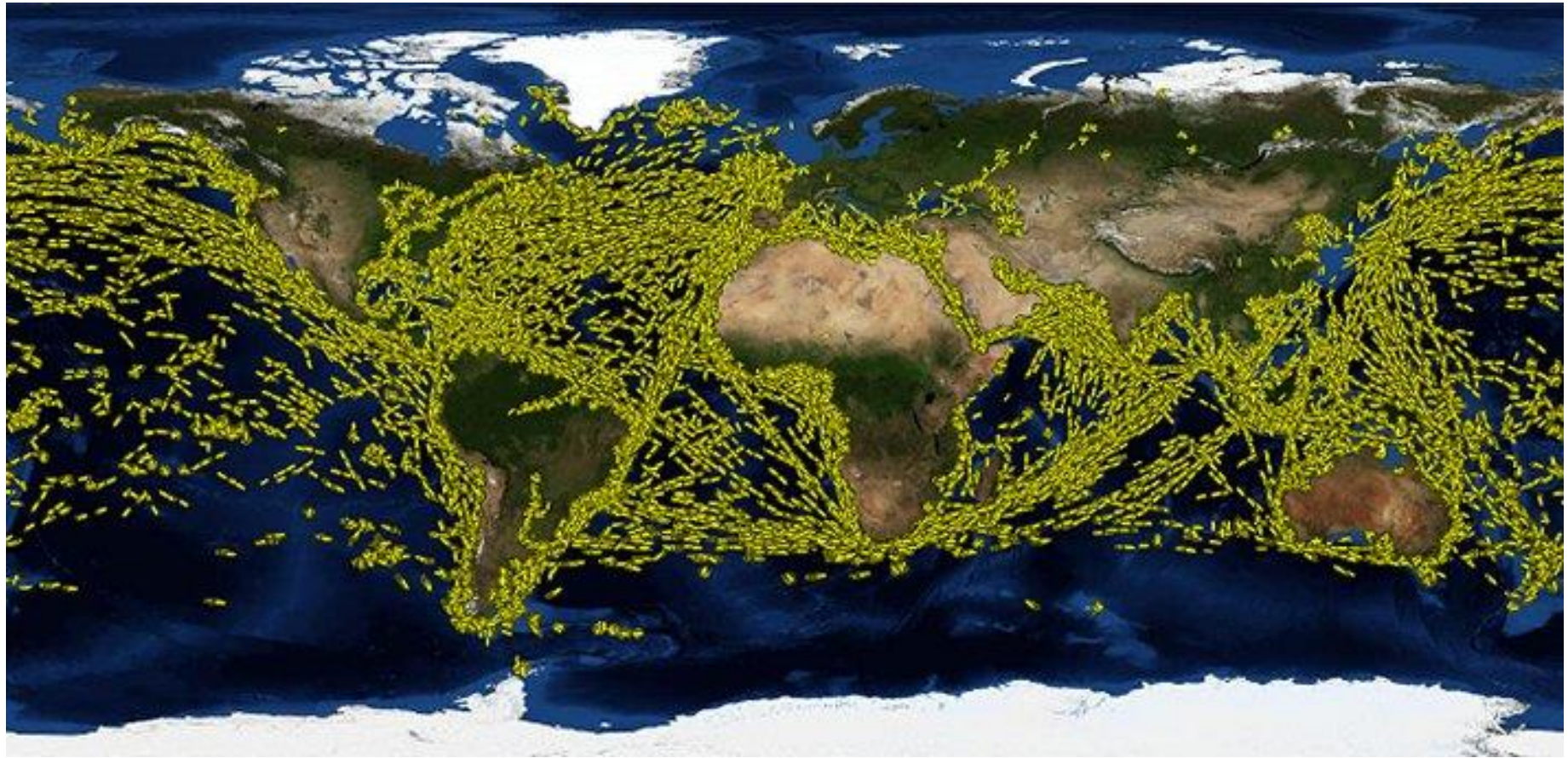


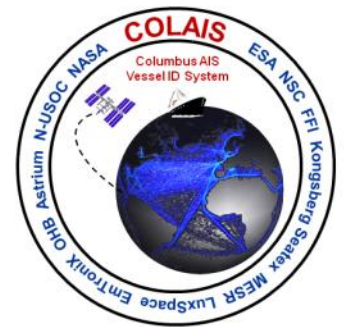
Emissioni navali e clima da un punto privilegiato di osservazione, l'isola di Lampedusa

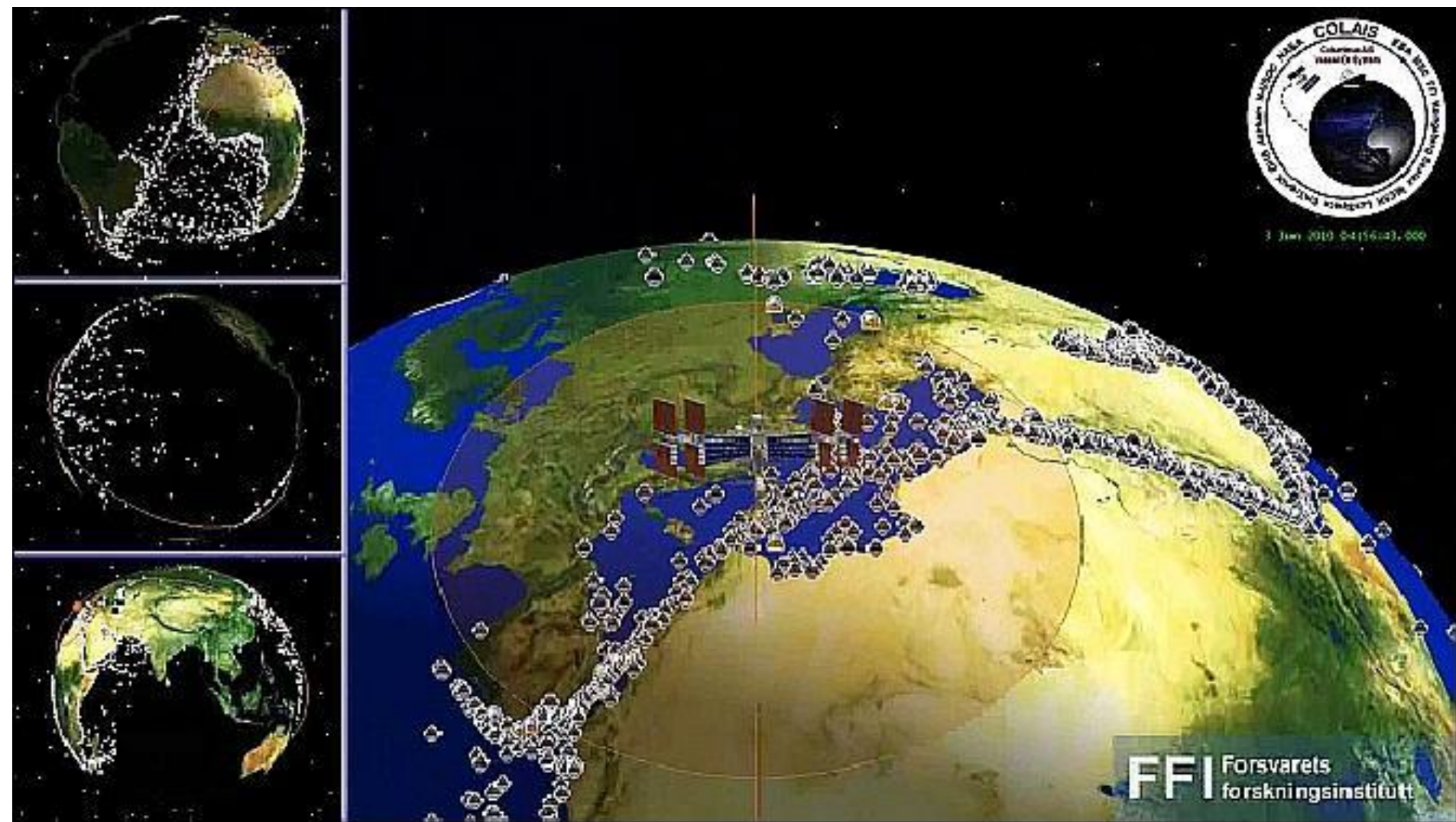
Alcide Giorgio di Sarra
Laboratorio di Analisi ed Osservazioni del
Sistema Terra
ENEA, Roma





14 ore, Giugno 2010





3 Giugno 2010

Alcuni meccanismi di interazione con il clima







Adriatic Sea

Po River
valley

Kiehl et al, 2000

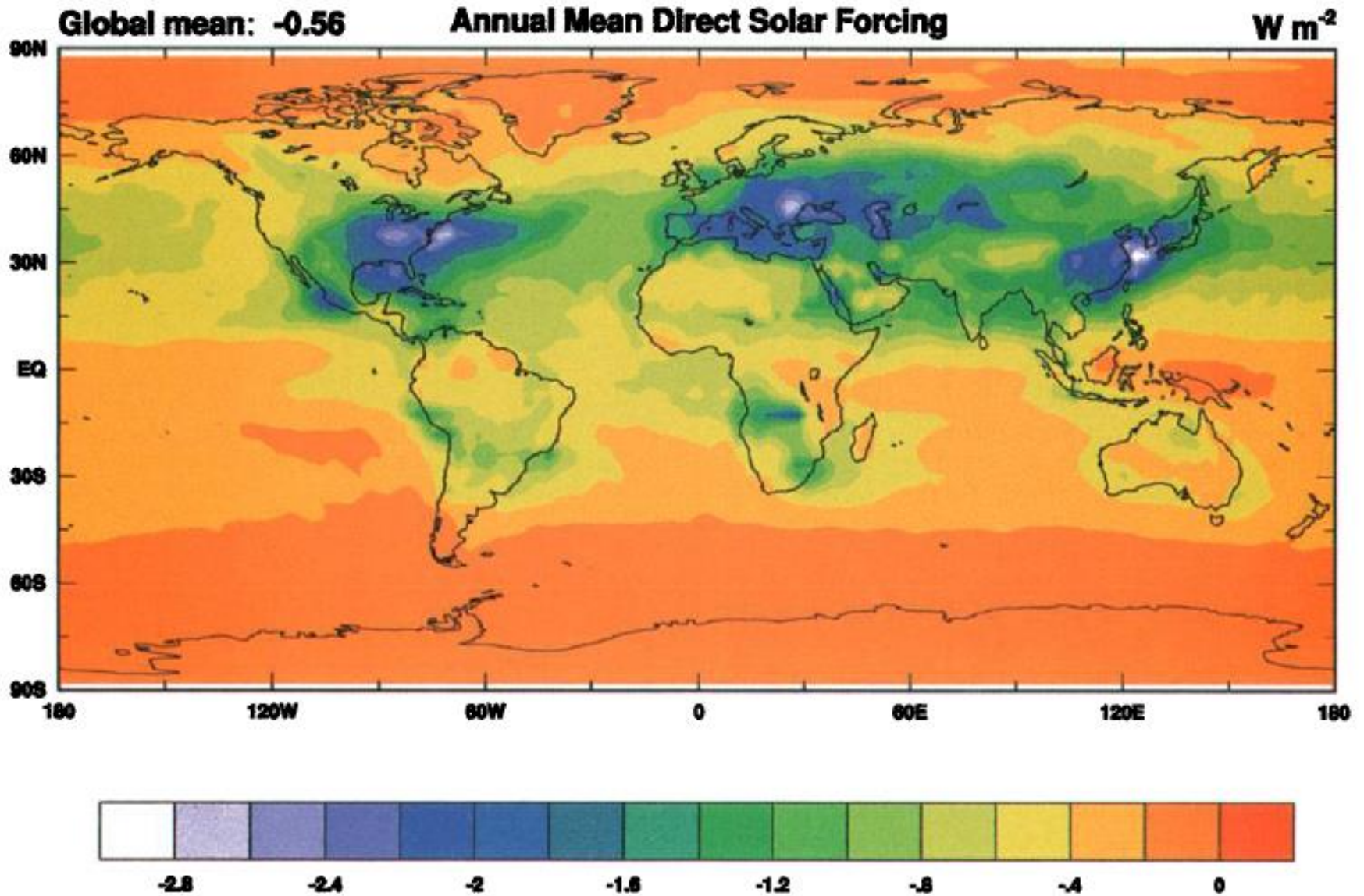
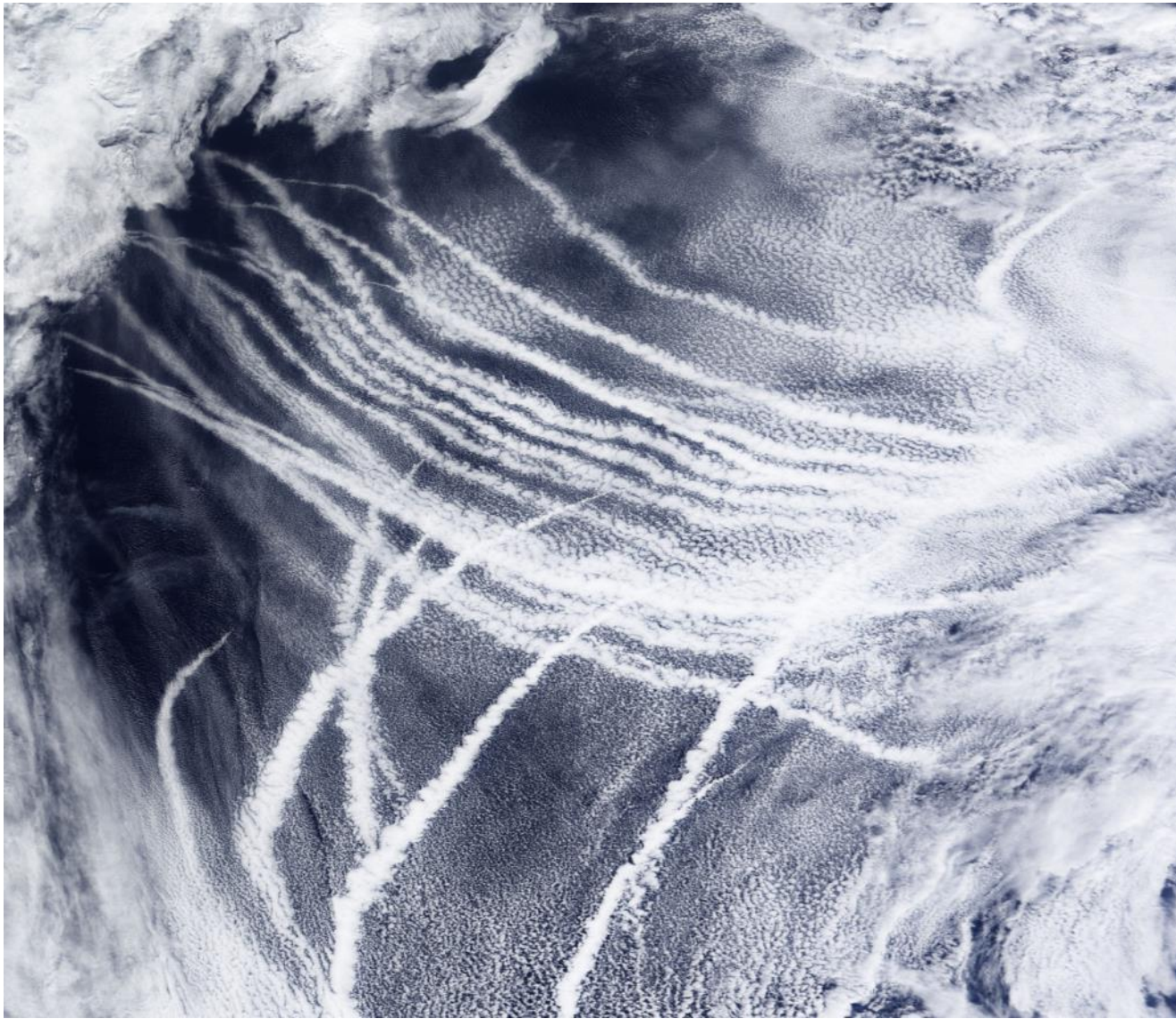


Plate 3. Geographic distribution of the annual mean direct forcing ($W m^{-2}$) due to anthropogenic sulfate aerosols.



MODIS, south of Alaska, 4 Mar 2009

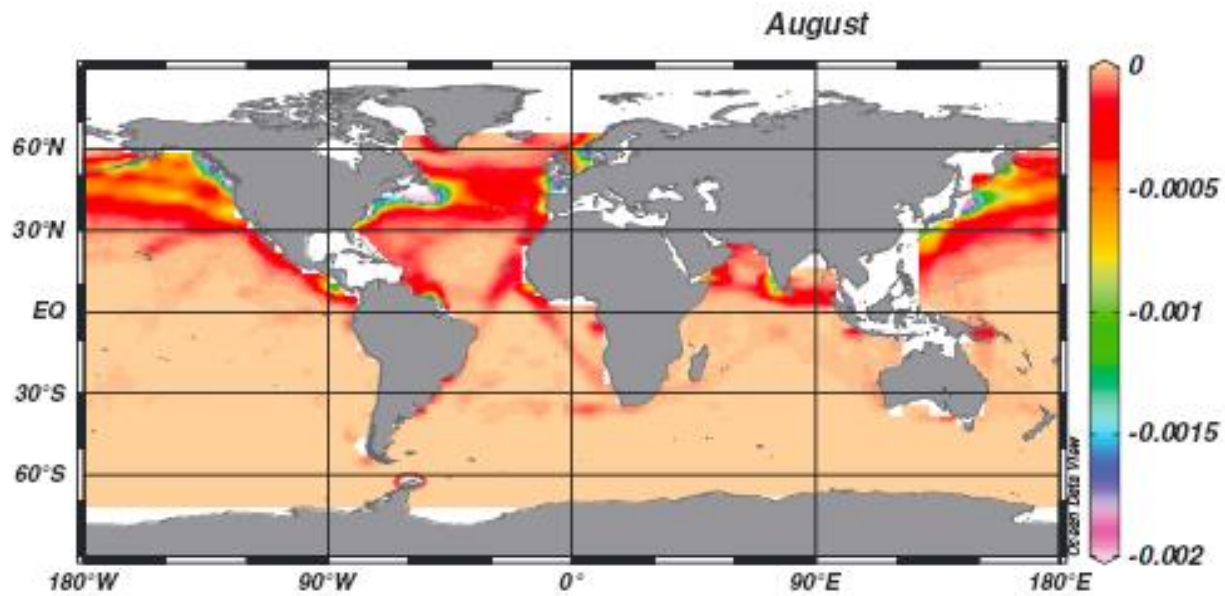
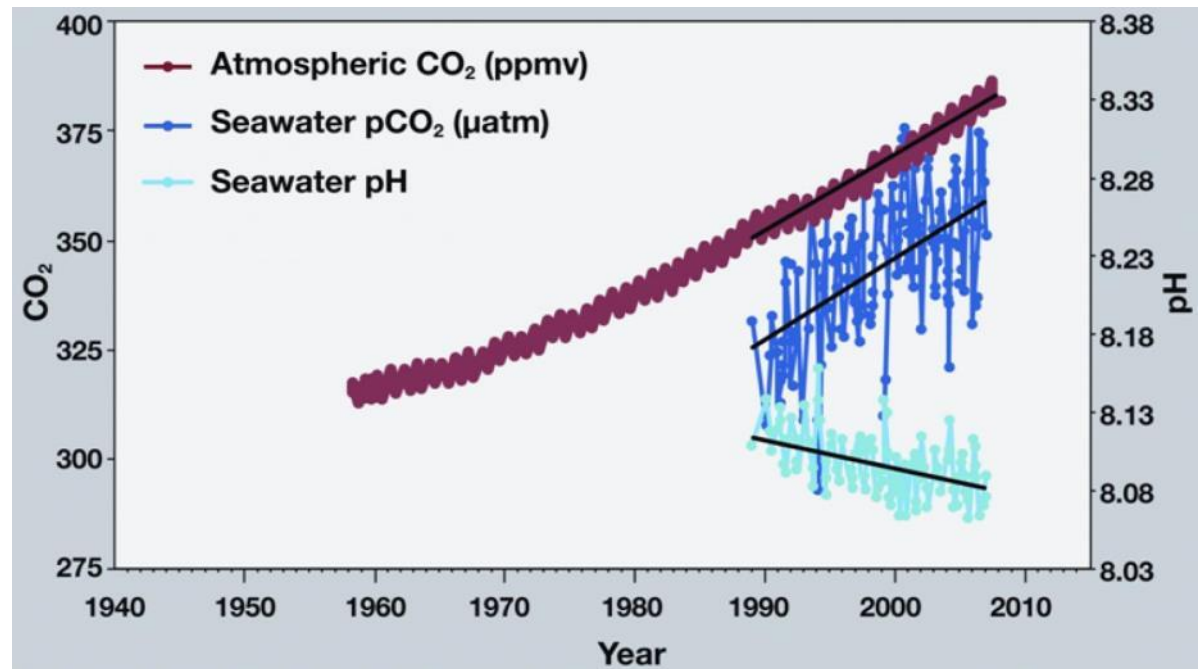
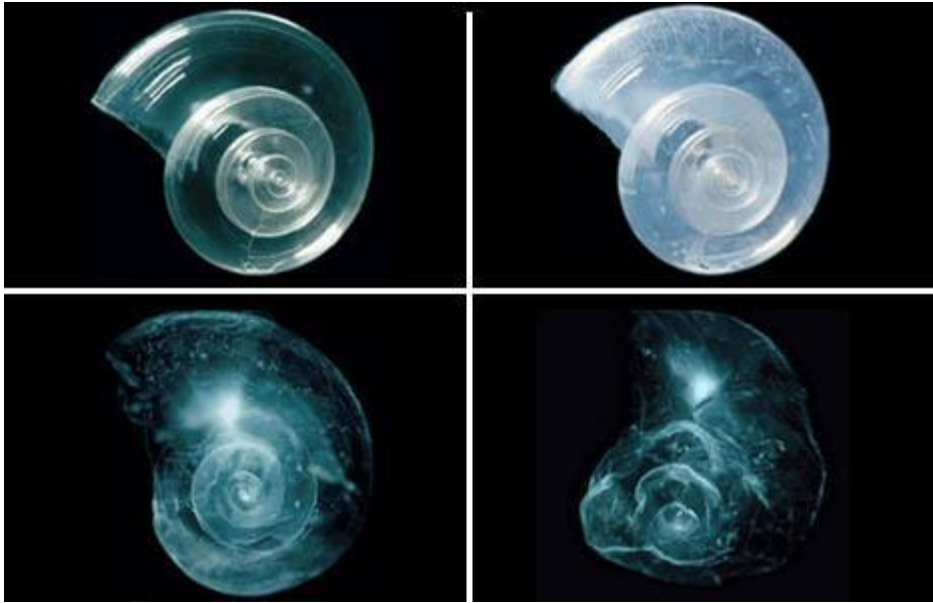


Figure 2. Calculated surface water pH changes arising from shipping-derived inputs of SO_x and NO_x . Calculations begin with the month of January.



NOAA PMEL
Hawaii





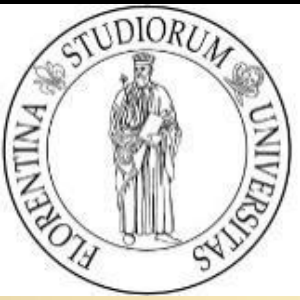
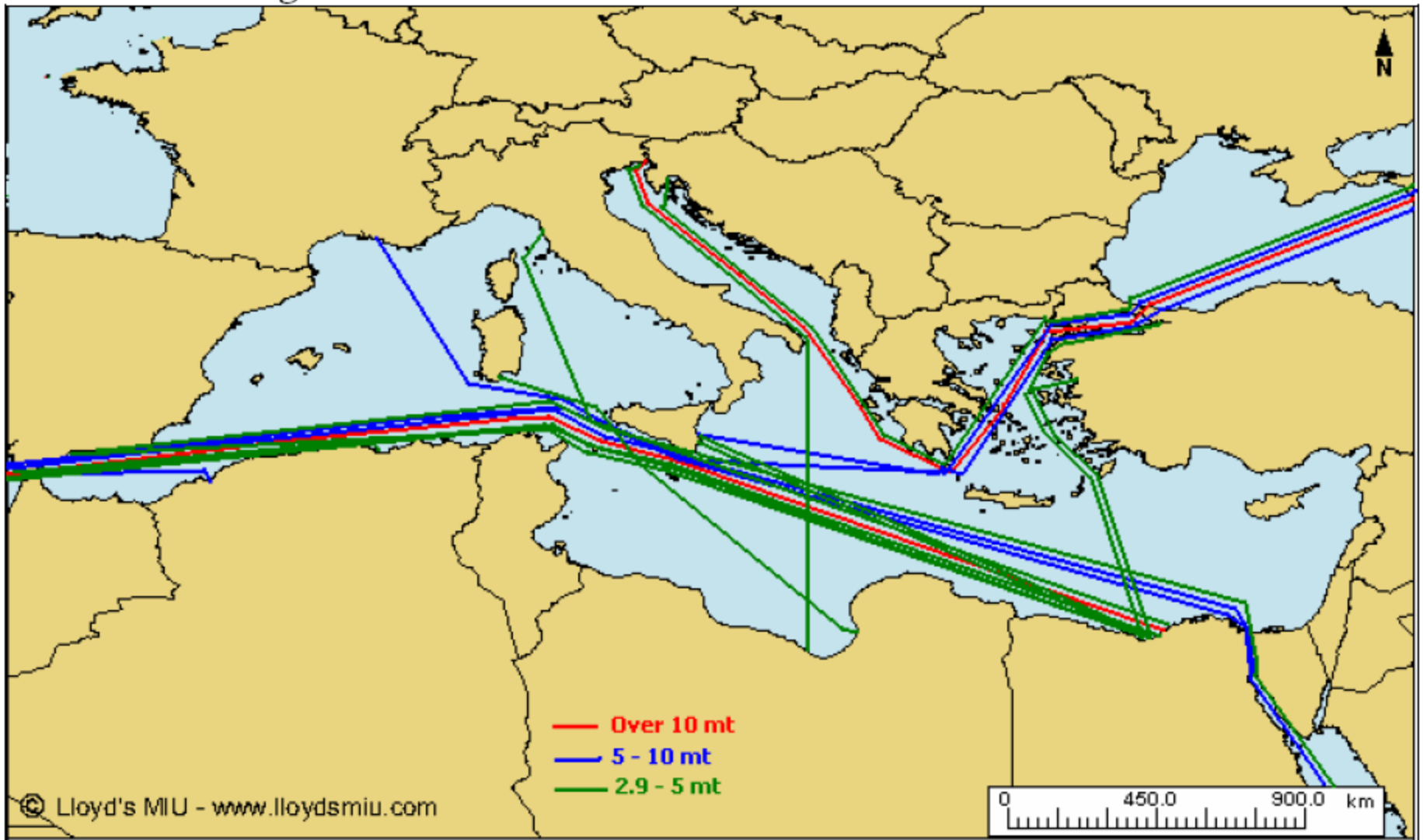


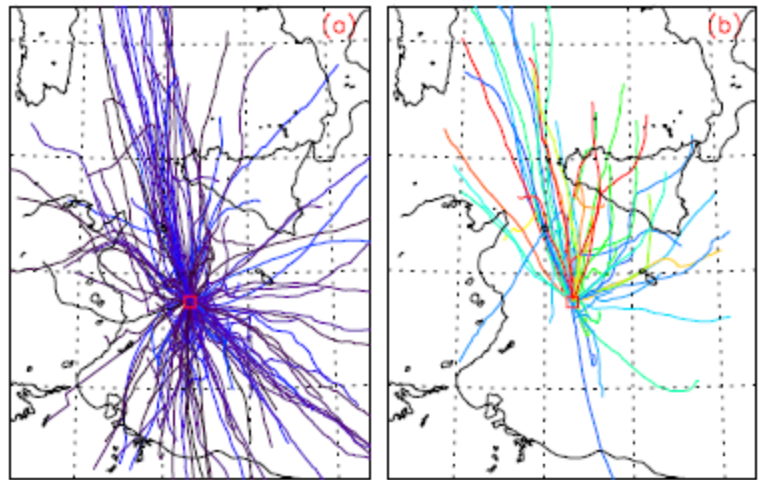
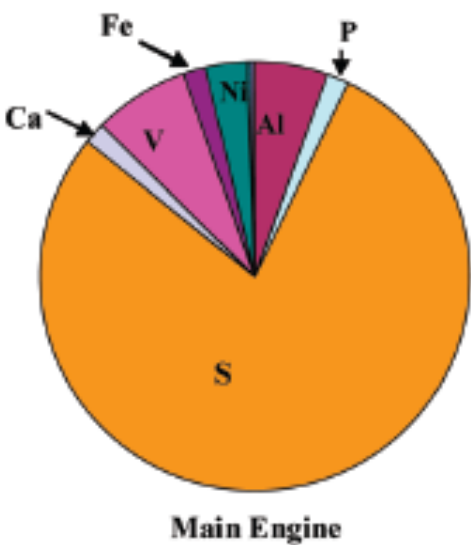
Figure 9.1: Laden Port to Port Crude Oil Routes in 2006



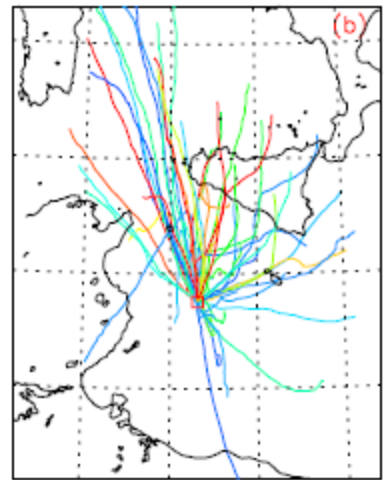
$V < 6 \text{ ng/m}^3$

$V \geq 6 \text{ ng/m}^3$

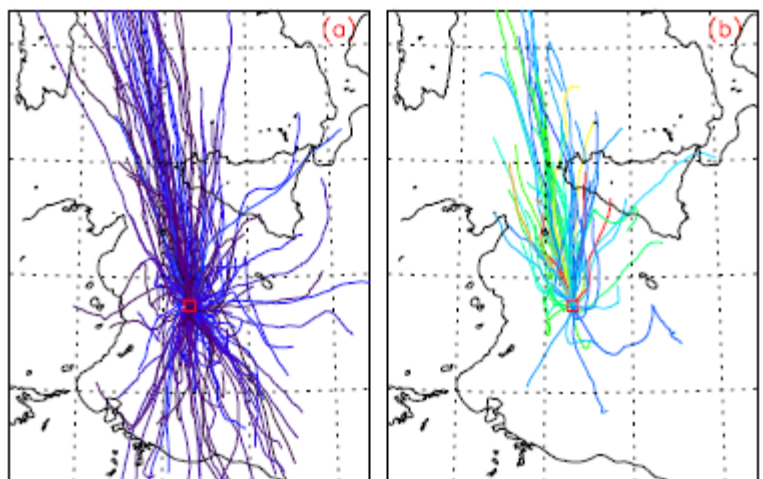
Traiettorie di 18 ore



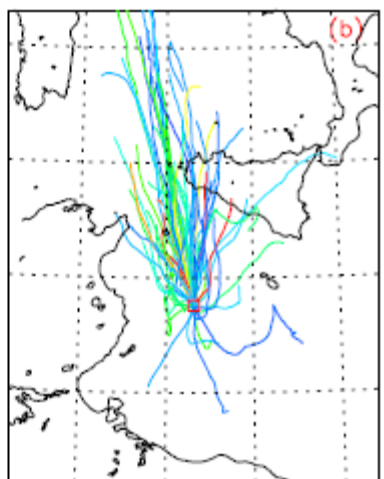
Apr., May, Jun.



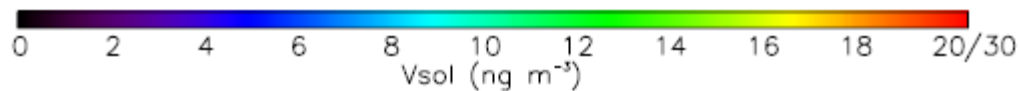
Apr-Mag-Giu

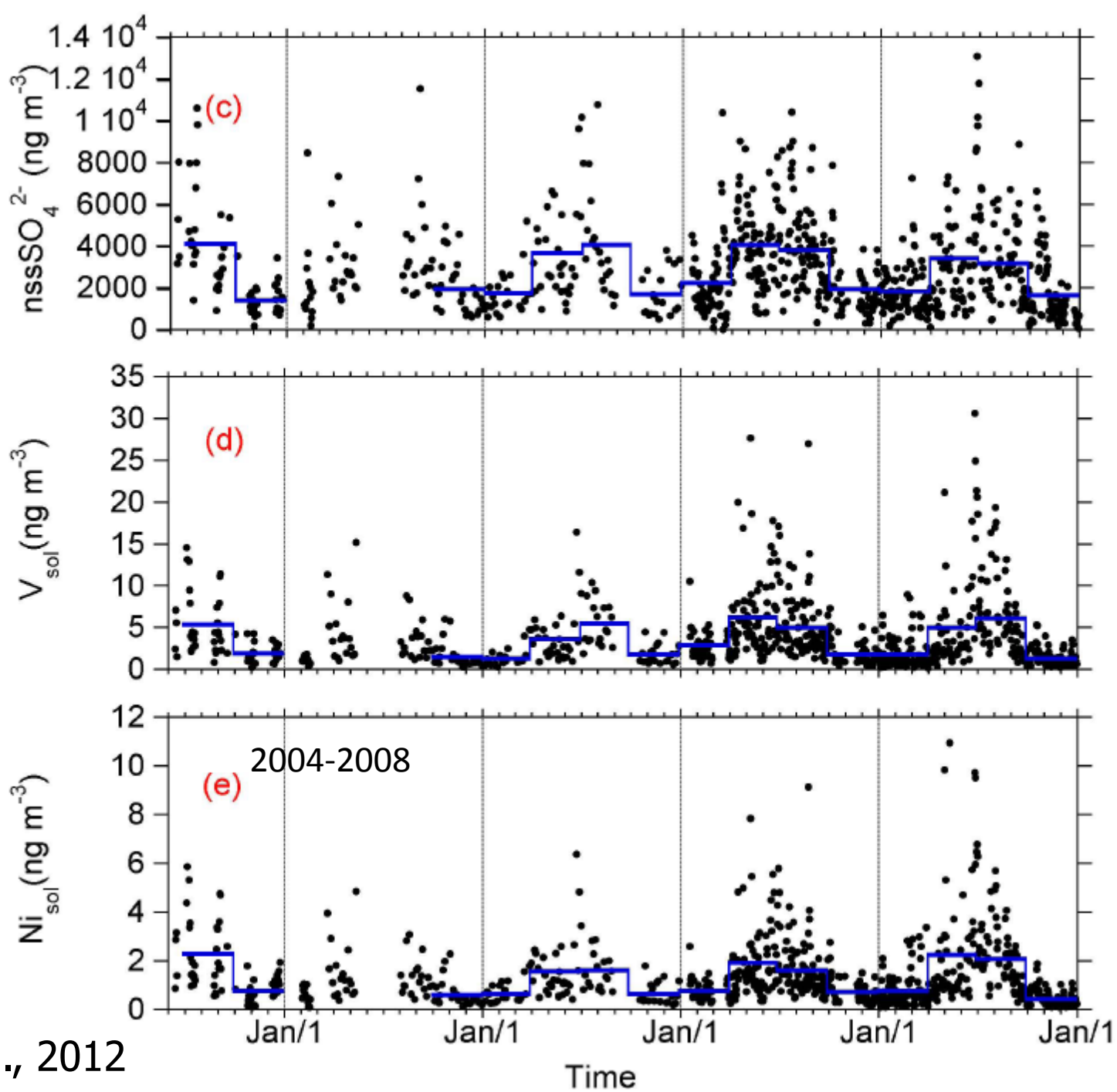


Jul., Aug., Sep.



Lug-Ago-Set



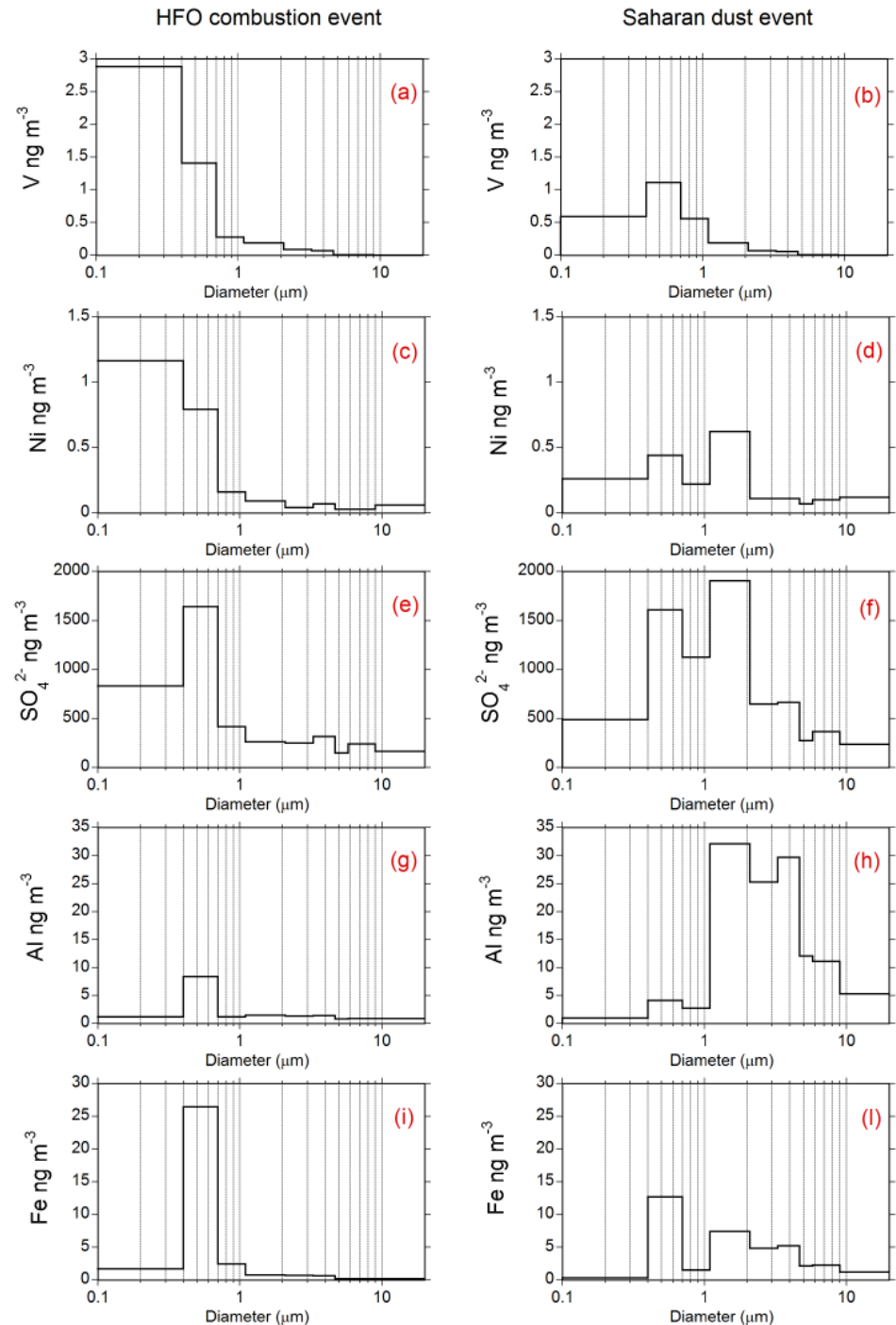


In estate il contributo delle emissioni navali ai solfati è maggiore del 30%

Costituisce più del 4% of PM10, e più dell'11% del PM1

I valori di picco raggiungono 6.1 ug/m3, 47% dei solfati, 15% del PM10.

Becagli et al., 2012





Grazie