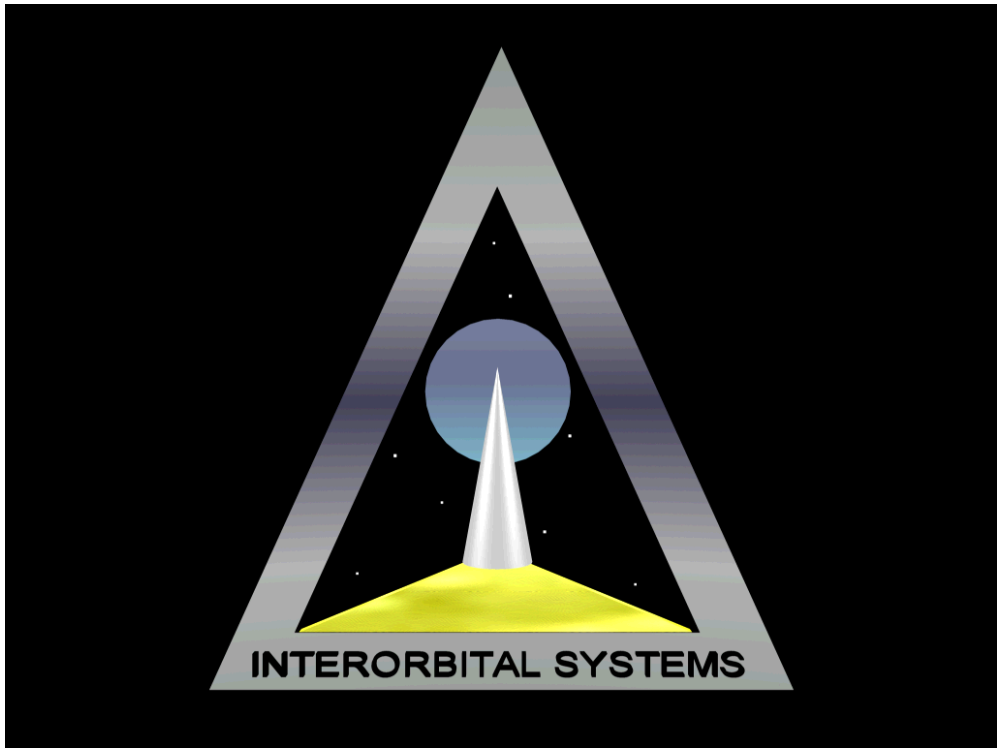

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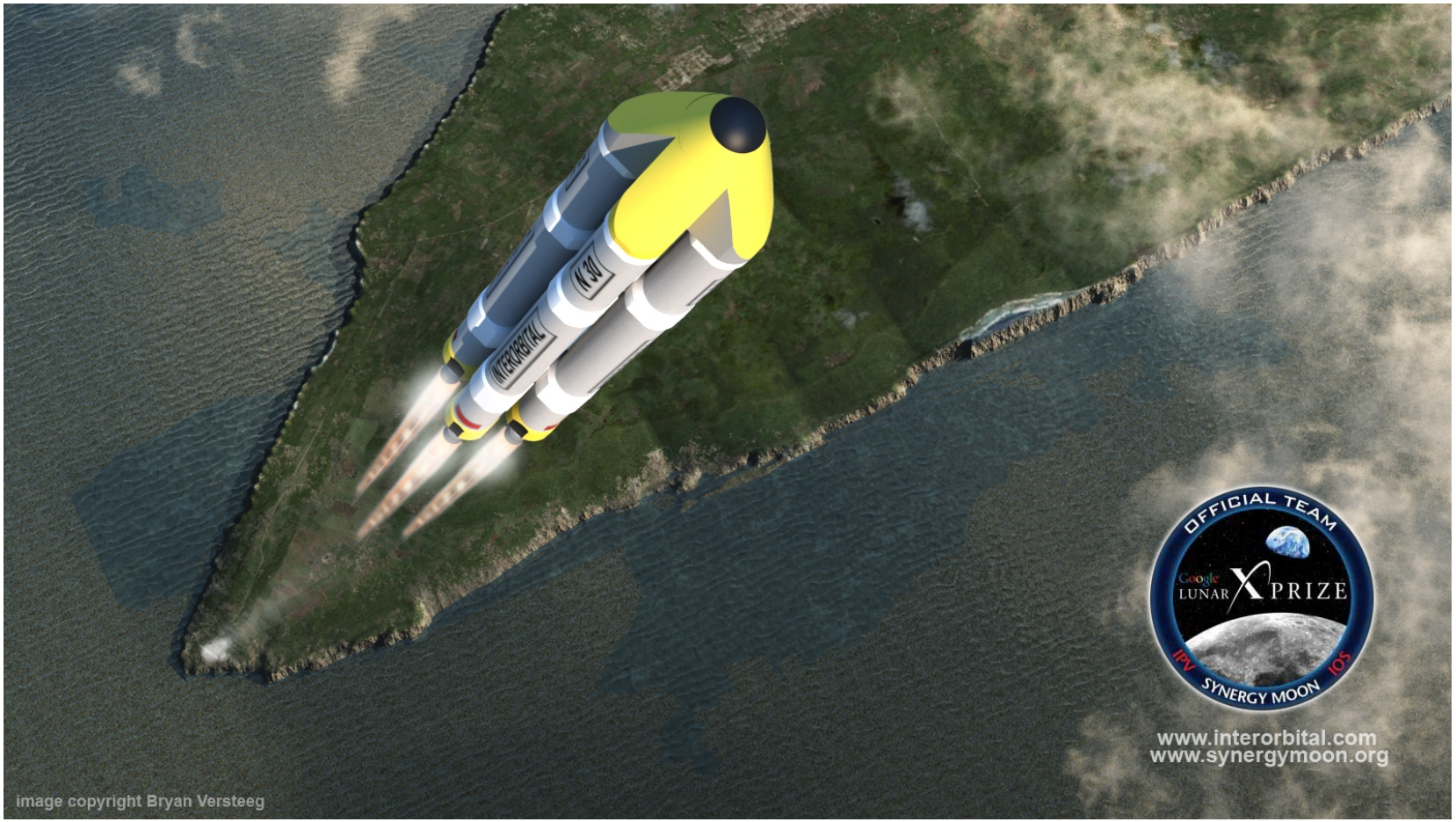
INTERORBITAL SYSTEMS' NEPTUNE MODULAR ROCKETS:

REVOLUTIONIZING LOW-COST SPACE ACCESS-----SUMMER 2012 REPORT

Presenter: Randa Milliron, CEO/CoFounder



Interorbital Systems
www.interorbital.com

ROCKET BUILD-TEST-LAUNCH FACILITIES

-- R&D and Manufacturing: Mojave Spaceport, since 1996

-- Two Rocket Engine Test Sites: Mojave Spaceport

-- Low-Altitude Flight-Test Area: PRS Mojave Test Area

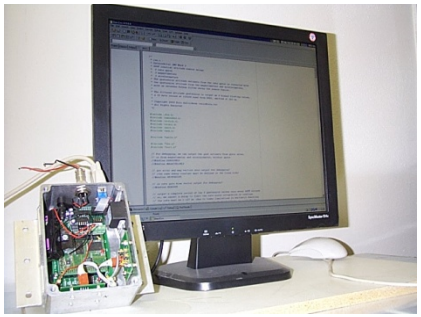
-- Orbital Spaceport (Ocean): Worldwide

-- Land-Based Launches: Kingdom of Tonga, South Pacific

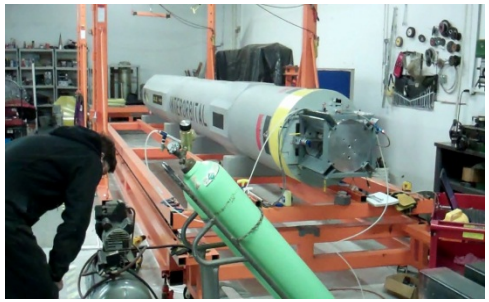
KEY ROCKET HARDWARE BUILT IN-HOUSE

Advanced Composites including state-of-the-art lightweight propellant tanks

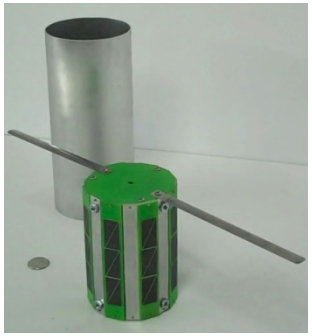
Ablative Rocket Engines and Components



Advanced Guidance Hardware and Software



Modular Rocket Components



Small Satellites: TubeSat and CubeSat Kits

Rocket Injectors, Valves Systems, and Other Metal Components

IOS UNIQUE ROCKET TECHNOLOGIES

-- NEPTUNE Modular Rocket System (three- and four-stage)
Assembled from multiple Common Propulsion Modules (CPMs)
Parallel- and tandem-staging options
Radically reduced rocket system development costs
Can be customized for a wide range of payloads
Ideal design for assembly-line mass production

-- Environmentally Safe, Storable, High-Density Hypergolic Propellants
White Fuming Nitric Acid (WFNA) and Turpentine/Furfuryl Alcohol
Instantaneous chemical ignition eliminates need for an ignition system

-- Low-Cost Propellant Tank Technology
Proprietary acid-resistant tank liners and tank ends
State-of-the-art carbon composite tank reinforcement technology

-- Blowdown Propellant Feed
Eliminates the need for turbopumps or a separate pressurant system

-- Unique Rocket Engine Injector
Automatically maintains propellant jet flow-rate in blowdown mode
Maximizes specific impulse over a wide pressure input range

-- CPM Engine is Ablatively Cooled and Gimballed
Ablative engines allow lighter propellant tanks
Gimballing allows rapid attitude correction in a rough-sea environment

-- Canister-Based Ocean Launch

COMMON PROPULSION MODULE (CPM)

-- Basic building block/construction element of the N-Series Rockets

-- Bi-propellant storable, hypergolic liquid rocket system

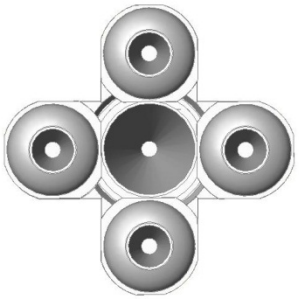
-- Blowdown propellant feed

-- State-of-the-art, all-composite propellant tanks

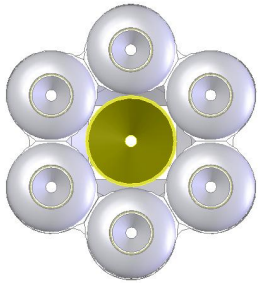
-- Single gimballed rocket engine

-- CPMs clustered together in multiples to meet mission requirements for both small and large payloads

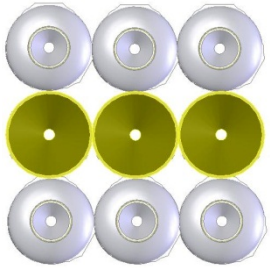
SELECT CPM CONFIGURATION EXAMPLES



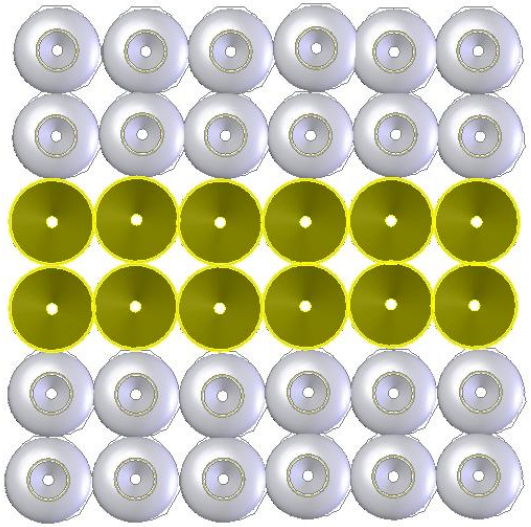
N5
5 CPMs
Three stages
Payload: 30-40 kg



N7
7 CPMs
Three stages
Payload: 50-60 kg



N9
9 CPMs
Three stages
Payload: 100- kg



N36
36 CPMs
Three stages
Payload: 1,000 kg

N5 MODULAR ROCKET SYSTEM

Three-Stage Launch Vehicle with Parallel and Tandem Staging

-- Five (5) Common Propulsion Modules (CPMs)

-- Stage 1: 4 CPMs with parallel staging

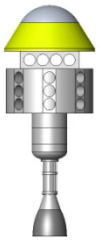
-- Stage 2: 1 CPM

-- Stage 3: Kick stage with solid motor (tandem staging)

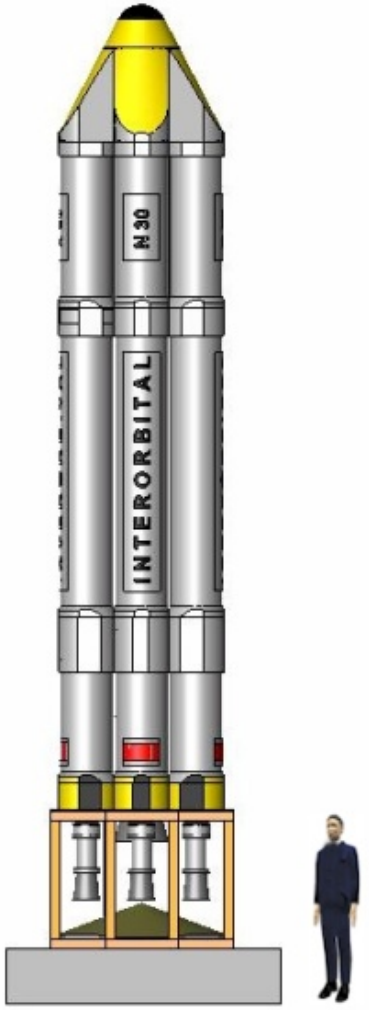
-- Length: 31.5 feet (10.3 m); Maximum diameter: 6.2 feet (1.89 m); fits cargo container

-- Payload: 66 lbs (30 kg) to a 192 mile (310 km) self-decaying polar orbit to eliminate orbital debris

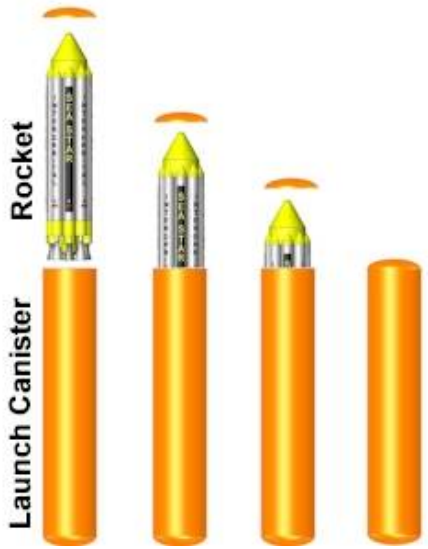
-- Academic base pricing: $8,000 includes TubeSat Personal Satellite Kit and Launch
or $15,000 CubeSat Personal Satellite Kit and Launch

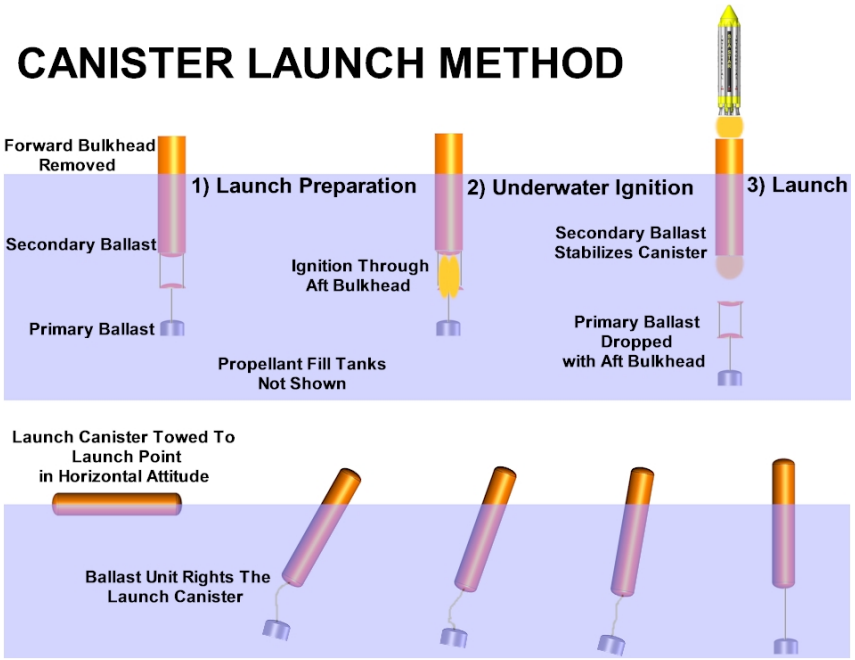


Stage 3



CANISTER OCEAN LAUNCH





CPM MOBILE ROCKET LAUNCHER

BREAKTHROUGH TECHNOLOGY

Ultra Lightweight Propellant Tank Technology

-- Acid-resistant propellant-tank liner
-- Carbon-composite exterior shell
-- Low-tech construction method
-- Ideal for mass production

Solid Rocket Motor Technology

-- Orbital kick-motor applications
-- Long burn-times with low thrust
-- Soft ride for payload
-- Ideal for mass production

BREAKTHROUGH TECHNOLOGY

Storable Propellant Rocket Engine Technology

-- Recent successful test of gimballed roll-control engine and rocket controller

-- IOS is first in the US to use high-density nitric acid and turpentine as propellants of choice

-- Precursor to 7,500-lb-thrust hot-firing of NEPTUNE GPRE-7.5KNTF Modular Rocket Main Engine

NEWS AND UPCOMING MISSIONS

Completed Phase I NASA SBIR Small Business Innovative Research Award

CPM TV: Common Propulsion Module Test Vehicle
Low-altitude suborbital test flights 2012 FAA Class 3 Waiver

Finalizing details of New High-End Satellite Venture with the GWU

Olav Zipser High-Altitude Jump Record Attempt from SR 145 CPM

NASA NanoSat Challenge/ IOS Satellite Missions I & II, 2013

Google Lunar X PRIZE Lunar Missions 2014

Orbital Expeditions Space Tourism Flights 2014

Interorbital Systems
www.interorbital.com

IOS TUBESAT AND CUBESAT KITS

FEATURES

-- PCB Gerber Files

-- Spectrolab TASC solar cells

-- A Li-ion battery pack (3.7 V 5200 mAh)

-- Microcomputer (NetMedia BasicX-24 or Arduino Mini)

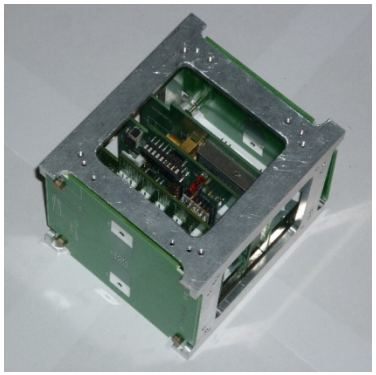
-- Transceiver (Radiometrix)

-- Antennas,

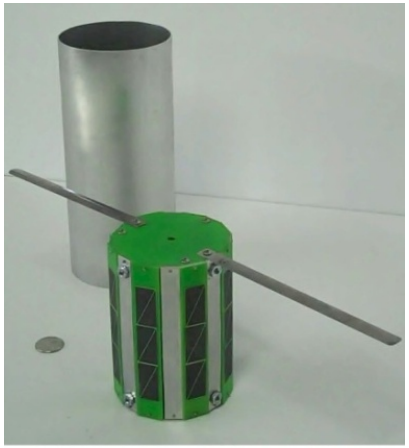
-- Fasteners

-- Complete instructions and assembly guide

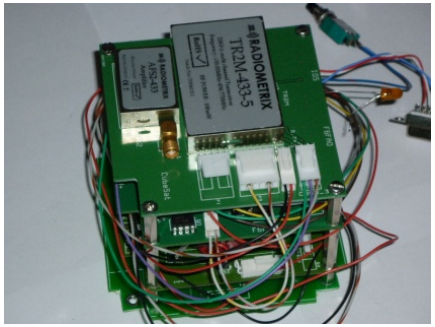
-- CubeSat Chassis



IOS CubeSat Kit



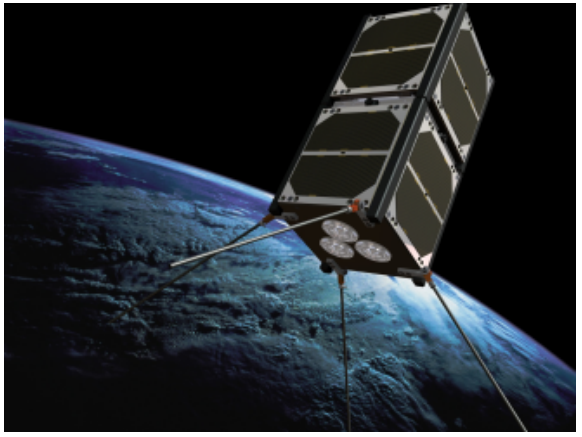
TubeSat with Sample Ejection Cylinder



CubeSats

UC Irvine, UCISAT1
FPT University, Vietnam, F-1 CubeSat
Nanyang Technological University, Singapore VELOX-P CubeSat,
Google Lunar X PRIZE(GLXP) Team PLAN B (Canada)
GLXP Team EuroLuna, Romit 1 (2-Unit CubeSat from Denmark)
NASA Independent Verification and Validation (IV&V) Facility, 1 CubeSat & 2 TubeSats
King Abdullah University, Saudi Arabia (KAUST) (2 IOS CubeSats;1TubeSat; 1 suborbital payload)
The Golden iPod: Voyager revisited; Earth to Sky, spaceweather.com, Bishop, CA, STEM Program
Pakistan's I CUBE-1 Islamabad Institute of Science and Technology

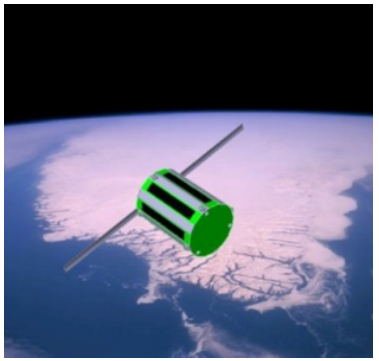
Denmark's GLXP Team Euroluna: *Romit 1*
2U (2-Unit) Cubesat



N5: MISSION I & II LAUNCH MANIFESTS 2013

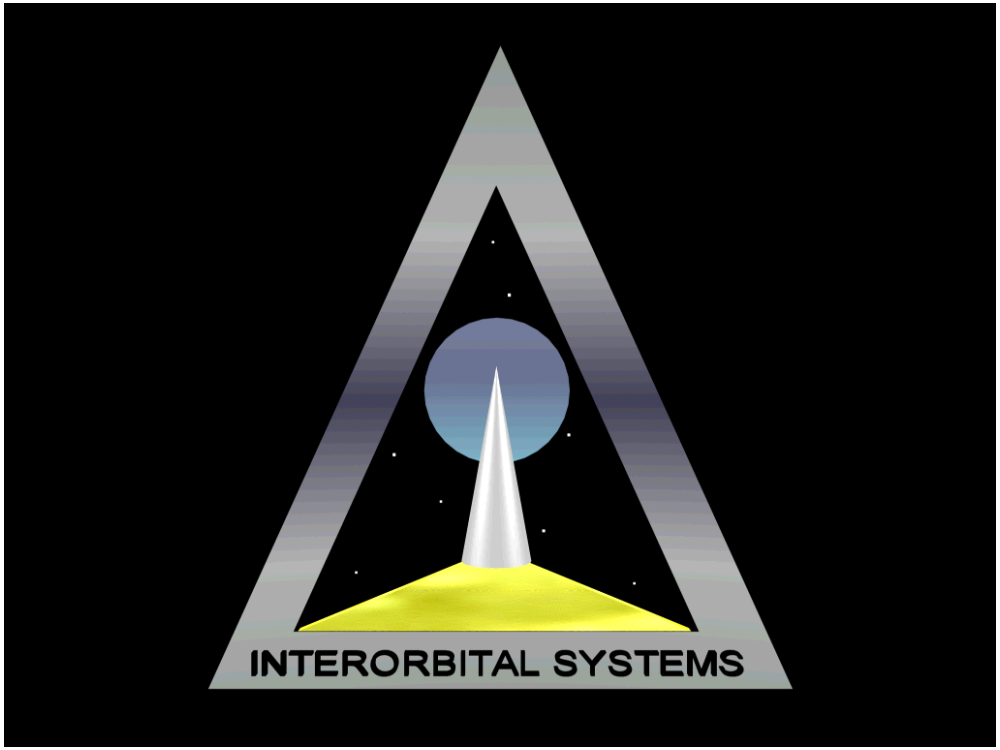
TubeSats

Morehead State University (Kentucky Space) (TubeSat and 2 suborbital payloads)
InterAmerican University of Puerto Rico
University of Sydney (Australia) (2) *i-INSPIRE (initial-INtegrated SPectrograph, Imager & Radiation Explorer)*
Aslan Academy (Private LA High School) STEM Program
Project Calliope (Space Music Project) Dr. Sandy Antunes' Mission to Sonify the Ionosphere
Universidad de Puerto Rico / Marcelino Canino Canino Middle School, STEM micro-meteoroid impact study
GLXP Team SYNERGY MOON Space-Qualifying Rover Team Astronomska Udruga Vidulini's (AUV) Comms
GLXP Team Part-Time Scientists / Fluid & Reason Software (2) (US/Germany): Wes Faler's FRETS 1
Naval Postgraduate School (3) (TubeSats as ad-hoc orbital communication nodes) and 2 suborbital payloads
Defense Science and Technology Lab (DSTL) United Kingdom, Earth observation
Austrian Arts Group mur.at with MURSAT: Earth-as-Art Project
United States Military Academy at West Point (2)
Brazilian Space Institute/108 5th-7th Grade Students, Ubatuba, Sao Paulo, Brazil STEM Program
Mexican Satellite Project ULISES Sat from PLAY Festival's Arts/Soccer Opera from Space
TriVector Services (Huntsville) TRACsat – TriVector Radiation and Attitude Control Satellite
La Despensa (The Pantry) Advertising Agency/Iniciativas en Idiomas (Madrid, Spain)
NASA Independent Verification and Validation (IV&V) Facility (2)
Galaxy Global, 1 TubeSat, donated to NASA Educational Program
Institute of Advanced Media Arts and Sciences/The Science Project, Inc., Japan (7)
AKQA Advertising, San Francisco
Universidad de Chile, Santiago
University of Sao Paulo, Brazil (2)
David Lawrence K-8 School, North Miami, Florida



- Fifteen additional projects pending including Taiwan, Uruguay, South Africa, and many more!

INTERORBITAL'S ROCKET TECHNOLOGY FIELD TRIALS & LAUNCH CREW TRAINING



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