The PEACETIME-MERMEX cruise (May 12-June 8, 2017) aimed to observe the impacts of Saharan dust on the plankton ecosystem (PIs: C. Guieu & K. Desboeufs).

Our results suggest an immediate response of planktonic microautotrophs quickly transferred to zooplankton, creating a new trophic habitat, *attractive* for certain functional groups (large migrant grazers, their predators), and *unappealing* for others (small particle filter-feeders).
Saharan dust inputs stimulate Mediterranean zooplankton

Introduction

Theory RFD and RAD

Dust events

Observed RFD’s

RAD Time series

Conclusion

Rank-frequency diagram (RFD) (Frontier, 1976)

Relative Abundance Diversity Index (RAD) (Mouillot & Leprêtre, 2000)

RFD is described using two linear regressions, the first for the r first species and the second for the following R-r species.

Deformation of RFD’s along an ecological succession of plankton communities
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From PEACETIME cruise

Overview of the dust events and associated measurements

<table>
<thead>
<tr>
<th>Stations impacted by dust and cruise visit duration</th>
<th>Cruise strategy with regard to dust events</th>
<th>Characteristics of the dust events</th>
<th>Zooplankton sampling Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyrrenian Sea 16 to 22 May 2017</td>
<td>Model predicted a dust event 6 days before the arrival</td>
<td>10 to 12 May Whole southern Tyrrenian sea Predicted flux: &gt;1 g m⁻² Flux in sediment traps: 153 mg m⁻²</td>
<td>ST5: 16 May</td>
</tr>
<tr>
<td></td>
<td>Scheduled on board according to meteorological event</td>
<td>4 to 5 June Between Baleares and Algerian coast Predicted flux: 0.5 g m⁻² Dust deposition observations: 0.012 g m⁻² Fluxes in sediment traps: 50 mg m⁻²</td>
<td>TYR: 19 May</td>
</tr>
<tr>
<td>Wet dust event FAST 02 to 08 June 2017</td>
<td></td>
<td></td>
<td>ST6: 22 May</td>
</tr>
<tr>
<td>References of the data</td>
<td></td>
<td></td>
<td>FAST1: 4 June</td>
</tr>
<tr>
<td>Dulac (pers.com)</td>
<td></td>
<td></td>
<td>FAST2: 6 June</td>
</tr>
<tr>
<td>Desboeufs et al. (in prep)</td>
<td></td>
<td></td>
<td>FAST3: 8 June</td>
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<tr>
<td>Guieu et al. (accepted)</td>
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<td>Tovar-Sánchez et al. (2020)</td>
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<td>van Wambeke et al. (in prep)</td>
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</tbody>
</table>

PCA environment
Saharan dust inputs stimulate Mediterranean zooplankton

From PEACETIME cruise

A virtual time series of zooplankton response to dust impact

<table>
<thead>
<tr>
<th>Timing after dust fall</th>
<th>FAST1</th>
<th>FAST2</th>
<th>FAST3</th>
<th>ST5</th>
<th>TYR</th>
<th>ST6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 0</td>
<td>Day 2</td>
<td>Day 5</td>
<td>Day 6</td>
<td>Day 9</td>
<td>Day 12</td>
<td></td>
</tr>
</tbody>
</table>
Saharan dust inputs stimulate Mediterranean zooplankton

A virtual time series of zooplankton RFD

Functional zooplankton groups from imagery analysis with ZOOSCAN
Saharan dust inputs stimulate Mediterranean zooplankton

**RAD time series of zooplankton as response to dust impact**

Low diversity →

High diversity →

Equation: $y = -0.039x + 1.129$
Introduction

• Finer dedicated observations are requested to test our hypothesis about the creation of a new trophic habitat after dust input and to better sample the productive layer at high frequency (several tows within 24 hours) to test the attraction of large migrant grazers and their predators, and the decrease of small particle filter-feeders.

Conclusion and perspectives

• The PEACETIME campaign allowed to observe a quick reactivity of Mediterranean zooplankton to Saharan dust inputs (by association of 2 events) in terms of change in diversity (RAD)
• This change in diversity appears to be a more relevant indicator than changes in biomass and abundance (no clear trend)

These results are available in Biogeosciences, 17, 1–25, 2020 https://doi.org/10.5194/bg-17-1-2020

• Finer dedicated observations are requested to test our hypothesis about the creation of a new trophic habitat after dust input and to better sample the productive layer at high frequency (several tows within 24 hours) to test the attraction of large migrant grazers and their predators, and the decrease of small particle filter-feeders.
• The impact on fluxes remains to be demonstrated (buoyant drifting sediment trap below the productive layer, metabolic rate measurements)
• The frequency of Saharan events could be a key factor for the productivity of the southern Mediterranean basins and the export of material.