



## Microplastic in the upper layers of the South Atlantic Ocean

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### Introduction and aim

An estimated 268,940 tons of plastic are circulating in the ocean<sup>[1]</sup>.

Microplastics (5 mm – 25 µm) are a proposed vector for the long range transportation of Persistent Organic Pollutants and heavy metals. Ingestion by biota introduces microplastic and the associated pollutants to the marine food web, where it is susceptible to bioaccumulation<sup>[2]</sup>. I aim to investigate this concentration and stratification of microplastic particles in the upper 100 m of the Southern Atlantic Ocean (SAO).

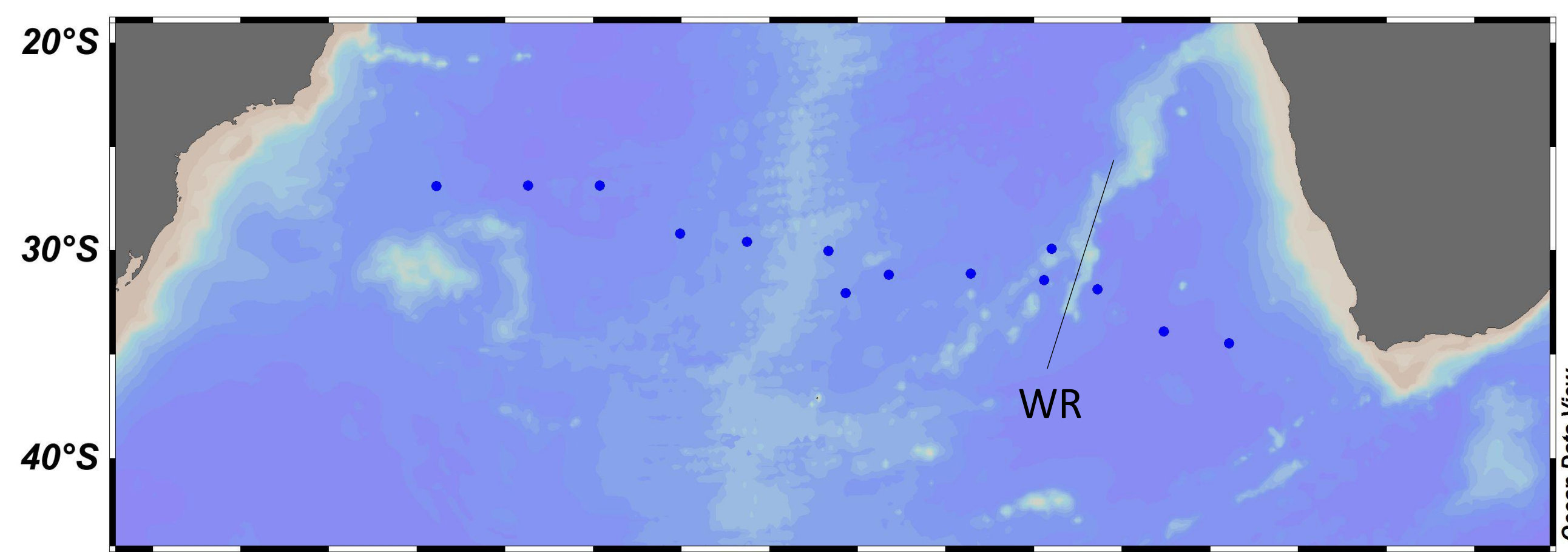


Fig 1: Route taken by the RV METEOR, showing the locations of the sampling stations (Raphael Morard)

### Methods

Multinets with 100 µm mesh size were deployed daily at 08:30. The top 100 m ocean layer was measured in 20 m intervals. The content of each interval layer was filtered and left to dry overnight. A dissection microscope was used to identify plastic particles.

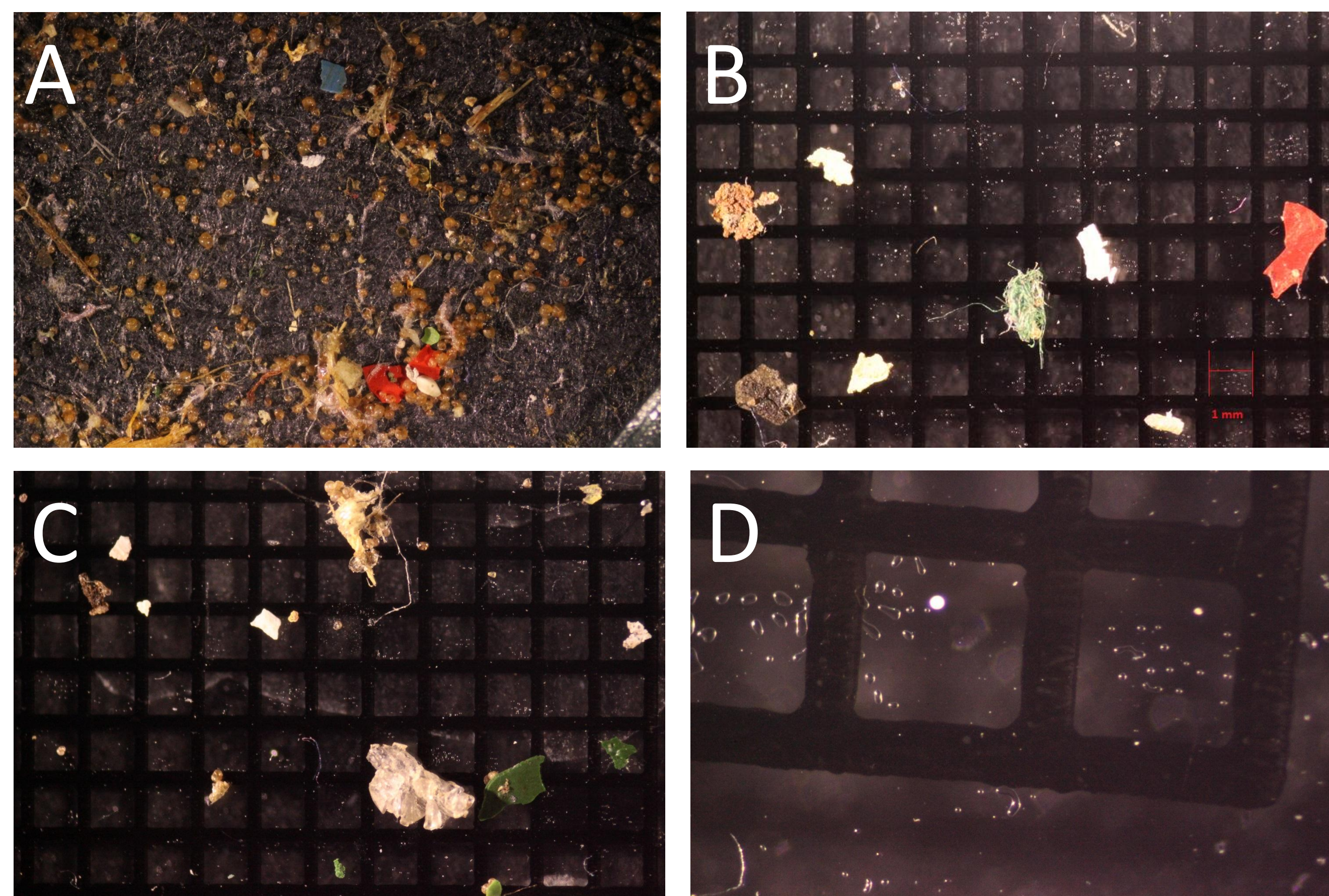


Fig 2: Plastic particles on the filter paper (A); and on the 1 mm x 1 mm grid, giving an indication of particle size (B;C;D). Fig 2D is a microbead- produced to be of microscopic size.

### Results

There was a high microplastic count near the South African coast (10°E-0°). Since crossing the Walvis Ridge (WR) (Fig 1) and sailing into the high pressure system over the SAO, the plastic count decreased dramatically. A fairly homogenous stratification was observed (Fig 3 & 4) . Near Brazil, the microplastic concentration increased again.

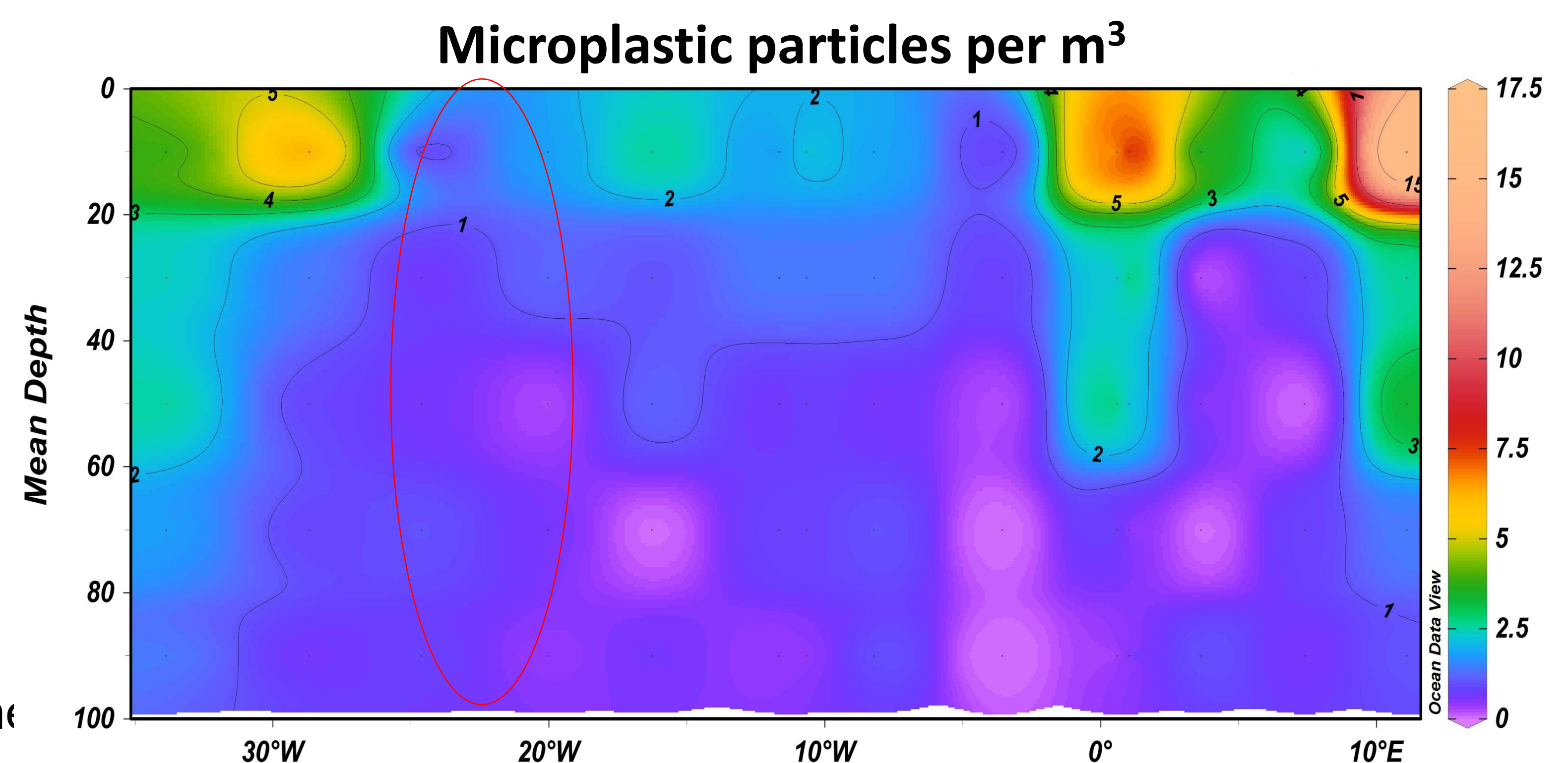


Fig 3: Density graph of the top 100 m of the studied area in the SAO (Raphael Morard)

The encircled area in Fig 3 indicates a sample collected from the eye of a cyclonic eddy. The stratification was inverted, with the bottom layer containing a slightly higher plastic concentration than the top layer.

Percentage of total plastic particles found in different depth intervals

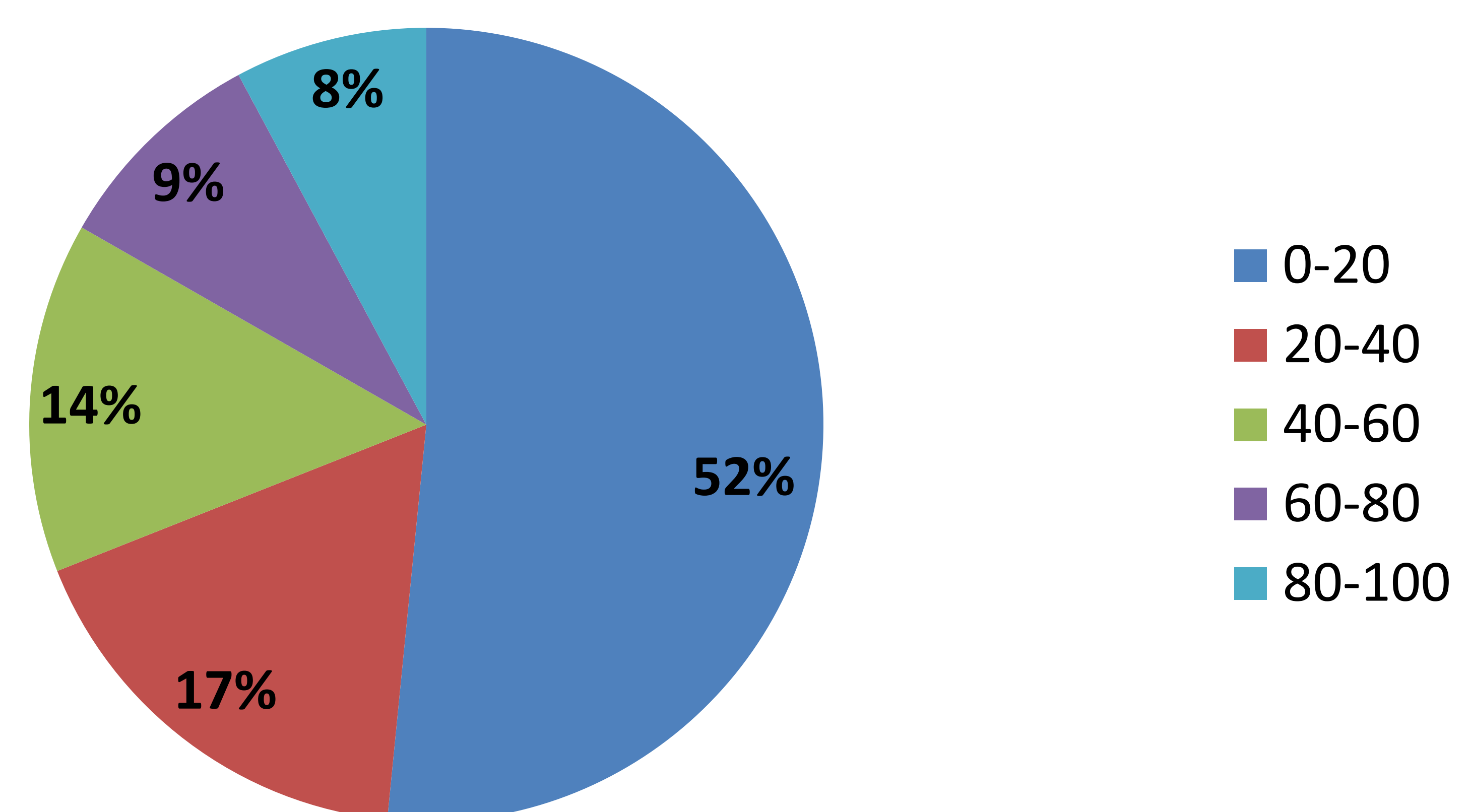


Fig 4: Pie graph of plastic stratification

### Conclusion

- Microplastics are not homogeneously spread throughout the ocean, but are clearly stratified (Fig 4)  
0-20 m > 20-40 m ≥ 40-60 m > 60-80m ≥ 80-100m.
- Proximity to continents seems to be the primary constituent in the amount of the total amount microplastics in the ocean.
- High pressure areas and eddies affect the concentration and stratification of microplastics

<sup>[1]</sup> Eriksen *et al.* 2014. Plastic Pollution in the World's Oceans: More than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea.

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<sup>[2]</sup> Cózar *et al.* 2014. Plastic debris in the open ocean. [www.pnas.org/cgi/doi/10.1073/pnas.1314705111](http://www.pnas.org/cgi/doi/10.1073/pnas.1314705111)

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