

# Improving accuracy of weather Forecast Models

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# Objectives

1. To understand the influence of Cloud Condensation Nuclei (CCN) on Cloud Droplet Concentrations (CDC)



# Importance of Accurate Precipitation Forecast



1. People are able to prepare for the storms
2. People are able to prevent property damage



# How weather is currently forecast?

Weather is currently forecast using WRF model with a standard value of  $300\text{#/cm}^3$

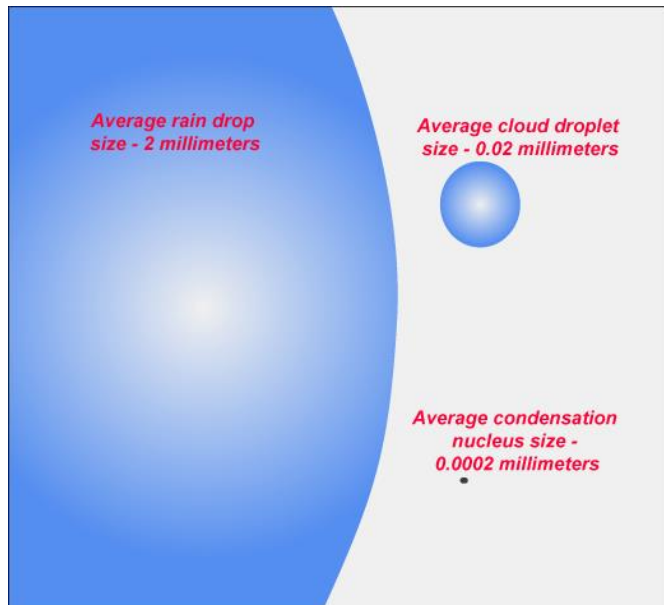


<http://gretchen.atmos.und.edu/sbass/CDC300/index.xhtml>



# Background

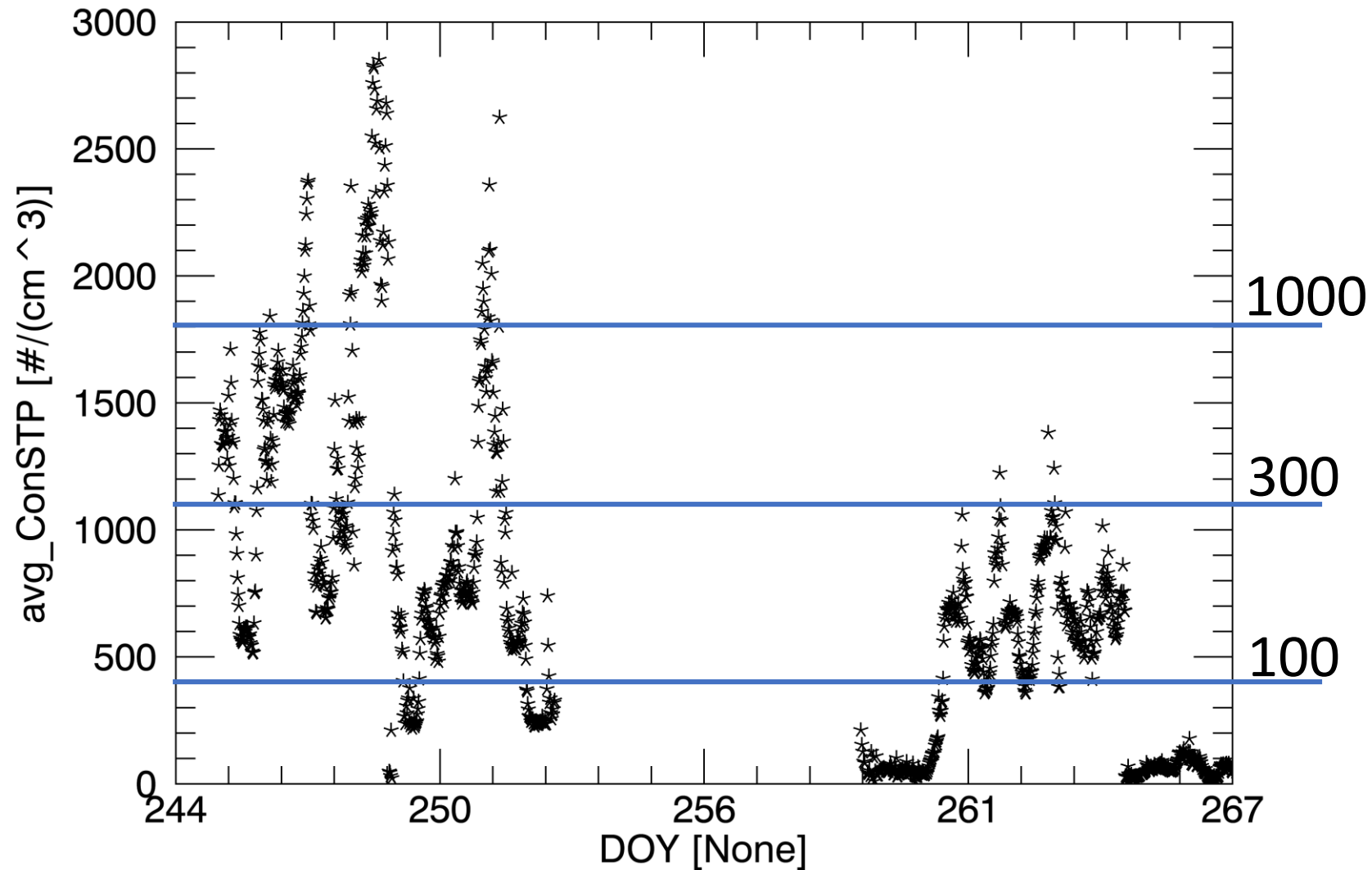
- Cloud condensation nuclei (CCN) are tiny particles approximately 0.04  $\mu\text{m}$  in size
- CCN are used to determine CDC
- CCN are directly proportionate to cloud droplet concentrations (CDC).



# Data Methodology

1. Data analysis of previously collected CCN measurements are used to analyze a hailstorm forecast in western North Dakota near Bismarck, on 30 September 2015.
2. From a range of the measurements 3 are chosen (100, 300\*, 1000 cm<sup>-3</sup>).
3. The numbers were input in WRF model to determine and compare the sensitivity of the forecast for the hailstorm.

# Data: Cloud Condensation Nuclei Measurements of 9/30/2015



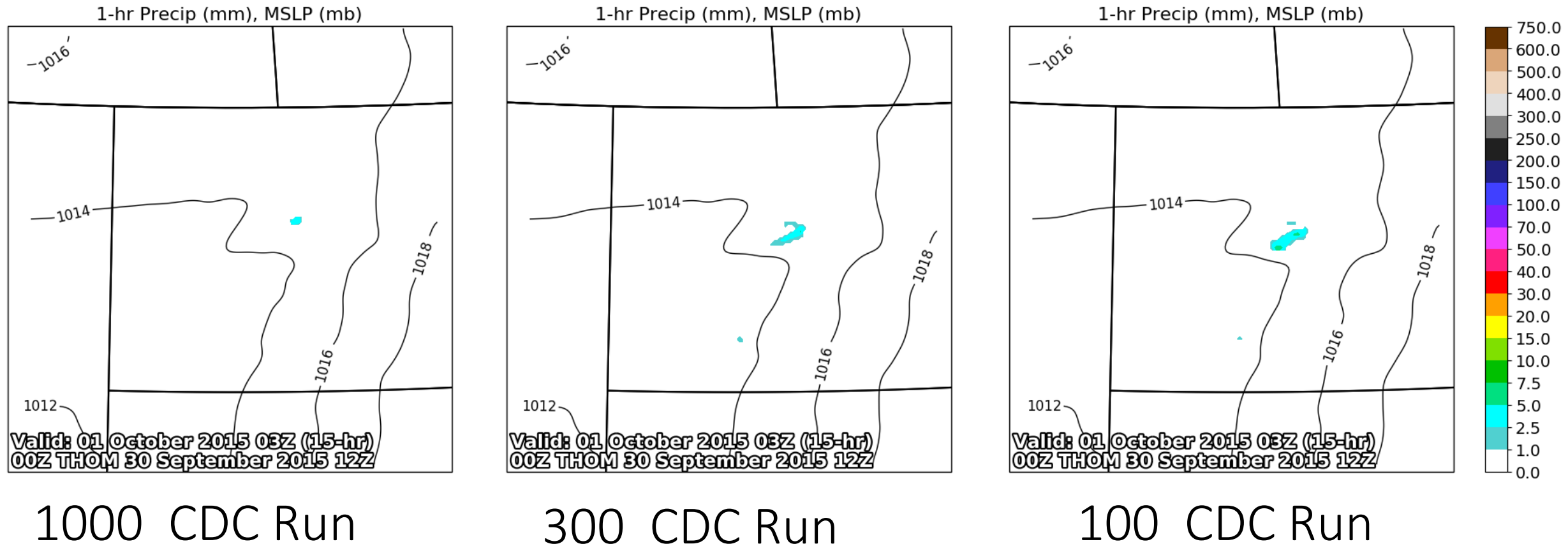
# Results

- <http://gretchen.atmos.und.edu/sbass/CDC300/index.xhtml>

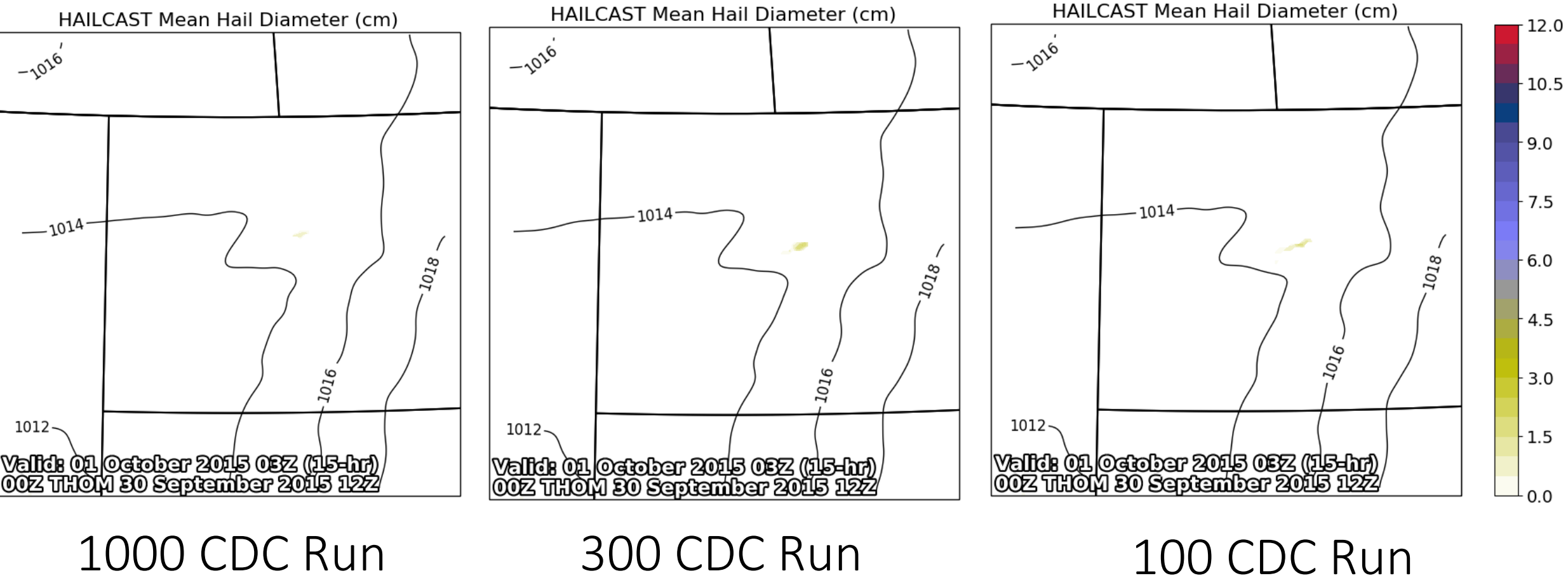


# Results: Precipitation

Forecast model varies upon change in Cloud droplet concentration



# Results: HailCast Diameter



# Important Things to Remember

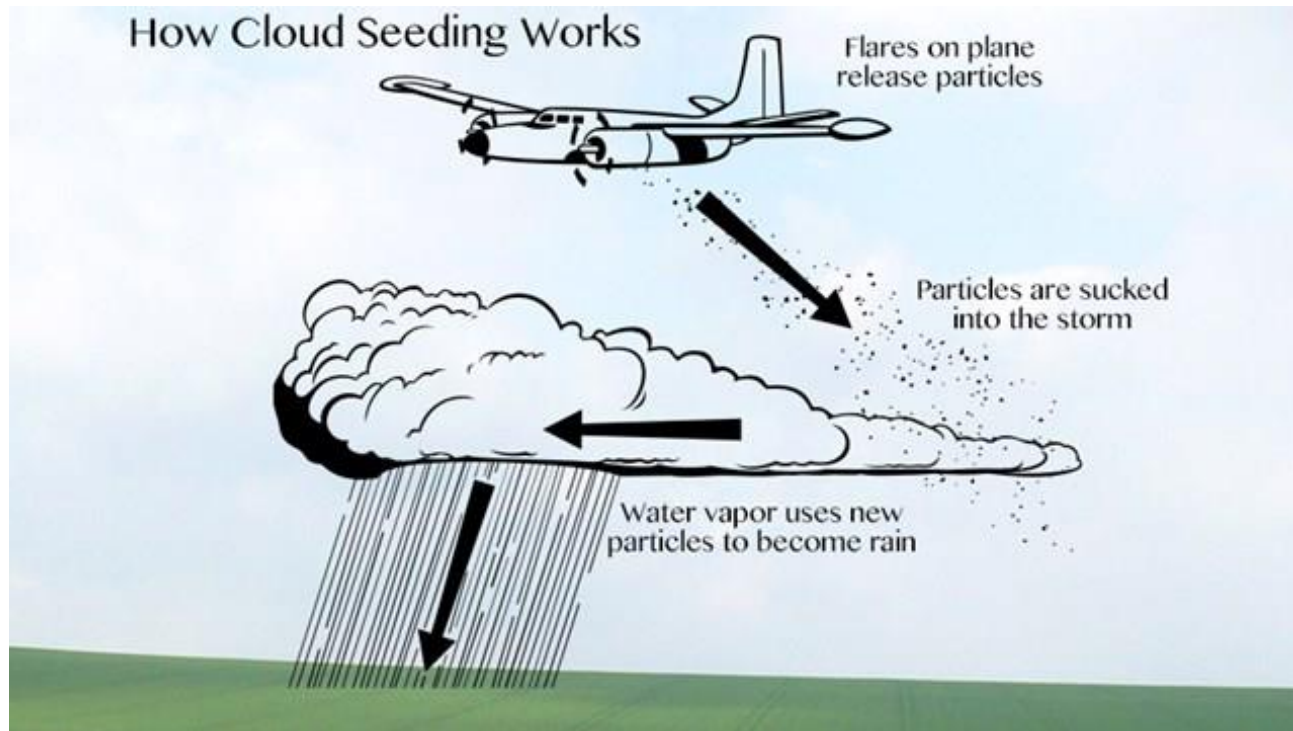
CCN measurements are taken from the amount of particles present per volume in the air.

As discussed before CCN measurements influence the sensitivity of precipitate producing weather forecast.



# Applications: Weather Modification

With more accurate forecast, there will be more opportunity to perform weather modification technique on harmful precipitate-producing storms.



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