Your goal is accurately determining nanoplastic concentration in the sample given. For that you are responsible for 2 themes: Looking at microplastic concentration as a proxy for nanoplastics and how to deal with other organic compounds that the machine can't differentiate.

3. What is the concentration of microplastics in this region, as an indication of the increase in nanoplastic concentration.

Q: Are they linearly related?

Q: Do NPs in sediment come from degradation of MPs (so total weight = constant)?

Q: Does degradation of MPs occur at those depths?

Q: What is the most important factor in MP degradation?

A: UV + trauma and microbes

Q: Do nanoplastics precipitate on their own in significant amounts?

Q: Do NPs precipitate on the seabed?

A: NP behave like colloids and do not precipitate in significant amounts

Q: Do they precipitate mostly by binding to heavier particles who precipitate?

A: NPs aggregate to themselves and specks and as a result sink due to their weight.

Detection

4. Amounts of detritus, and whether this would contaminate the measurement

Q: What is detritus concentration in the surrounding water?

Q: What is its precipitation rate?

Q: Is detritus of bottom dwellers or carcasses concentrated on the seafloor significant?

Q: How do you account for the signals of detritus?

A: Filter detritus beforehand so only NP are measured?

Q: How to filter just the detritus?

A: Enzymatic treatment to destroy only biodegradable compounds

Q: Subtract detritus concentration (average) from concentration of NP?

A: A very crude method, not suitable to quantitative analysis we do

Q: Do we need to account for detritus signals?

Considering the sources I found, it seems that bioproduction of NPs at depth is real and non-negligible, but only a fraction of the concentration (though no paper has in situ results for this). Considering that mechanical, bio- and especially photodegradation at the surface in combination with a higher concentration of plastics at the surface lead to more NP production. Vertical transport of NPs should account for the majority of NP concentration in the water above the seabed. Even accounting for slow vertical transport.

At deeper waters there is reduced current speed as induced by wind. That combined with low NP production from mechanical stress alone as well as less biodegradation should lead to negligible NP production at greater depths.

There is a lot of NP production at the surface. It has 5 things not found at greater depths. High plastic amounts, mechanical stress, UV radiation, amount of microbes and high temperature. Leaving the first aside, in order to get any NP production we seem to need either microbes (preferably at higher temperatures) or mechanical stress (greatly improved by UV-radiation). None of the five are readily found at the bottom of the ocean which leads me to conclude that there is little NP production at greater depths and any NP present is transported there.

Bronnen:

[Salinity correlates with microplastic concentration in surface samples. Microplastic concentration correlates negatively with distance to coast.](https://www.sciencedirect.com/science/article/pii/S0025326X24011949)

[Qualitative assessment of NP concentration from ~ 2 cm^2 PS with only UV/Vis exposure.](https://www.sciencedirect.com/science/article/pii/S0045653515304094?via%3Dihub)

[Simulated NP generation using sterile seawater and mechanical and photodegradation. Found that NP concentration (PS and PE-PP) was significantly higher with mechanical and photodegradation than with only mechanical fragmentation. Attributed to few micron plastics being formed by mechanical strain and subsequently fragmented by UV radiation into NPs.](https://www.sciencedirect.com/science/article/pii/S0048969722015315)

[2 Species of deep sea bacteria can fragment PS to significant amounts of MNP in 30 days at high concentration of both PS and bacteria and at high temperature and (presumably) not in darkness.](https://www.sciencedirect.com/science/article/pii/S0304389423026237)

[(marine) Surface plankton generate a lot of NPs from photodegradated MPs.](https://www.nature.com/articles/s41565-023-01534-9)

[Describes the fragmentation of MPs to NPs by mechanical means during wastewater treatment](https://www.sciencedirect.com/science/article/pii/S026974912402027X)