

Exame de Proficiência

2023.2

Inglês

Ciências Exatas e da Terra

Instruções

1	Confira se os dados contidos na parte inferior desta capa estão corretos e, em seguida, assine no espaço reservado para isso. Se, em qualquer outro local deste Caderno, você assinar, rubricar, escrever mensagem, etc., será excluído do Exame.
2	Este Caderno contém 5 questões discursivas referentes à Prova da Língua Estrangeira escolhida pelo candidato. Não destaque nenhuma folha.
3	As respostas às questões deverão ser redigidas em PORTUGUÊS .
4	Se o Caderno estiver incompleto ou contiver imperfeição gráfica que impeça a leitura, solicite imediatamente ao Fiscal que o substitua.
5	Será avaliado apenas o que estiver escrito no espaço reservado para cada resposta, razão por que os rascunhos não serão considerados.
6	Escreva de modo legível, pois dúvida gerada por grafia, sinal ou rasura implicará redução de pontos.
7	Só será permitido o uso de dicionário INGLÊS/INGLÊS.
8	A Comperve recomenda o uso de caneta esferográfica, confeccionada em material transparente, de tinta preta. Em nenhuma hipótese se avaliará resposta escrita com grafite.
9	Utilize para rascunhos o verso de cada página deste Caderno.
10	Você dispõe de, no máximo, três horas, para responder as 5 questões que constituem a Prova.
11	Antes de retirar-se definitivamente da sala, devolva ao Fiscal este Caderno.

Assinatura do Candidato: _____

As questões de 01 a 05, cujas respostas deverão ser redigidas EM PORTUGUÊS, referem-se ao texto abaixo.

THE PHYSICAL OCEANOGRAPHY OF THE TRANSPORT OF FLOATING MARINE DEBRIS

Erik van Sebille et al.

Abstract

Marine plastic debris floating on the ocean surface is a major environmental problem. However, its distribution in the ocean is poorly mapped, and most of the plastic waste estimated to have entered the ocean from land is unaccounted for. Better understanding of how plastic debris is transported from coastal and marine sources is crucial to quantify and close the global inventory of marine plastics, which in turn represents critical information for mitigation strategies. Besides, plastic is a unique tracer that provides an opportunity to learn more about the physics and dynamics of our ocean across multiple scales. In this review, we comprehensively discuss what is known about the different processes that govern the transport of floating marine plastic debris in both the open ocean and the coastal zones, based on the published literature and referring to insights from neighbouring fields such as oil spill dispersion, marine safety recovery, plankton connectivity, and others. We discuss how measurements of marine plastics (both in situ and in the laboratory), remote sensing, and numerical simulations can elucidate these processes and their interactions across spatio-temporal scales.

Introduction

Plastic debris has rapidly become one of the most pervasive and permanent pollutants, particularly in marine ecosystems. It occurs in all compartments of the ocean worldwide, and has a range of adverse environmental and economic impacts. Although there are many critical environmental issues (notably linked to human population growth and the climate crisis), plastic pollution has attracted considerable attention in recent years, with numerous initiatives to tackle the problem from the United Nations, the G7 and G20, the European Commission and many national and local authorities, as well as non-governmental organisations.

The widespread presence of plastics in marine systems is generally assumed to result from their longevity in the environment (they degrade very slowly, mainly through mechanical abrasion and exposure to UV radiation) and relatively high buoyancy, which facilitates long-distance transport from source areas (Andrady 2005). By mass, roughly half of all plastics produced are less dense than seawater, and thus should float at sea (Geyer et al 2017). Many plastic items also contain trapped air (e.g. expanded polystyrene, intact bottles, buoys), which further increases their buoyancy and therefore increases windage, subsequently aiding their dispersal.

The objective of this study is not only to give an overview of the processes governing the dispersion of floating plastics, but also to highlight the opportunities to expand the scope of physical oceanography by analysing floating plastics. Plastic is a unique tracer in that it is a solid material related to human activity with sources non-uniformly distributed along the world's coastlines, shipping lanes and fishing regions. Therefore, we hope that this review is of interest not only to oceanographers working on marine plastics, but also to physical oceanographers who aim to understand the way ocean processes interact across different scales (from basin-scale gyre circulation to individual waves). Note that, while we have assembled an author group with broad expertise, it is unavoidable that there are some biases because some expertise is better represented than others.

Discussion

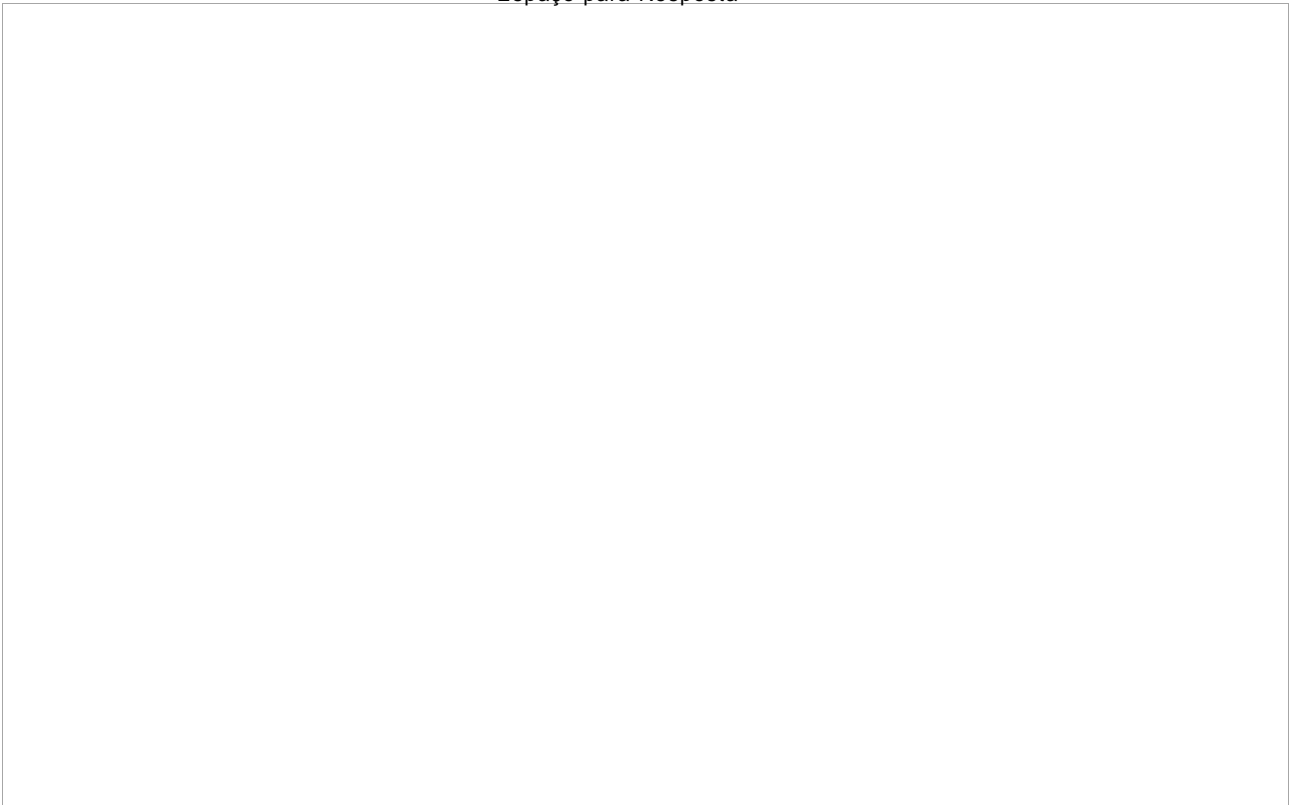
Plastic debris items in the oceans vary widely in terms of size, shape or chemical composition. In this review paper, we focus specifically on floating plastic marine debris. That means that the plastic particles considered here are positively buoyant, i.e. their density is lower than the local water density. However, this does not mean that plastics remain at the sea surface at all times as breaking waves and ocean turbulence can temporarily mix them down to several or even tens or hundreds of meters (Kukulka et al 2012, Poulain et al 2019), from where the particles ascend back to the surface after waves and turbulence decay. This tendency of particles to rise to the surface depends on the particle's terminal rise velocity (which, in turn, is also controlled by its shape and dimension) as well as on the density difference between plastic and sea water (Allen 1985, Chubarenko et al 2016). For example, for a given plastic density, the rise velocity generally increases as a function of sphere diameter..

Adapted from <https://iopscience-iop.ez18.periodicos.capes.gov.br/article/10.1088/1748-9326/ab6d7d>

Question 1

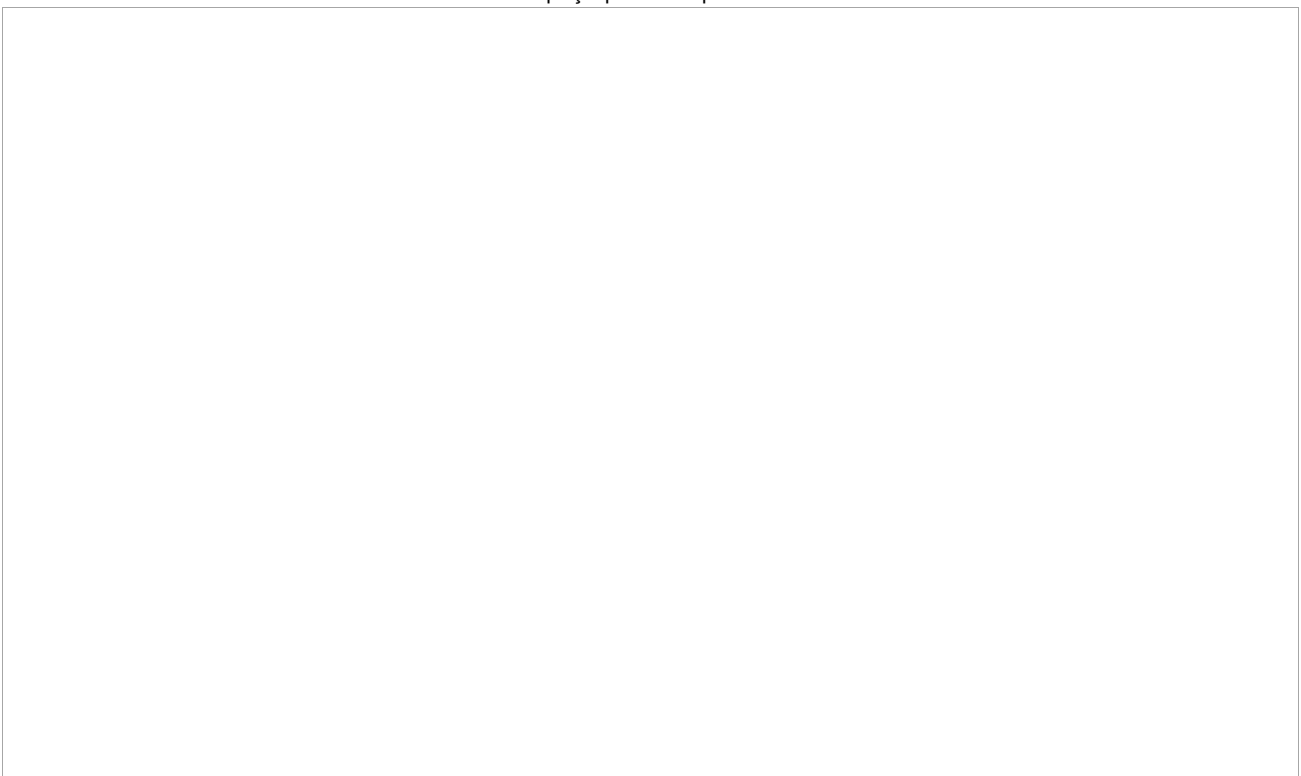
Present the aim(s) of the present research.

Espaço para Resposta

**Question 2**

Write about the probable cause of the widespread presence of plastics in marine systems, according to the authors.

Espaço para Resposta



Question 3

Explain why the authors state that although plastic debris is buoyant, it does not necessarily remain at the sea surface at all times.

Espaço para Resposta

Question 4

According to the abstract, explain why it is important to understand how marine plastic debris is transported.

Espaço para Resposta

Question 5

Translate the excerpt below. The translated text should be clear and accurate in terms of structure and meaning.

Plastic debris has rapidly become one of the most pervasive and permanent pollutants, particularly in marine ecosystems. It occurs in all compartments of the ocean worldwide, and has a range of adverse environmental and economic impacts. Although there are many critical environmental issues (notably linked to human population growth and the climate crisis), plastic pollution has attracted considerable attention in recent years, with numerous initiatives to tackle the problem from the United Nations, the G7 and G20, the European Commission and many national and local authorities, as well as non-governmental organisations.

Espaço para Resposta

