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PARTICLE NUMBER CONCENTRATIONS AND SIZE DISTRIBUTIONS MEASURED USING PORTABLE INSTRUMENTS AROUND THE FINNISH ANTARCTIC RESEARCH STATION ABOA

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INTRODUCTION

New aerosol particle formation has been observed at the Finnish Antarctic Research station Aboa (73°03'S, 13°25'W) in Queen Maud Land. To study the representativeness of these observations particle number concentrations and size distributions were measured during the austral summer 2004/2005 at several locations at distances starting from less than 10 km from the coast up to about 200 km from Aboa and more than 300 km from the coast. The goals of the measurements were to study 1) whether the high number concentrations during nucleation events are confined to a small region around Aboa or whether it is a phenomenon observable at a larger geographical range; 2) the sea-salt particle gradient at winds blowing from the sea; 3) the size distribution and transport of dust from the nunatak Basen during high wind speeds.

METHODS

Total particle number concentration was measured using a TSI model 3007 CPC. An optical particle counter, Grimm model 1.108, that has 16 size channels from 0.3 to 20 µm was used for the size distribution measurements. A thermally insulated box and a common inlet was designed for the counters. Power was provided with a 12 V car battery that enables operation of several days for the counters. The counters were placed some hundreds of meters upwind of the camp sites.

RESULTS

During the inland expedition three nucleation episodes were observed at Aboa. The last one of these was observed very clearly with the mobile instruments as well. At that time the portable system was located 50 km south of Aboa. That the other high number concentration episodes were not observed at the other inland sites is most probably due to different air mass origins and transport routes to the sites. There was a clear gradient in all size channels of the optical particle counter from the coast to inland.