

ReadMe DRI CCN

Jim Hudson, 21-May-2009

Cumulative concentrations per cubic centimeter are given in rows according to supersaturation (S) and columns according to time. The S in percent at the top of each column is the supersaturation below which the particle concentrations in the column would activate into cloud droplets. Concentrations should thus always decrease or remain the same with decreasing S (columns toward the right). Concentrations are given in terms of the ambient volume of the atmosphere (at the ambient pressure not corrected to sea level). The concentrations are integrated over the time intervals indicated by the first columns (hours, minutes and seconds GMT). Time gaps are indicated by blank rows. Where there are no blank rows the integration of data is over the time period between adjacent rows with about one tenth second dead time between records. The supersaturation range will vary among flights and sometimes within flights. There were two DRI CCN spectrometers, old (#1) and new (#2). New operated on all flights and old only on some flights. New had a higher and usually larger S range. Data from the two instruments are in separate files. The first data column for #2 is a total CCN concentration, which is at an S beyond the calibrations so it is more than 1.5% but is not a constant value among or within flights.

CCN measurements within clouds are not very useful. There are often artifactually large concentrations for within cloud measurements due to splashing. However, this seemed to be minimal in ICE-L. The other problem is that many CCN are within cloud droplets, which are not always sampled. Thus the CCN measurements within clouds are usually interstitial measurements. However, we do not know the droplet size cutoff so we do not know just how interstitial these measurements are. Thus the user is severely cautioned about using data within or close to clouds. There is approximately a 30 second delay for going through the instruments. This is accounted for but not with great precision. Thus the actual measurements may be incorrect by a few seconds. I have provided extra files for some flights where I have removed the cloud periods; these have a ced added to the name. However, the user is cautioned that these may not always be precise. There are ambiguities about what constitutes cloud.

The instrument is described in:

Hudson, J.G., 1989: An instantaneous CCN spectrometer. *J. Atmos. & Ocean. Techn.*, **6**, 1055-1065.