# Supplementary A Diagnostic pigments

For pigment analysis we used a high performance liquid chromatography (HPLC) analyser and calculated pigment concentration according to Kilias et al. (2013). The relative proportion of phytoplankton functional types (PFTs) to the sum of diagnostic pigments was calculated after Hirata et al. (2011) (Table A2, Fig. A5). We checked for ultraoligotrophic conditions (chl *a* < 0.08 mg m-3; Brewin et al. 2010), however, none of our stations was ultraoligotrophic according to these terms. Relative proportion of each phytoplankton size class (PSC) was calculated using a linear regression model proposed by Uitz et al. (2006). ∑DPw is the sum of all diagnostic pigment concentrations and is expressed as the sum of 1.41 [Fuco] (Fucoxanthin) + 1.41 [Perid] (Perdinin) + 1.27 [Hex-fuco] (19'-hexanoyloxyfucoxanthin) + 0.6 [Allo] (Alloxanthin) + 0.35 [But-fuco] (19′-but-fucoxanthin) + 1.01 [TChl-b] (Chlorophyll b) + 0.86 [Zea] (Zeaxanthin). The calculated size classes were microplankton (20 – 200 µm), nanoplankton (2 – 20 µm) and picoplankton (0.2 – 2 µm) (Sieburth et al. 1978). For our data, the difference between total chl.*a* and accessory pigments varied in the given range between 7% and 27%, with one outlier in station 37 (51%) because of the high quantification of diatoxanthin (and beta carotenoids). The regression between total chl.*a* and accessory pigments had a slope of 0.96 and R2 > 0.9. We note that diagnostic pigment analysis has its inaccuracies and may fail on a case-by-case basis (e.g. the size of diatoms can range between the micro and nanoplankton size fraction); for more detail, see Aiken et al. (2009) and Uitz et al. (2006). Nevertheless, this method allows a comprehensive description of the distribution of PFTs and PSCs on global scales.

# References

Aiken, J., Y. Pradhan, R. Barlow, S. Lavender, A. Poulton, P. Holligan, and N. Hardman-Mountford. 2009. Phytoplankton pigments and functional types in the Atlantic Ocean: A decadal assessment, 1995-2005. Deep. Res. Part II Top. Stud. Oceanogr. **56**: 899–917. doi:10.1016/j.dsr2.2008.09.017

Brewin, R. J. W., S. Sathyendranath, T. Hirata, S. J. Lavender, R. M. Barciela, and N. J. Hardman-mountford. 2010. A three-component model of phytoplankton size class for the Atlantic Ocean. Ecol. Modell. **221**: 1472–1483. doi:10.1016/j.ecolmodel.2010.02.014

Hirata, T., R. J. W. Brewin, J. Aiken, R. Barlow, K. Suzuki, and T. Isada. 2011. Synoptic relationships between surface Chlorophyll- a and diagnostic pigments specific to phytoplankton functional types. Biogeosciences **8**: 311–327. doi:10.5194/bg-8-311-2011

Kilias, E., C. Wolf, E. M. Nöthig, I. Peeken, and K. Metfies. 2013. Protist distribution in the Western Fram Strait in summer 2010 based on 454-pyrosequencing of 18S rDNA. J. Phycol. **49**: 996–1010. doi:10.1111/jpy.12109

Sieburth, J. M., V. Smetacek, and J. Lenz. 1978. Pelagic ecosystem structure : Heterotrophic compartments of the plankton and their relationship to plankton size fractions. Limnol. Oceanogr. **23**: 1256–1263.

Uitz, J., H. Claustre, A. Morel, and S. B. Hooker. 2006. Vertical distribution of phytoplankton communities in open ocean: An assessment based on surface chlorophyll. J. Geophys. Res. Ocean. **111**. doi:10.1029/2005JC003207