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Form Approved  
OMB No. 0704-0188

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1. REPORT DATE <b>1998</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-1998 to 00-00-1998</b>	
4. TITLE AND SUBTITLE <b>Source Strength and Scattering Properties of Organic Marine Aerosols</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Princeton University, Department of Chemical Engineering, Princeton, NJ, 08544</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADM002252.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>2</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

# Source Strength and Scattering Properties of Organic Marine Aerosols

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Award #: N00014-97-1-0673

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## LONG-TERM GOAL

My long term goal is to quantify the role played by sea salt in radiative scattering in the marine environment. This project studies the number of aerosol particles produced from sea salt under different marine conditions. Studying the chemical composition of those particles provides important information about their behavior in the atmosphere.

## OBJECTIVES

I would like to see if whether the number of sea salt particles observed in field projects can be predicted by current parameterizations of particle flux based on wind speed. I will test whether other parameters are also important determinants of sea salt particle concentrations.

I also want to establish what the compositions of sea salt particles are. I want to know what role the presence of organic species may play in the hygroscopicity of particles.

## APPROACH

I participated in the ACE2 experiment to collect information on particle composition. We are using this information to evaluate the particle flux.

We have also designed and calibrated an instrument for measuring the sodium composition of particles. We plan to deploy this instrument on the INDOEX cruises of the NOAA R/V Ronald Brown. We plan additional field collection of data on airborne and land-based platforms for 1999 and 2000.

## WORK COMPLETED

In the first year of this award, we have focussed on analyzing data from a field campaign and on designing a new instrument.

Collection of filter samples aboard Pelican flights during the Aerosol Characterization Experiment (ACE2) was completed. All organic and elemental carbon analyses have been completed. All ionic analyses are completed. Extraction of samples for trace metal analysis was performed. Our samples provide important data on the composition of the aerosol measured for the limited samples that were allowed by the aircraft constraints.

The ACE2 project has provided a wealth of data on the distribution of and scattering by aerosol particles over the North Atlantic.

Data and sample analysis have proceeded well. We have begun examining data from certain time periods in detail.

## **RESULTS**

While there is evidence that the ambient concentration of the coarse fraction of sea salt particles depends strongly on wind speed, the comparison with existing parameterizations is weak. In addition, there is some evidence that a large fraction of the organic material present in clean marine conditions is associated with sea salt. Our filter analyses have also shown trace metal signatures of dust from some of the ACE2 samples.

## **IMPACT/APPLICATION**

The primary application of our instrument development work is that we will now be able to measure simultaneous mass and sodium distributions. This technique provides us with an unambiguous way to measure the ambient concentrations of sea salt particles. With vertically-resolved measurements of this type, we can obtain the flux of particles.

## **TRANSITIONS**

Our filter data have been made available to other ACE2 investigators for use in their analyses.

## **RELATED PROJECTS**

1 – The relationship between particle number and organic mass is being studied with the help of my filter data from ACE2 by Dean Hegg (University of Washington).

2 – The particle compositions determined from our ACE2 data are being used to assess the inversion methods of optical particle data by Don Collins, Richard Flagan and John Seinfeld (California Institute of Technology).

## **PUBLICATIONS**

Russell, L.M., and J.H. Seinfeld: Size- and Composition-Resolved Externally Mixed Aerosol Model, *Aerosol Science and Technology*, 28, 403-416.