The Green-Wake Project

UV Lidar for Wake Vortex Detection

An overview

presented by Carsten Schwarz
(DLR Institute of Flight Systems)

Funded by the European Commission's
Framework Programme 7 under Grant Agreement 213254

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June 2010

Green-Wake at a glance

- Funded by European Commission (FP 7)
- NOV 2008 – OCT 2011 (36 months)
- http://www.greenwake.org
- 12 Partners:
  - Lidar Technologies Ltd (coordinator), UK
  - EADS Deutschland GmbH, Germany
  - Université catholique de Louvain, Belgium
  - Technical University Sofia, Bulgaria
  - German Aerospace Center DLR, Germany
  - Aeronautical Research and Test Institute VZLU, Czech Republic
  - Active Space Technologies, Portugal
  - ADSE, Netherlands
  - Photonic Science Ltd, France
  - SensL Ltd, Ireland
  - Sula Systems Ltd, United Kingdom
  - SimSoftware Ltd, Bulgaria

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Green-Wake status

- The Green-Wake project coordinator, Lidar Technologies, ceased trading in March 2010
- The relevant officers from the European Commission have supported the formulation of a plan to continue the project
- A mutually acceptable plan is being developed by the Commission and the consortium members

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Green-Wake status

- Hovemere Ltd has expressed interest in taking Lidar Technologies' role in the project
- Hovemere have employed some of LT's original staff and has all the technical resource to fulfil LT's role in the project
- The project coordination function may tranfer to either Sula Systems or UCL to satsify EC requirements
- The aim is to restart the project in Autumn 2010

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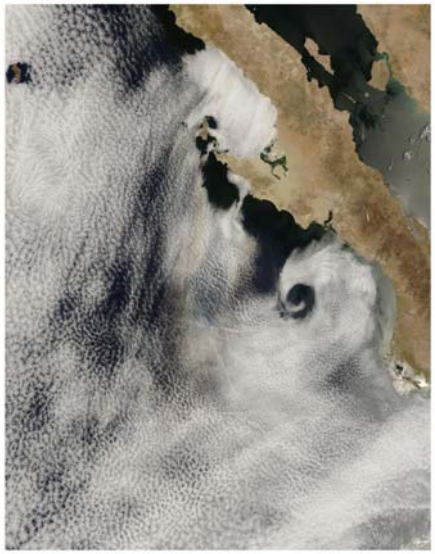
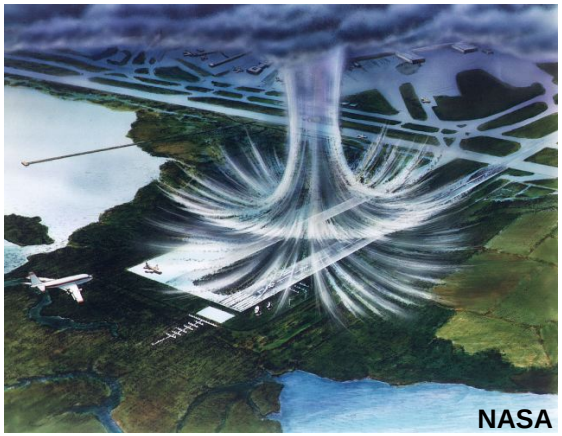
Atmospheric threats

Clear air turbulence (CAT)



Wind shear



Wake vortices

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Green-Wake objectives/ benefits

- Detect wake vortices and wind shear in a timely manner
- Anticipate and mitigate effect of wake vortices and wind shear on aircraft and occupants via warnings and flight controls
- Develop and validate innovative technologies: UV LIDAR based
- Increased safety
- Higher airport capacity via reduced air traffic separation

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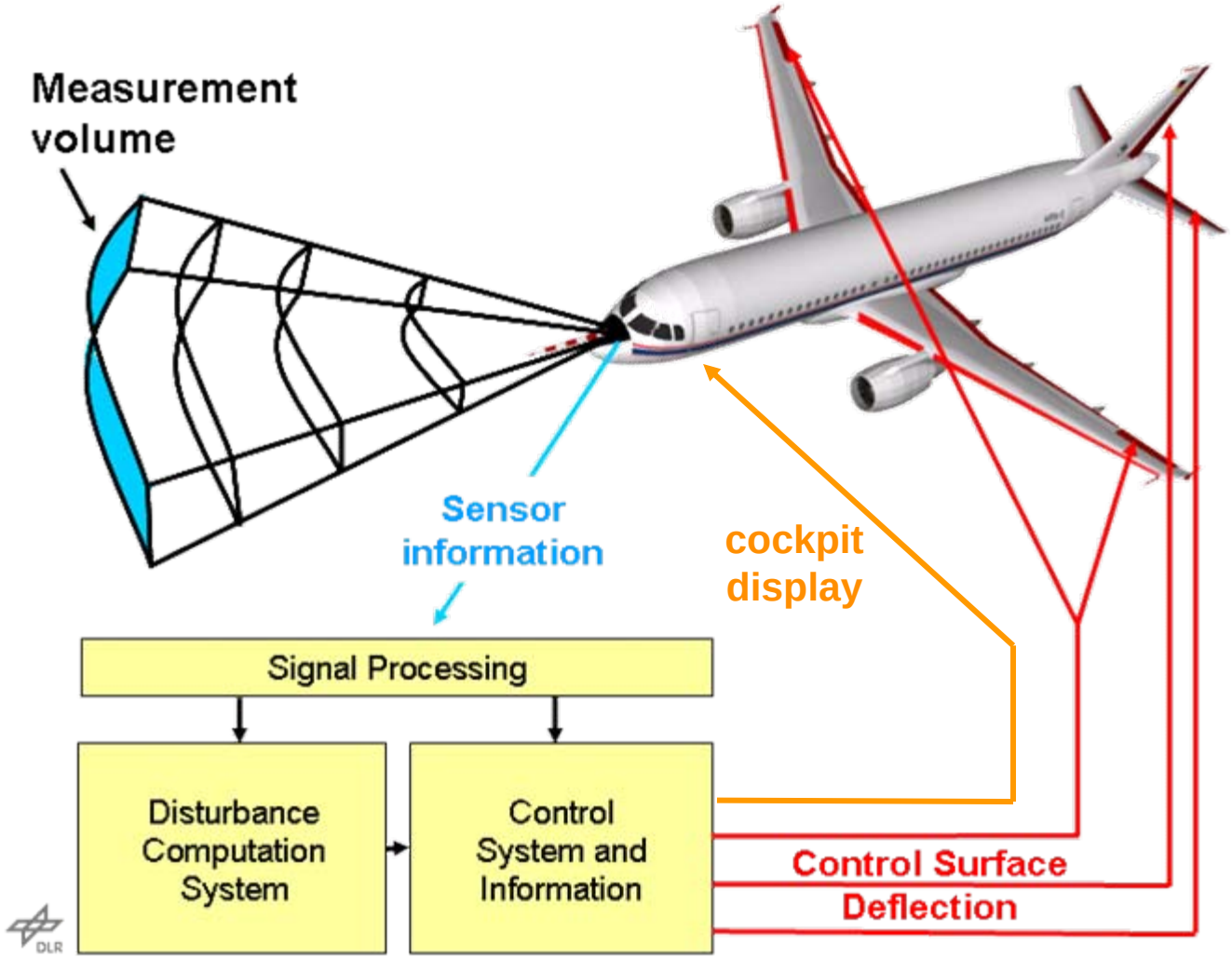
The Green-Wake concept
Airborne detection, control & warning



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Green-Wake innovations

- Modeling and simulation of wake vortex and wind shear detection by imaging LIDAR instruments
- Development of an imaging Doppler LIDAR and fast scanning system
- Detector and data processing
- Test and demonstration of the performance of the system
- Hazard map

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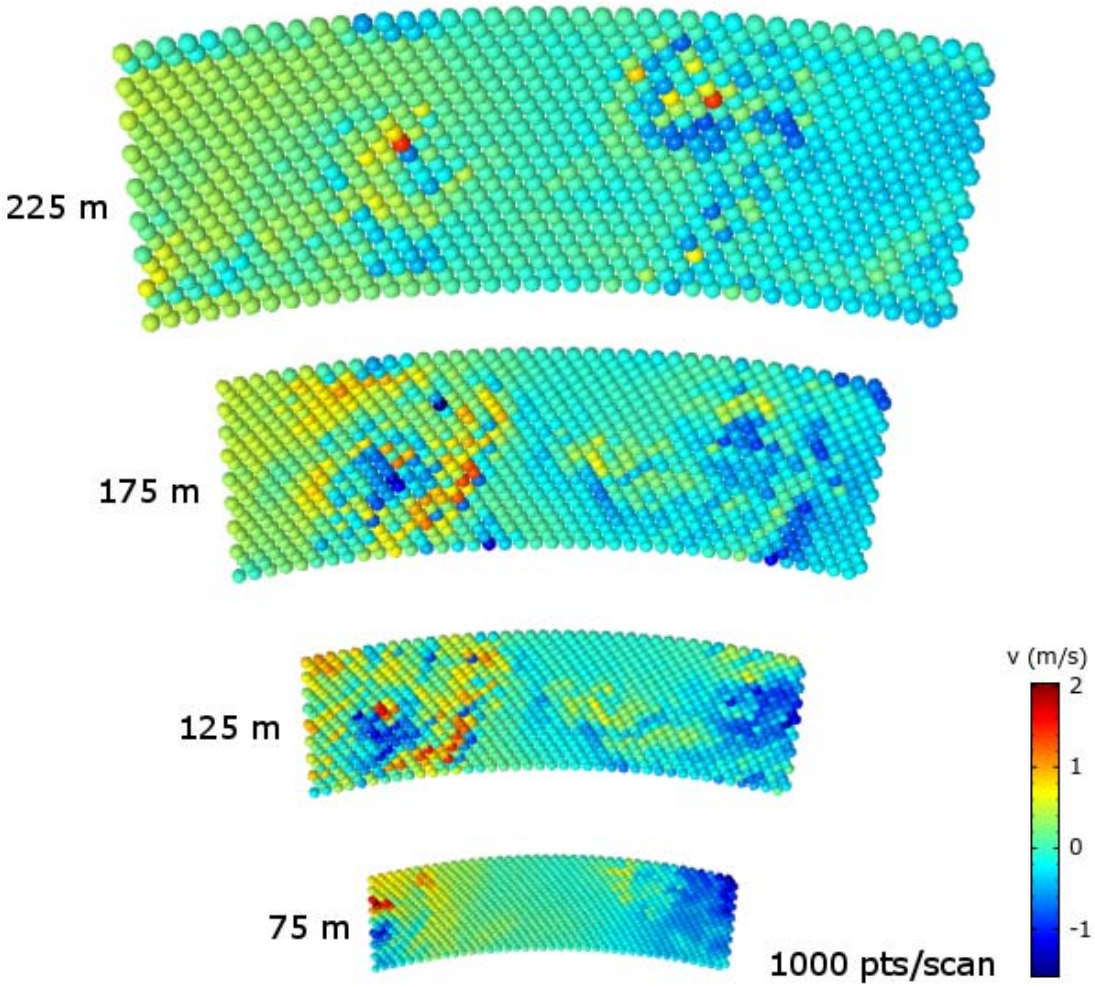
Wake vortex in ground effect with cross-wind



Simulation of a scan by an ideal radial velocity (e.g. Doppler) sensor of a wake vortex pair in ground effect with cross-wind

(b_0 = 50 m)

Scanned area:
120m × 50m at 200m

UCL/iMMC – UCL/ICTEAM

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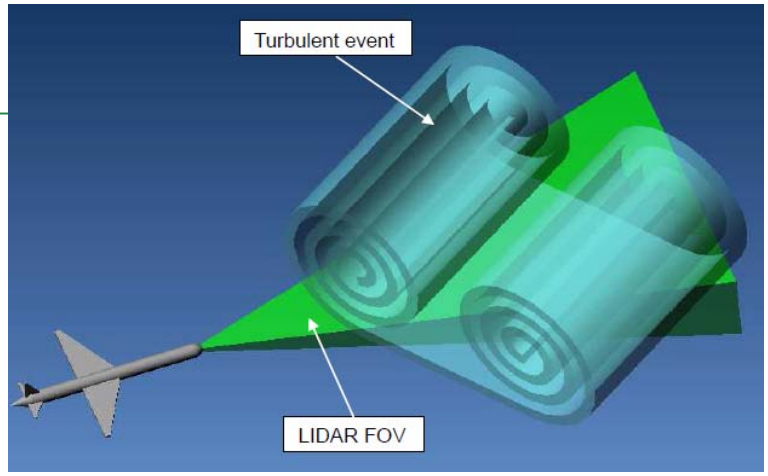
System concept



- Simulation model developed
- Scanning system (mirrors/ prisms)
- Scanning pattern
- Focus regarding wake vortices on approach/ landing and takeoff/ departure rather than cruise flight
- Key questions
  - What is the optimum scanning regime (size and number of points)?
  - What is the optimum bin length (LOS sample size)?
  - What is the required laser power?

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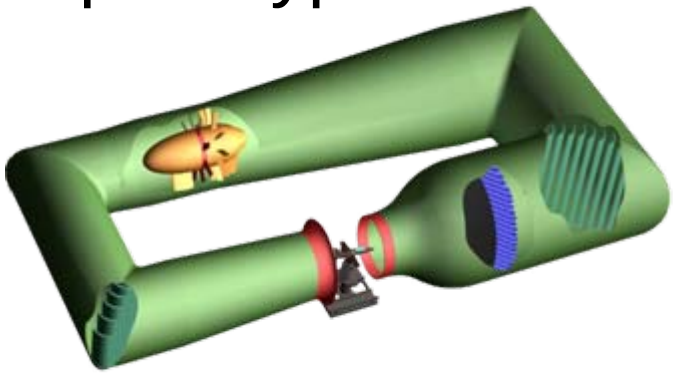
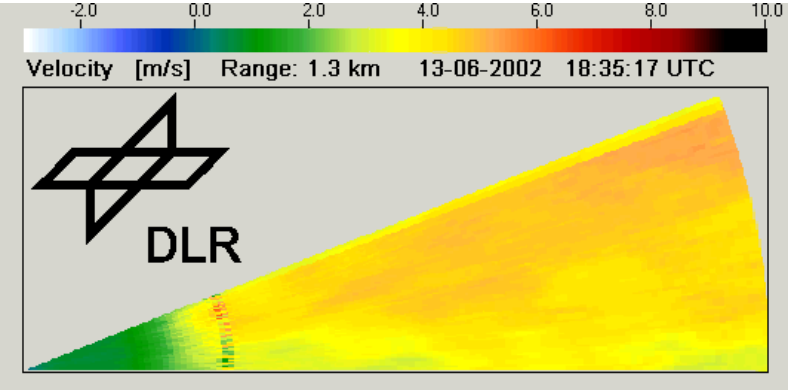
Outlook

- final design review
- ground-based demonstrator/ prototype
- testing/ validation
  - wind tunnel
  - airport
    (with DLR coherent LIDAR)





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