

Interactive comment on “Formation and distribution of sea-surface microlayers” by O. Wurl et al.

Anonymous Referee #3

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General comments:

The sea-surface microlayer (SML) has been studied for many decades already and thereby, physical, chemical and biological characteristics have been of interest in order to decipher the role of the SML in air-sea exchange processes. Wurl and coauthors contribute to this field as they provide a comprehensive data set of surfactant- (SAS) and total dissolved carbon- (TDC) measurements from various oceanic regions, showing that these substances are accumulating in the SML under most trophic (primary productivity) and meteorological conditions (wind speed). From this data set, they provide an interesting model of the global and seasonal distribution of SAS and TDC in the SML based on primary production as well as wind speed maps. One important basis for this study is the assumption that surfactant production is mainly driven by

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phytoplankton. The manuscript would clearly benefit if the authors would discuss potential surfactant production by (non-chlorophyll-a containing) bacteria as well as data on the relationship between absolute SAS / TDC concentrations and concentrations of chlorophyll-a, showing that these assumptions – although intuitive - are reasonable (especially in section 3.3 enrichment versus PP). The structure and the language of the manuscript are precise, except for the term “surfactants” as it is sometimes unclear whether this refers to SAS only or SAS + TDC. It would help to use precise terms or abbreviations throughout the manuscript as they are defined in the methods-section. Furthermore, most of the figures refer to surfactants, i.e. SAS and not SAS + TDC?! The manuscript would benefit from comparing results of TDC and SAS in more detail and discussing their relation also in terms of the importance of dissolved (TDC) versus total (SAS) surfactants in the SML.

Overall, the manuscript is acceptable for publication after revision.

Specific comments:

P5720, L15 The term ‘being affected’ is unclear (in which way, direction, implication?). P5720, L21 This range of SML thickness seems to be somewhat arbitrary, especially as it is most often technically determined by the SML samplers. P5724, L3-5 How much later were the cruise samples analysed? P5725, L8 Please specify from which depth (1 or 8 m) these chl-a concentration were derived. P5727, L6 An increasing enrichment of SAS/TDC after rainfall should be another example of SML import driven by bubbles. However, the ‘elevated levels of particulate loads’ are unclear. Please provide data. P5727, L7 Romano et al (1991 *EstuarCoastShelfSci*, 1996 *DeepSeaRes*) reported quite frequent observation of slicks, at least in coastal regions. Thus, the exclusion of slick samples might overestimate SAS/TDC enrichment. Please discuss the occurrence of slicks in your study. P5727, L28 Poor phrasing. Please also provide references. P5732, L15-18 Please be more precise, as it remains unclear what the implications for this manuscript would be, i.e. how does particle transformations effect SAS/TDC enrichment in the open ocean? P5735, L25-P5736, L1 Please correct ref-

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erencing: Cunliffe et al 2009b did not report any bacterial abundances. This has been done in Cunliffe et al. 2009a. Moreover, please be aware that Fehon&Oliver counted viable cells on agar plates, which is a highly disputed method for bacterial quantification. The authors should better refer to studies using other techniques, although there is generally contradictory evidence on bacterial enrichment in the SML. Generally, the whole section, especially P5735, L17 – P5736, L14 needs to be rewritten in terms of phrasing as it is somewhat imprecise. P5746, Table 2 Please define abbreviations in the legend

Technical corrections:

P5721, L18 Period is missing P5723, L11 It should state 'scraped off' P5730, L7 It should state 'We used ...' P5734, L6-8 Incomplete sentence P5735, L17 The sentence starting with 'Furthermore..' would better not be placed in the new, but rather in the preceding paragraph. P5735, L26 It should state 'Cunliffe' P5745, Table 1 There is a upper case 'b' in the second last column which needs to be moved into the last column

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