

SMS-618, Particle Dynamics, Fall 2009 (E. Boss)

Assignment # 2:

1. Describe properties of particles that affect their ‘behavior’ in the environment which are dependent on:
 - a. Size.
 - b. Shape.
 - c. Composition

2. Describe more than five methods to estimate particulate size distribution (in number of particles per volume per size bin). For each method provide:
 - a. What is actually being measured?
 - b. What are the assumptions relating to obtaining the PSD?
 - c. If you find a good web site describing the method/instrument please provide a link (I may use it to compile a table on the class’s web site).

3. A coulter counter output file is provided on the web site (052.xls). It provides a number of size distributions (2 per depth) collected south of Martha’s Vinyard at about 70m water depth. Note that there is one ‘diameter size’ more than the number of ‘channels’. This is because the diameter sizes are the boundaries of each size bin. Choose a specific depth for which you would like to perform the analysis. For the data from that depth:
 - a. Plot the number, area and volume distribution in each bin as function of the geometric mean size of that bin (assume spherical particles). Provide correct units on the graph. Choose plot axes (e.g. linear or logarithmic) such as to convey the most information about the data.
 - b. In order to obtain a size distribution that does not depend on the bin size, divide the number in each bin by the size of the bin (e.g. divide by 3microns a bin spanning from 15 to 18microns). Plot the new PSDs and provide correct units on the graph. For three oceanic processes of your choice, choose the most relevant PSD.
 - c. Don’t forget to add uncertainties to the plotted PSDs. How did you compute them?