PEGASUS :

a future tool for providing near real-time high resolution data for disaster management

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Overview

- **Vito in a nutshell**
- **GI for Disaster Management and Spaceborne *vs* airborne RS**
- **The *PEGASUS* project**
  - HALE-UAV: what & why
  - Implications of the solar character of the carrier
- **The payload characteristics and some possible applications**
  - The Multispectral Digital Camera
  - The LiDAR instrument
  - The Thermal Digital Camera
  - The SAR instrument

Vito in a nutshell

- About 500 people in 7 “centre of expertise”
- Nearly 50 people dealing with R.S.
- Processing of Spot Vegetation Images (daily)
- Global vegetation, agricultural forecast, hyperspectral, new technologies
- Our job: image processing (Level 1 up to level 3)

Requirements for Disaster Management

- Geo-information rapidly available (rapid deployment)
- Coverage of large areas + possibility for local dedicated missions with very high precision
- Very high update rate of information (images) during long periods
- All weather information (different sensors)
- Database for comparison purpose
- No risks for dangerous survey (e.g. Chernobyl 1986, NY 9/11)

Airborne & Spaceborne data for Disaster Management

- Satellite sensors
  - Global coverage
  - Relatively High update rate
  - Imagery from library & rapid
  - QC/QA
  - Low to medium resolution (km – m)
  - Less precise geo-referencing
  - Fixed orbit or geo-stationary
  - Always available (if weather OK)
  - Suffer cloud coverage
- Airborne sensors
  - Local coverage
  - No inherent update rate
  - No library & long delays
  - Unknown quality
  - Medium to high resolution (m – cm)
  - Very precise geo-referencing
  - Flexible
  - Submitted to ATC
  - Suffer cloud coverage

The *PEGASUS* project or the use of a HAP for RS

- Platform flying at High (stratospheric) Altitudes (14-20 km)

  -> Very limited interaction with ATC
- Very flexible trajectories
- Mobile ground station (rapid deployment of the system)
- Long Endurance : up to 8 months continuously
- Equipped with different very high resolution sensors (20 cm)
- Data in near real-time available via protected internet for decision makers

A solar Unmanned Aerial Vehicle (UAV)

Long Endurance >> several days
=> unmanned & solar powered (nuclear not acceptable)
But performance of solar cells and batteries are limited !

- Light weight carrier (20-30 kg)
- Small payload (few kg)
- Small format (more stable)

=> *PEGASUS*-like project

- Heavy carrier (~ 500 kg or more)
- Bigger payload (hundreds of kg)
- Subject to turbulences

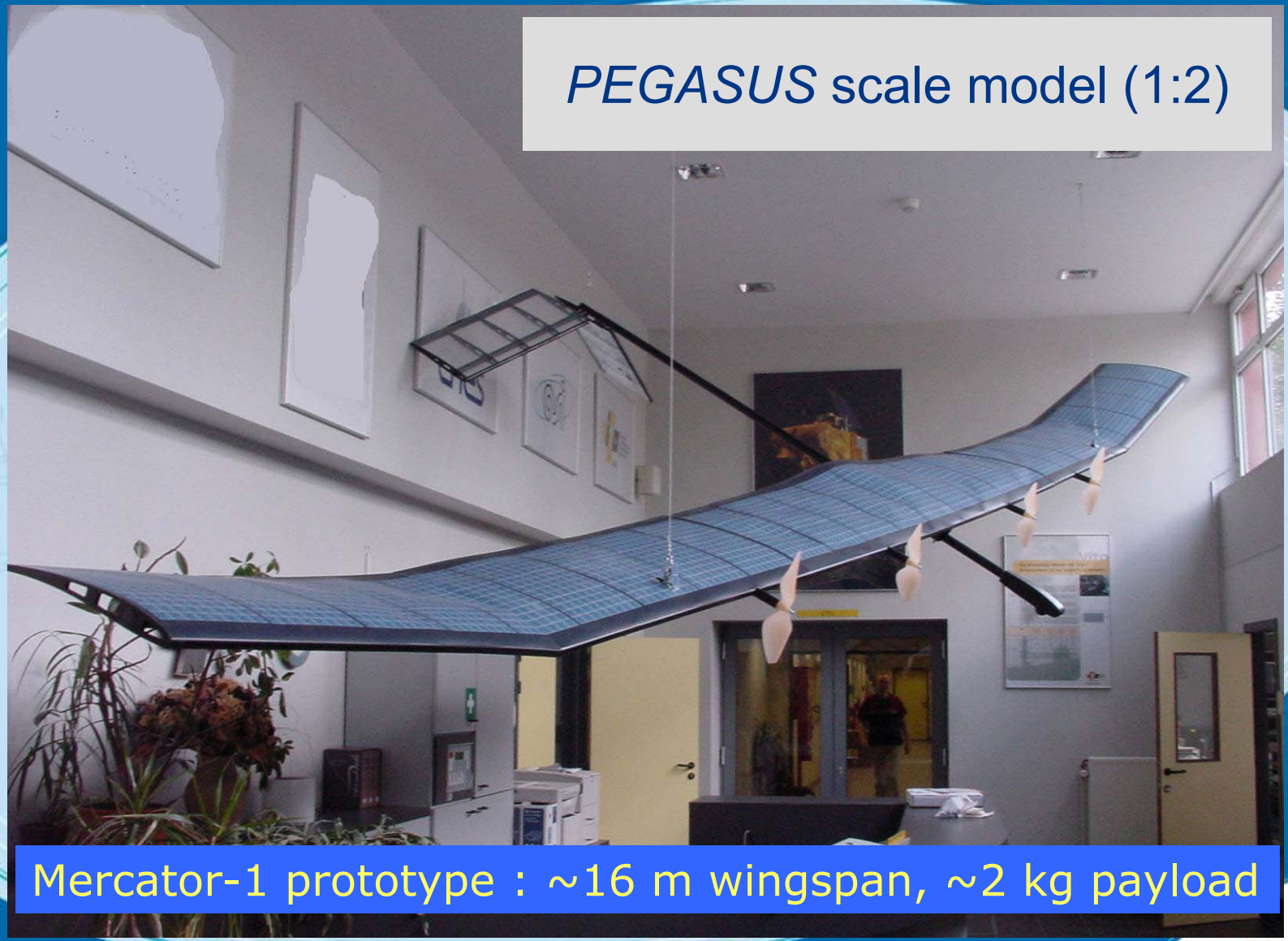
=> Helios-like design

AeroVironment: ERAST program

Helios prototype : 96,863 ft (29500 m) in August 2001

maximum 45° NL, crashed in 2003

PEGASUS scale model (1:2)



Mercator-1 prototype : ~16 m wingspan, ~2 kg payload

Instruments performances

1. Multispectral Digital Camera :
   20 cm pixel resolution and positioning over 2.4 km swath
   3-10 tunable spectral channels (450 – 1000 nm)

2. TIR Digital Camera :
   2 spectral channels (3-5 µm, 8-12 µm)
   1 - 2 m pixel resolution over 2.4 km swath

3. Laser scanner :
   0.25 pt/m2 point density,
   elevation accuracy < 15 cm (post-processed)

4. Synthetic Aperture RADAR :
   2.5 m ground resolution over 4.5 km swath

Applications for disaster situations

HALE-UAV's combine the best of satellites and airplanes

	Satellite	Airplanes	HALE-UAV
Coverage	global	local	regional
Frequent update	+	-	++
QA/QC	+	-	+
Availability	+	-	++
Resolution	-	++	+
Precision	-	++	+
Flexibility	-	+	++
Cheap	+	-	++

+ very rapid deployment !!!

Pegasus: the missing link

a revolution or just a complementary evolution ?

- 8 months continuous survey
- 20 cm ground pixel resolution (multi-spectral) in near real time
- Very flexible trejectories
- Rapid deployment (mobile ground station)
- Telecom
- Test bed for µ-satellite instruments
- Clean technology (solar)

Challenge: integration of existing technologies

What about the planning ?

- 2005 : Proof of concept of the carrier (Funded by Flemish government)
- 2006 : 3 weeks continuous survey with near real time multispectral images
- 2007 : LIDAR
- 2008 : Thermal camera & SAR
- 2009 : constellation of HALE UAV's

Thank you for your attention

any questions ?

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