

Sensitivity of VDRAS wind analysis with respect to input radar data quality/quantity

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Objectives

- Examine the sensitivity of VDRAS analysis WRT radar data quantity, in particular, with/without S-Pol
- Understand the key processes contributing to the orographical convection of 31 May 2008

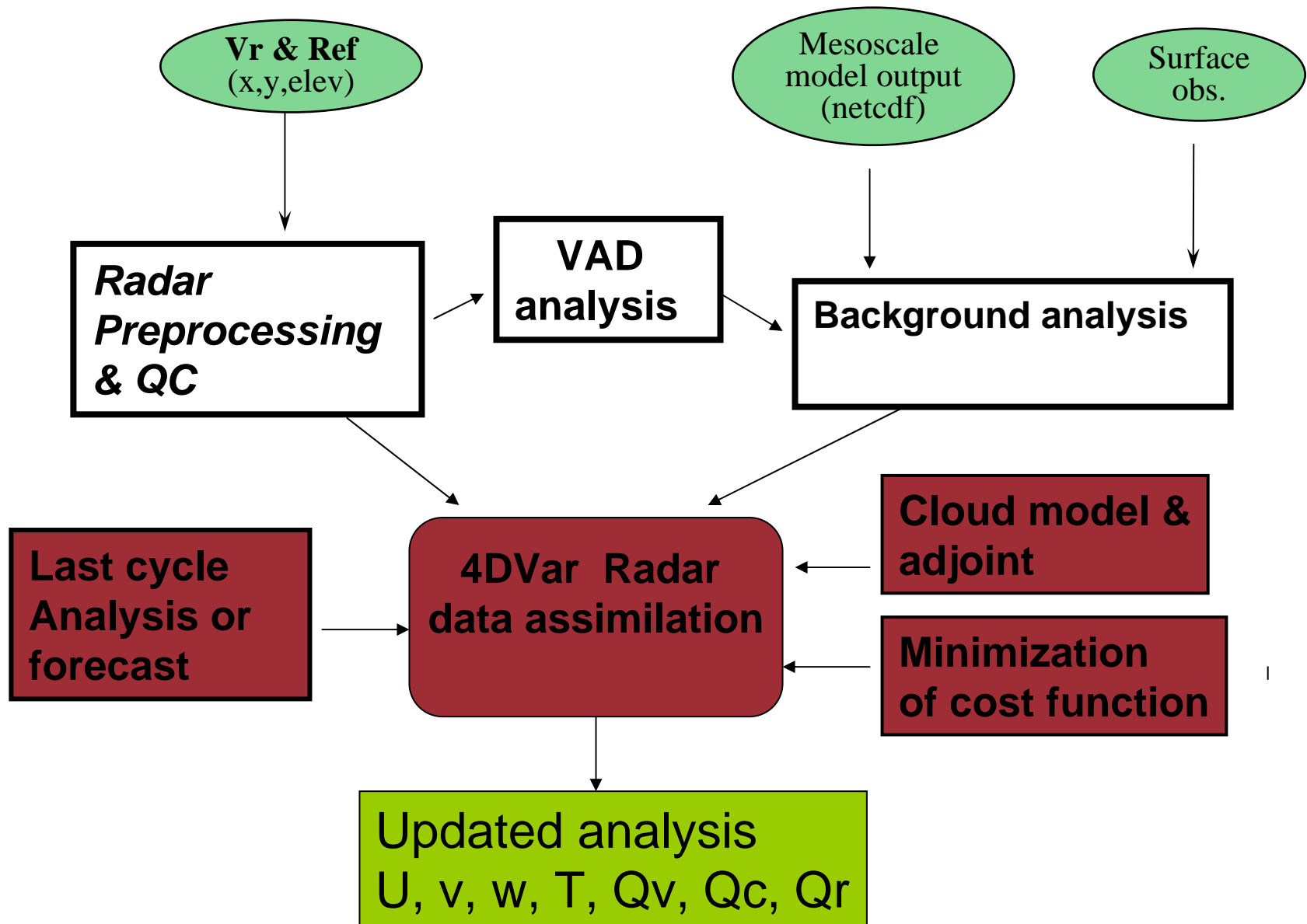


VDRAS overview

- VDRAS is an advanced data assimilation system for high-resolution (1-3 km) and rapid updated (6-18 min) analysis
- Produces low-level wind, temperature, humidity analysis
- VDRAS assimilates mesoscale model data, surface data, and radar radial velocity and reflectivity data from single or multiple radars
- The core is a 4-dimensional data assimilation scheme based on a warm-rain cloud-scale model
- It has been installed at nearly 20 sites for nowcasting application since 1998



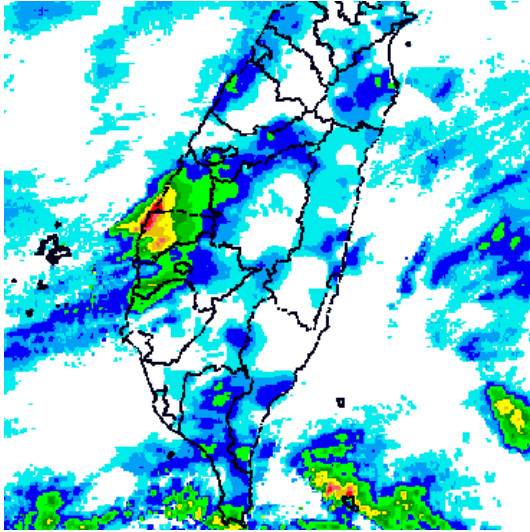
VDRAS analysis flow chart



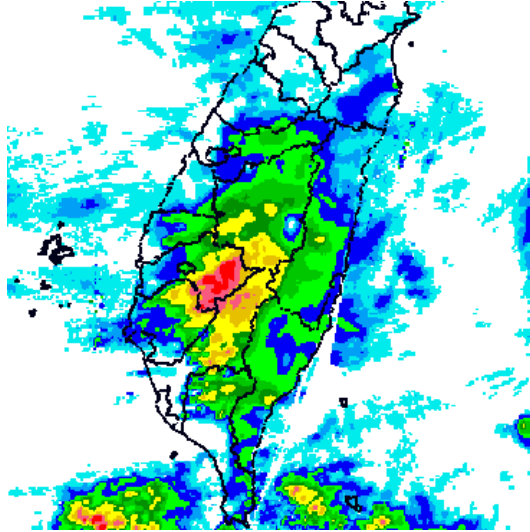
SoWMEX/TiMREX case of 31 May 2008

QPESUMS accumulated precipitation

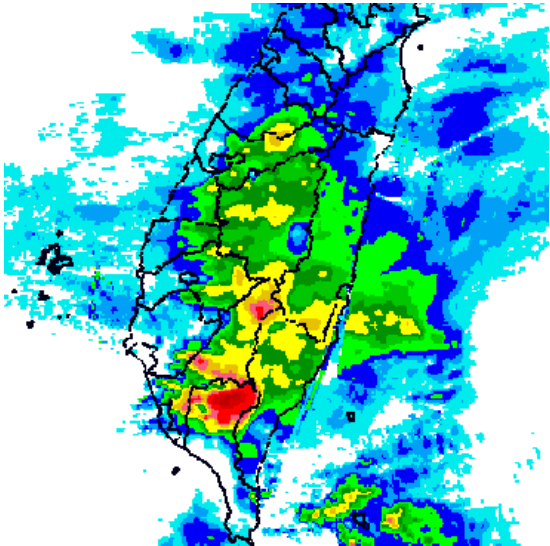
00-03 UTC



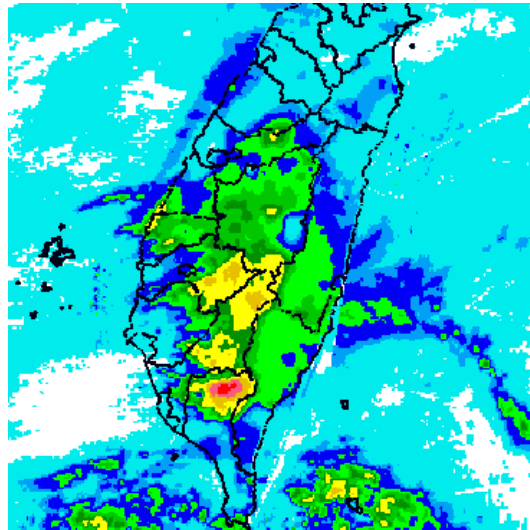
03-06 UTC



06-09 UTC



09-12 UTC



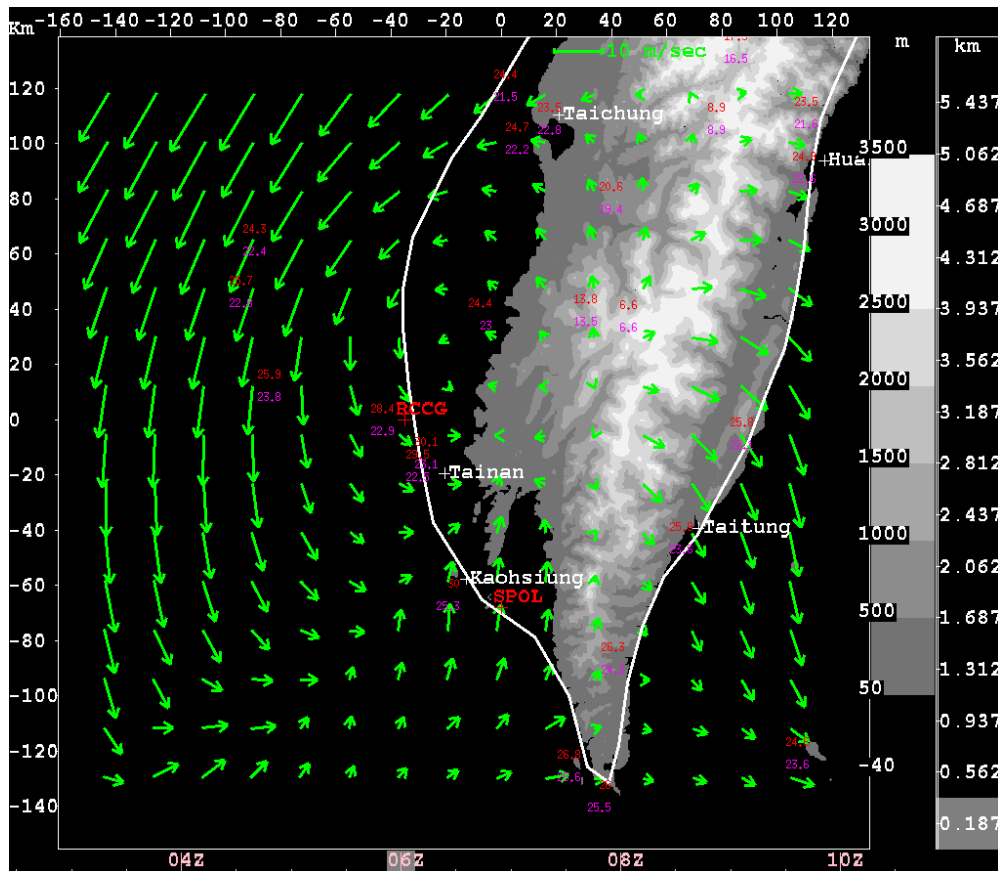
Experimental Design

CTRL: analysis with both
S-Pol & RCCG

RCCG: analysis with RCCG only

SPOL: analysis with S-Pol only

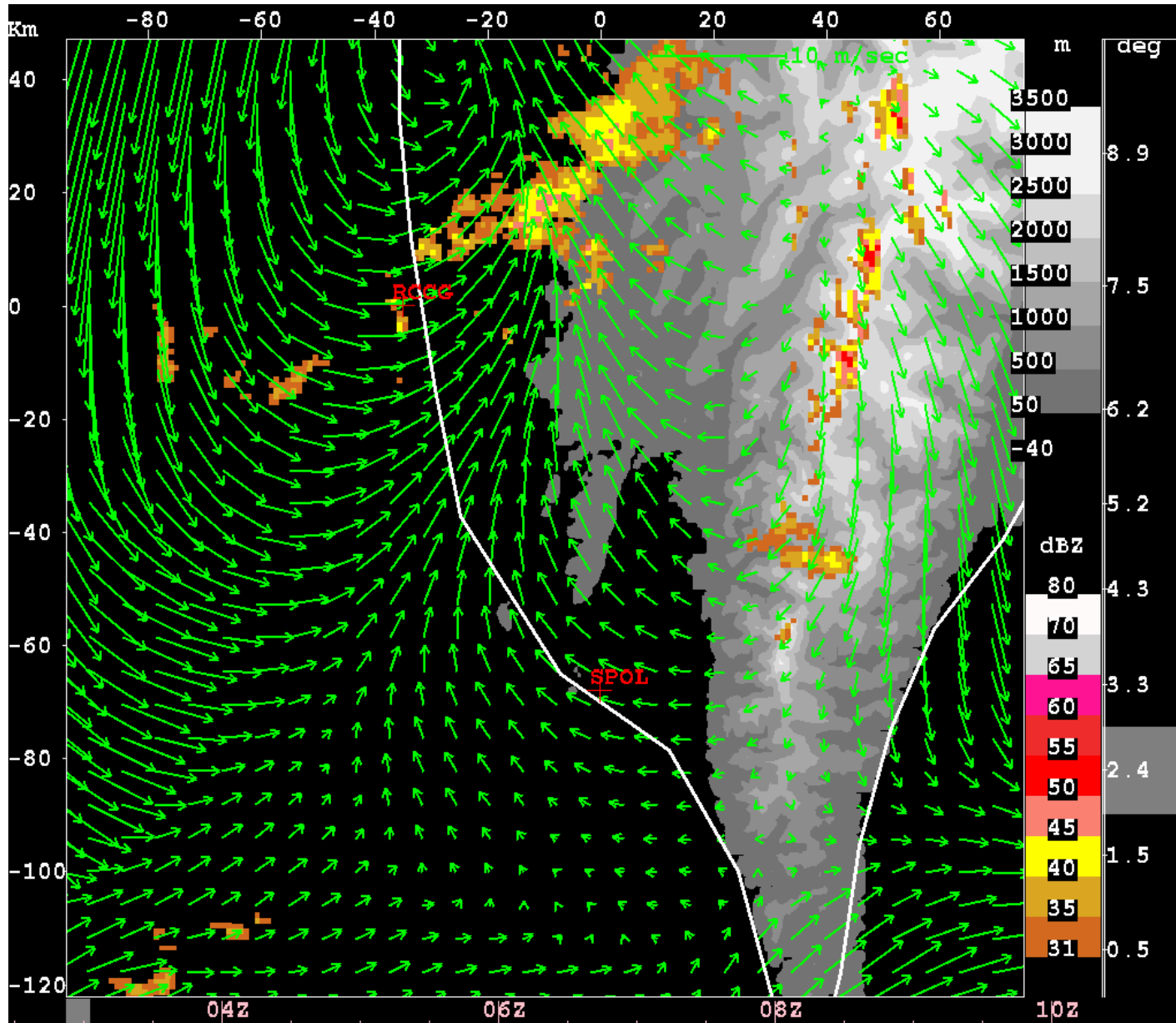
VDRAS Domain



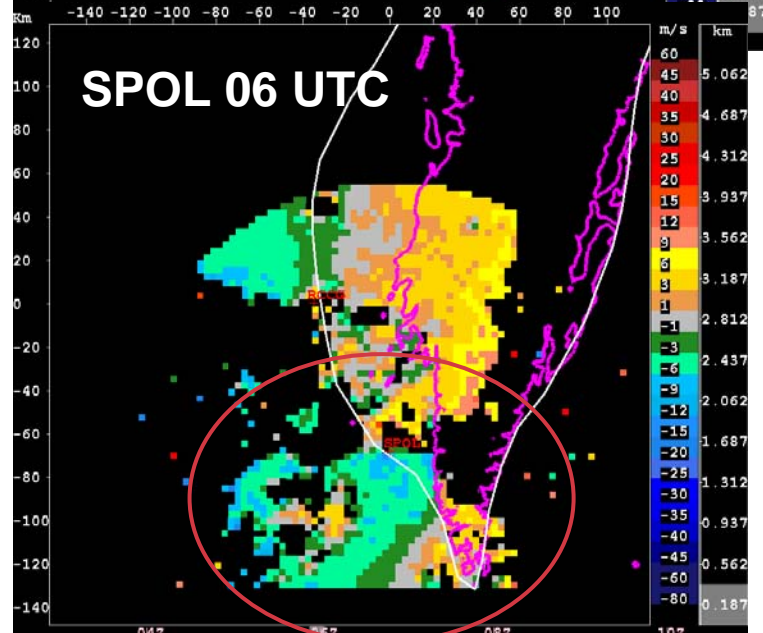
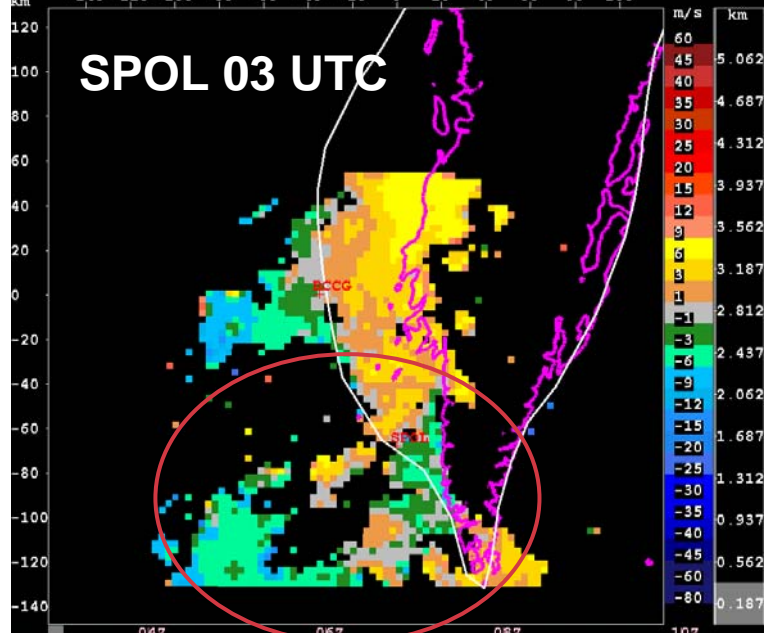
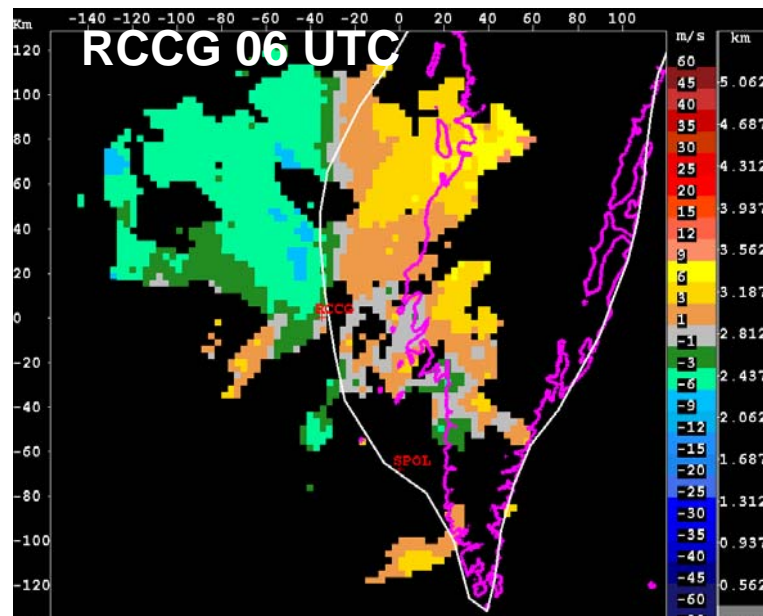
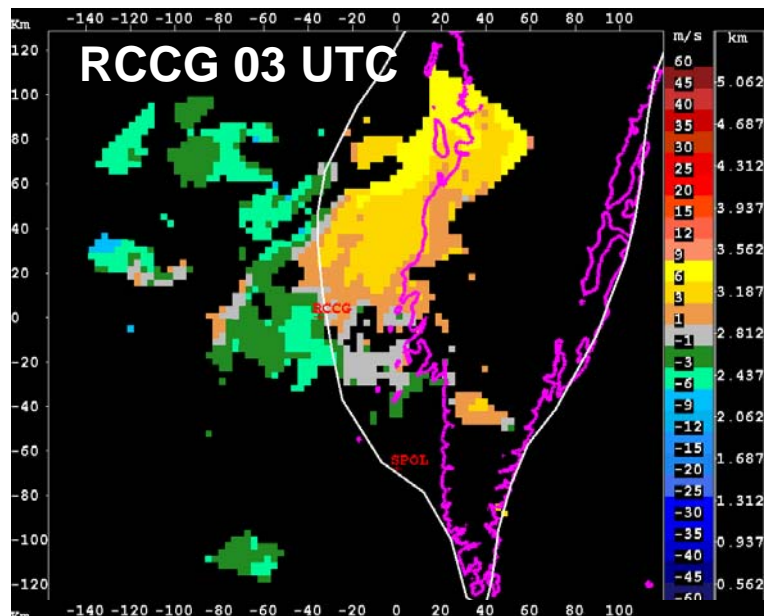
- 270km² x 5.625km with a resolution of 3km x 0.375km
- WRF 3km hourly forecasts as background
- 42 AWS stations
- Assimilation window is 10 min

VDRAS wind analysis from CTRL experiment

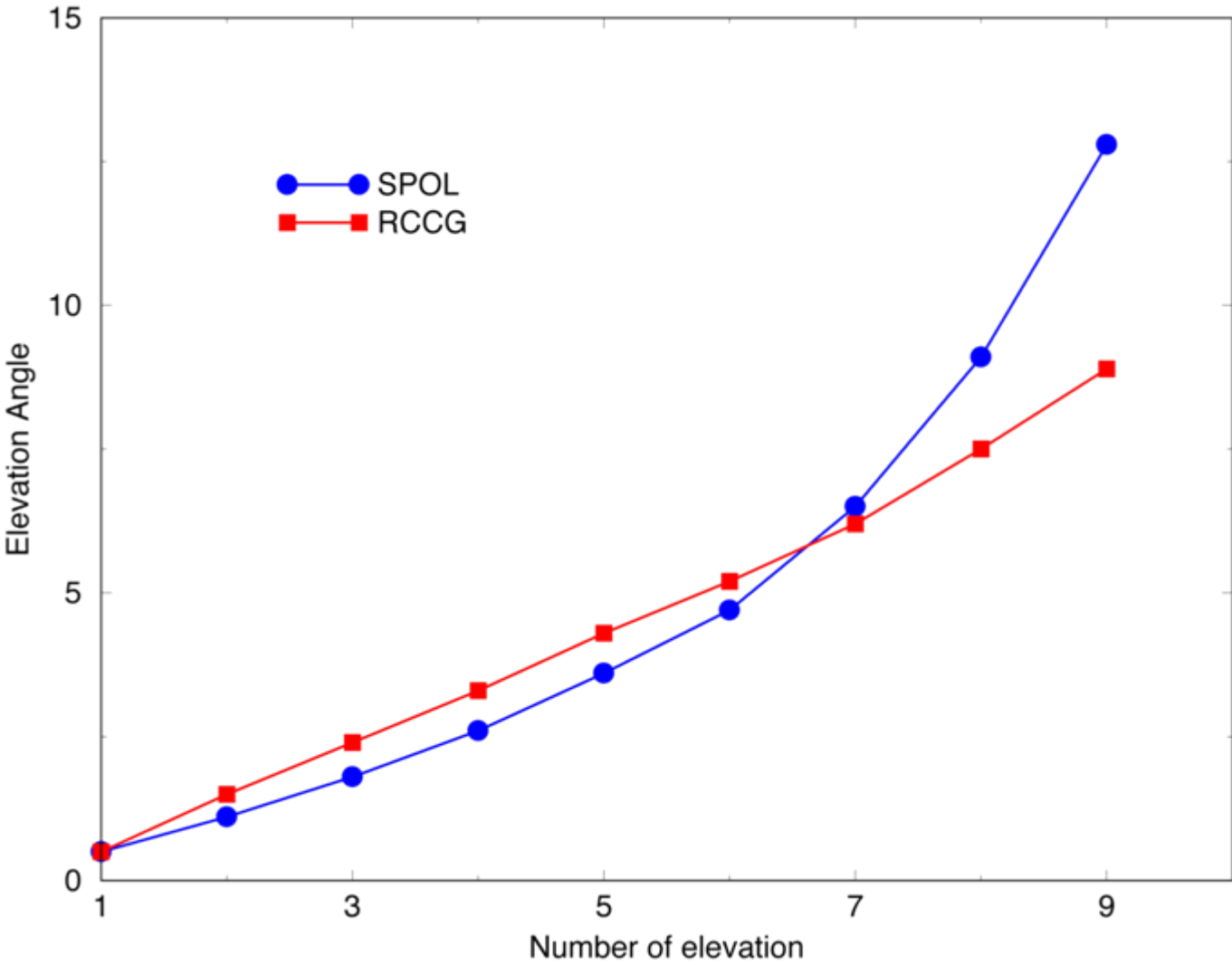
03 UTC - 10 UTC



Comparing radial velocities from RCCG and S-Pol



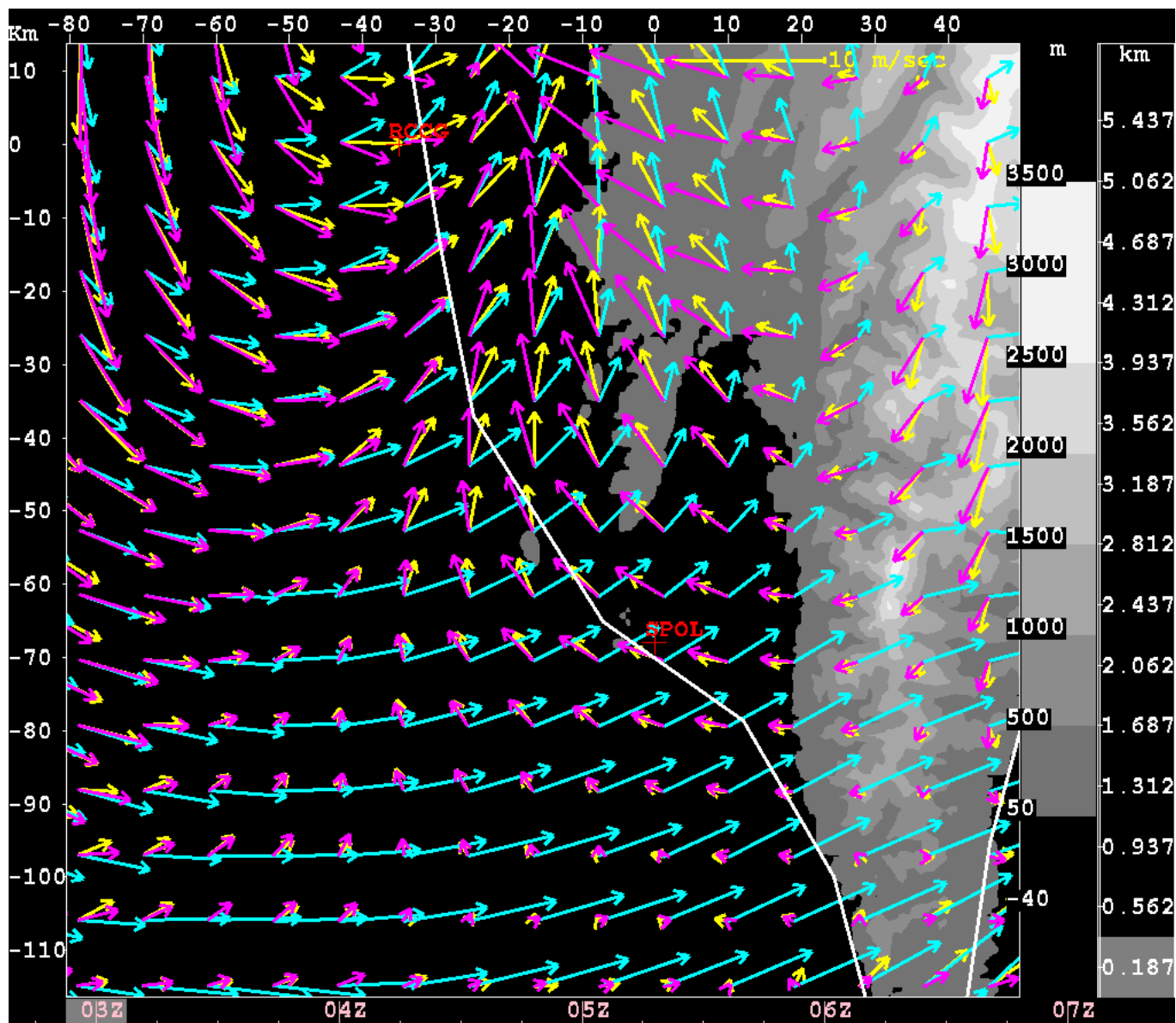
Comparing scanning elevations of RCCG & S-Pol



VDRAS winds from CTRL, S-Pol, and RCCG

03 UTC

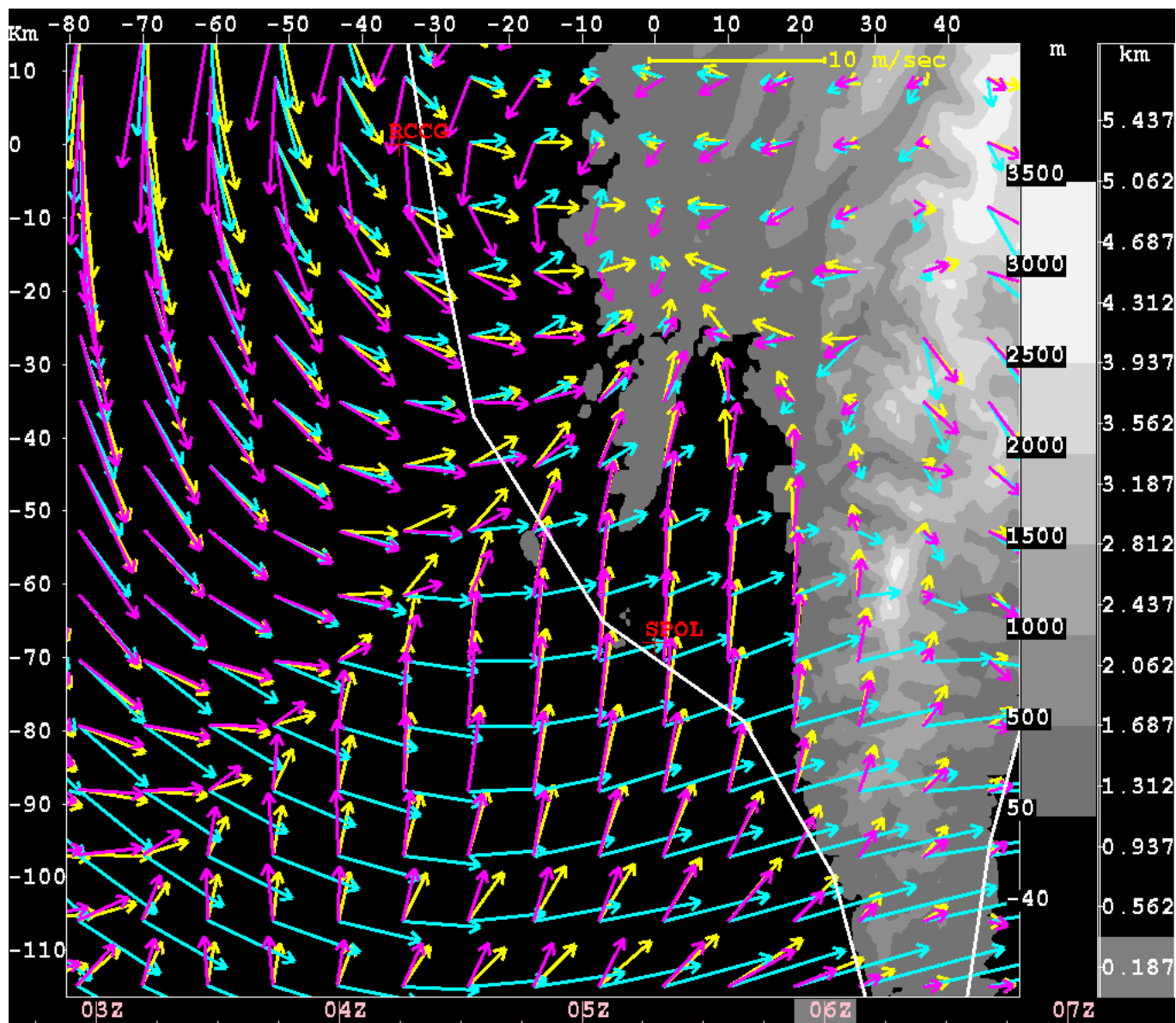
Z = 0.187 km



VDRAS winds from CTRL, S-Pol, and RCCG

06 UTC

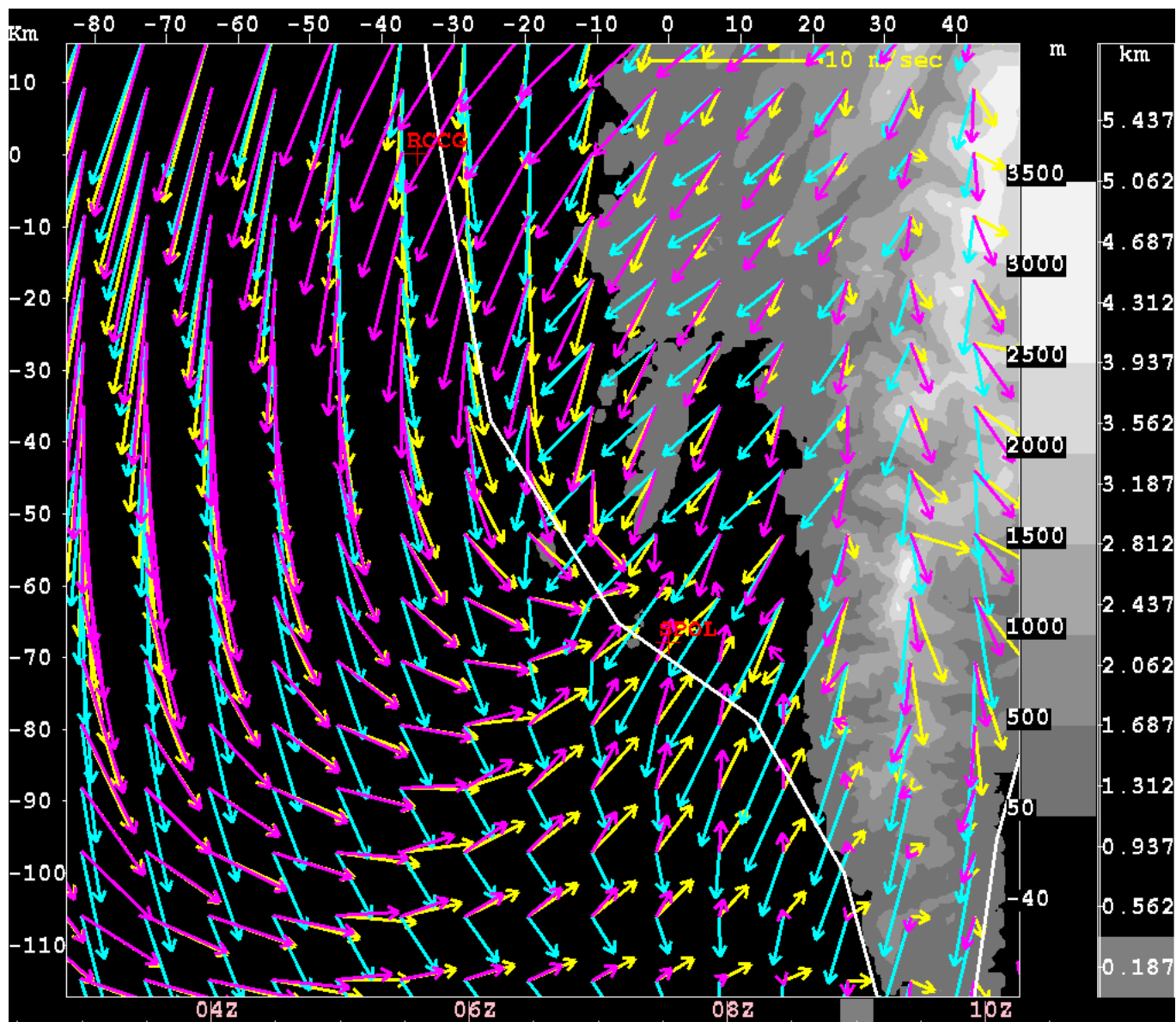
Z = 0.187 km



VDRAS winds from CTRL, S-Pol, and RCCG

09 UTC

Z = 0.187 km

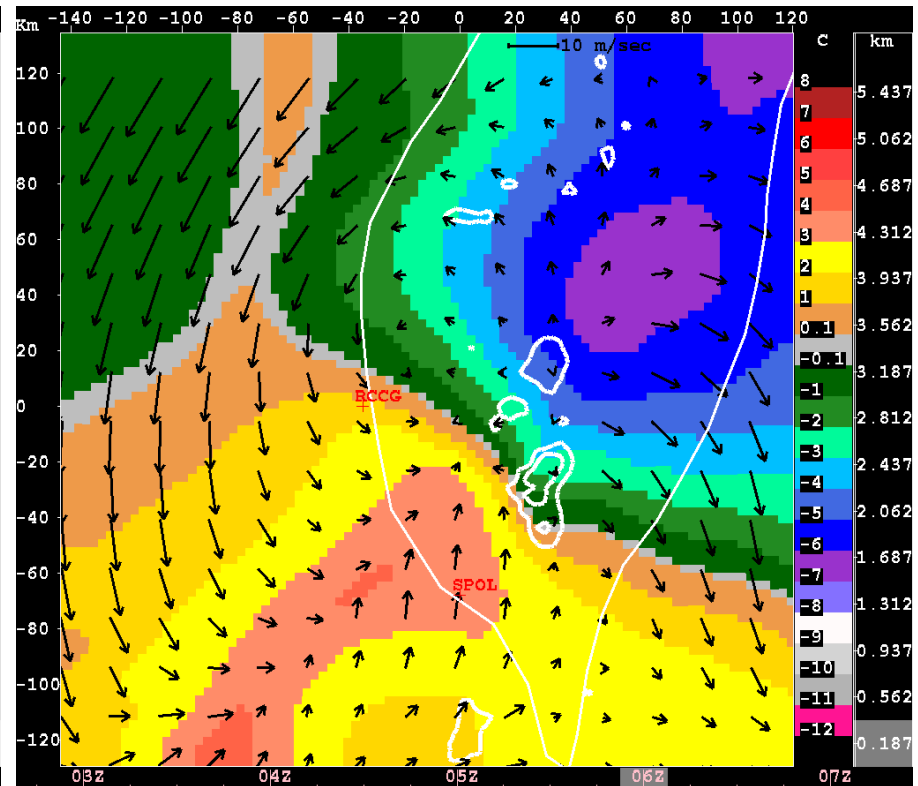
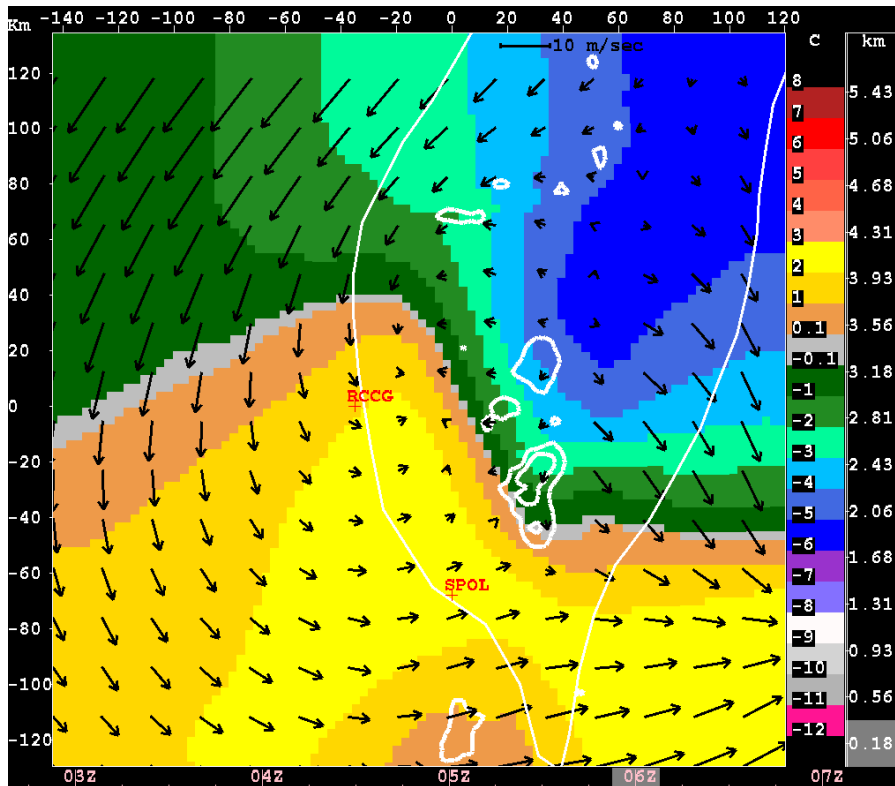


Temperature perturbation at 06 UTC

RCCG

Z = 0.187 km

SPOL

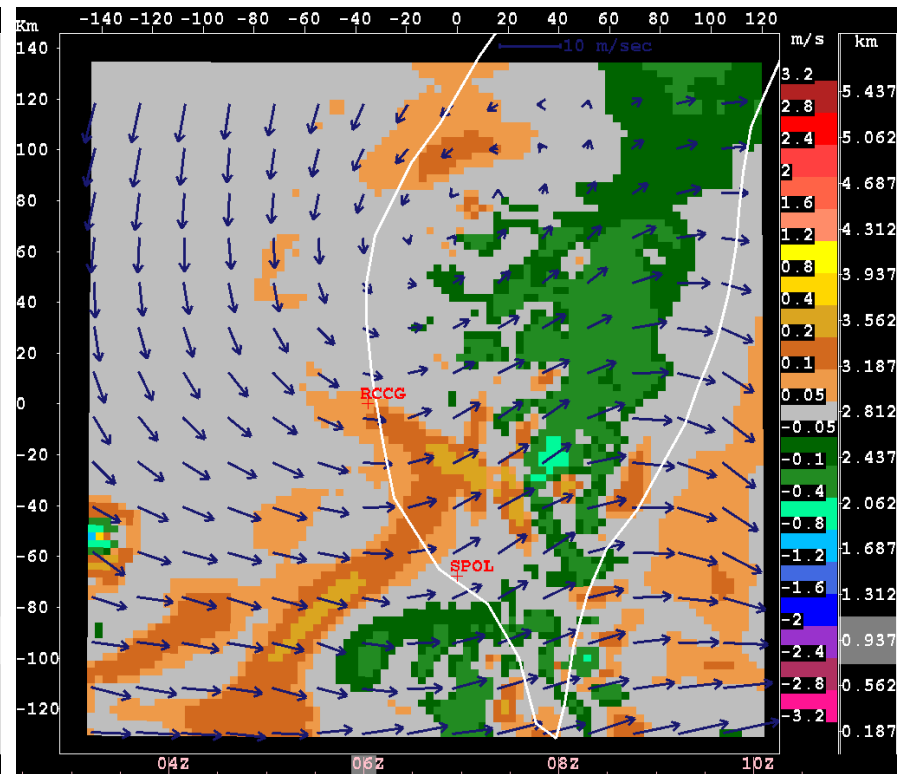
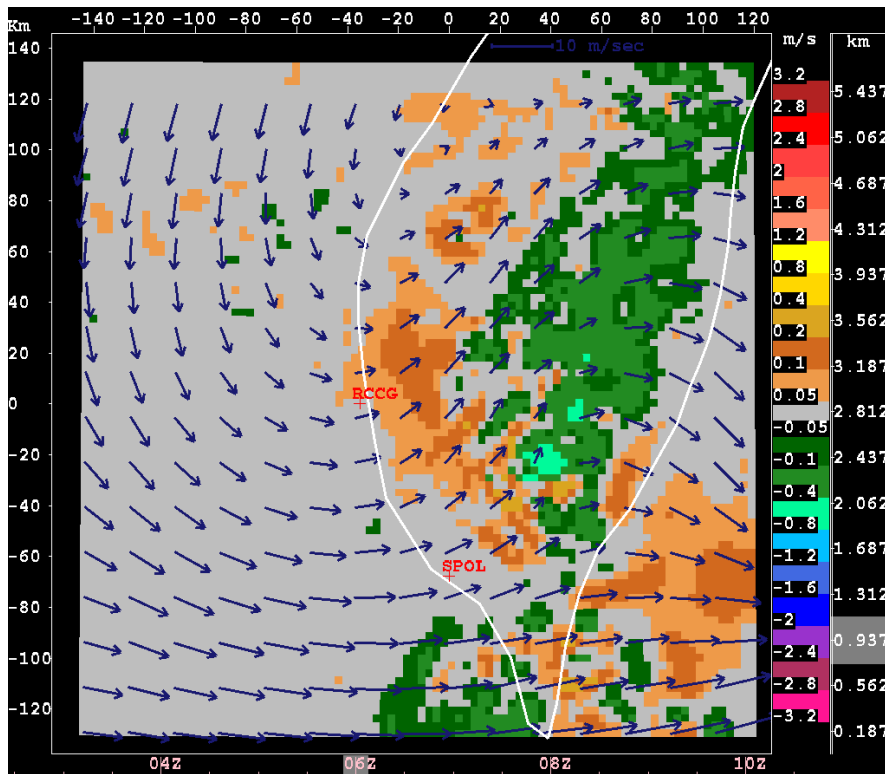


Vertical velocity at 06 UTC

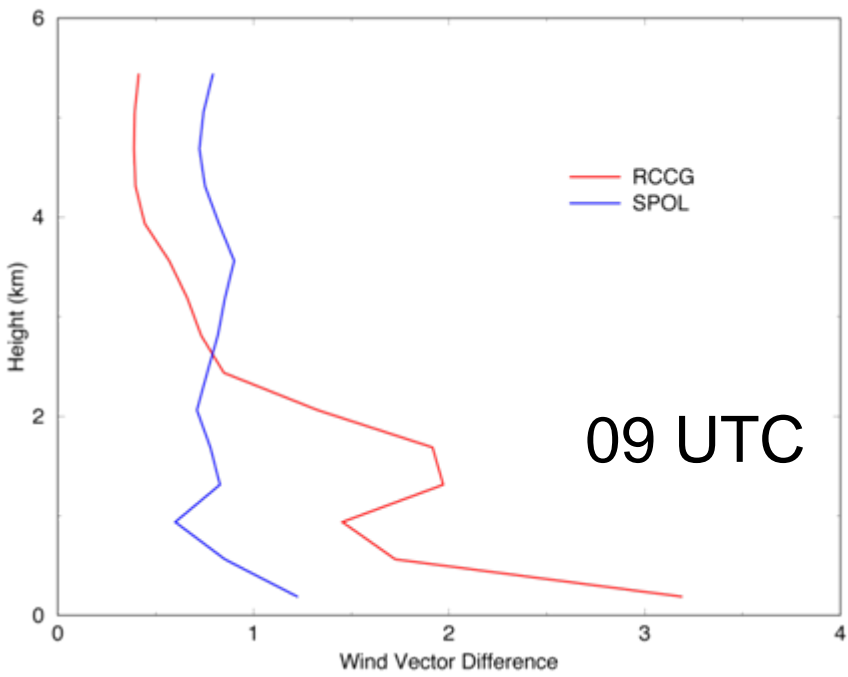
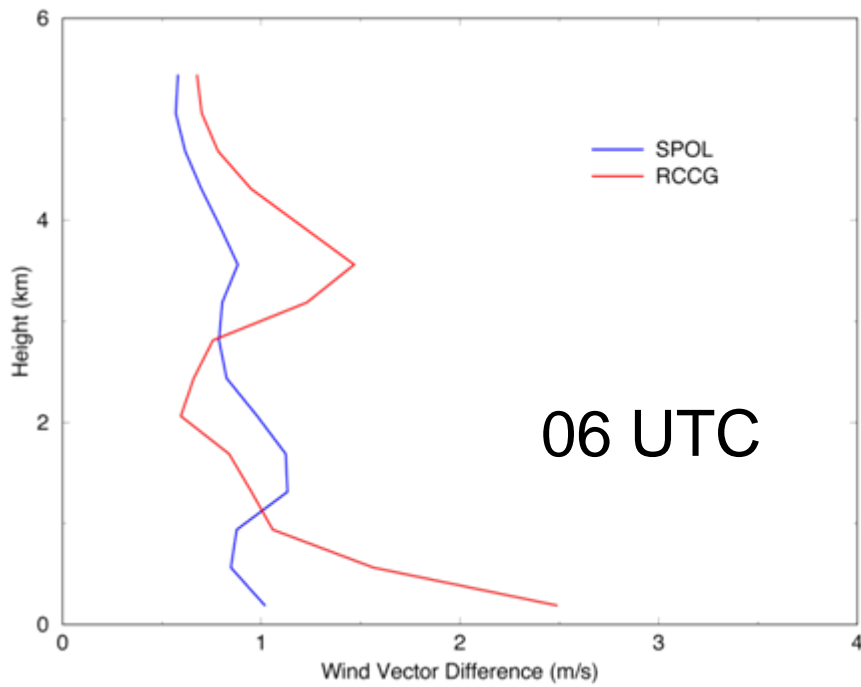
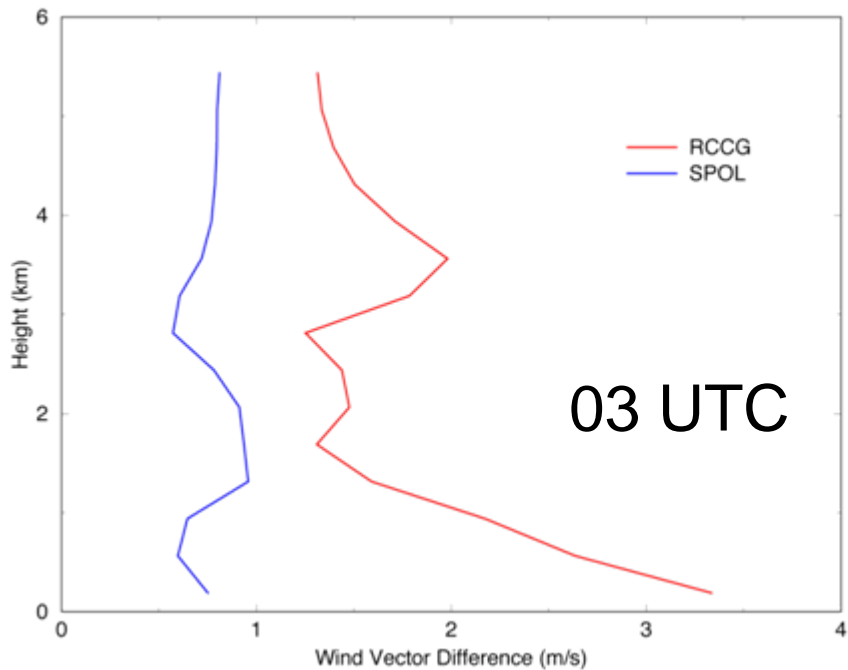
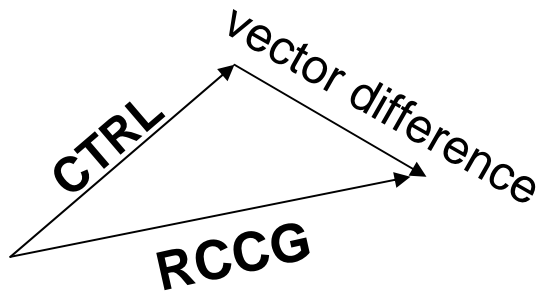
RCCG

Z = 0.937 km

SPOL



Mean vector difference



Summary

- VDRAS analysis reveals southwesterly flow over the southwest plain and the surrounding ocean by assimilating S-Pol observations
- Without the S-Pol observations, VDRAS winds are mainly westerly over that region
- The temperature difference from the coast to the mountain are increased by around 2°C with S-Pol data assimilated
- A southwest-to-northeast convergence line is analyzed when S-Pol data are used
- The wind differences are most noteworthy in the boundary layer



