Lab Journal: analysis of an Atlantic clay sediment sample near the Canary Islands

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I. INTRODUCTION

First, we shall discuss the points we are to research before starting our research plan. In literature, we shall attempt to find:

1. the precipitation rate for this portion of the Atlantic, to determine the time resolution in our sample;
2. perturbation of the ocean floor through natural or human mechanisms;
3. concentration of microplastics, as an indication of the increase in nanoplastic concentration;
4. amounts of detritus, and whether this would contaminate the measurement;
5. protocols for extraction of the plastics from the clay.

From this, we shall construct a protocol for our measurements and from there, we shall find the tools we may need to acquire.
In general we split these into three categories: items 1 and 2 (to be researched by Joost) describe the context of the samples, items 3 and 4 (to be researched by Has) describe the contaminants, and item 5 (to be researched by Eva) describes the practical steps to be taken.

I.i. Question Answers

I.i.1.

We found numerous different values for the sedimentation rates, influenced by exact location, period, etc. The found values were however all in the range of several mm [3] to cm [7] per thousand years. So either way, assuming the pollution of the environment started, say, a century ago [6], in theory only the upper millimeters of the ocean bottom should contain (traces of) plastic. Although that is unfortunately not the whole story. (There does perhaps seem to be more data, except we have not (yet?) figured out where exactly to find it or how to get it into a readable format, if we are even able to. Being this paper [8], but also the sites of several organisations, such as PLOCAN, BIOS and IODP)

I.i.2.

Something to take into consideration when analysing these samples, are possible perturbations caused by both human and natural causes. This could be for example anchors, strong water flows or (deep sea) animals mixing some of the upper layers. We found a source stating that the ocean floor in the area we're interested in is currently stable "Under static (gravitational) loading conditions" [5]. However, human influences can also cause mixing and other perturbations in the sedimentation. [2] [4]. Unfortunately there seems to be no way to deal with this, other than maybe changing our hypothesis on the (maximum) depth we expect to find significant amounts of (nano)plastics.

I.i.3.

I.i.4.

I.i.5. Existing Protocols

There exists research on the filtration, dialysis, and ultrafiltration retention rates using polystyrene nanospheres between 1000 and 50 nm.[1]

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