#### **SNOWWEB Reference:**

Coggins et al. (2013) - 'Antarctic Science'

### Spatial Cloud Structure over the Ross Ice Shelf

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### Introduction

#### The purpose:

To better understand low-level cloud structure over the Ross Ice Shelf in general and how this relates to the RAS specifically

#### This presentation:





# **Target Area**







### Ross Ice Shelf Air Stream

Parish et al. 2006

 'Corridor' of air flowing from the Siple Coast to the northern edge of the RIS with consistently above-average wind speed





### k-means Clusters





#### k-means Clusters - RAS



- Corridor of increased wind speed
- Cyclone in Ross Sea
- Katabatic contribution



### k-means Clusters - RAS

- MSLP anomaly consistent with surface winds, shows corridor
- Consistent with barrier flow along Transantarctic Mtns



MSLP anomaly (hPa)



That synoptic processes influence, and are visible in, spatial structure of low-level cloud over the Ross Ice Shelf

That RAS events can be associated with specific spatial low-level cloud structures (Steinhoff et al. 2009)



### Satellite Data

- CloudSat Radar and CALIPSO Lidar integration (2B-GEOPROF-LIDAR)
- Point data along track (1 km spacing, 250 m vertical bins)
- 2006 2011



# Satellite Data

- Investigate lowlevel cloud (< 2 km ASL)
- Use bins to create comparable time slices (25 x 130 km)
- Group by cluster, average







### Average Cloud < 2 km













#### DJF (summer)

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0



2k\_JJA (2,4) 24 6hr\_pds(avg) [-0] r=0.43 p=0.00





2k\_JJA (2,5) 38 6hr\_pds(avg) [-0] r=0.21 p=0.00









#### **Altitude Correlation**



CANT

Te Whare Wānanga o Waitaha



# **Preliminary Conclusions**

- As expected, cloud structure very complicated to explain
- Spatial structure and amount of cloud can partially be explained by synoptic-scale patterns
- Source of air over RIS important, cluster evolution may explain more



# Steinhoff et al. 2009

#### • RAS event on 5-6 April 2004





# On-going Work

- High-level / low-level correlations
- Evolution of clusters to possibly explain source of air and differing cloud
- Further investigation of Steinhoff et al
- More analysis of pressure / moisture data