



Israeli Programmes in Space

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Israel Space Agency, Chairman
FIG

5 May 2009 Eilat

5 May 2009

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Information Revolution

First Wave	Agriculture	Sword
Second Wave	Industry	Tank
Third Wave	Information	Computer

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First there was the Security Need



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3

Then came the Gulf War (1991)...



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4



Revolution in Military Affairs

- Precision Strike
- Space Control
- Information Warfare
- Dominant Maneuver

Precision Guided Munitions



System Of Systems



C4I

Targeting Intelligence

Sensors

All weather, real time



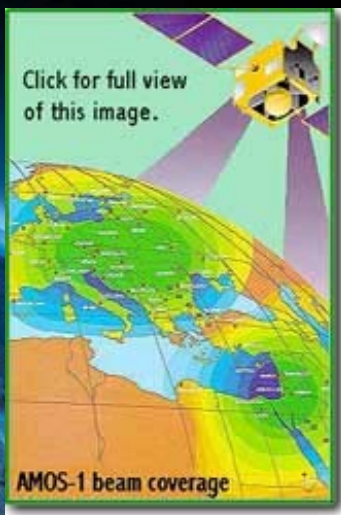
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And then came Amos (Com)



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An Exclusive Club



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OFEQ-5 Satellite Launching By SHAVIT Launcher



ISRAEL AIRCRAFT

Small Is Beautiful

- Miniaturization as a necessity
- Small is cheap (~20K\$/KG)
- Affordability and availability
- 200-300 Kg

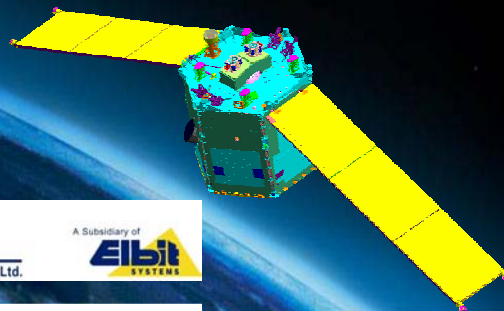
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Israeli – French Venus Mission

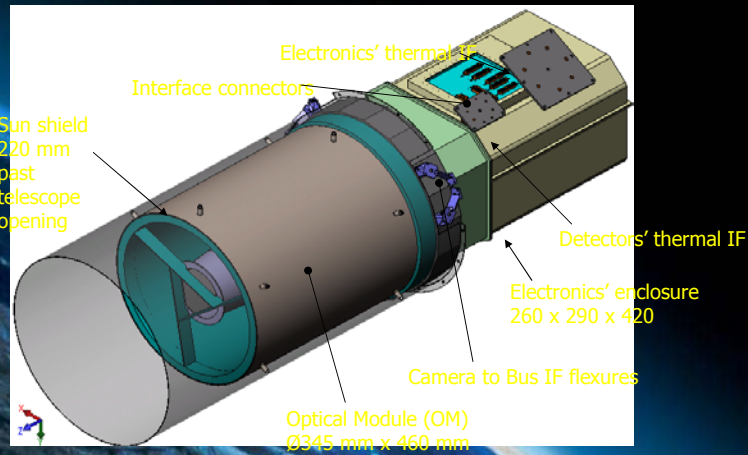


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Multi Channel Sensor



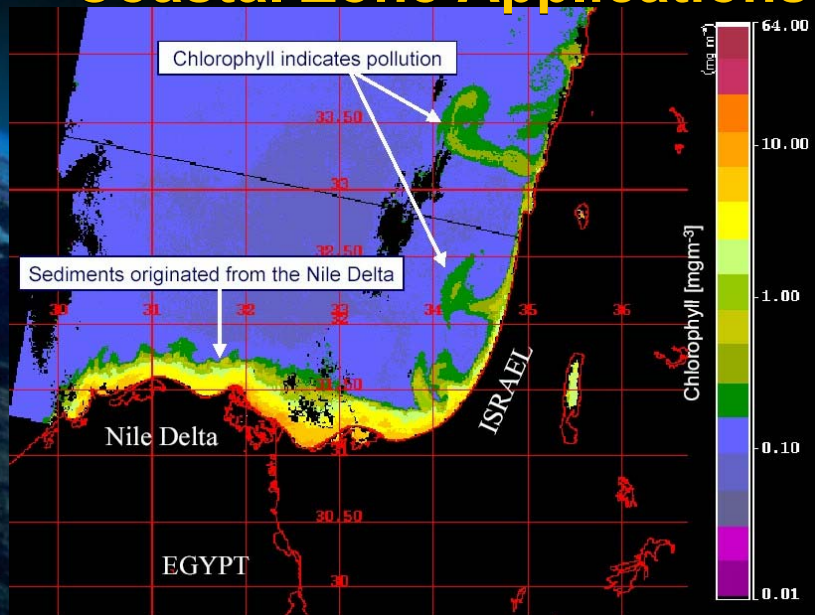
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Coastal Zone Applications



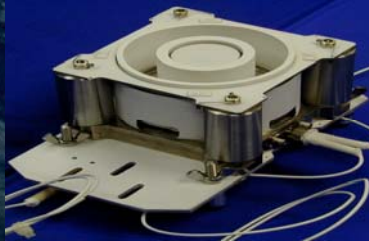
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Hall Thruster



- Israeli HALL Effect Plasma Thruster
 - Trajectory corrections
 - Orbit change
 - Drag compensation in low altitudes



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A view of the TAUVEX mounted on GSAT-4

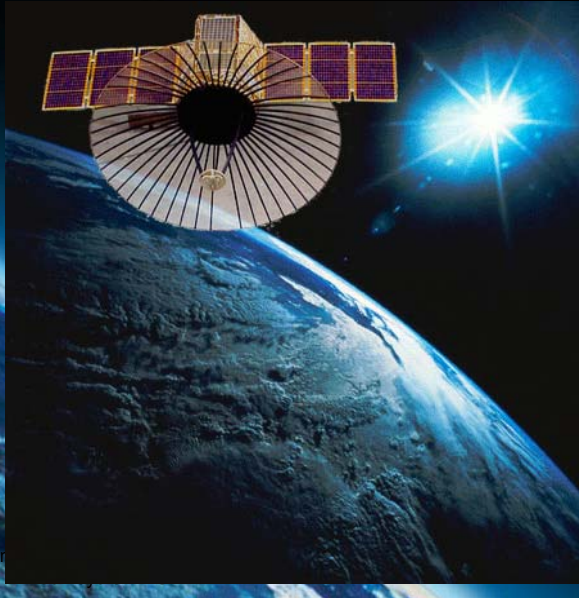


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Space SAR Payload

- An affordable space borne SAR satellite that operates day and night in all weather condition.
- The payload is capable of multi mode operation:
 - High Resolution.
 - Wide Coverage.
 - Electronic beam steering

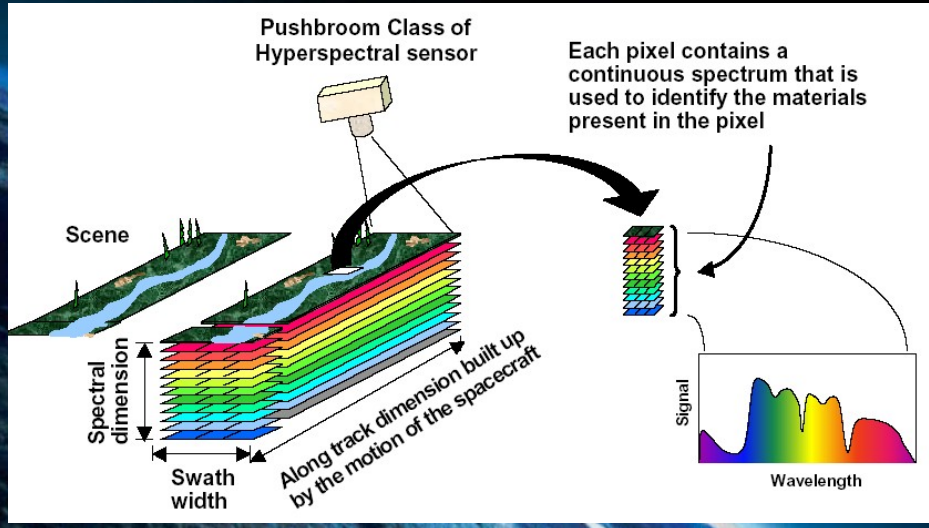


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Hyperspectral Sensor

Pushbroom Class of Hyperspectral sensor

Each pixel contains a continuous spectrum that is used to identify the materials present in the pixel



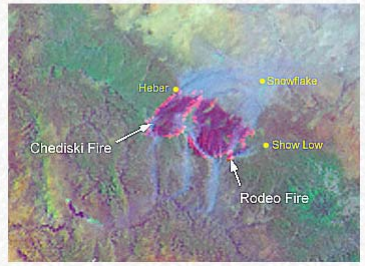
The diagram illustrates the pushbroom class of a hyperspectral sensor. It shows a satellite sensor pointing at a landscape scene. The sensor's field of view is divided into a 'Swath width' and a 'Spectral dimension'. The 'Along track dimension built up by the motion of the spacecraft' is also indicated. A 'Signal' graph shows the continuous spectrum of a pixel, with 'Wavelength' on the x-axis.

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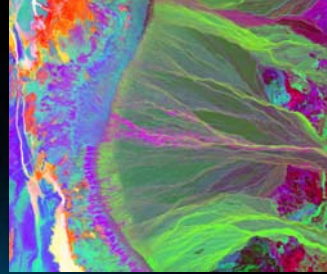
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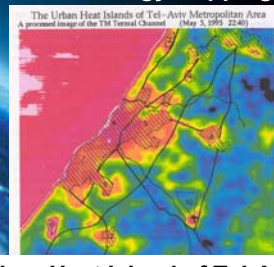
Environmental Applications



5 May Fire Front Detection



Geology Mapping



Urban Heat Island of Tel-Aviv

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Application : Global and local scales



The Middle east during night time



The Middle east during day time

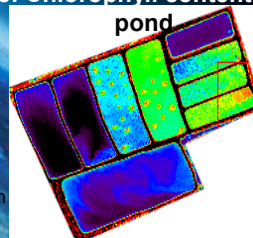


High Spatial Resolution Digital Image



5 May 2001

High Spectra Resolution Digital Image: Chlorophyll content in waste pond



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Achievements

10 satellites were launched
8 in orbit currently

בלחס

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חטיבת מערכות טילים וחלל
התעשייה האווירונאוטית לישראל בע"מ

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Coming Launches

Ground Stations

בלחס

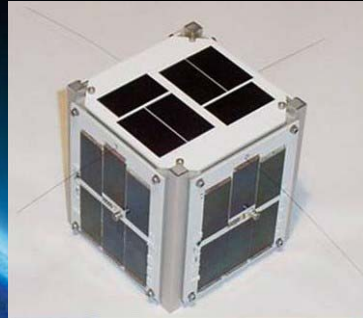
תעשיית האווירונאוטיקה הישראלית

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Future Trends

- 100Kg→10→1Kg
- **A host docking satellite with multiple cubesats no larger than 10 cm on any side able to place for instance a black swath of adhesive material over a satellite lens or solar array – then removed once the objective has been met.**



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ESCORT INSPECTION MICROSATELLITE

Monitor space around a large satellite to detect attacks

Stealthily inspect and monitor a large satellite to determine its capabilities

Stealthily attack to permanently or temporarily disable a large satellite

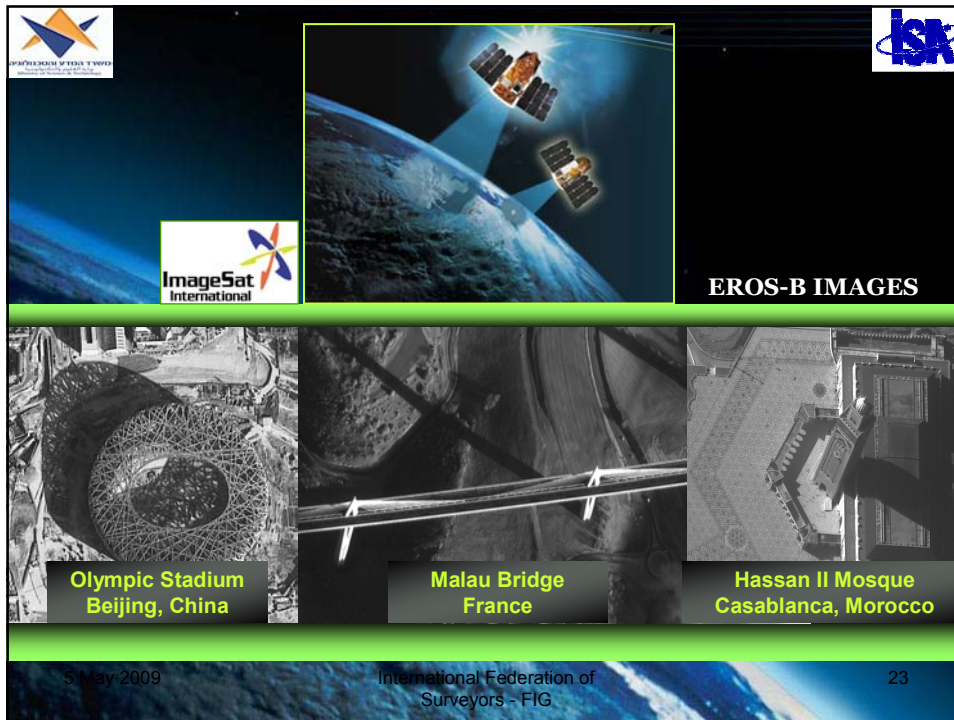
Actively defend a large satellite against attack by microsattellites



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Conclusion

- Israel is a living proof that a small country can be a full member in the Space Club
- High return for relatively small investments in space
- Space is the new frontier.

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There are three possible roads to ruin - women, gambling and technology. The most pleasant is with women, the quickest is with gambling, but the surest is with technology.

Georges Pompidou