

# Objectives

- *Study transport of CBL DMS through clouds*
- *Study the distribution of SO<sub>2</sub> in and around clouds*
- *Estimate loss of SO<sub>2</sub> in clouds using DMS and other conservative tracers*
- *Study CCN formation around clouds*

# Atmospheric Pressure Ionization Mass Spectrometry (APIMS)

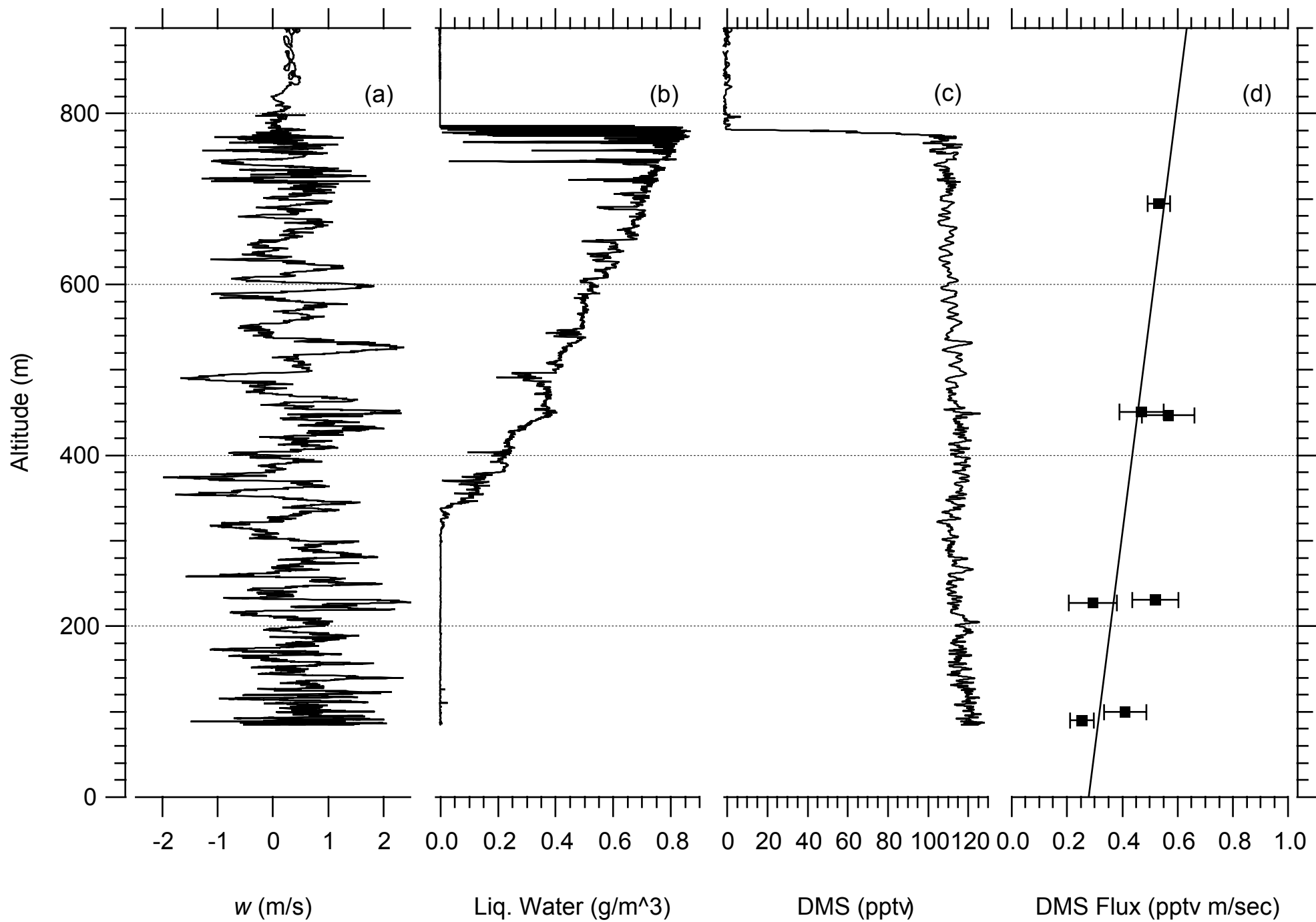
- *ions are formed by ion - molecule reactions initiated by electrons emitted by nickel-63*
- *DMS is determined using proton transfer ionization to form  $\text{DMSH}^+$*
- *$\text{SO}_2$  is determined as  $\text{SO}_5^-$  formed by reactions initiated with ozone, carbon dioxide, and oxygen*
- *ion - molecule reactions are fast:  
leads to high rate determinations with ambient species and internal standard alternately measured (25 samples per second for each ion)*
- *calibration is achieved with isotopically labeled internal standards:  
deuterated DMS and  $^{34}\text{SO}_2$*

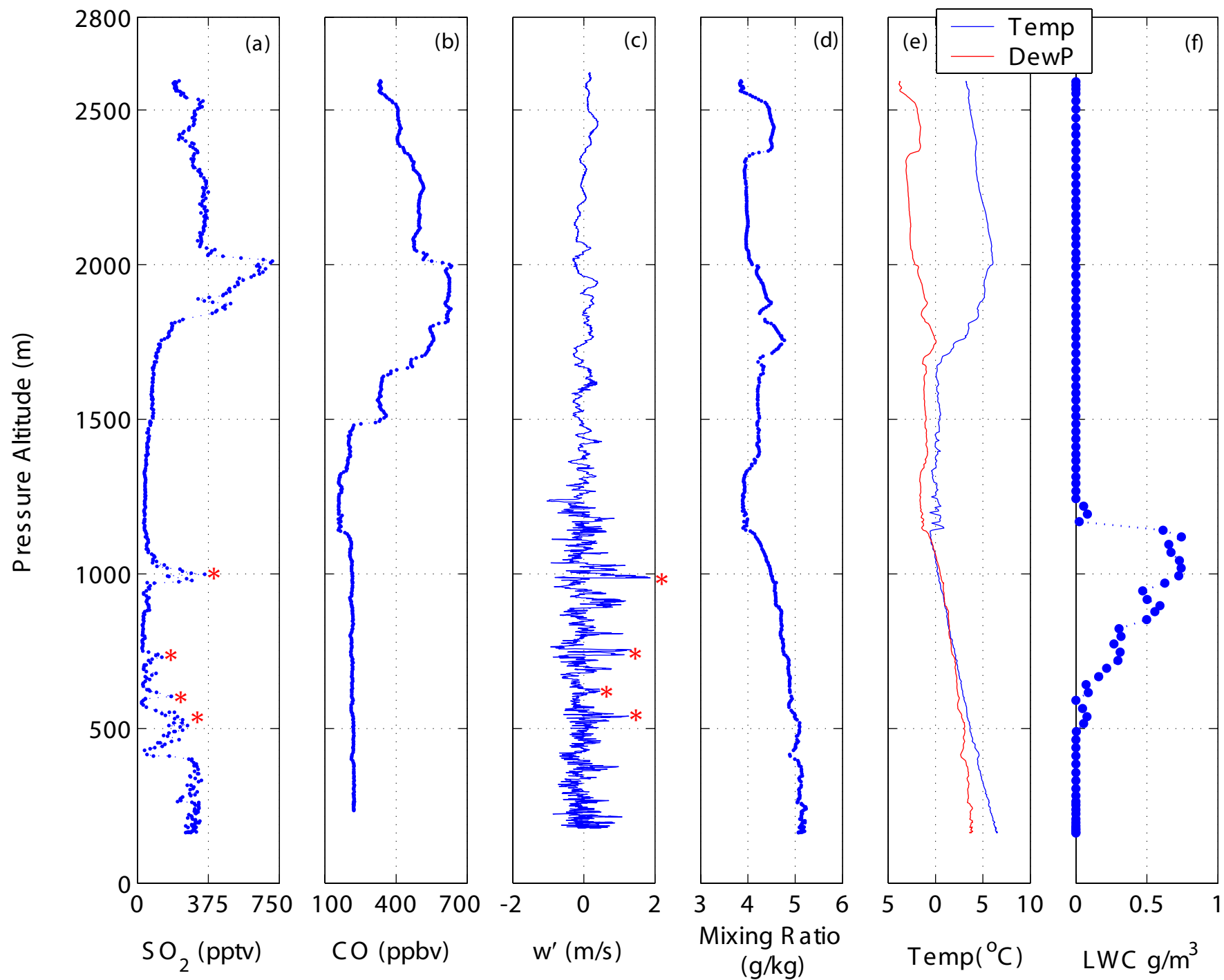
## **Advantages of the internal isotopically labeled internal standard**

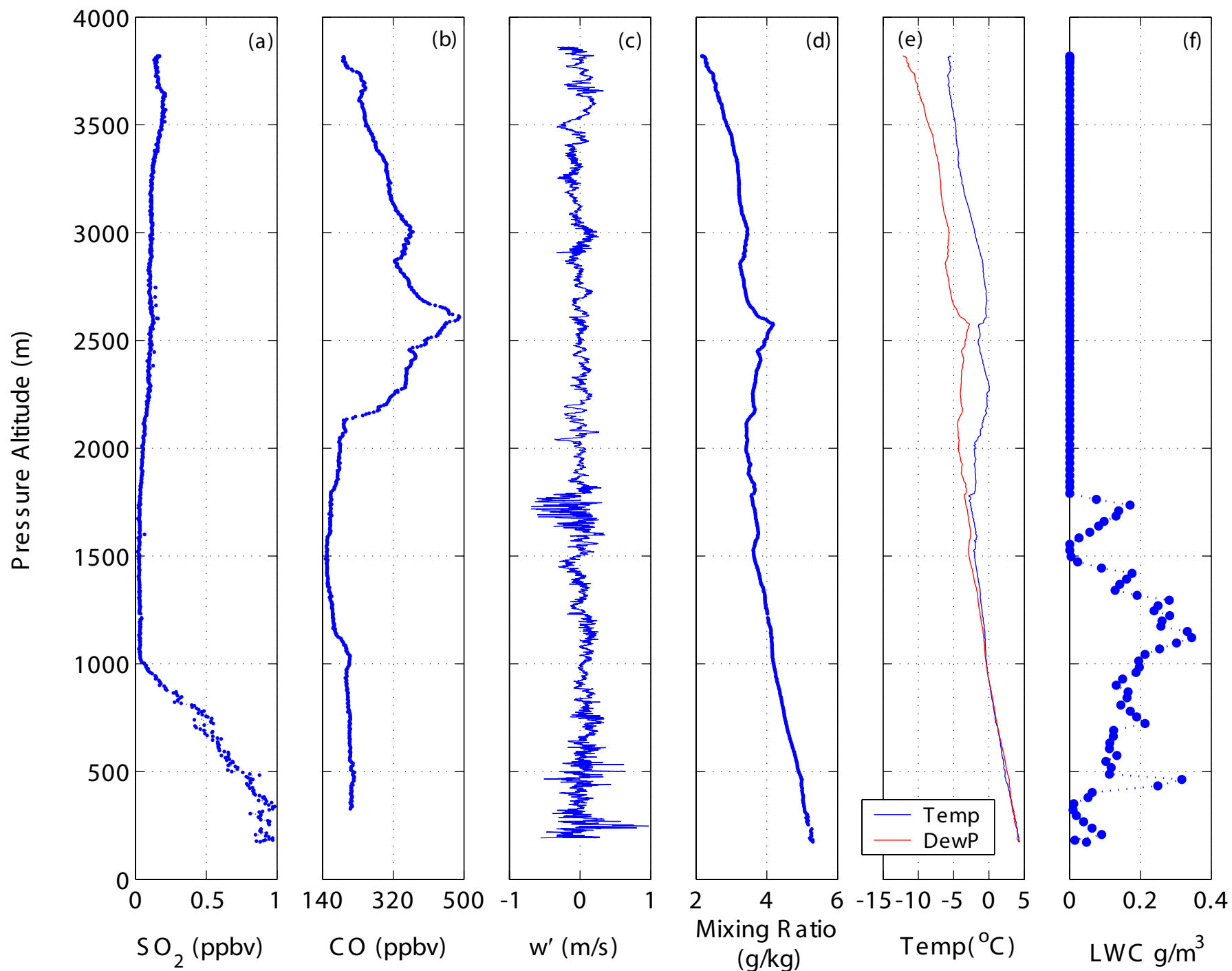
- *calibration for every sample*
- *determination of the ambient analyte without knowing the instrument absolute sensitivity*
- *can determine the lower limit of detection for every sample*
- *internal standard acts as a carrier for low concentrations of the analyte*

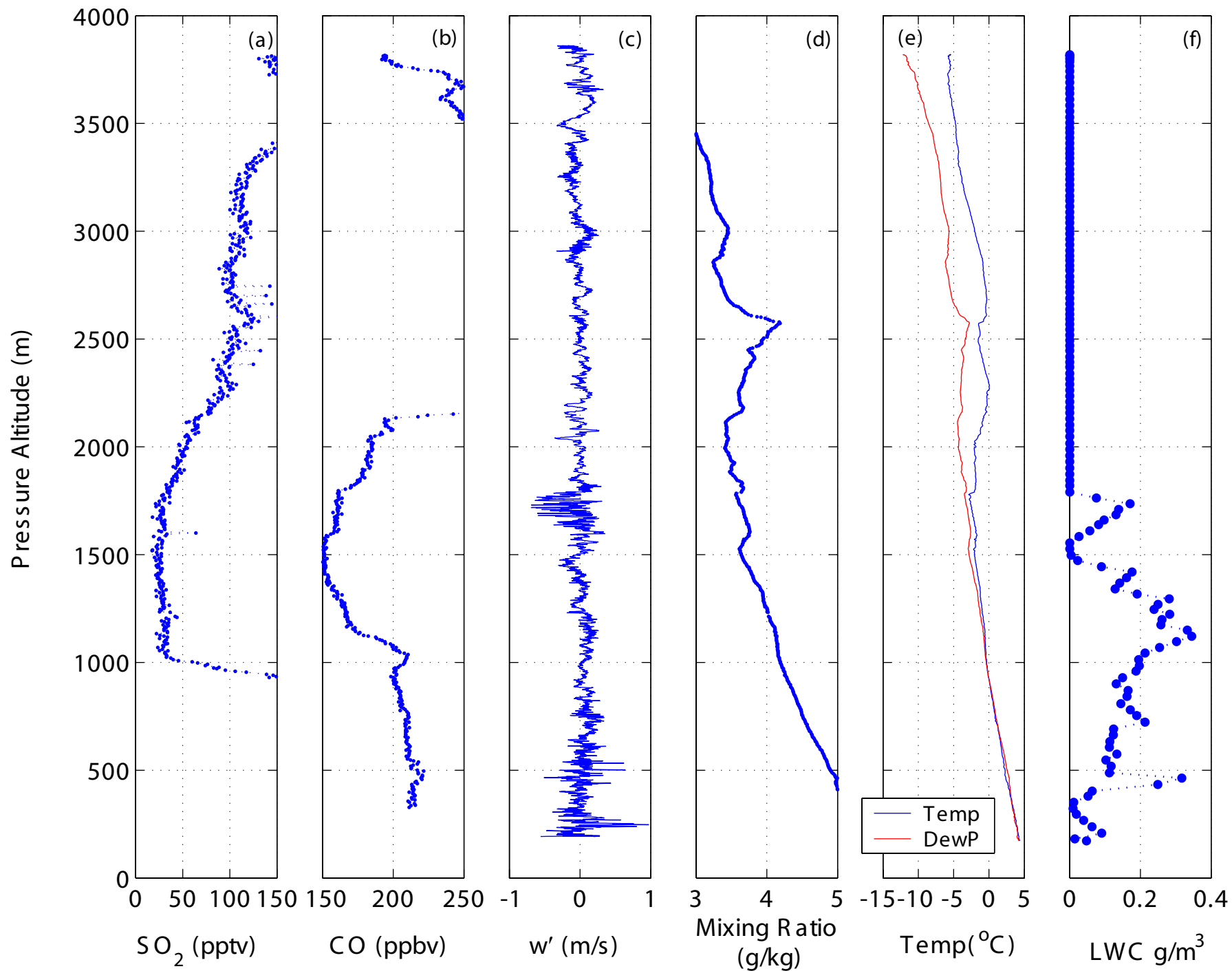
**Combined effect: *can determine DMS and SO<sub>2</sub> both in and out of cloud with high precision and accuracy at high rates***

# DYCOMS 2









# Ship Plumes

