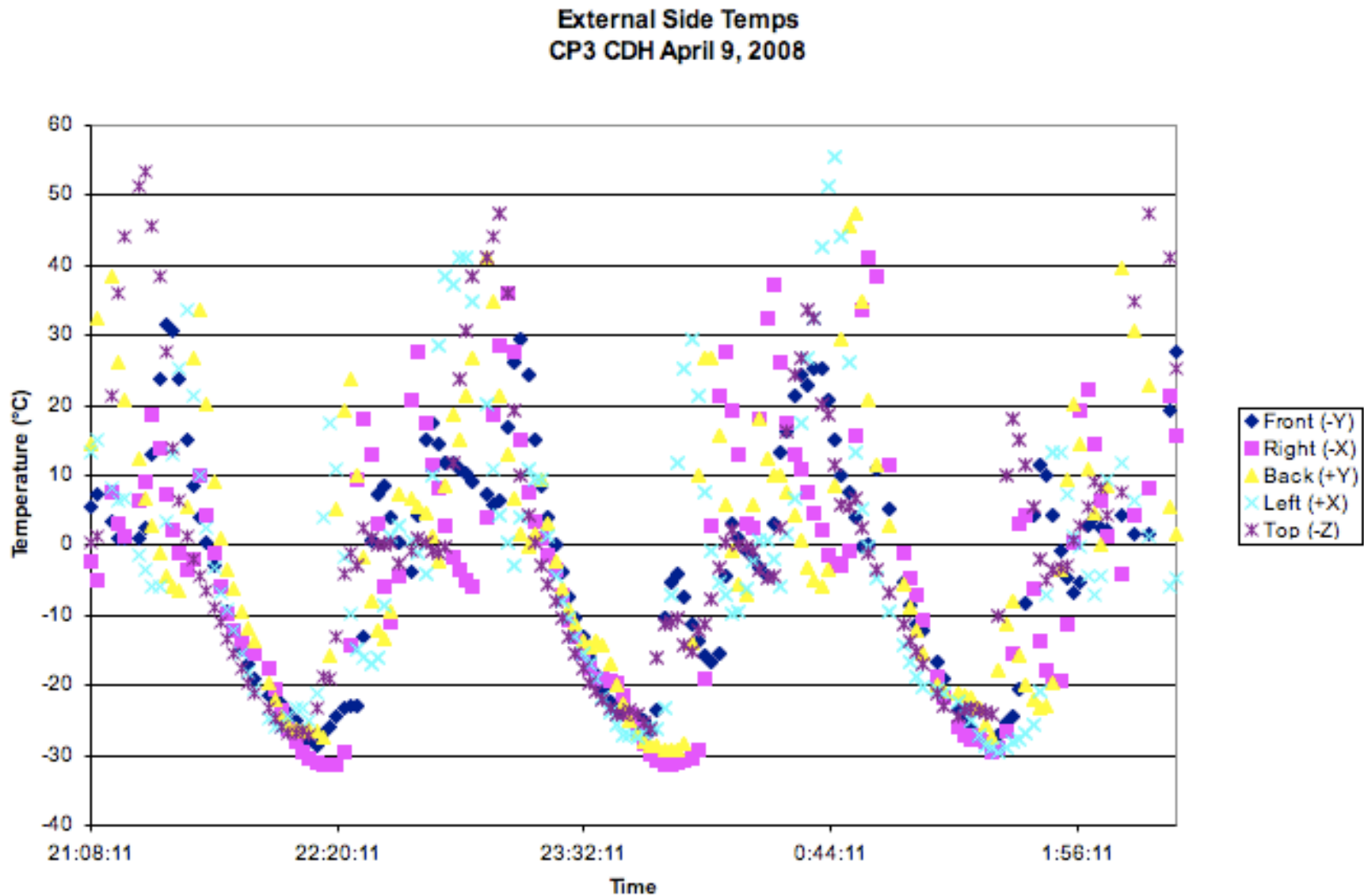
- CP3
 - Attitude Determination using a suite of sensors
 - Attitude Control using Magnetorquers in each side panel
 - Observation Imagers: lots of data to download!



Early CP3 External Temps

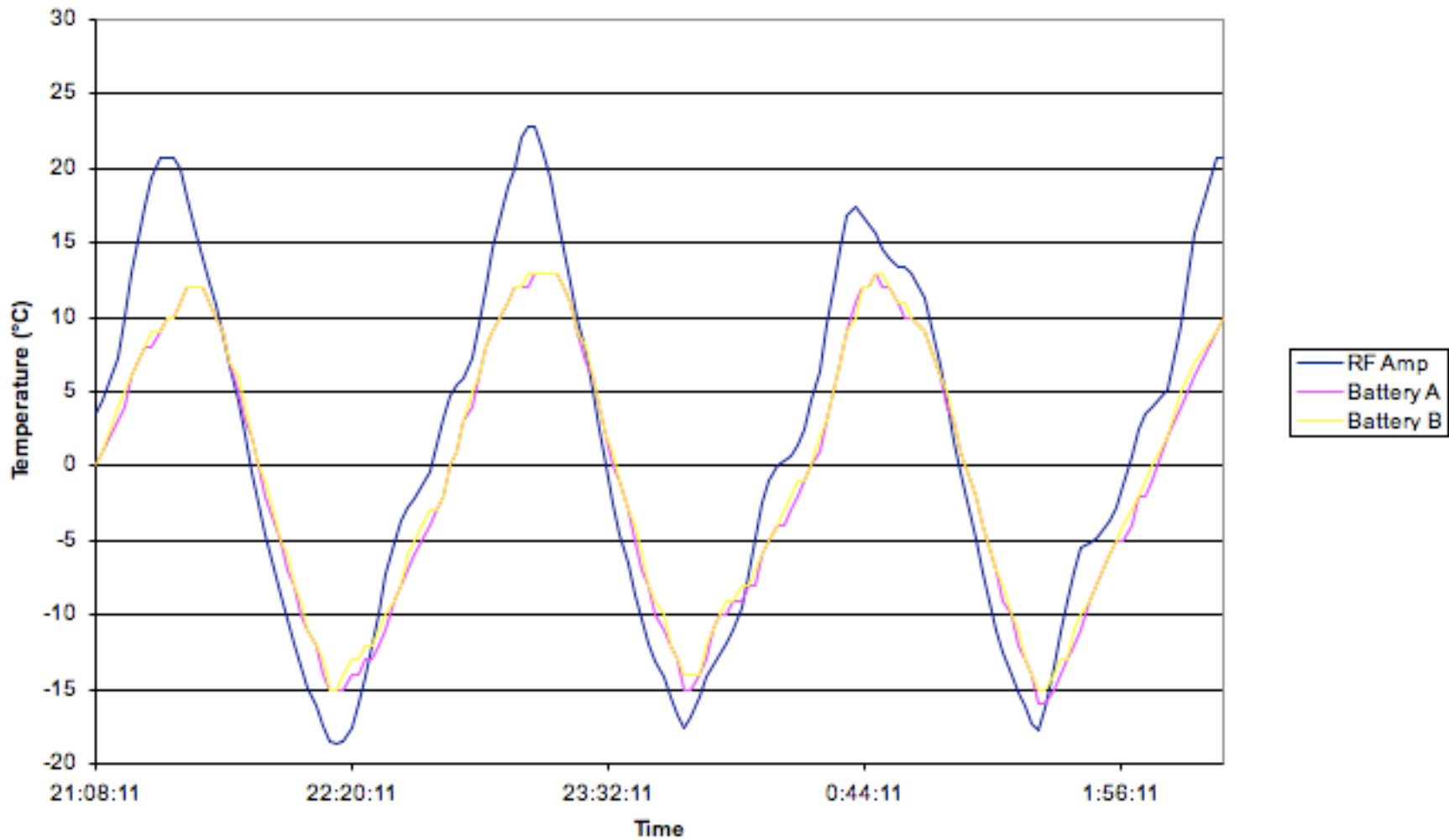


Recent CP3 External Temps

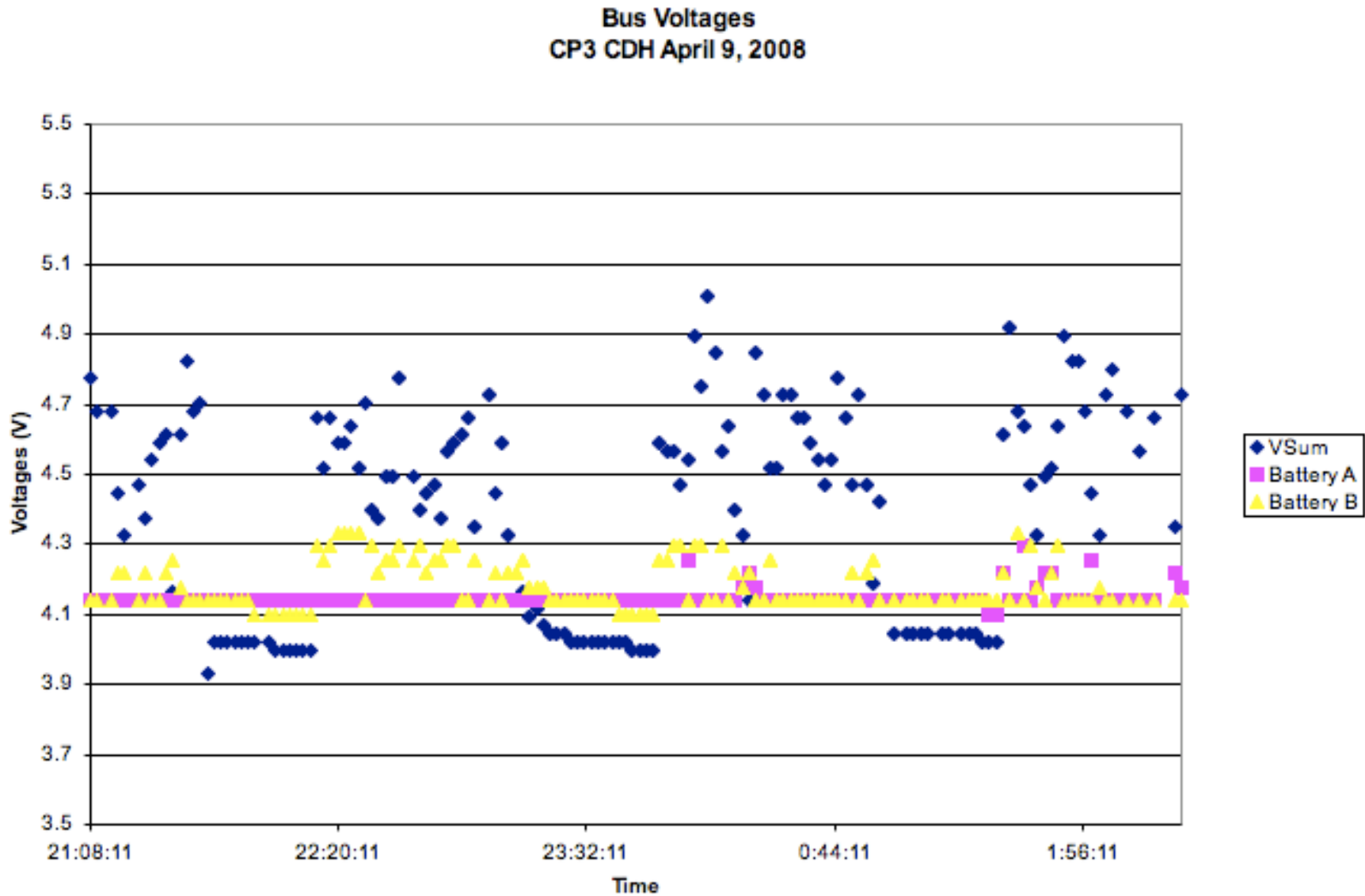


Recent CP3 Internal Temps

Internal Temperatures
CP3 CDH April 9, 2008

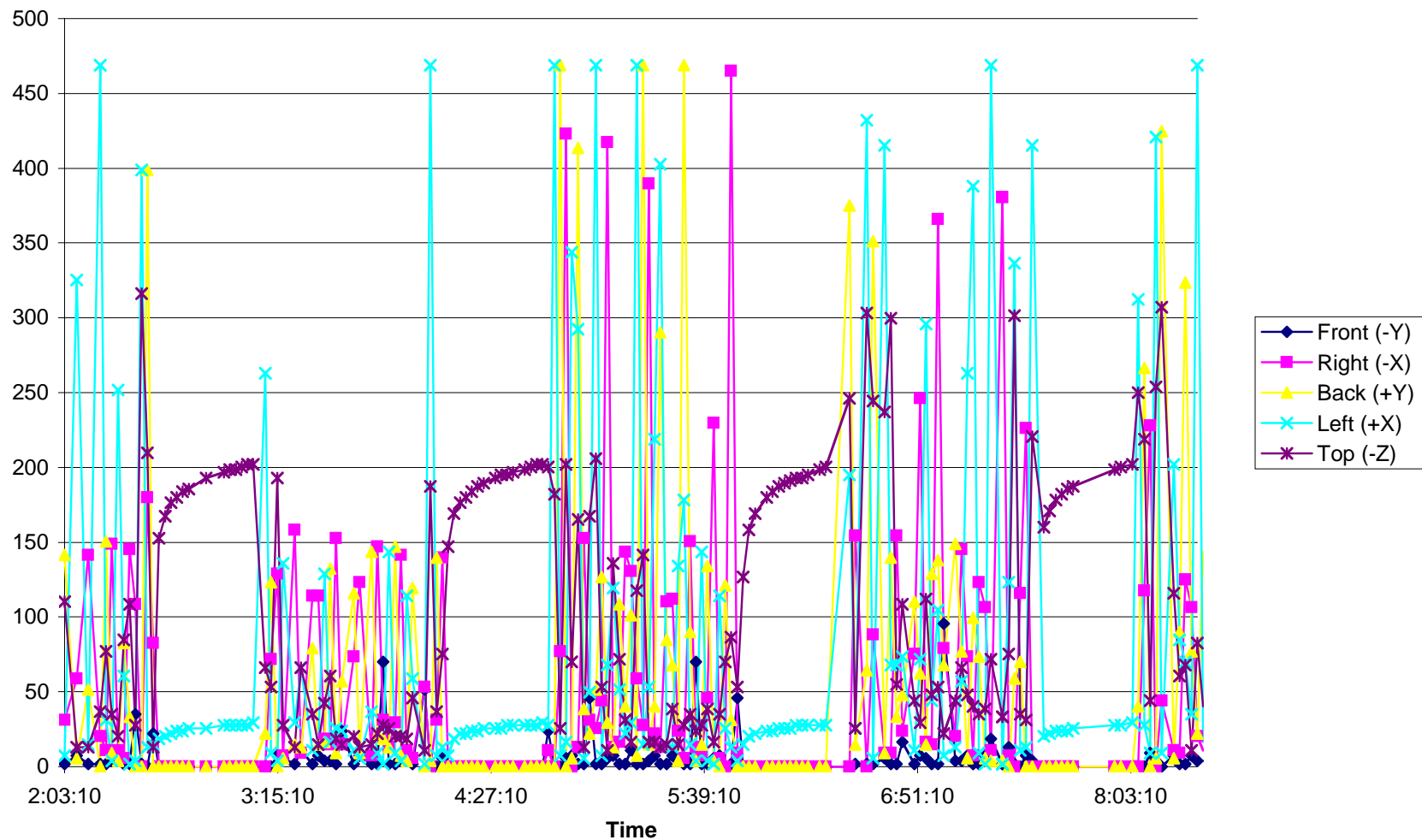


Recent CP3 Bus Voltages

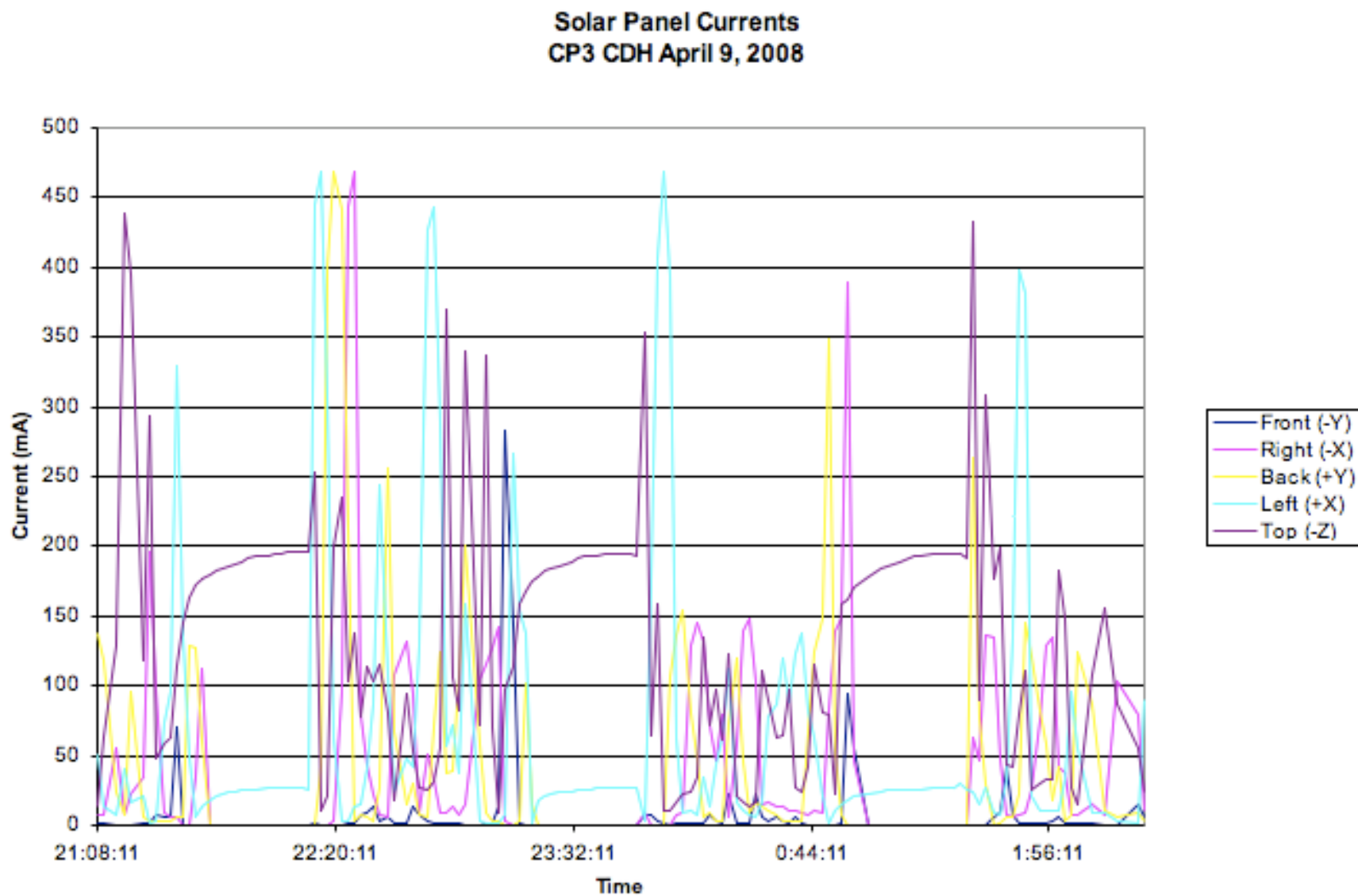


Early CP3 Solar Panel Currents

Solar Panel Currents
CP3 CDH June 18, 2007

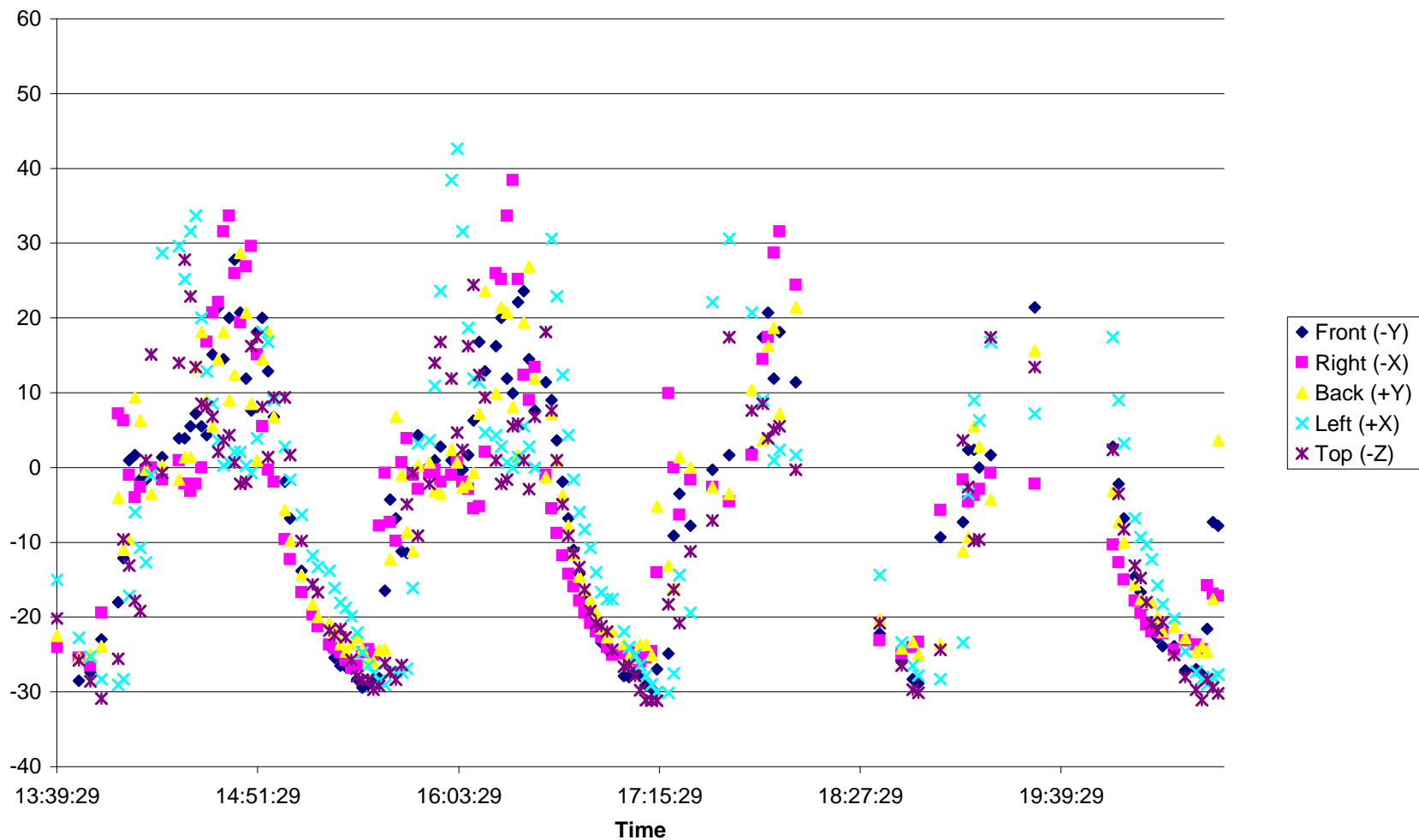


Recent CP3 Solar Panel Currents



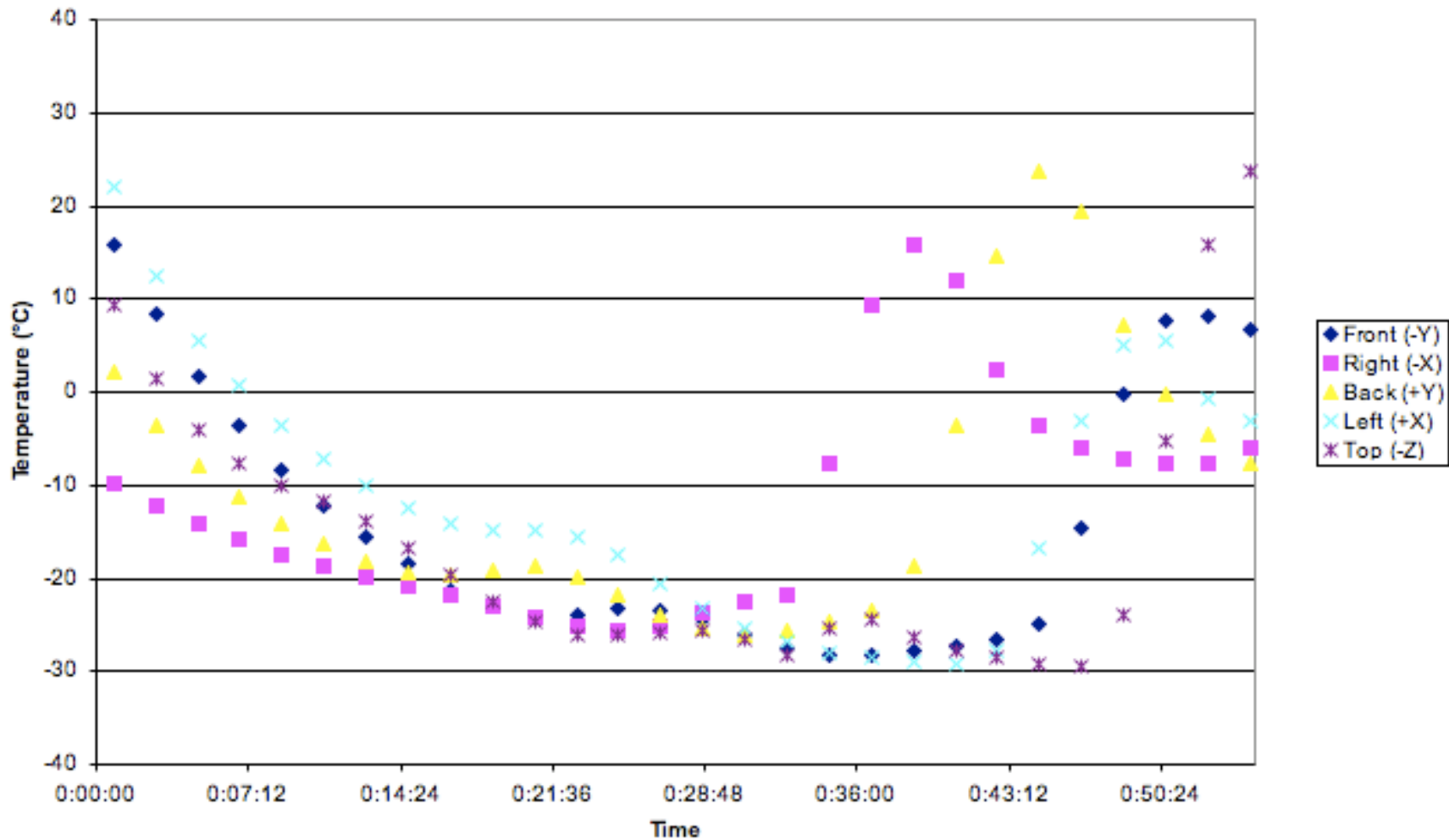
Early CP4 External Temps

External Side Temps
CP4 CDH May 24, 2007



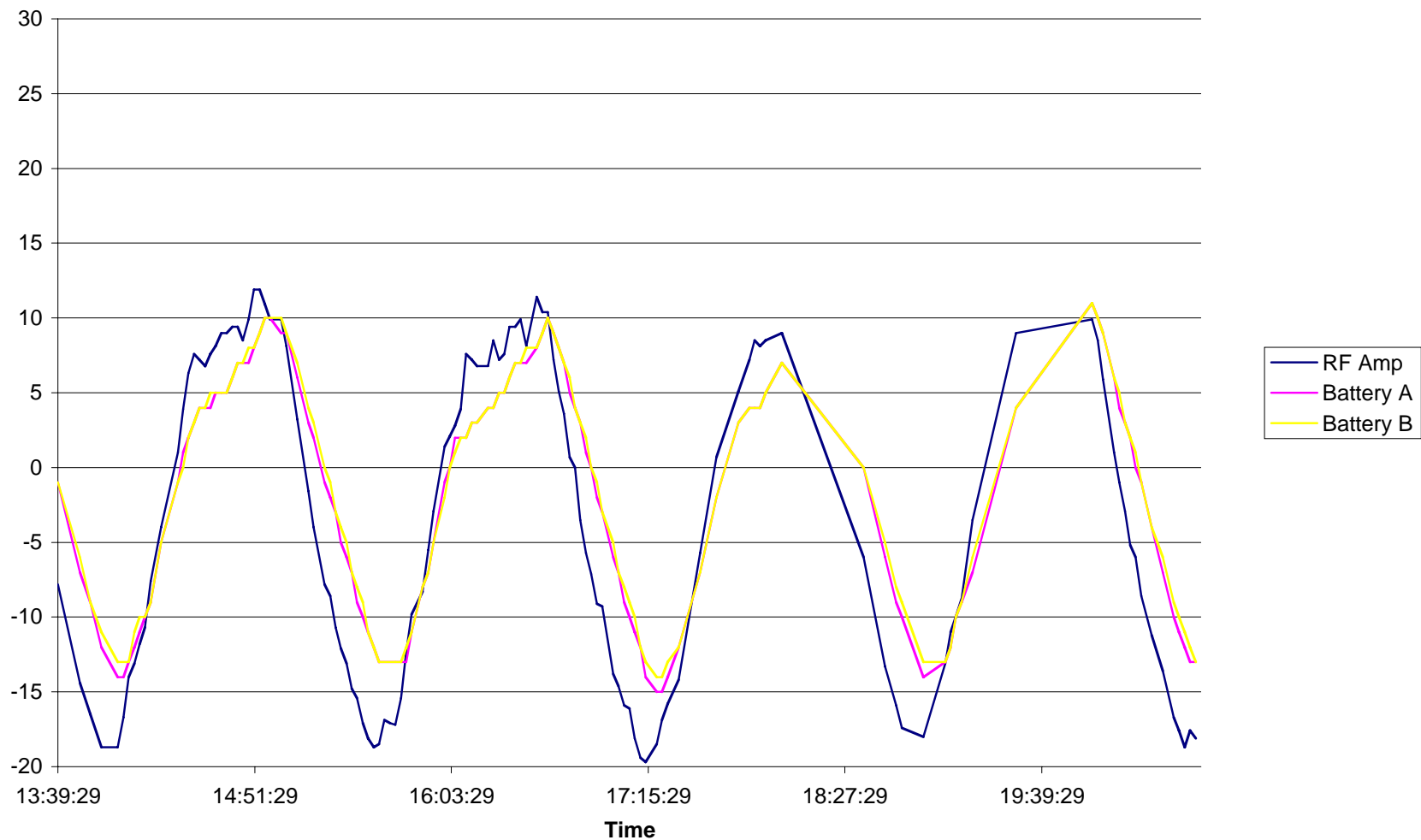
Recent CP4 External Temps

External Temperatures
CP4 ADCS July 31, 2008



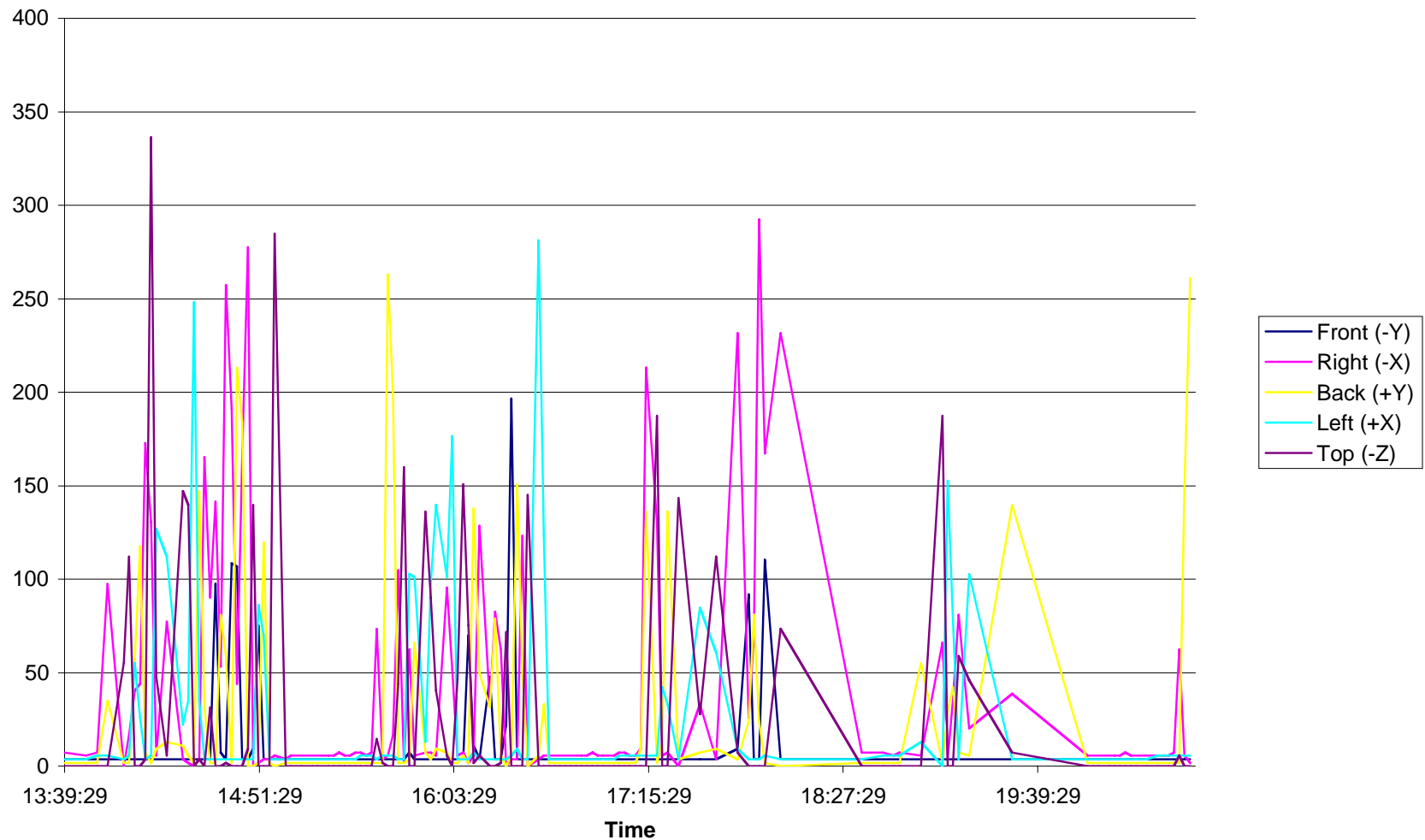
Early CP4 Internal Temps

Internal
Temperatures



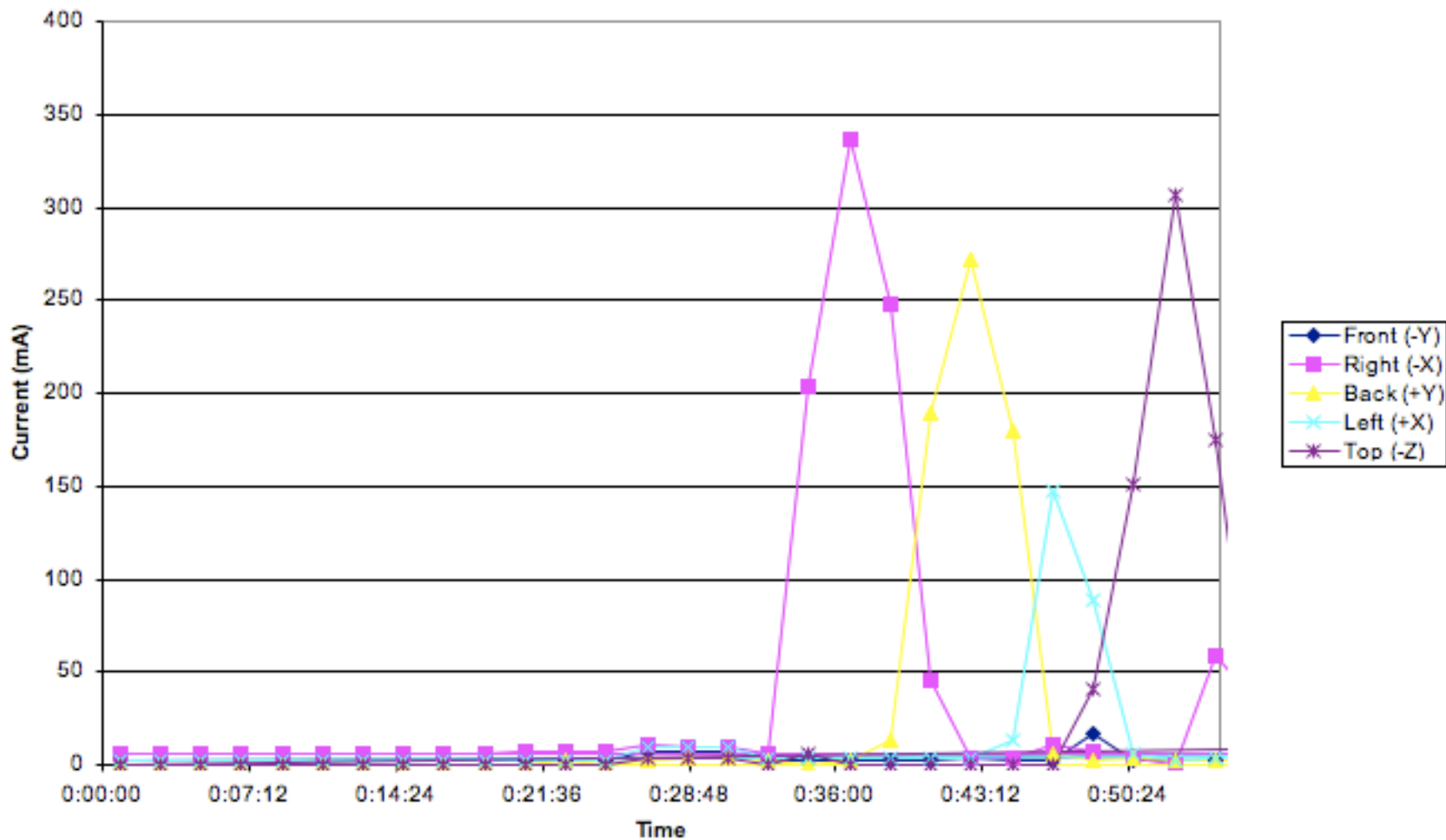
Early CP4 Solar Panel Currents

Solar Panel Currents
CP4 CDH May 24,



Recent CP4 Solar Panel Currents

Solar Panel Currents
CP4 ADCS July 31, 2008



A satellite-style map of Earth showing the Americas, Europe, and Africa. Several thin, colored lines (green and yellow) represent satellite orbits or paths across the globe. The background is dark, suggesting a night view of the planet.

Lessons Learned

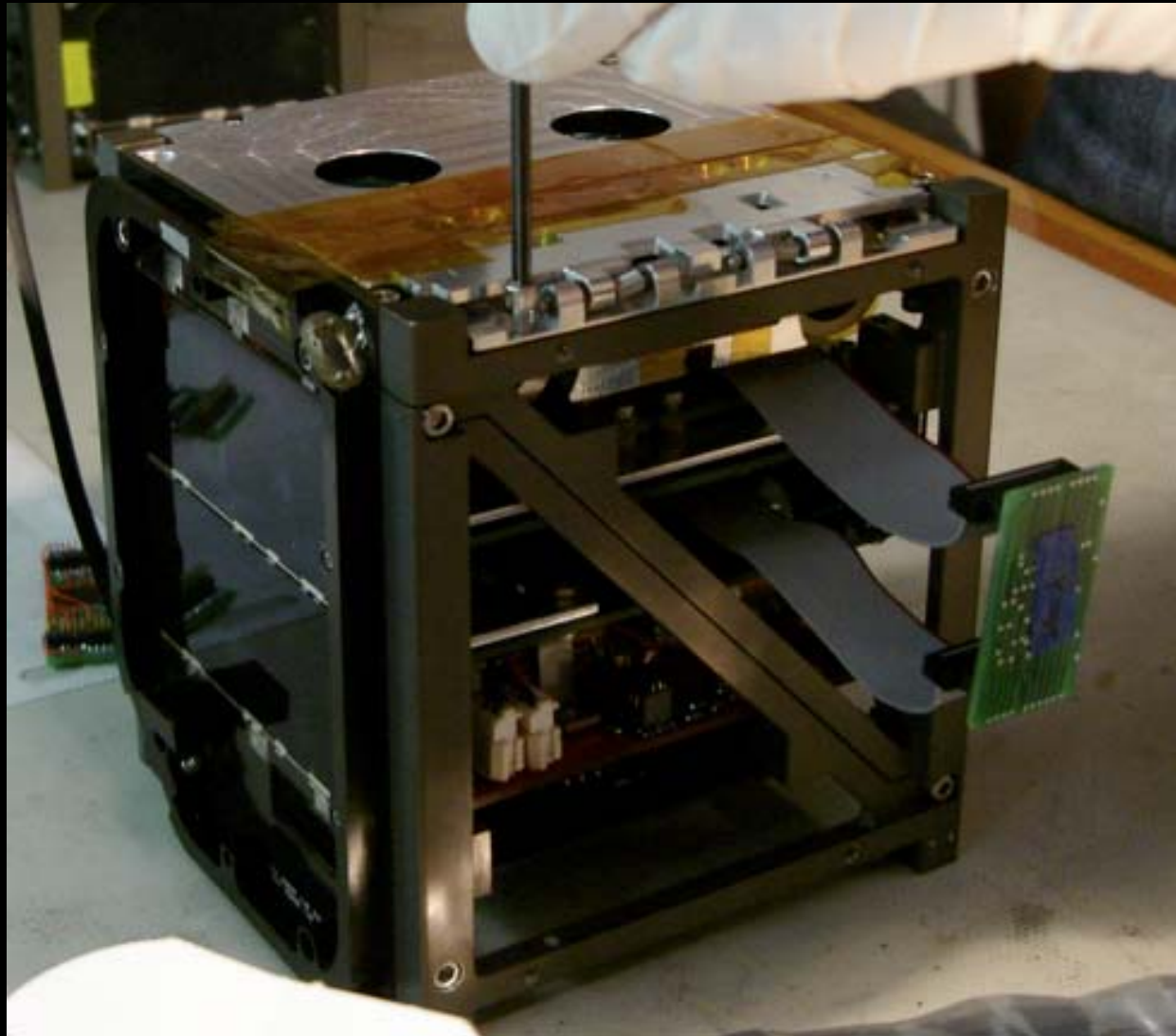
- Beacons
 - Object identification
 - Immediate data
 - Fun for world wide satellite trackers
- Uplink difficulties
- Solar panel efficiency

CP6

- Bus Improvements:
 - Low Noise Amplifier
 - Software stability
- Naval Research Laboratories Payload
 - Electron emitter and collection experiment
 - Two collectors, one emitter
 - Hopeful precursor to full electro-dynamic tether experiment

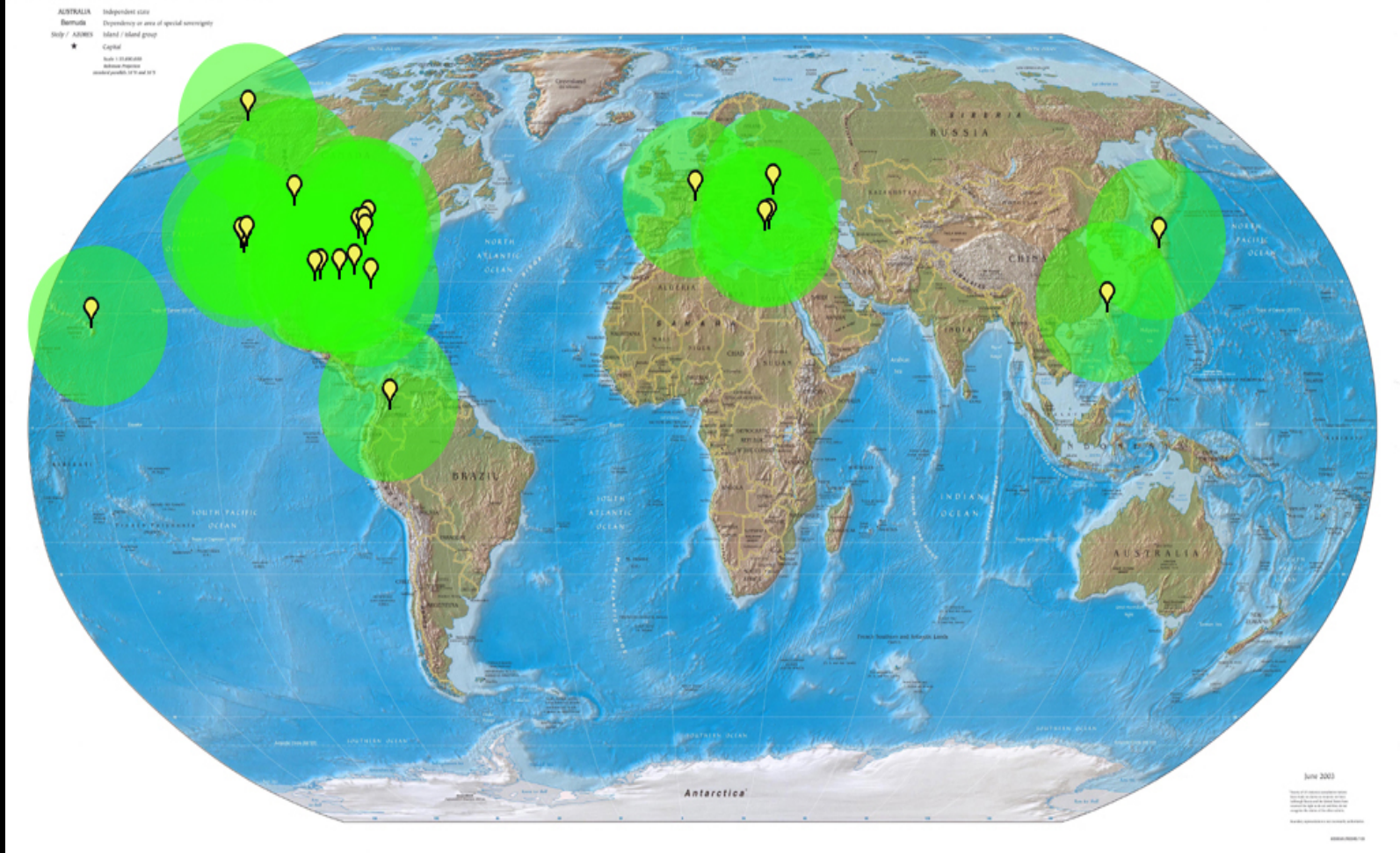


NRL Payload Fit Check



The Ground Station Network

Physical Map of the World, June 2003



A satellite-style map of the Earth, showing continents and oceans, serves as the background for the slide. The map is centered on the Atlantic Ocean, with North America on the left and Europe and Africa on the right. The title 'GENSO Background' is overlaid on the top left of the map in a large, white, sans-serif font.

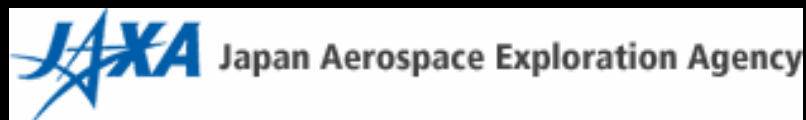
GENSO Background

- A system to link ground stations using the internet
- Only 1200/9600 baud data for now
- Three parts:
 - Central server
 - Authentication and registration
 - Mission Control Client
 - Scheduling of Ground Station Servers
 - 1 MCC per satellite developer
 - Ground Station Servers
 - Actual interface between rotors/radio and internet

GENSO Background

- Global Educational Network for Satellite Operators
- Originally started with the Japanese to combat interference (GROWS)
- Started under the International Space Education Board, a collaboration between CSA, ESA, JAXA, and NASA
- Approved on 5 October 2006 for 2 years
- Project to link low-cost earth stations

Canada 



元素





“Standard” Earth Station

- Icom IC-910 radio with computer interface
- M² OR2800P-DC for Azimuth and MT-1000 for elevation
- Symek TNC 31S
 - Possibly software in future
- Antennas:
 - 2MCP22 for 145 MHz
 - 436CP42UG for 437 MHz
 - 1 meter dish for S-band (downlink only)

A satellite-style world map showing the Americas, Europe, and Africa, with a dark blue background. The map is slightly faded and serves as a background for the text.

GENSO Update

- Finishing alpha testing
- Had a workshop at AMSAT UK Colloquium recently where the technology was demonstrated
- Central server currently active at Cal Poly
- Genso-us@atl.calpoly.edu for mailing list



Thanks!

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