Observing Drizzling Marine Stratocumulus

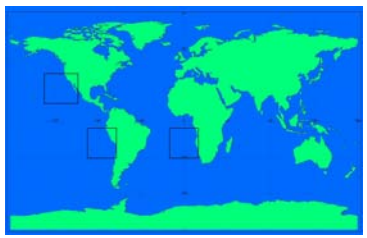
Jessica Ram, Thomas H. Vonder Haar, and Steve Miller
CIRA/Colorado State University, Fort Collins CO
E-mail: Ram@cira.colostate.edu

Introduction

- The objective is to gain a better understanding of marine stratocumulus so that forecasts and climate models can be improved
- Can compare seasonal, regional, and day/night variations
- Drizzle affects:
  - Radiative properties of the cloud
  - Aerosols in and around the cloud
  - Boundary layer properties
- CloudSat and CALIPSO provide a very large dataset spanning from 2006-present

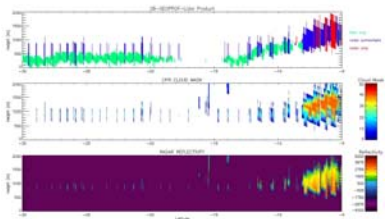
Method

- Using the 2B-GEOPROF-LIDAR product
  - CloudSat detects any precipiation within the cloud
  - CALIPSO detects the cloud whether it is precipitating or not
- So far, data has been collected from 9/1/2006 – 2/16/2009



- North America
  15°N – 40°N
  110°W – 145°W
- South America
  5°S – 30°S
  70°W – 100°W
- Africa
  5°S – 30°S
  15°W – 15°E

- If CloudSat detects any part of the cloud, then it is considered to be precipitating
- Look at the first layer of clouds with a top height below 2000 m
- Only consider passes over the ocean



African Coast 10/13/2006 12:23 UTC

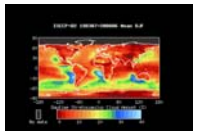
Percentage of Precipitating Clouds

- The degree to which marine stratocumulus clouds form or precipitate partially depends upon the number and size of the aerosols present
- Due to radiative cooling, these clouds tend to drizzle more at night

	Africa	N. America	S. America
Day	27.61%	25.22%	32.76%
Night	38.22%	33.15%	48.49%
Overall	33.08%	29.24%	40.87%

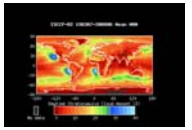
Seasonal Precipitation

D J F



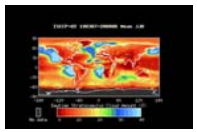
Africa	26.27%
N. America	32.57%
S. America	29.92%

M A M



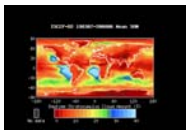
Africa	19.09%
N. America	24.61%
S. America	29.21%

J J A



Africa	32.01%
N. America	32.03%
S. America	51.82%

S O N



Africa	44.71%
N. America	26.41%
S. America	49.48%

In the Future

- Still many details to work out
  - How accurate is this method for determining drizzle?
  - Make sure clouds are actually marine stratocumulus
- Combine satellite and buoy data for a specific location
- Compare to model data
- Still many possibilities

- Site located off the Chilean Coast
- The Improved Meteorological (IMET) sensor suite measures:
  - SST
  - Air temperature
  - Wind speed/direction
  - Barometric pressure
  - Incoming long-wave and solar radiation
  - Humidity
  - Precipitation
  - Aerosol levels

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