

## Introduction

The eastern part of the central North Atlantic is a major sink of Saharan dust (~20-100 g m<sup>-2</sup>a<sup>-1</sup>, Fig. 3 left). Desert dust carries many nutrients important for oceanic biota, its availability controlled by the content and solubility of iron. The solubility of iron is influenced amongst others by chemical reactions on the particle surface.

As part of the German project SOPRAN (Surface Ocean PRocesses in the ANthropocene), aerosol samples were taken for chemical analysis on an atmospheric observatory on the island of São Vicente (Fig. 1, 2). For weekly measurements throughout the year a DIGITEL high volume filter sampler is used. Due to variations in the dust depositions throughout the year, 3 intensive campaigns in summer and winter months took place. During these campaigns a 5-stages BERNER impactor is used for size segregated particle collection (Fig. 3).

For chemical characterization determination of mass, inorganic ions (Ion chromatography), monosaccharide (Ion chromatography), OC/EC (Thermogravimetry) and first analysis of trace metals (Total X-Ray Reflectory Fluorescence Spectroscopy) was carried out up to now.

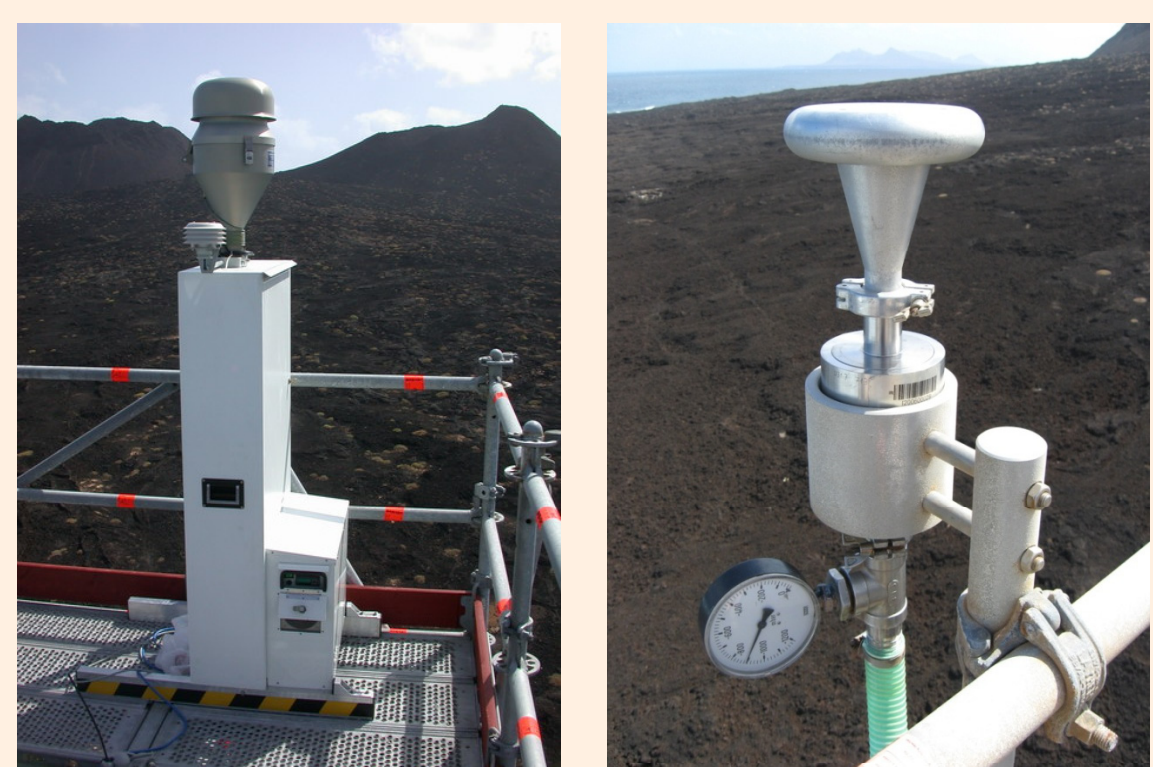


Fig. 3: DIGITEL high volume sampler (left) with PM<sub>10</sub>-inlet, 500 l min<sup>-1</sup>, 150 mm quartz fibre filters (Munktell MK 360); BERNER 5-stages impactor (right), 75 l min<sup>-1</sup>, collecting on aluminium and Nuclepore® foil (Wicom GmbH, Heppenheim, Germany), stages lower cut-offs: 0.05 - 0.14 - 0.42 - 1.2 - 3.5 µm,

## Results

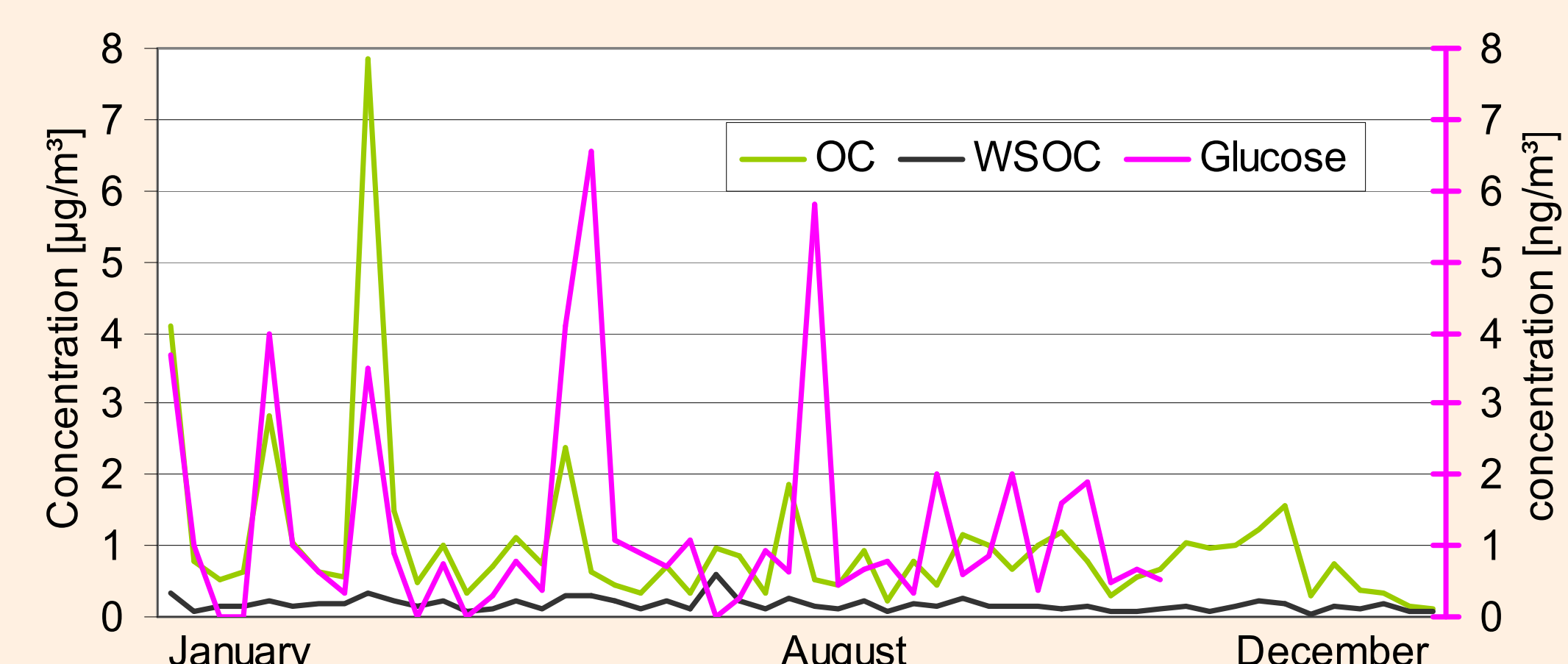
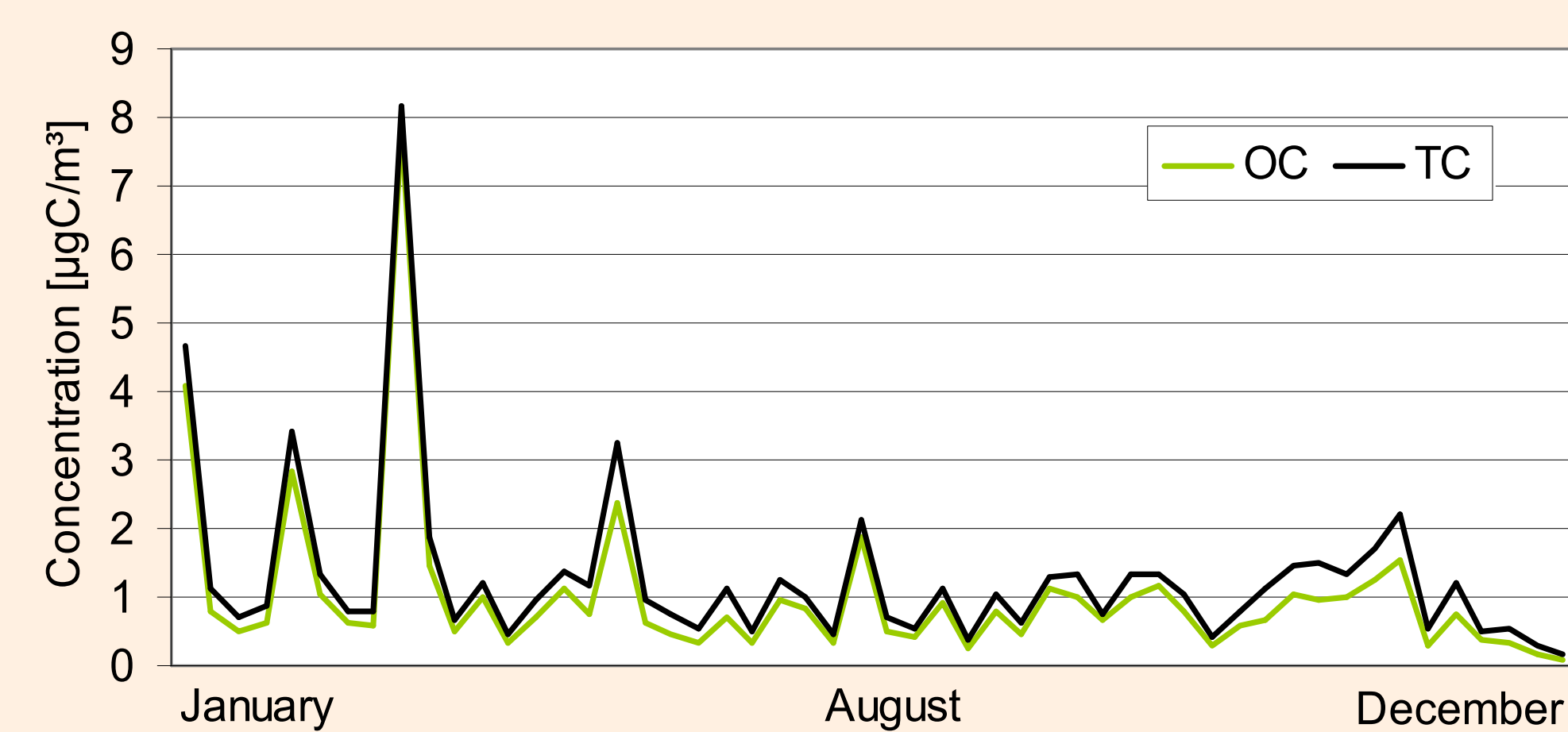
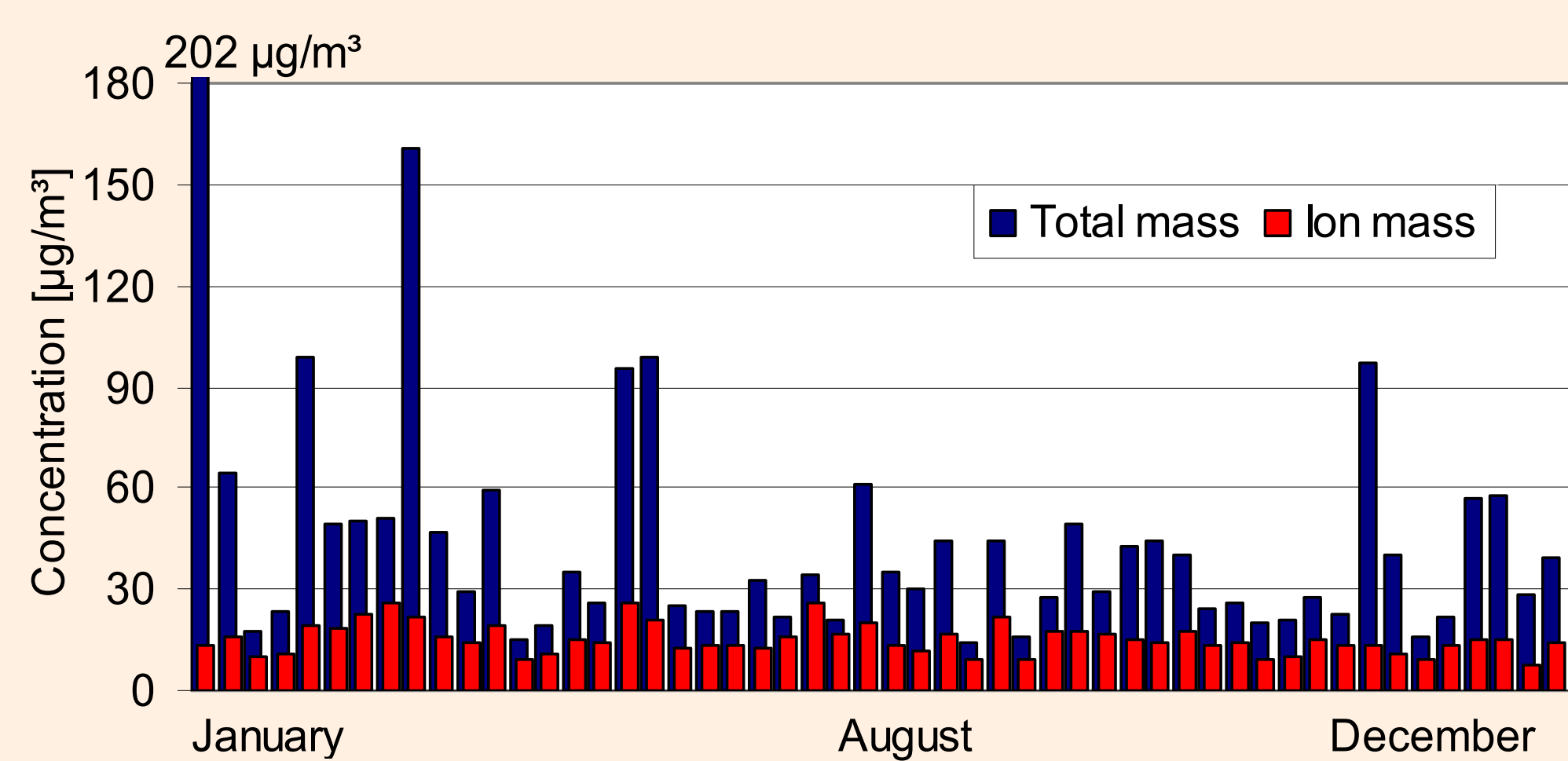


Fig. 4: Weekly averages of total and ion mass, organic carbon (OC) and total carbon (TC), water soluble carbon (WSOC), Glucose from DIGITEL samples



Fig. 2: Atmospheric observatory with 30 m-tower for chemical measurements, ~100 m onshore

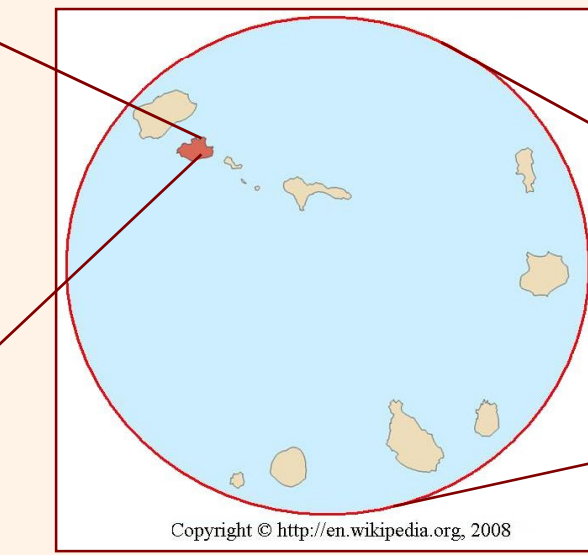


Fig. 1: São Vicente, Cape Verde Islands, 95 % northeasterly trade winds, average annual for temperature: 25 °C, precipitation: 50 mm

## Results

Tab. 1: Total mass concentration as average amounts of 5 samples for dust events and 5 for low dust events from BERNER impactor

Total mass concentration		Dust events	Low dust events
		[µg/m <sup>3</sup> ]	[µg/m <sup>3</sup> ]
Stage 1	0.05 – 0.14 µm	0.295	0.117
Stage 2	0.14 – 0.42 µm	1.660	1.052
Stage 3	0.42 – 1.2 µm	7.583	0.979
Stage 4	1.2 – 3.5 µm	32.904	3.681
Stage 5	3.5 - 10 µm	27.227	3.447
Sum		69.670	9.276

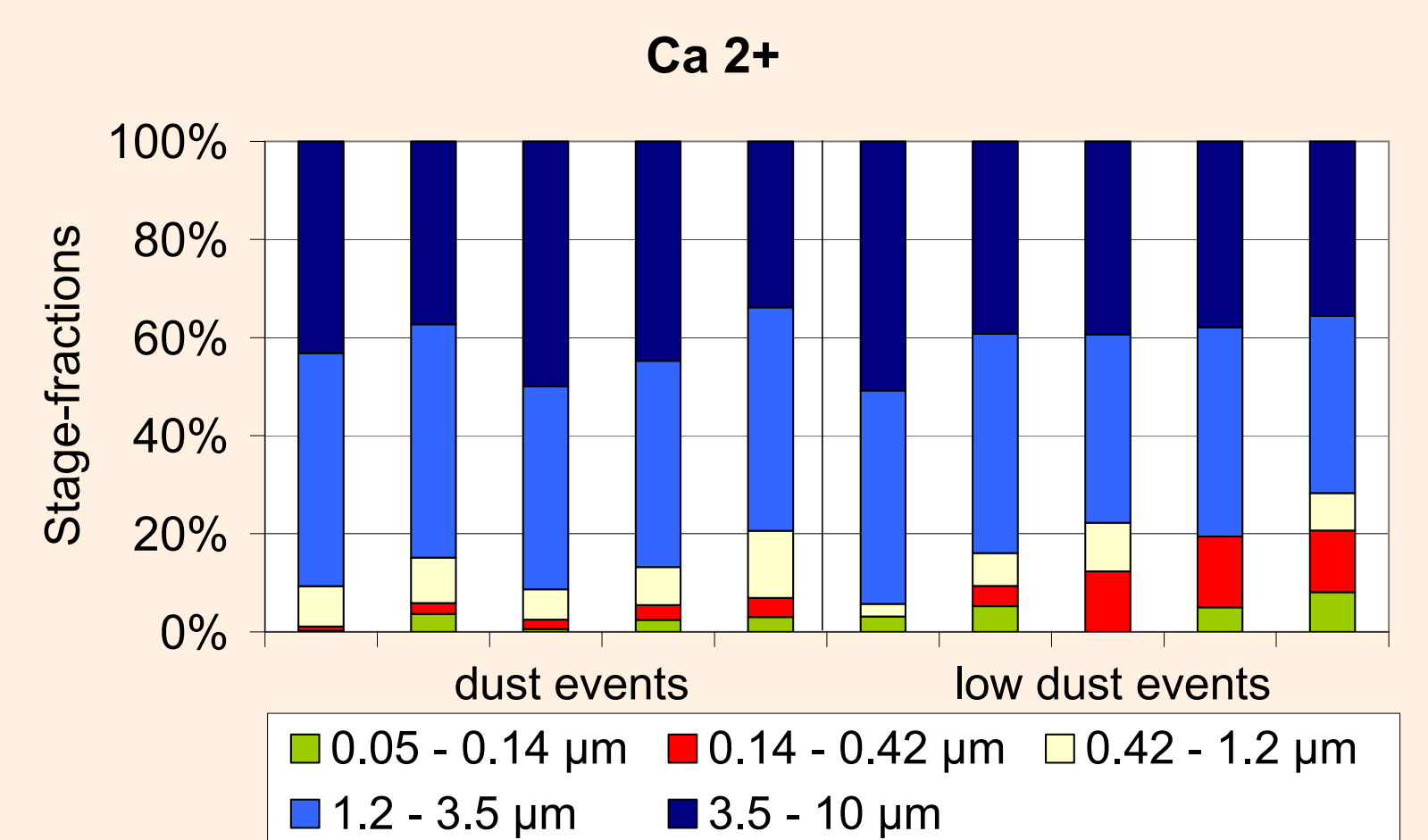
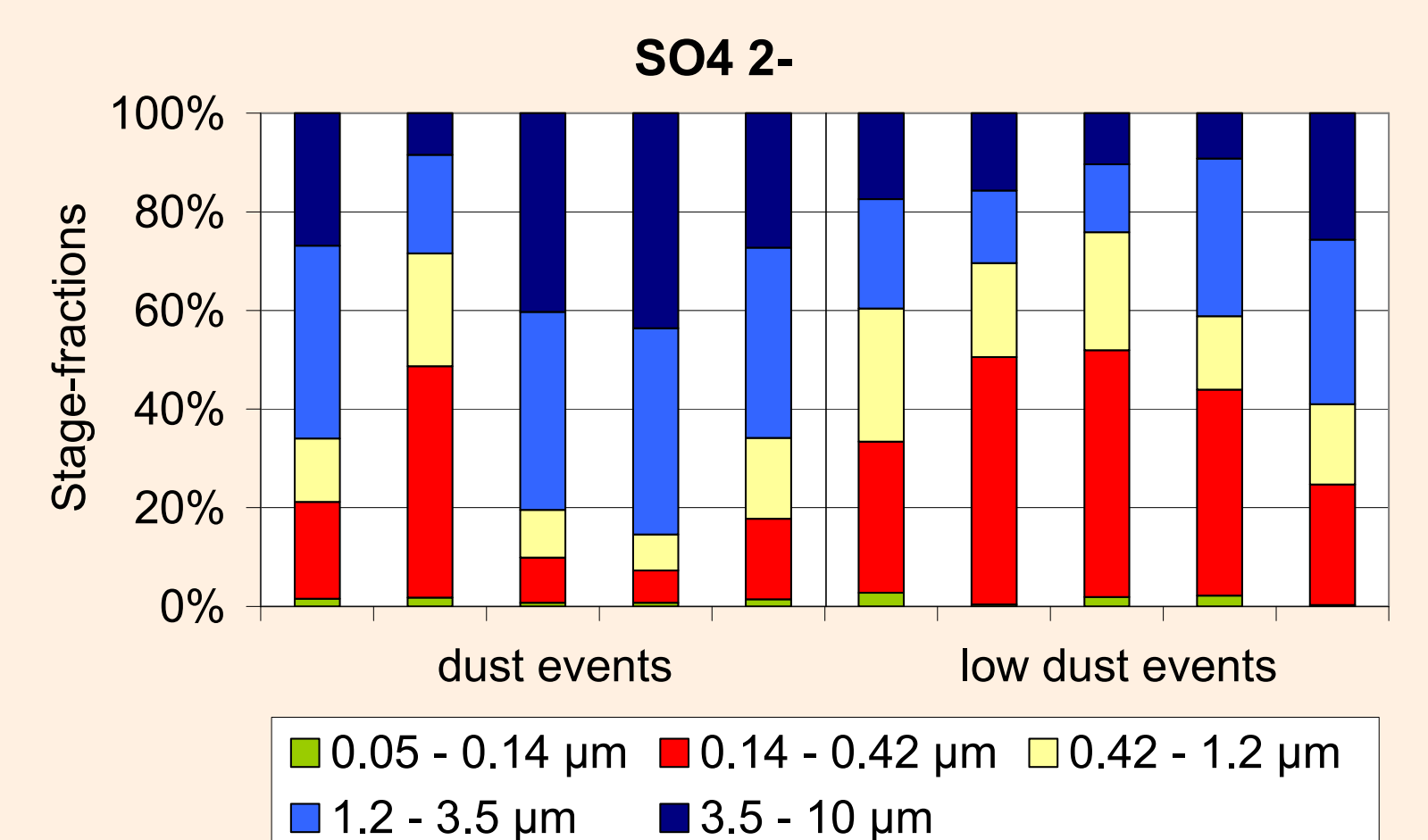


Fig. 6: Size segregated ratios of SO<sub>4</sub><sup>2-</sup> and Ca<sup>2+</sup> in BERNER samples during dust and low dust events (2007)

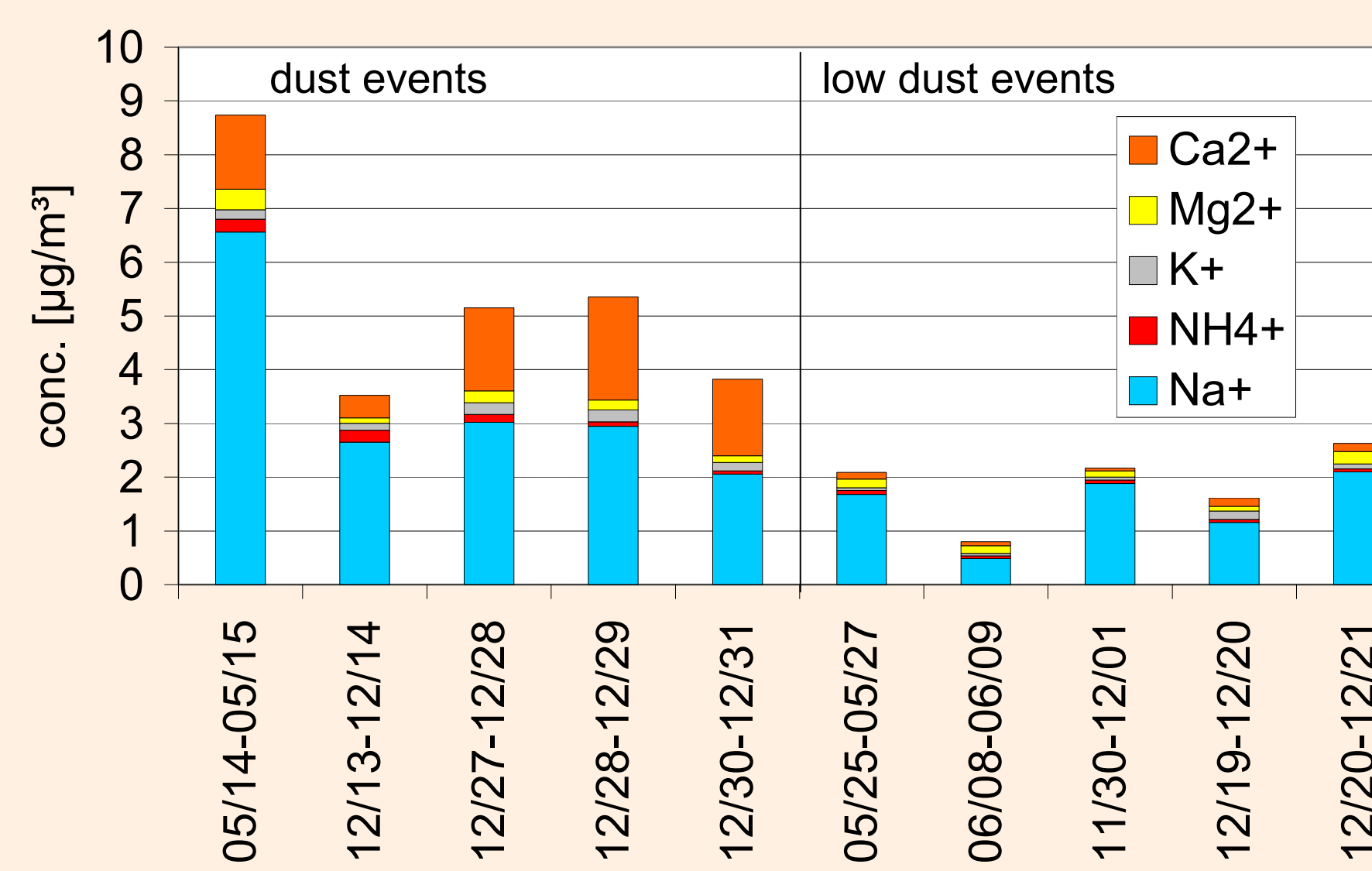
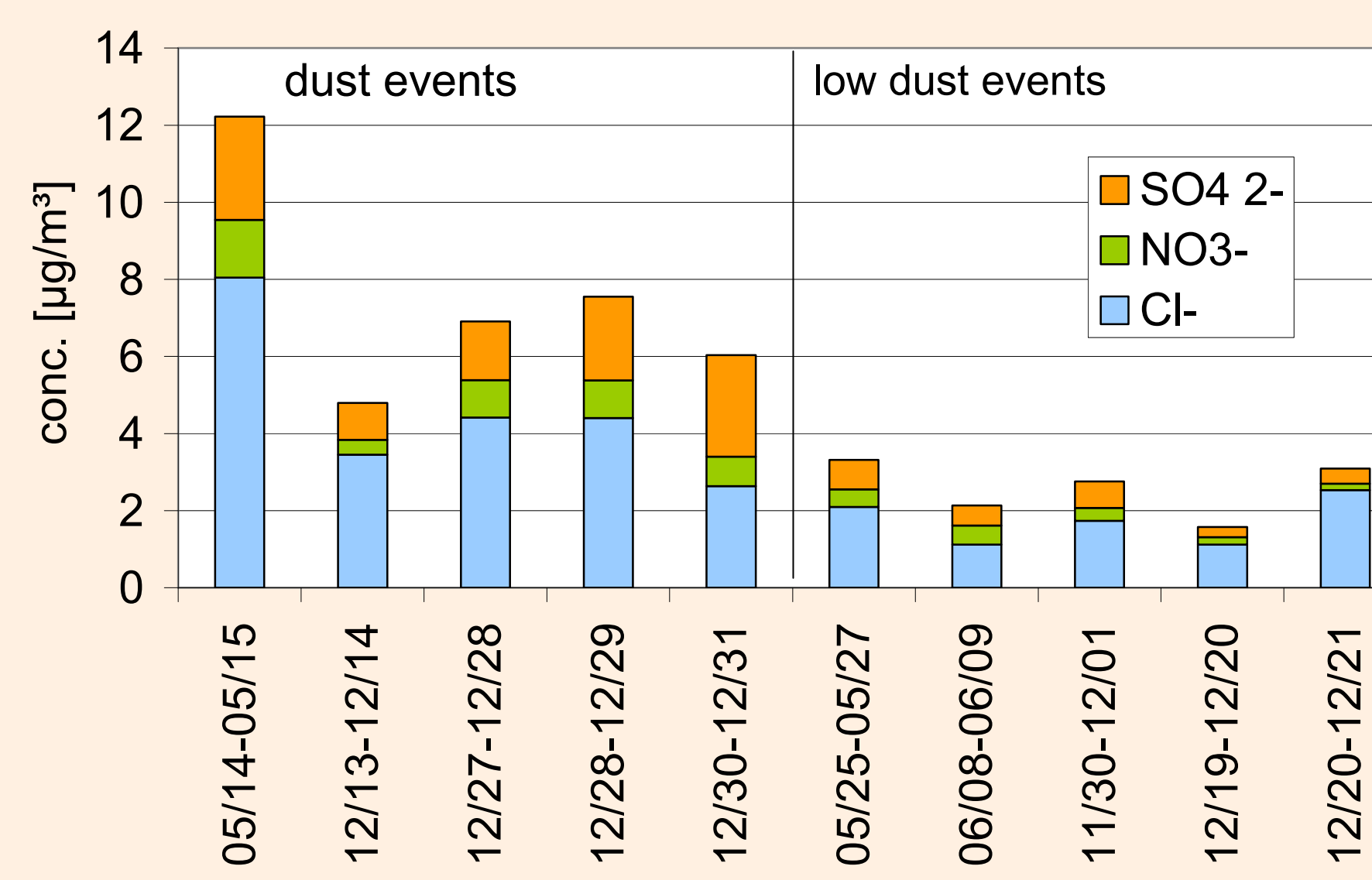


Fig. 5: Ion concentrations of dust events and low dust events from BERNER samples (2007)

### Dust event 05/11/2007

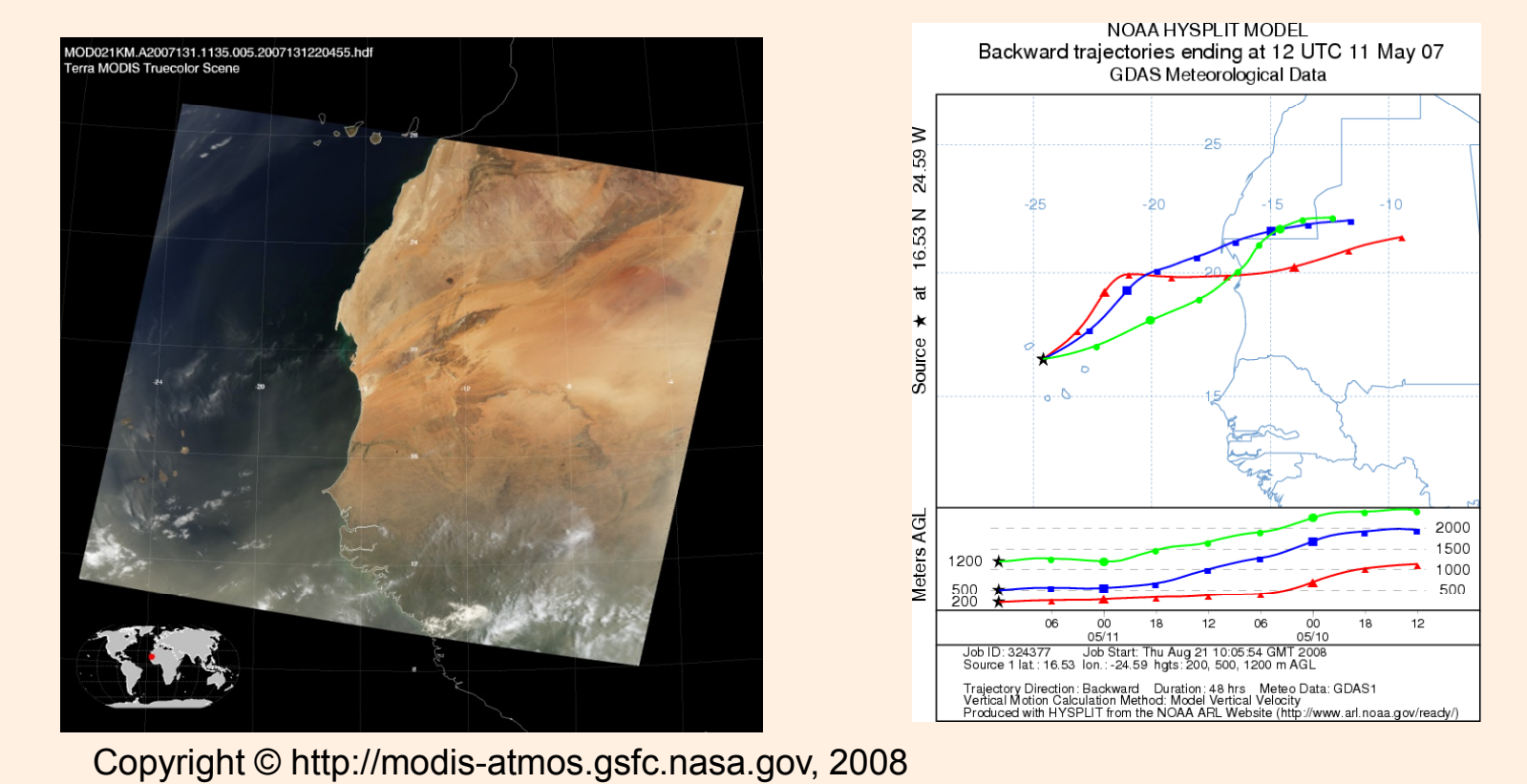


Fig. 7: Satellite image (MODIS) and backward trajectories (Hysplit)

Tab. 2: Trace-metals of DIGITEL sample 05/10-05/11/07

Element	Element conc. [µg/m <sup>3</sup> ]	Ratio element to particle mass [%]
Ca	7.427	2.24
Mn	0.077	0.02
Fe	3.676	1.11
Zn	0.077	0.02

## Summary

The results of the particle analysis show a distinction between dust and low dust events. Dust events are indicated by high loading of total mass compared to ion mass, accompanied by increased amounts of organic carbon and glucose (Fig. 4), supported by satellite and trajectory images (Fig. 7). The difference between high and low dust can also be seen in the total mass concentration in the 3 upper stages of the BERNER impactor (Tab. 1). The higher concentrations of SO<sub>4</sub><sup>2-</sup> and NO<sub>3</sub><sup>-</sup> indicate long range transport, the high Ca<sup>2+</sup> is probably of mineral origin (Fig. 5).

## Acknowledgement

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## References

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N. Mahowald, K. Kohfeld, M. Hansson, Y. Balkanski, S. P. Harrison, I. C. Prentice, M. Schulz, and H. Rohde, *J. Geophys. Res.*, 1999, 104, 15,895