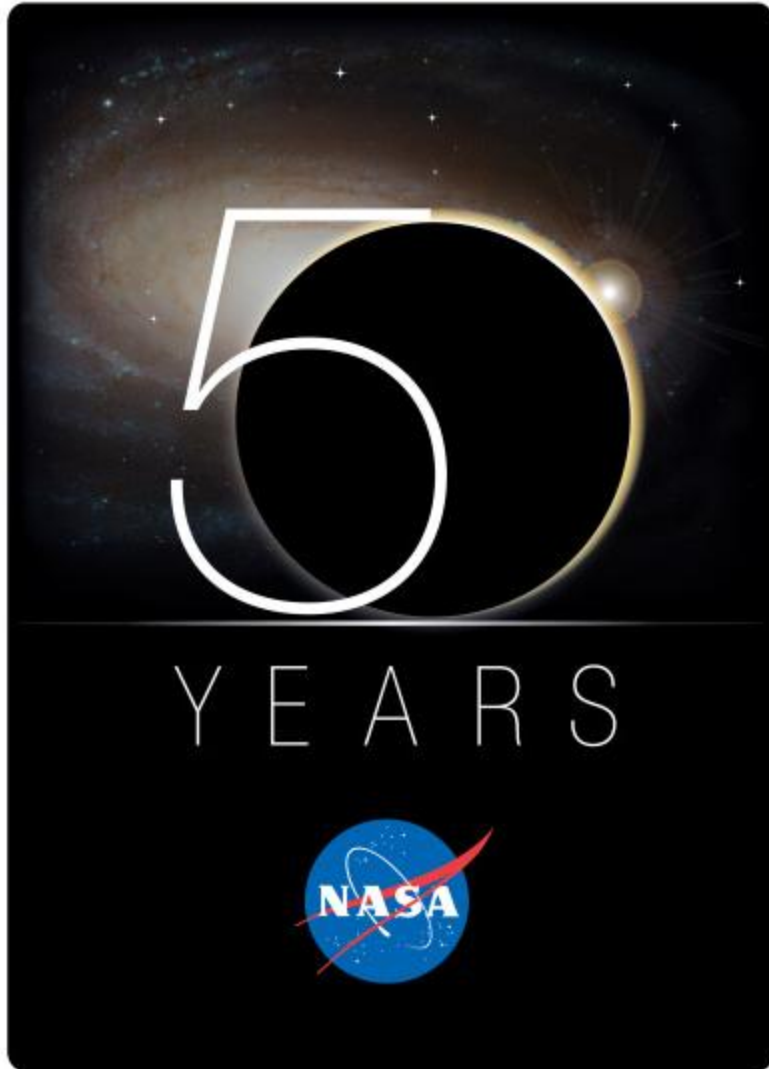


National Space Grant Student Satellite Program



NSGSSP Program Update

6 March 2010

Mike Drake, Arizona SG

Chris Koehler, Colorado SG

Alec Gallimore, Michigan SG

Luke Flynn, Hawaii SG

Student Opportunities



- Rock-On 2010
 - Date – June 19-24, 2010
- BalloonSat
 - Date – July 7-10, 2010
- CubeSat Proposal Opportunity
 - NSF National Space Weather Program
 - http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5575
 - RFP release every year (??)
 - Due Date 05/10
- Nanosatellite Proposal Opportunity
 - AFRL University Nanosatellite Program
 - <http://www.vs.af.mil/UNP/>
 - RFP release in Fall of even numbered years

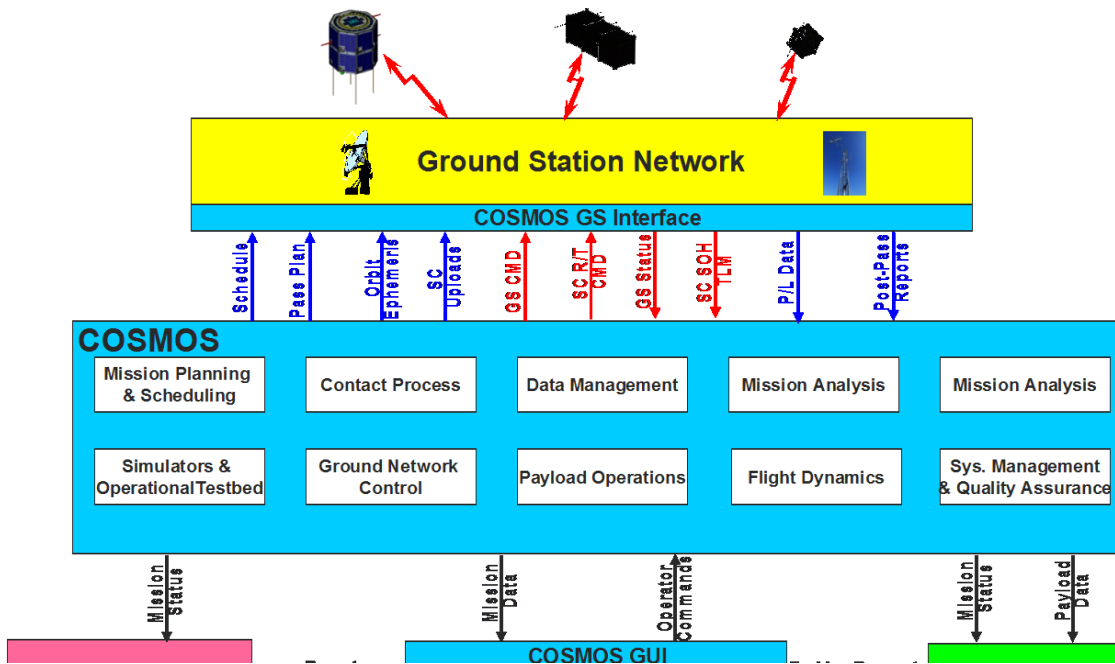
National Space Grant Survey



- Survey Results
 - 44 SG's with small sat programs
- Working Together
 - Common CubeSat components
 - Custom NanoSat components
 - Time zones, schedules
 - Real-time networking and communications
 - Educational Focus – Grad, undergrad?
 - Build Schedule – 1 year, 2 years??
- Working with NASA Center(s)
 - NASA's Posture
 - Risk averse
 - Paper intensive
 - SAA Legal Challenges



Comprehensive Open-architecture Space Mission Operations System (COSMOS)



Features of COSMOS:

- Set of software and hardware tools to support spacecraft mission operations
 - Mission Planning & Scheduling Tool (MPST)
 - Mission Operations Support Tool (MOST)
 - Ground Network Control Tool
 - Data Management Tool
 - Analysis Tools
 - Test Bed Control Tool
- Open architecture to enable modifications and adaption to new missions and MOCs
- User-friendly interfaces and short learning curves for users and software integrators
- COSMOS editor
- Uses Limited Qt – helps ITAR
- Sockets for COTS/GOTS

COSMOS is especially designed to be easily adaptable to operate multiple small satellites and to be easily transferable to new MOCs. COSMOS is being developed as a collaboration between HSFL, NASA Ames Research Center, and Santa Clara University. Participation by other universities is welcome.



Mission Operations Support Tool (MOST)



Mission Time
ADCS
MOST Mode

Solar Panels Temperatures

#15	-53.5	#13	-14.3	#11	31.2
#16	-53.5	#14	-14.3	#12	31.2
#1	-39.4	#2	-39.4	#9	49.4
#3	-2.3	#5	22.7	#7	41.6
#4	-2.3	#6	22.7	#8	41.6

Heaters

Heater IMG1 Heater 2

Close

General Info

Temperature Scale

All temperatures in deg C

HawaiiSat Interior TOP view

CPU 17.9

IMG1 17.9

GPS 17.9

EPS 17.9

CERTO 17.9

COM2 0.0

COM1 -3.0

HawaiiSat Interior BOTTOM view

THI 0.0

TCU 0.0

RW 17.9

IMG2 17.9

CRTX 17.9

- Real-time
- Easily
- Based
- Cleme
- Prototy

4.0	5.0	6.0	Y (rad/s)	Torquered 1	1.0	0.0	
7.0	8.0	9.0	Z (rad/s)	Torquered 2	1.0	0.0	
Orbital Frame			GPS		Torquered 3	1.0	0.0
Angle (Deg)	Rate (Deg/S)	X(m)	Lat. (Deg)	Reaction Wheel			
Pitch 1.0	1.0	Y(m)	Long. (Deg)	Torque (Nm)	0.0		
Roll 2.0	2.0	Z(m)	Altitude (m)	Reaction Wheel Speed (rpm)	1.0		
Yaw 3.0	3.0						

Planning
missions
and
sales
g & Analysis
Anomaly Resolution

HSFL PROPRIETARY

5

NSGSSP Summary



- Flight Hardware Development Opportunities Exist
 - NSF Space Weather Program for CubeSats
 - AFRL University Nanosatellite Program
- Partnering challenges extend to Universities and NASA Centers
- CubeSats favor rapid technical advancement due to common toolkits
- NanoSats represent more custom builds – harder to collaborate because of complexity
- NSGSSP can foster small satellite development by encouraging common support tools and providing “emergency” or “reciprocal-arrangement” comm links
- Universities can lead advances in small sat technology due to risk-averse posture of US programs.