

Simulating new DWL concepts for ISS science missions.

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Lidar Working Group Meeting
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Outline

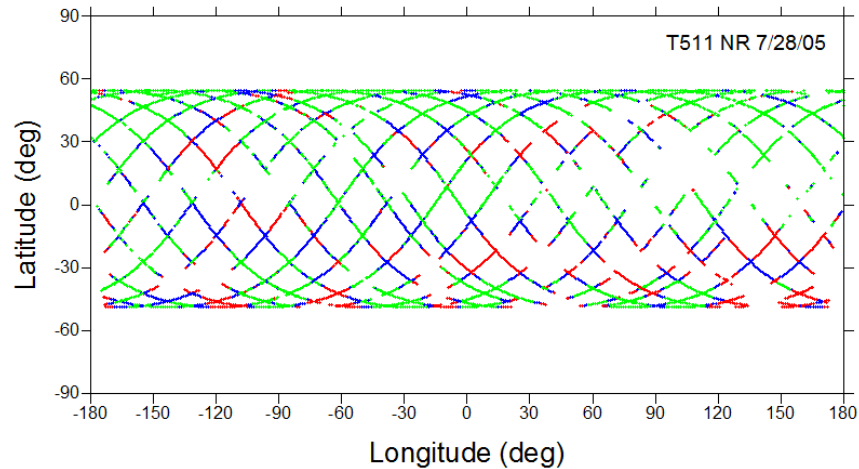
- Background on prior OSSEs
- Realistic OSSEs
- OAWL, Double Edge and Coherent subsystems
- Shot patterns for ISS orbit
- Data product charts
- Summary of preliminary results

Energy Aperture Product

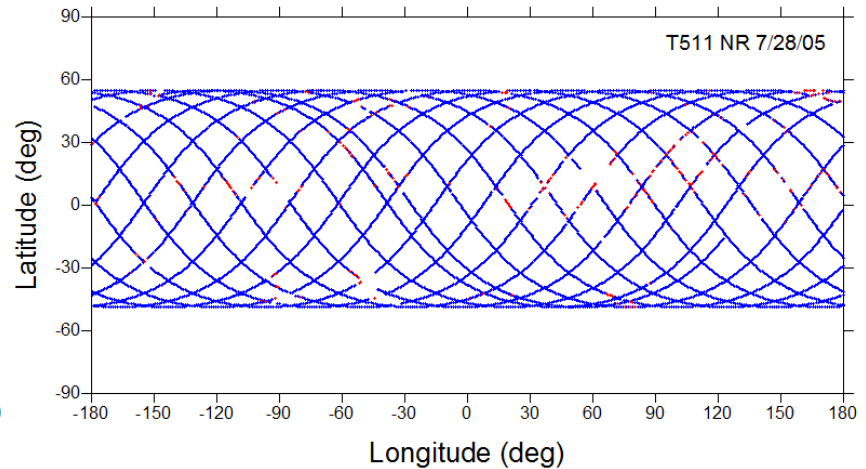
- OAWL
Pulse Energy: 1.22 J (0.55 J @ 0.355 μm)
Aperture: 0.7 m (1.54 m^2)
PRF: 50 Hz
EAP: 93.94 (42.35)
- OAWL Double Edge
Pulse Energy: 1.22 J (0.55 J @ 0.355 μm)
Aperture: 0.7 m (1.74 m^2)
PRF: 50 Hz
EAP: 93.94 (42.35)
- WISSCR Coherent
Pulse Energy: 0.25 J
Aperture: 0.5 m (.79 m^2)
PRF: 10 Hz
EAP: 1.98
- WISSCR Double Edge
Pulse Energy: 0.8 J (0.36 J @ 0.355 μm)
Aperture: 0.5 m (.79 m^2)
PRF: 100 Hz
EAP: 63.2 (28.44)

Upper Troposphere

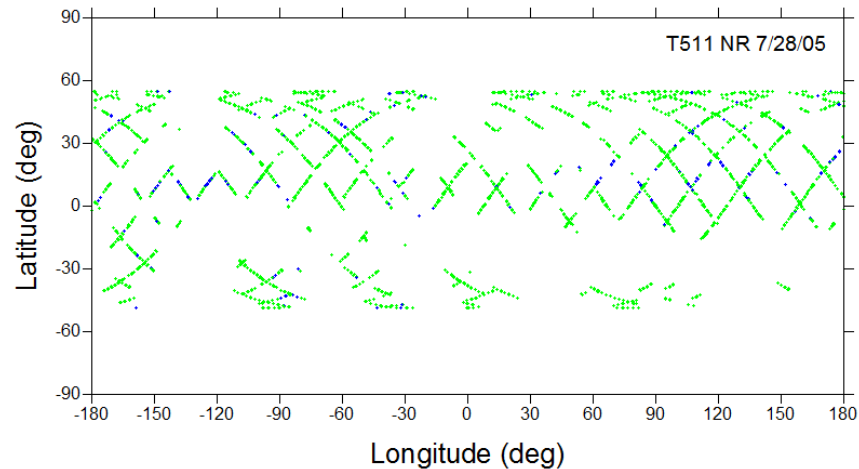
OAWL (background mode) Sigma0 at 11 km



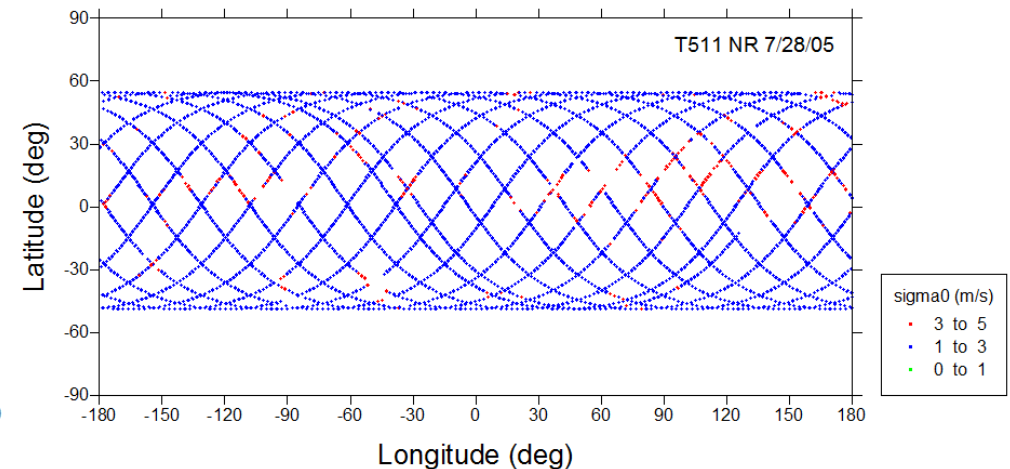
OAWL Double Edge (background mode) Sigma0 at 11 km



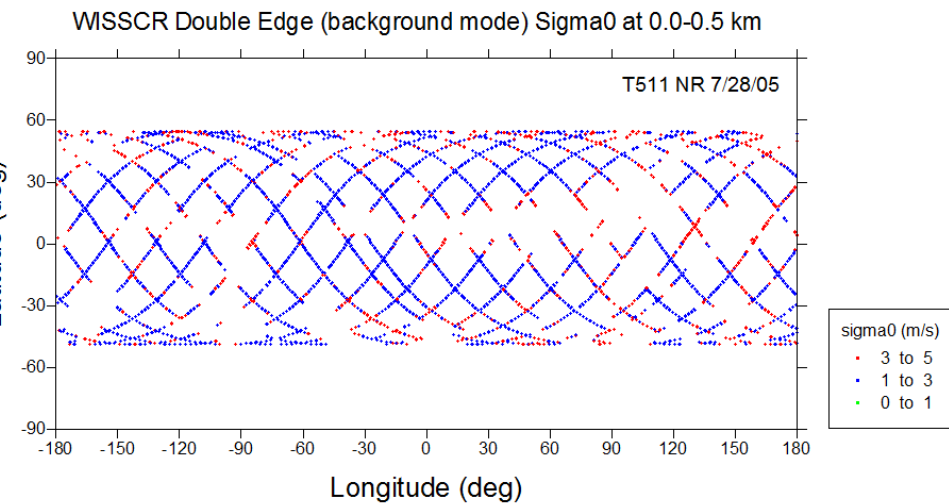
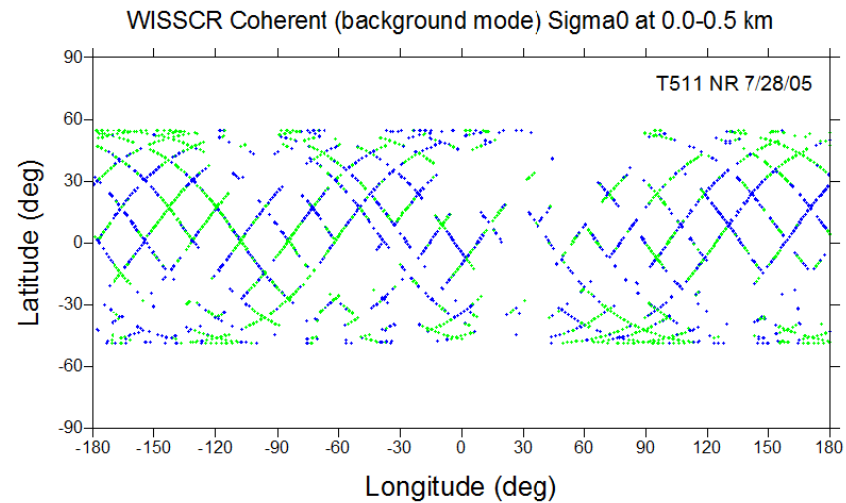
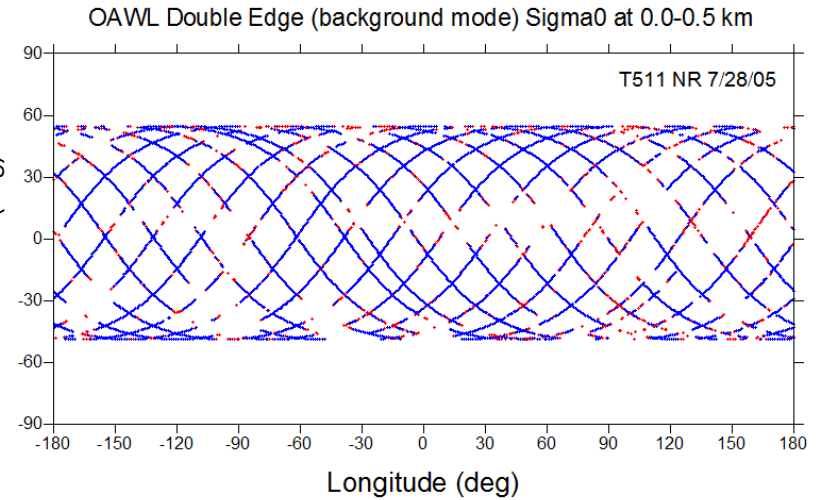
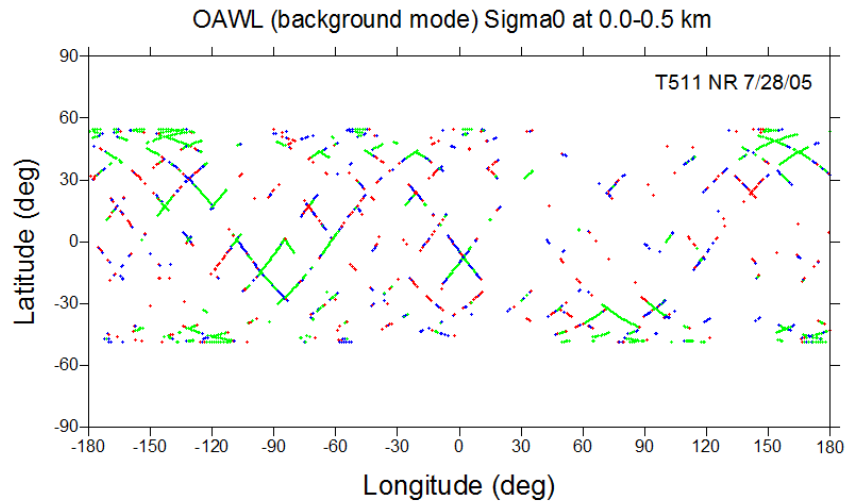
WISSCR Coherent (background mode) Sigma0 at 11 km

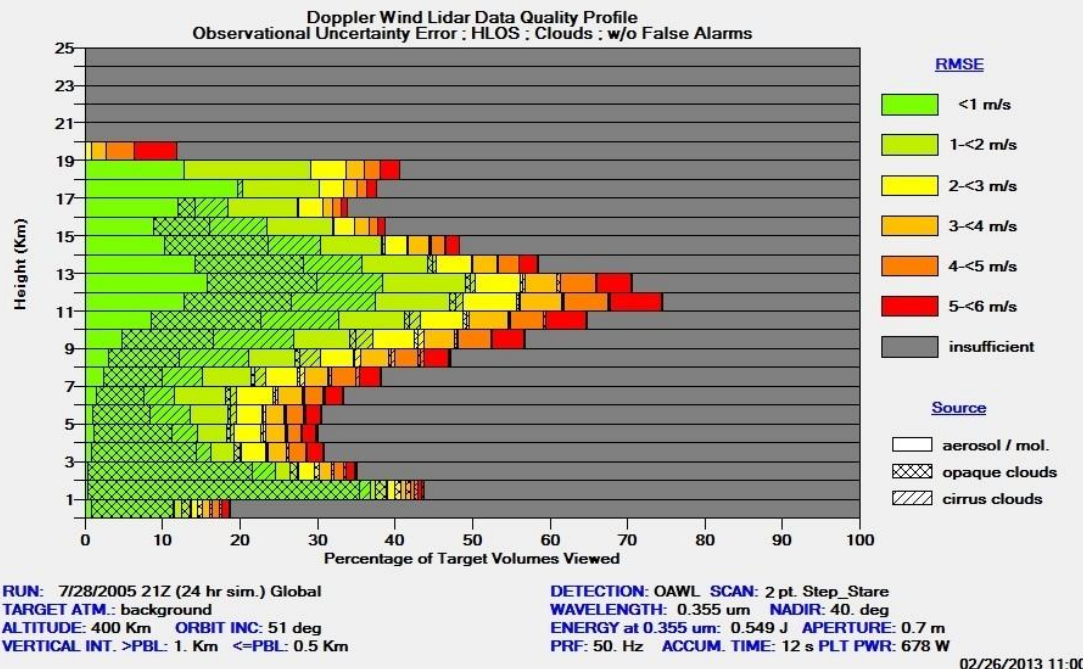


WISSCR Double Edge (background mode) Sigma0 at 11 km

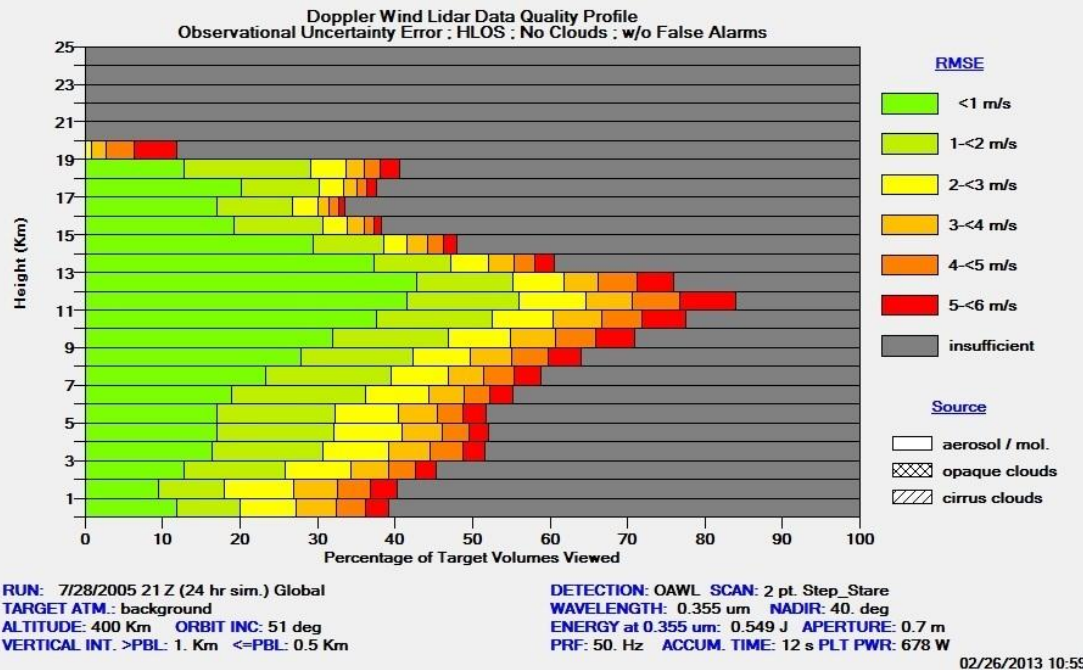


Marine PBLs

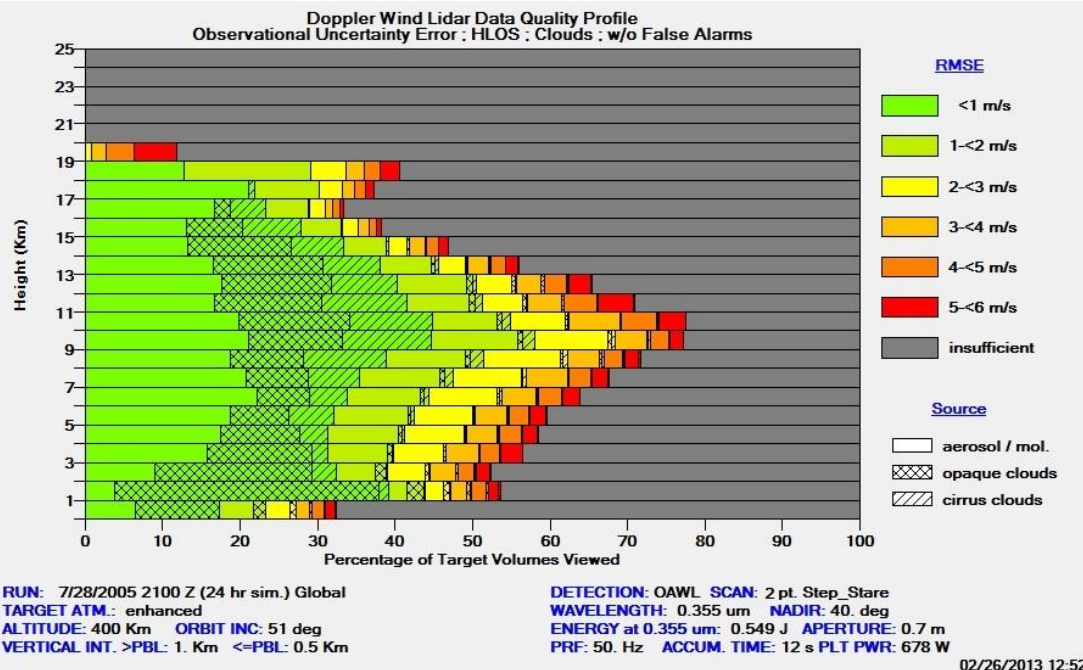




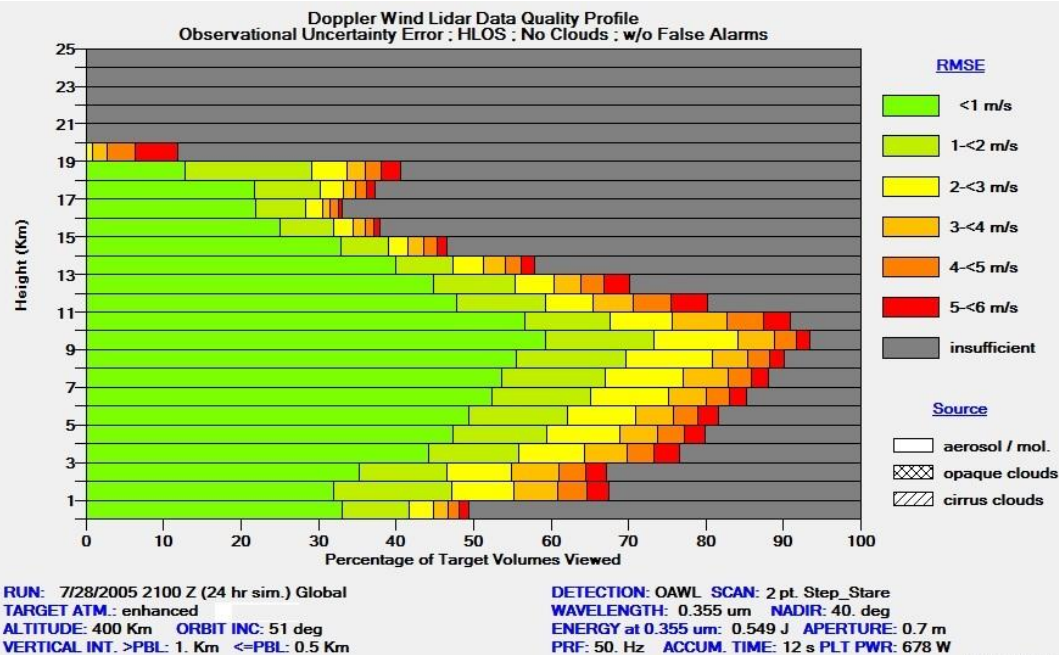
OAWL with Clouds Backscatter Mode: Background



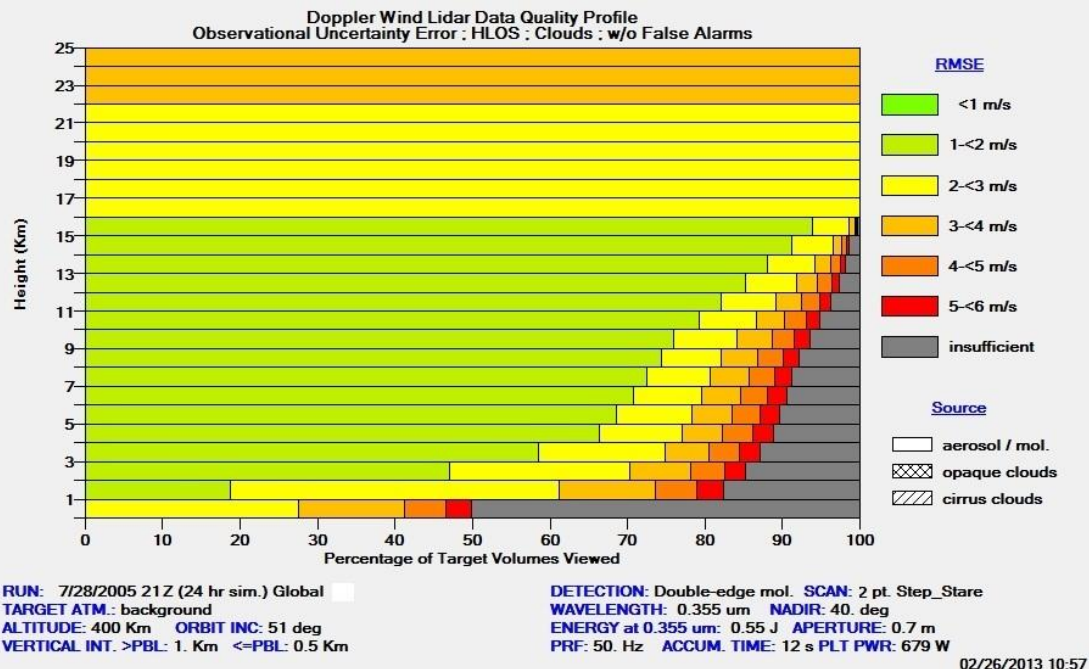
OAWL without Clouds Backscatter Mode: Background



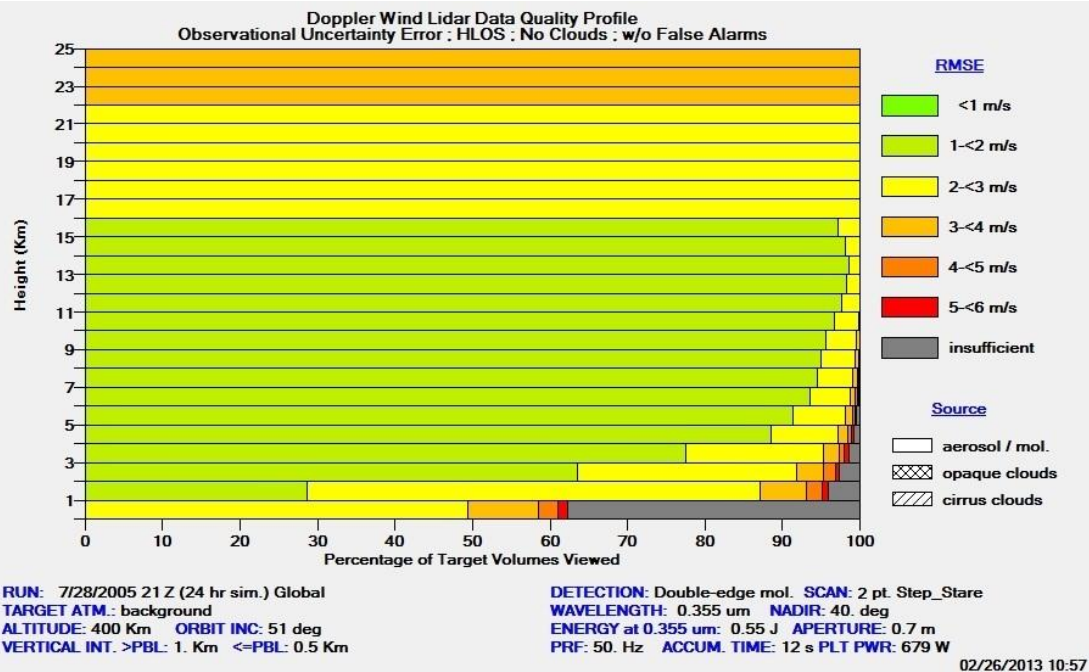
OAWL with Clouds
Backscatter Mode: Enhanced



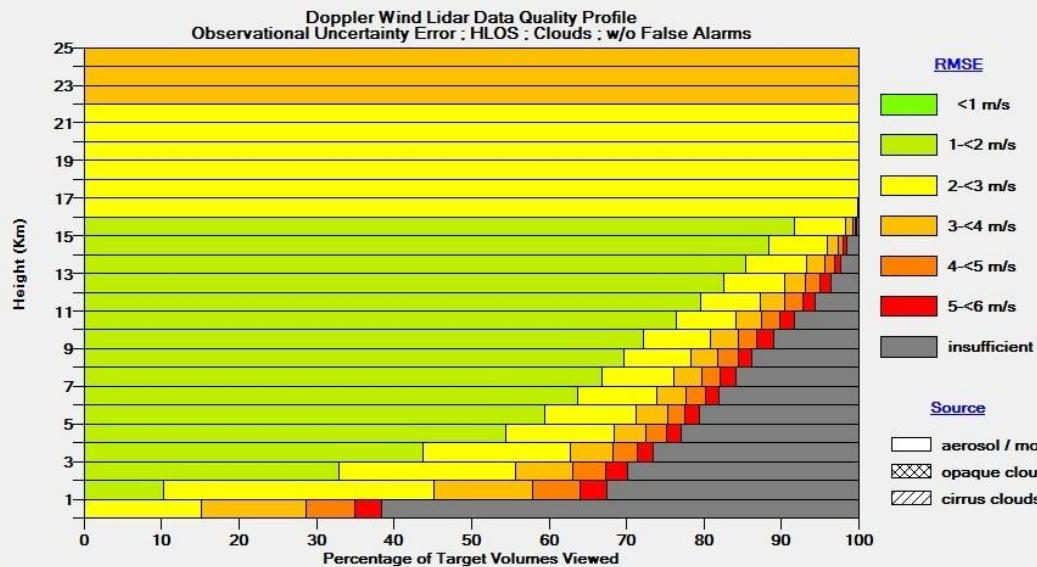
OAWL without Clouds
Backscatter Mode: Enhanced



OAWL Double Edge with Clouds Backscatter Mode: Background



OAWL Double Edge without Clouds Backscatter Mode: Background

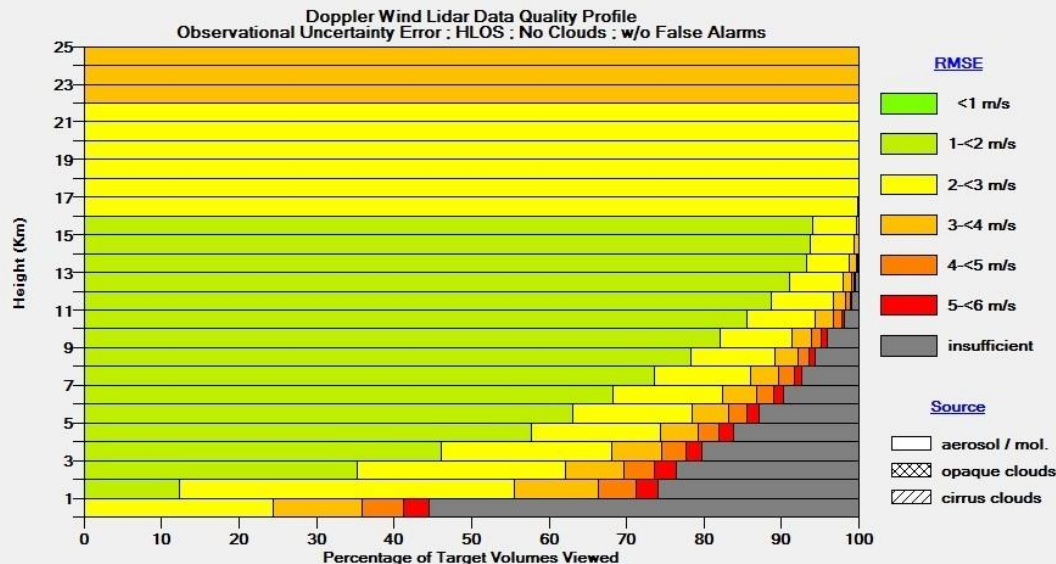


RUN: 7/28/2005 21 Z (24 hr sim.) Global
TARGET ATM.: enhanced
ALTITUDE: 400 Km ORBIT INC: 51 deg
VERTICAL INT. >PBL: 1. Km <=PBL: 0.5 Km

DETECTION: Double-edge mol. SCAN: 2 pt. Step_Stare
WAVELENGTH: 0.355 um NADIR: 40. deg
ENERGY at 0.355 um: 0.55 J APERTURE: 0.7 m
PRF: 50. Hz ACCUM. TIME: 12 s PLT PWR: 679 W

02/26/2013 14:07

OAWL Double Edge with Clouds
Backscatter Mode: Enhanced

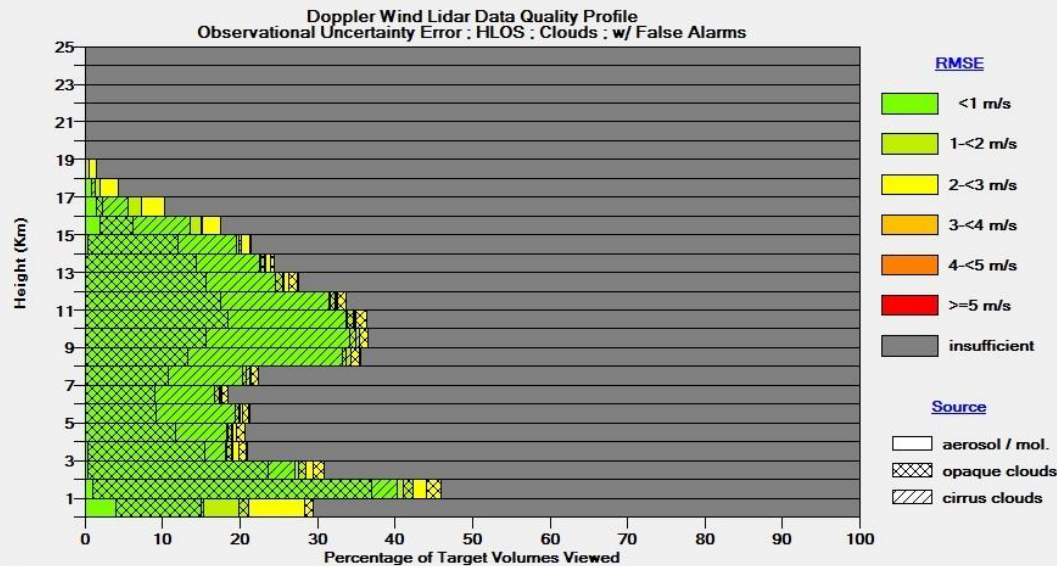


RUN: 7/28/2005 21 Z (24 hr sim.) Global
TARGET ATM.: enhanced
ALTITUDE: 400 Km ORBIT INC: 51 deg
VERTICAL INT. >PBL: 1. Km <=PBL: 0.5 Km

DETECTION: Double-edge mol. SCAN: 2 pt. Step_Stare
WAVELENGTH: 0.355 um NADIR: 40. deg
ENERGY at 0.355 um: 0.55 J APERTURE: 0.7 m
PRF: 50. Hz ACCUM. TIME: 12 s PLT PWR: 679 W

02/26/2013 14:08

OAWL Double Edge without Clouds
Backscatter Mode: Enhanced

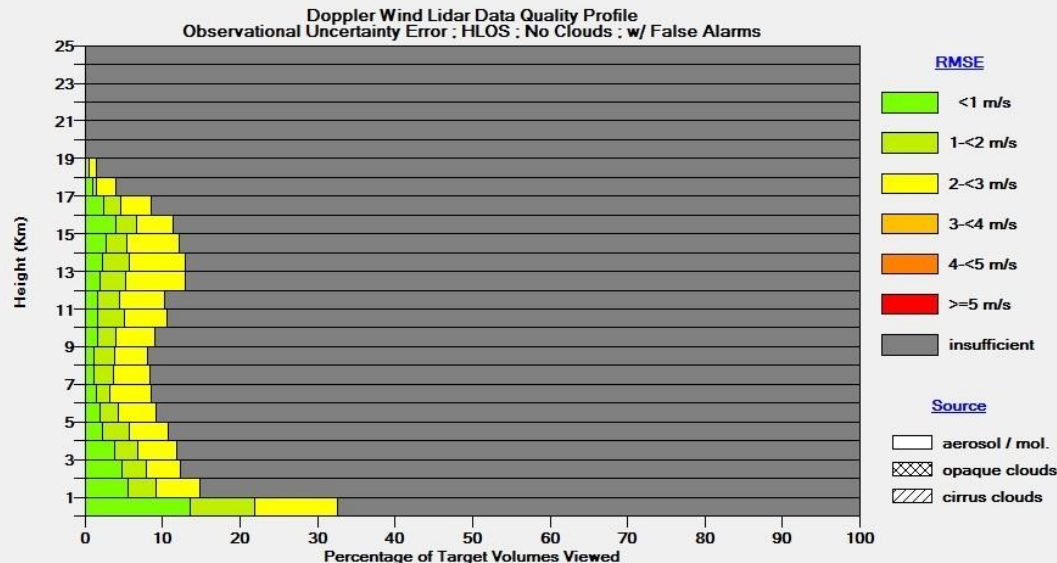


RUN: 7/28/2005 2100 Z (24 hr sim.) Global
TARGET ATM.: background
ALTITUDE: 400 Km ORBIT INC: 51 deg
VERTICAL INT. >PBL: 1. Km <=PBL: 0.5 Km

DETECTION: Coherent SCAN: 2 pt. Step_Stare
WAVELENGTH: 2.052 um NADIR: 40. deg
ENERGY: 0.25 J APERTURE: 0.5 m PLT PWR: W
PRF: 10. Hz ACCUM. TIME: 12 s BETA THR: 50. %

02/26/2013 10:52

WISSCR Coherent with Clouds
Backscatter Mode: Background

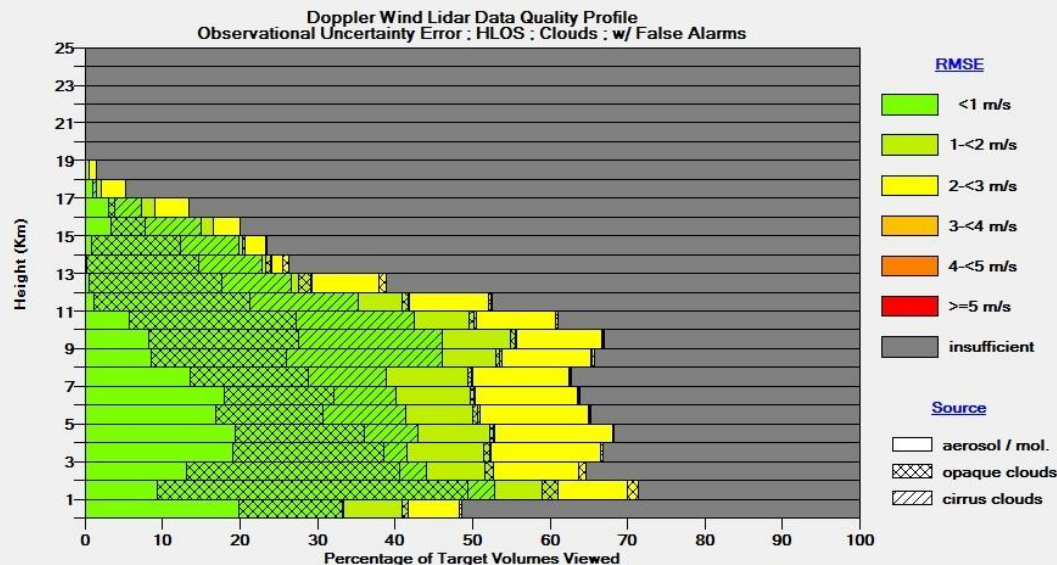


RUN: 7/28/2005 2100 Z (24 hr sim.) Global
TARGET ATM.: background
ALTITUDE: 400 Km ORBIT INC: 51 deg
VERTICAL INT. >PBL: 1. Km <=PBL: 0.5 Km

DETECTION: Coherent SCAN: 2 pt. Step_Stare
WAVELENGTH: 2.052 um NADIR: 40. deg
ENERGY: 0.25 J APERTURE: 0.5 m PLT PWR: W
PRF: 10. Hz ACCUM. TIME: 12 s BETA THR: 50. %

02/26/2013 10:53

WISSCR Coherent without Clouds
Backscatter Mode: Background

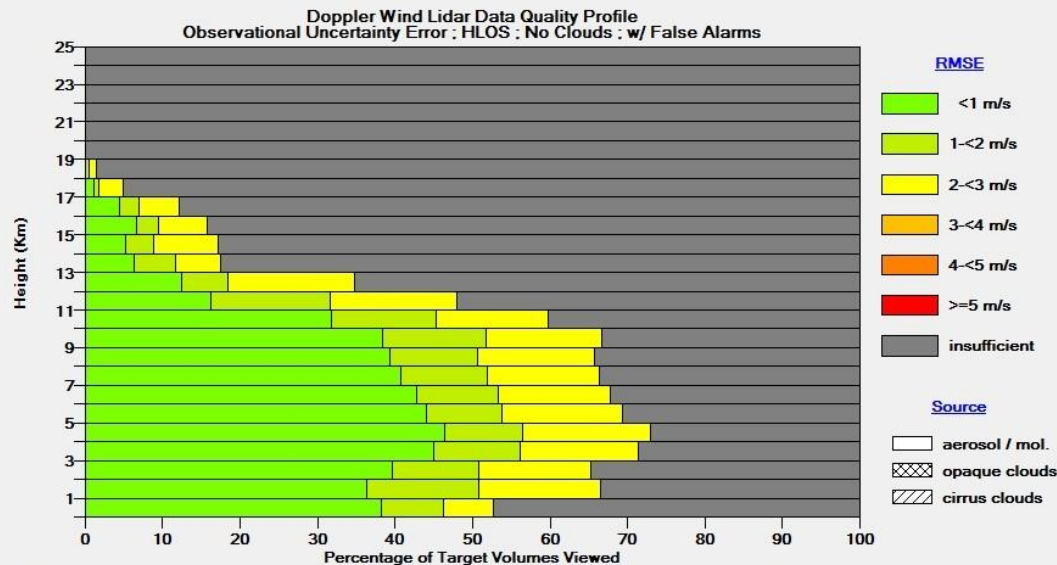


RUN: 7/28/2005 2100 Z (24 hr sim.) Global
TARGET ATM.: enhanced
ALTITUDE: 400 Km ORBIT INC: 51 deg
VERTICAL INT. >PBL: 1. Km <=PBL: 0.5 Km

DETECTION: Coherent SCAN: 2 pt. Step_Stare
WAVELENGTH: 2.052 um NADIR: 40. deg
ENERGY: 0.25 J APERTURE: 0.5 m PLT PWR: W
PRF: 10. Hz ACCUM. TIME: 12 s BETA THR.: 50. %

02/27/2013 14:38

WISSCR Coherent with Clouds Backscatter Mode: Enhanced

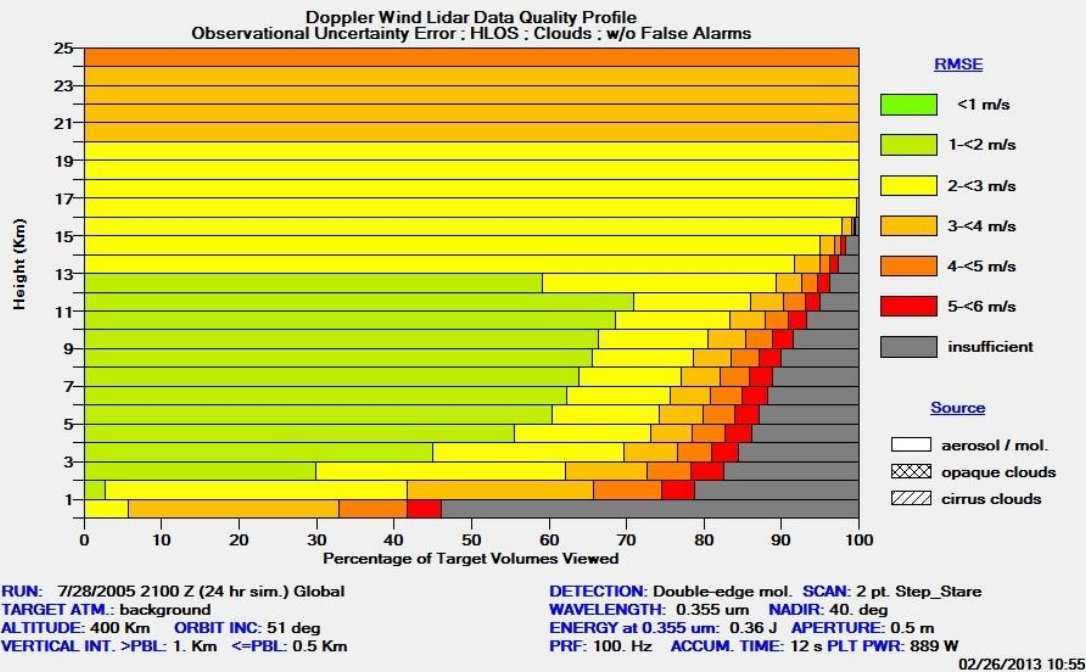


RUN: 7/28/2005 2100 Z (24 hr sim.) Global
TARGET ATM.: enhanced
ALTITUDE: 400 Km ORBIT INC: 51 deg
VERTICAL INT. >PBL: 1. Km <=PBL: 0.5 Km

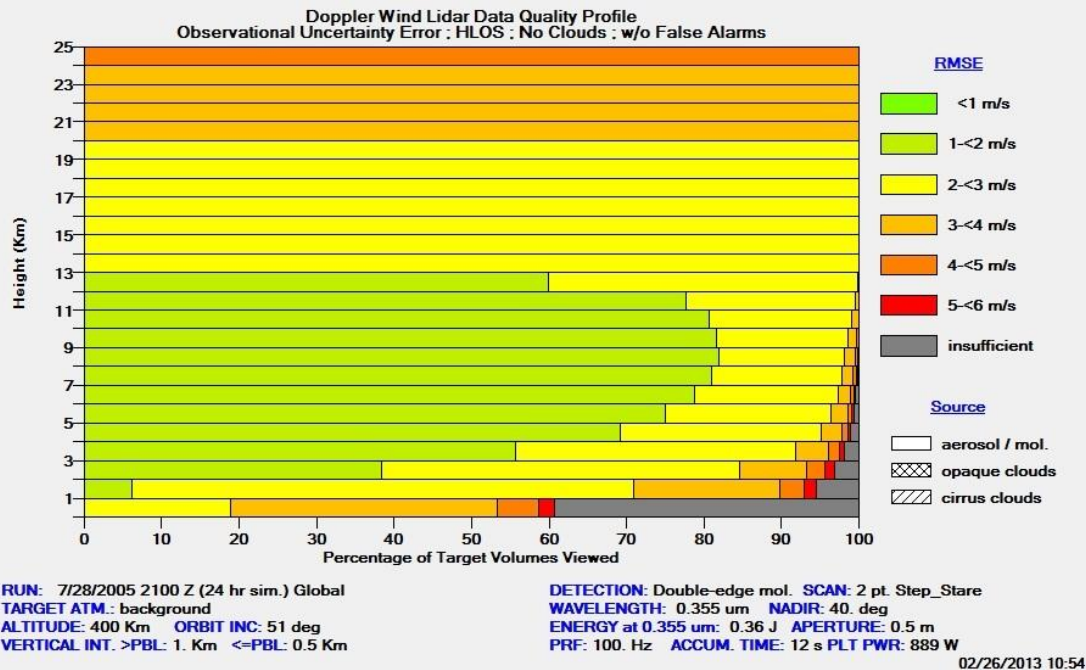
DETECTION: Coherent SCAN: 2 pt. Step_Stare
WAVELENGTH: 2.052 um NADIR: 40. deg
ENERGY: 0.25 J APERTURE: 0.5 m PLT PWR: W
PRF: 10. Hz ACCUM. TIME: 12 s BETA THR.: 50. %

02/27/2013 14:37

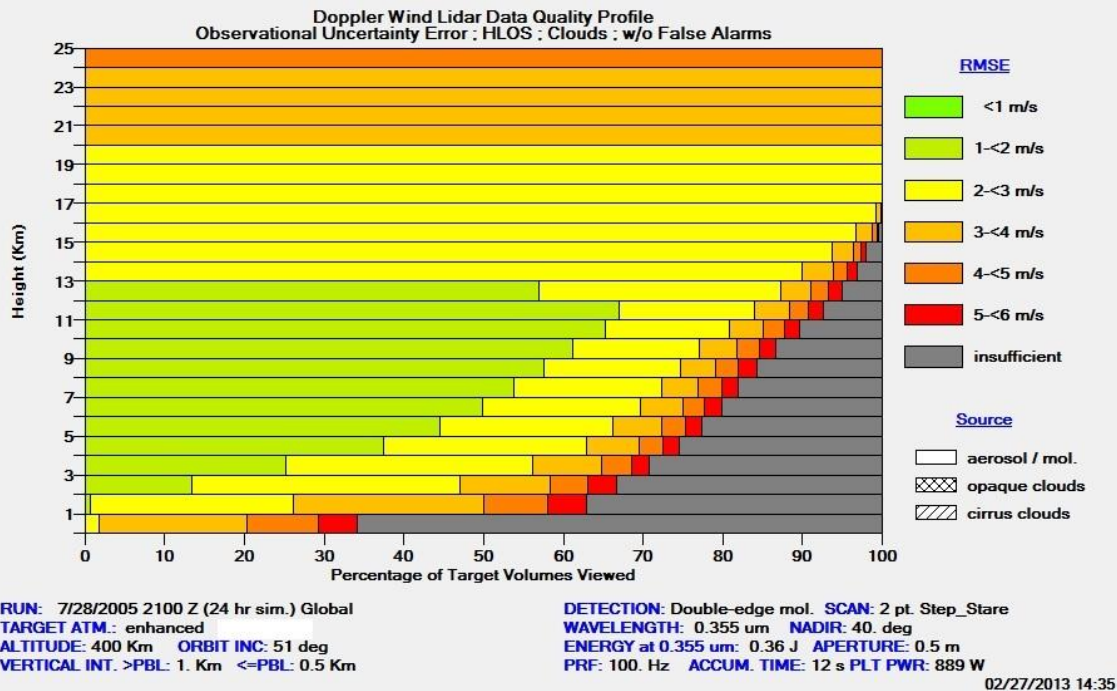
WISSCR Coherent without Clouds Backscatter Mode: Enhanced



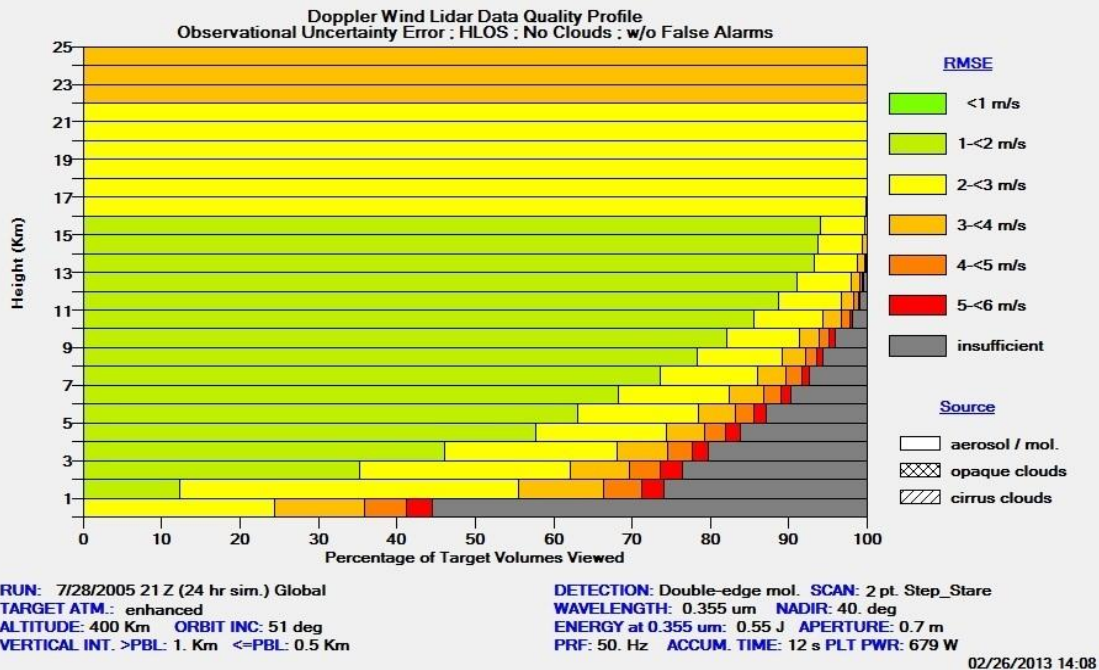
WISSCR Double Edge with Clouds Backscatter Mode: Background



WISSCR Double Edge without Clouds Backscatter Mode: Background



WISSCR Double Edge with Clouds Backscatter Mode: Enhanced



WISSCR Double Edge without Clouds Backscatter Mode: Enhanced

Summary of preliminary results

- The EAPs for the OAWL and companion DE detector are higher than those for the WISSCR concepts.
- The vertical coverage of quality “aerosol winds” for the OAWL system is much greater than that for the WISSRC coherent system. (EAP ratio ~ 50 (20))
- The vertical coverage of the DE systems in the mid and upper troposphere are comparable for both mission scenarios.
- The coherent system (WISSCR) is the better PBL wind observing system while the OAWL provides the better quality aerosol winds in the mid and upper troposphere.