

Vertical Velocity Focus Group Status Report

Pavlos Kollias

Primary Objectives of the VVFG

- Investigate the potential of current ARM measurements to retrieve the vertical motion in clouds and precipitation
- Develop value-added products with vertical motion measurements
- Make recommendations for future measurements/instruments that can improve ARM capability to retrieve the vertical motion in clouds and precipitation.

VVFG: Progress Report

Cloud/ Precipitation Category	Observations/ Technique	Velocity Retrieval (domain, accuracy)	Microphysics (impact or assumptions)	Maturity of retrieval algorithm	Small-scale Turbulence/ Wind Shear Information	Value-Added Product in ARM Archive? Who? Group?
Deep Convective Clouds	Profilers and Scanning radar networks	3D-domain ~ 2-5 ms ⁻¹	Requires assumption	Novel	Wind shear Turbulence	
Large-scale precipitation (Liquid)	Non-Rayleigh scattering – Profiling radars	Profiles ~2-5 cms ⁻¹	No assumption – Great Impact	Mature	H & V Shear of Vertical Velocity	
Warm rain	Profiling radars	Profiles ~ 1-2 ms ⁻¹	Requires assumption	Novel		
Ice clouds	Profiling Doppler cloud radars	Profiles – Accuracy ?	Requires assumption	Novel	Sp. width – Dissipation rate	
Drizzling clouds	Profiling cloud radars (spectra)	Profiles ~5-10 cms ⁻¹	No assumption – Great Impact	Novel	Sp. Width – Dissipation rate	
Non- precipitating clouds	Profiling cloud radars (moments)	Profiles ~2-5 cms ⁻¹	No assumption or impact	Mature	VV Skewness VV Variance Mass-flux Sp. width	
Convective BL Subcloud Layer	Doppler Lidar & Insect MMCR returns	Profiles ~5-10 cms ⁻¹	No assumption Impact in falling precipitation	Mature	VV Skewness VV Variance Mass-flux	

VVFG & New Instruments – Recommendations?

- Multi-scale Observing Facility at SGP
 - Network of short-wavelength weather radars
 - Network of wind profilers
 - C-band precipitation radar
- Scanning cloud radars
 - 2D and 3D kinematical structure of clouds
- Multi-frequency profiling observations in rain
 - Better calibration with allow use of Z-V
- Doppler lidars
 - Subcloud layer turbulent structure
 - Synergy with cloud radars