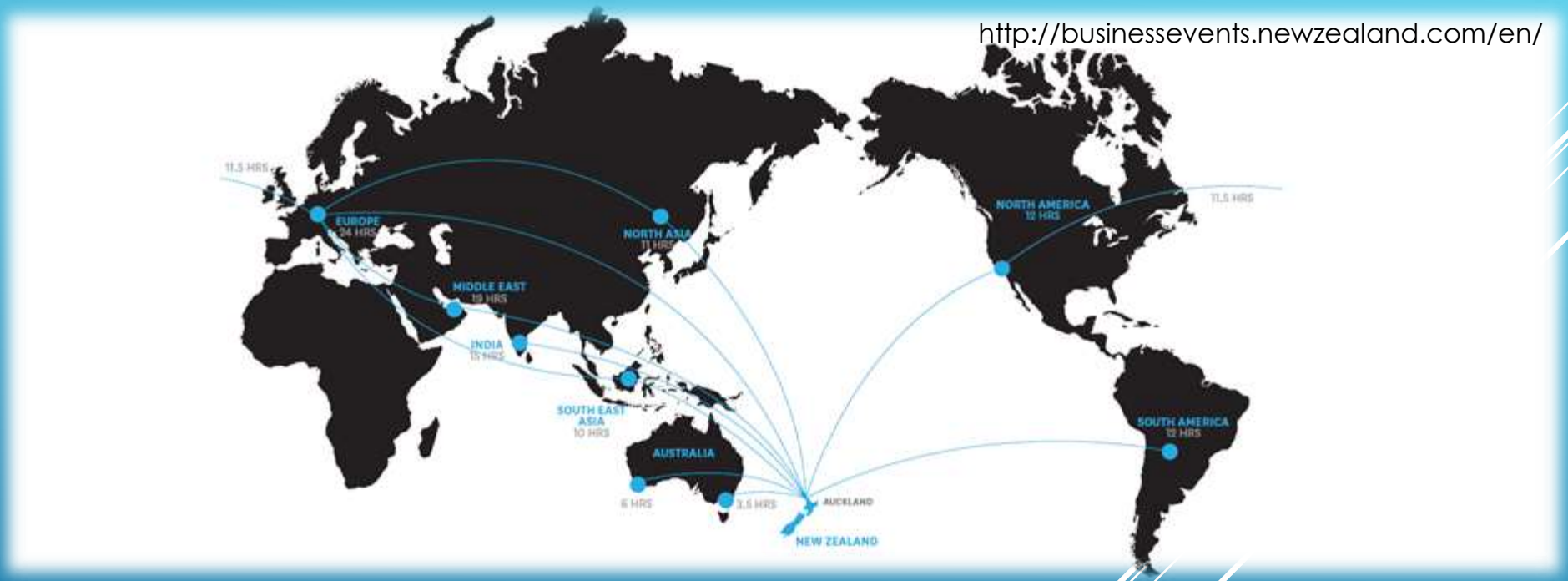


POC REPORT NEW ZEALAND

5th UNISEC-Global Meeting

Rome, 2017

Jim Hefkey

The University of Auckland

New Zealand Tertiary Institutes

8 Universities

16 Polytechnics

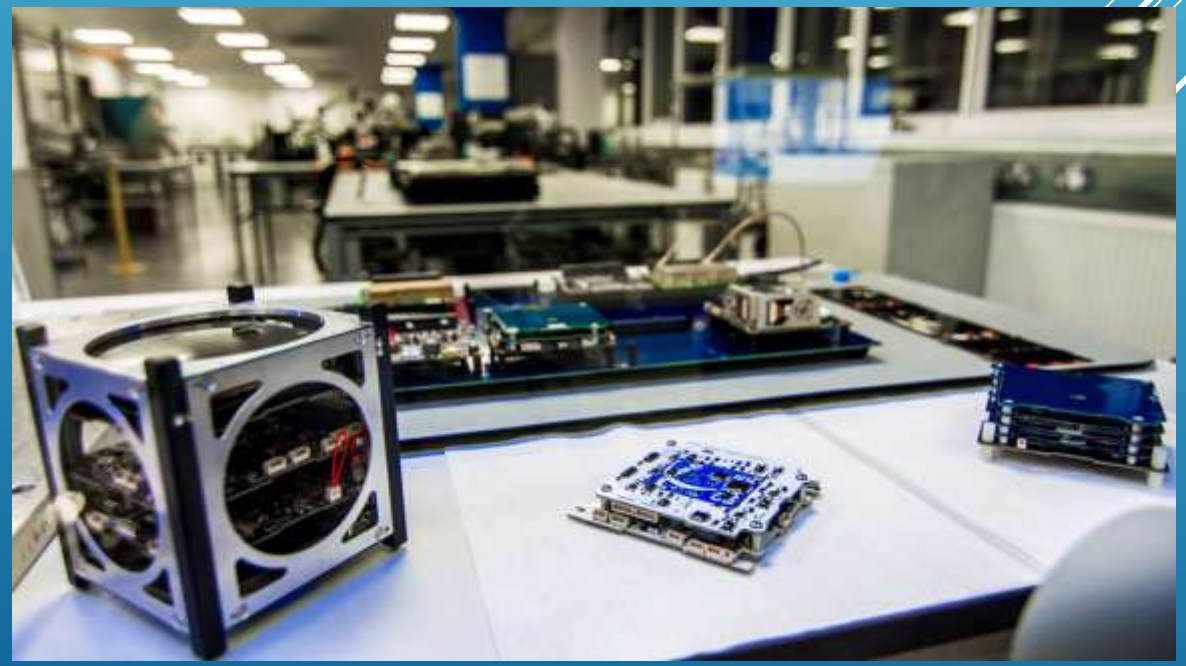
http://english.net.nz/unilist.htm

Slow Beginnings

ROCKET LAB

AUCKLAND PROGRAM FOR SPACE SYSTEMS

- STUDENT-LED CROSS FACULTY PROGRAM
- DEFINE A PROBLEM OR A NEED TO BENEFIT SOCIETY
- FORM THEIR OWN MULTI-DICIPLINARY TEAM
- DEVELOP A SOLUTION TO THAT PROBLEM UTILISING A CUBESAT
- SUBMIT A FORMAL PROPOSAL WHICH INCLUDES A BUSINESS PLAN
- SUBMIT A POSTER AND VIDEO



AUCKLAND PROGRAM FOR SPACE SYSTEMS

- **A PROGRAM FOR UNDERGRADUATES**
- **LEARNINGTO WORK ON COMPLEX PROBLEMS WITH PEOPLE THAT DO NOT THINK THE SAME WAY**
- **OPEN TO STUDENTS FROM ALL FACULTIES**


MAKE BIGGER,
HIGHER, SMARTER
YOUR PROFESSION
3.402
3.401


Mission Idea Challenge
Blow it up!
Look at results?
Yes
It's Science
No
It's Entertainment

Student teams bid to launch space project

by Andrew Ashton

Rocket Lab's Mahia launch site inspires students in Auckland to aim sky high.

THE existence of Rocket Lab's new launch site at Mahia is inspiring university students in Auckland to aim sky high — even though the first rocket launch is some months away.

COUNTING DOWN: Rocket Lab's launch platform at the Mahia launch site, being manoeuvred into place last week. Picture supplied.

About two dozen teams from the University of Auckland are now competing to design a satellite that would be delivered into orbit from the Rocket Lab launch pad at Onenui Station.

University Faculty of Engineering professional teaching fellow Jim Hefkey said multi-disciplinary student teams from across different university faculties were involved in the competition to design and build their own CubeSat-sized satellite.

"It is critical that the approach we take within the university reflects the real world, where space missions might include everything from astrophysics to archaeology. Complex future problem-solving in all fields, not just space, will require inter-disciplinary teamwork.

ACTUALLY, IT IS ROCKET SCIENCE

Space is the new frontier at the University of Auckland with the launch of a space systems project where students will design and build a satellite that will be sent into orbit.

The Auckland Program for Space Systems takes an innovative approach that will see multi-disciplinary student teams from across different Faculties working together.

"This project is about creating a culture of cross-faculty team-work that will see students from Arts for example working with students from Science or Engineering," says Faculty of Engineering professional teaching fellow Jim Hefkey.

"It is critical that the approach we take within the University reflects the real world where space missions might include everything from astrophysics to archaeology. Complex future problem-solving in all fields, not just space, will require inter-disciplinary teamwork."

Almost two dozen student teams have entered the space CHALLENG competition to design and build their own CubeSat-sized satellite. Students have volunteered for the project which is over and above their courses of study.

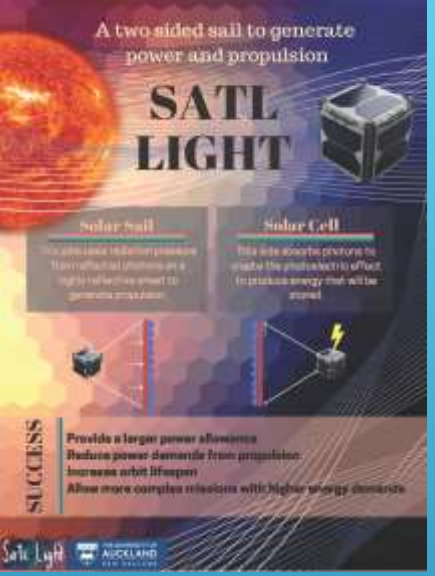
"We've had a very enthusiastic response which is great because as space technologies are developing rapidly and decreasing significantly in cost, New Zealand will have a space industry and we need the human resources to help it develop," Jim says.

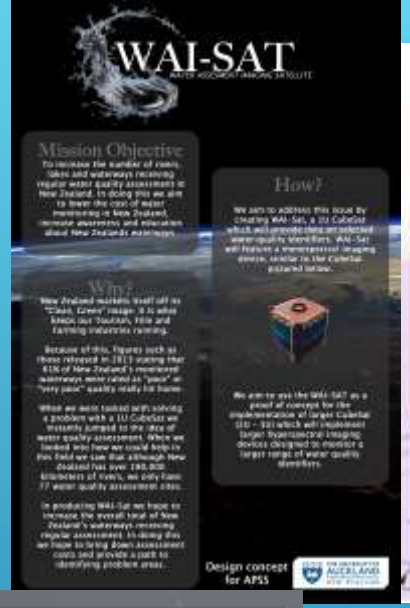
Each student team will come up with an idea for the mission and the functions they want the satellite to perform. The winning team will qualify to build their satellite and prepare it for flight. Entries will be judged by a panel of academics and industry representatives.

Peter Beck, founder of Rocket Lab, has undertaken to help launch the winning satellite on one of his company's Electron rockets. The launch will occur from the private orbital launch site Rocket Lab has nearing completion on the Mahia Peninsula, south of Gisborne.

The Electron vehicle was designed specifically with the small satellite market in mind - the size of satellite technologies has reduced rapidly in recent years and CubeSats have increased in capability and performance.

Once launched, students will be able to operate the mission from a control centre at the University.

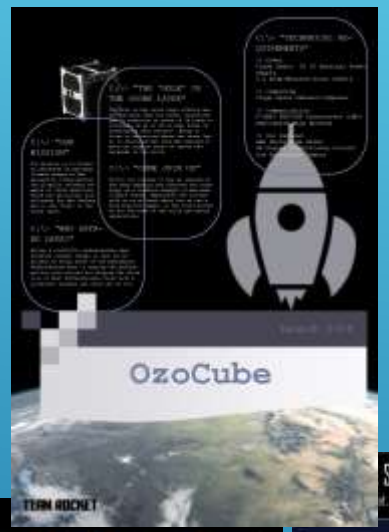

A two sided sail to generate power and propulsion
SATL LIGHT
Solar Sail
Solar Cell
SUCCESS
Provide a larger power allowance
Reduce power demands from propulsion
Increase orbit lifespan
Allow more complex missions with higher energy demands


WAI-SAT
Mission Objective
How?
Why?
Design concept for APSS


Half the world will have a fresh water crisis by
2030
2.8 billion
lack access to fresh water
Scan for subterranean fresh water from
SPACE
No Water.
No Life.
No Blue.
No Green.
- Sylvia Earle


SPECTRA
OUR MISSION
APPROACH
POINT OF DIFFERENCE


WALL-E 3.0
Feasibility of Total Electron Content as a Precursor to Earthquakes


OzoCube
TEAM ROCKET


Microbe Interaction & Biomass Production
Team Space Silk Road
Problem
Solution


Electromagnetic Thruster
Mechanism
Objective


ELECTRO DYNAMIC TETHERS
WHAT WE AIM TO DRIVE
THE CONCEPT
WHAT ARE ED TETHERS?


Helios
Ionospheric electron flux measurement
Mission overview
Application
Measurement
Deployment

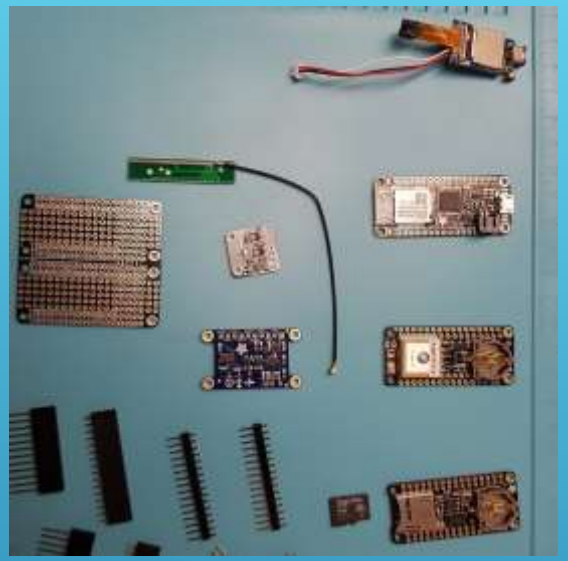

AGRISAT
TIR/D Sensor
Magnetorquer
Battery
Solar Panel
Computer


Strikes Back
Space Junk
Detection
Transmission
Future

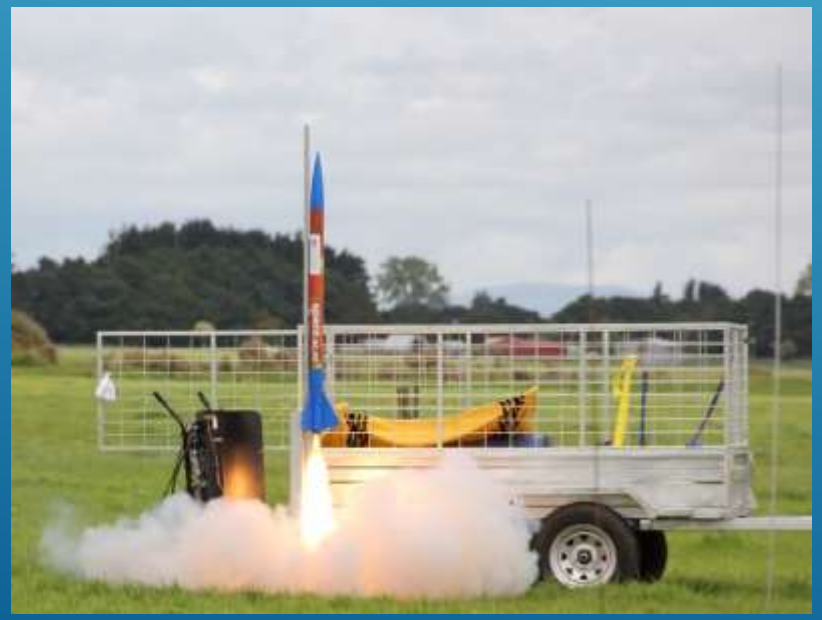

DT-SAT
ENDEAVORING TO REDUCE SPACE DEBRIS
Mission Statement
Technical Specifications
Operation
Value
BAM! AND THE JUNK IS GONE

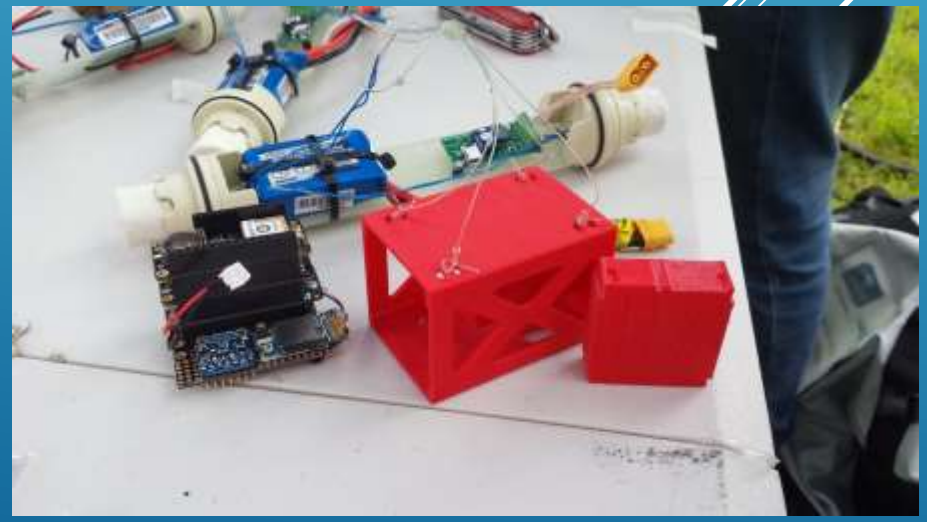

SPACE JUNKIES
Problem
Solution
Protecting our satellites. Protecting our future.


R.E.L.I.C
Radar . Extrapolation . Lidar . Information . Cubesat
Radar
Lidar
Solar Panels
Data Transmission
Battery



P-SAT 2017





UNPACKING 1U "QUAKESAT"

RESEARCH & FUNDING

- Undergraduate CubeSat funded through UoA Vice Chancellor for 2018 launch
- P-Sat (Cansat) program funded for 2017
- Postgraduate Research grant for investigation of Synthetic Aperture Radar

PUBLIC TALKS

INVITED SPEAKERS

- Dr Alice Gorman, Flinders University, Australia
- Dr S. Pete Worden, Breakthrough Foundation, USA
- Prof. Christine Charles, Australian National University
- Robin Sampson, Clyde Space, Scotland

STAFF TALKS

- Raising The Bar, Auckland City
- ASPIRE Conference, UoA
- Spring Week on Campus, UoA

CONFERENCES & MEETINGS

- SMALL SAT 2016, USU, Logan, Utah, USA (1 attendee)
  - CubeSat 2017, Cal Poly, California, USA (3 attendees)
    - IAC 2017, Adelaide, Australia (2 attendees)
      - Local meetings, talks and round tables:

        NZ Space Agency

        UNOOSA

        DTA

        US Consulate

        NZ Agencies

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

UNISEC GLOBAL
University Space Engineering Consortium

THANK YOU