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Biogeosciences
Discussions

Interactive comment on "Short term variability of dissolved lipid classes during summer to autumn transition in the Ligurian sea (NW Mediterranean)" *by* M. Goutx et al.

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General comments:

By their very nature dissolved lipids are difficult to work with, consequently there are limited data for the marine environment. This manuscript describes the variability in a wide range of dissolved lipid classes in the context of an even wider range of supporting data. The authors have clearly made the most of the results from their comprehensive sampling program by providing an extensive discussion.

Specific comments:

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Interactive Discussion

Discussion Paper

p29

l 12 What is cs-170?

l 14 What are the Lipid metabolites

l 18 . . . zooplankton wax ester biomarkers . . . What about steryl esters?

l 26 Which are the biogenic lipids?

l 27 While phosphoglycerides is certainly a correct term, glycerophospholipids is more commonly used. Also are you sure all your phospholipids are indeed glycerol-based?

p30

l 5,6 . . . a major source of DOM, which is primarily composed of proteins, carbohydrates and lipids . . . Is it really?

l 7 . . . biomolecules, their resistance to remineralization and their transformation . . . An interesting combination of properties.

l 9 . . . a small proportion ($<$11%) of DOM is identifiable . . . This seems to contradict the earlier DOM statement.

l 20,21 . . . triglycerides . . . The correct term is now triacylglycerols.

p31

l 3 . . . Dissolved lipids are operationally defined by GF/F 0.7 um membranes . . . This is probably a bit too explicit as some authors use different cut-offs. In any case GF/F is a glass-fibre not a membrane filter. Why not just say filter?

l 20 . . . Parrish et al., 1995). Not a good reference for this point; Liu et al. would be better.

p32

l 10 . . . 90 samples . . . A good data set.

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l 21-26 Would it be useful to tabulate this information?

p33

l 7,8 Give the diameter of the filters.

l 12 . . . internal standard (hexadecan-3-one (?) . . . Did you use the same concentration each time? If so what was it? What was it dissolved in? Did you check for interferences in your sample types? None were found in samples from the northwest Atlantic (J. Chromatogr. 262:103) but some algae do synthesize ketones (Mar. Biol. 133:461).

p34

l 1 . . . steryl esters co-eluting with wax esters . . . This is the only time you mention this: Is it enough? For almost the entire paper you call this band WE. Admittedly particulate lipids in the Atlantic usually contain much more WE than SE (Nature 286:798; J. Chromatogr. Sci. 39:146), but this is not always the case (Nature 286:798; Lipids 17:831). What do we know about dissolved wax versus steryl esters?

l 1-6 This is a very broad range of classes.

p35

l 23 . . . succession of wind gusts from opposite directions: SW, NE and SW occurred . . . Over what periods of time?

p36

l 9,10 Explain LSW and JD.

l 23,24 . . . TLd concentrations varied from . . . On what basis did you calculate molarity?

p37

l 3 The day/night TLd profiles were not significantly different(?) . . . Did you test this

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statistically or do you mean there were no obvious or discernable differences?

l 14 . . . The only significant increase in DOC . . . Again do you mean this in a statistical sense?

p38

l 1,2 . . . and pigments), triacylglycerols, wax and steryl esters and metabolites . . . You should probably list the metabolites here too.

l 4 . . . the glycolipids (monogalactosyl diacylglycerols) . . . What about DGDG and SQDG?

l 5 . . . pigments, monoacylglycerols and non-nitrogen containing phosholipids

l 26 . . . (normalized to a 150 m depth water column . . . Would it be more straightforward to calculate an average concentration based on integrated values?

p39

l 17 . . . results reflected the . . . The rest of the Results section is quite discursive.

p43

l 6 . . . bacterial production was significantly correlated . . . Did you measure bacterial production? Do you show these significant correlations?

l 25 . . . acids and alcohols (Gurr and James, 1980) . . . I am not sure what is being said here. In this context, I think Gurr and James talk mainly about lipases working fastest on triacylglycerols and slowest on monoacylglycerols.

p45

l 3 . . . hydrocarbon to depth . . . Perhaps you mean petroleum?

l 9 . . . the high HC proportion . . . Yes this is very high.

l 15 . . . in total carbon, most lipids being in the form of membrane phospholipids . . .

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What about lipopolysaccharides?

l 27 . . . does not support the idea that these PL would represent the only BB increase. The phospholipid . . . BB?

p46

l 10 . . . shelter phospholipids . . . An interesting term.

p58

This table is already too complicated, but you could indicate the magnitude of the values that were not significant. Some people might be interested in the sign of a particular relationship, others might be interested in how strong or weak a relationship is, even if $p > .05$.

p62

Explain the dotted line.

p63

Should the symbols be different?

p64

Should the title be Total Lipids (% DOC)? I am not sure what the extrapolation statement means here or in Fig 7.

p68

What are the P values?

Technical corrections:

p29

l 2,3. . . composition of Iatroscan-measured dissolved lipid classes were examined at

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daily to monthly scales,

l 7 . . . respectively, in the 0-1000 m water column.

l 17,18 . . . observed before winter mixing: mid-way through the cruise . . .

l 18 . . . zooplankton wax ester biomarkers

l 20,21. . . accompanied by rebounds in hydrocarbon (6-8 October) and phospholipid concentrations (12 October)

l 22 . . . and/or fecal pellet egestion, . . .

l 25 . . . ($<$15 knots: 28 September-12 October). . . .

l 28 . . . than in nearby sea water

p30

l 1 . . . levels of HC contamination in this less-saline water.

l 4 . . . cycle on Earth (Hansell

l 5 . . . a major source of DOM, which is primarily composed of proteins, carbohydrates and lipids

l 10 . . . Although DOM

l 24 . . . and are further used

p31

l 3 . . . Dissolved lipids are operationally defined by GF/F 0.7 um membranes

l 6 . . . microalgae cultures to evaluate their production of food web substrates

l 18 . . . Only a few studies

l 24 . . . The TLC/FID technique involving an

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Interactive Discussion

Discussion Paper

l 27 . . . This analytical technique involves

l 29 . . . on Chromarods coupled

p32

l 1 . . . . analytical protocol have

l 3 . . . requires a small extract for lipid class

l 4 . . . it requires less seawater and

l 5 . . . therefore seemed to be a priori a technique of choice

l 8 . . . using TLC/FID, we

l 11 . . time scales at a

l 18 . . . Samples were collected at a central point (CP, 43 25 N, 8 E; ca 48 km offshore) in

l 21 . . . of the biological system were studied

p33

l 6 . . . bottles previously washed with 2 M HCl (?)

l 10 . . . 2 M HCl,

l 12 . . . internal standard (hexadecan-3-one (?) .

l 17 . . . on the ketone internal

l 18,19 . . . lipid classes were separated on Chromarods by thin layer chromatography and quantified with flame ionisation detection (TLC/FID) in an Iatroscan TH10

l 23 . . . Hamilton syringe onto Chomarods-SIII previously

l 26 . . . diethyl ether

p34

l 8 . . . by the summing all lipid classes except

l 9 . . . the biogenic origin of hydrocarbons could not be ascertained here, this lipid class is not included in TLd that are thus

l 10 . . . referred to as biogenic lipids. Hydrocarbon dynamics were then treated separately.

l 14 . . . with orthophosphoric acid

l 16 . . . the high-temperature catalytic

p35

l 10 . . . being considered significant.

l 11 . . . was assessed by ANOVA using

l 20,21 . . . observed strong water column stratification being partially

l 21 . . . low nutrient concentrations and

l 22 . . . events from the NE occurred

l 23 . . . succession of wind gusts from opposite directions: SW, NE and SW occurred over periods of . . .

p36

l 7 . . . beginning of fall mixing(?)

l 11 . . . At the beginning of

l 13 year (integrated Chl-a concentration of

l 17 . . . at the beginning of the cruise (thus 50% higher

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p37

l 3 The day/night TLd profiles were not significantly different(?)

l 9 and no apparent difference between day and

l 14 . . . The only significant increase in DOC

l 17 . . . at a seasonal scale,

p38

l 1,2 . . . and pigments), triacylglycerols, wax and steryl esters and metabolites (

l 4,5 . . . the glycolipids (monogalactosyl diacylglycerols)

l 5 . . . pigments, monoacylglycerols and non-nitrogen containing phosholipids

l 7 . . . the so-called chloroplast lipids which include glycolipids and

l 12 . . . values (ca 10-14

l 19 . . . were the least abundant lipid

l 20 . . . marked increase in

l 29 . . . prevailed during Leg 2, that is

p39

l 3 . . . in the lipid pool during Leg 1.

l 11 . . . Correlations among bulk organic compounds

l 15 . . . found between total dissolved lipids and concentrations of hydrocarbons, triacylglycerols,

l 17 . . . results reflected the

l 25 . . . lipid concentrations were not correlated with either DOC or PC,

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l 28,29 . . . lipids, which was correlated with DOC and PC was the glycolipids (0.57 and 0.45, $p<0.01$, respectively) constituents

p40

l 4 . . . which altogether indicate picoplanktonic sources

l 10 . . . carbon, DOC, MGDG and CDOM were tightly related

l 13,14 . . . study provides the first total lipid concentration and lipid class composition data in DOM from

p41

l 3 . . . time series (Fig. 10):

l 16 . . . in Bedford Basin

l 25 . . . classes, or that partially fractionated polar lipid classes

l 26 . . . for revealing such relations.

p42

l 1 . . . compounds have different origins

l 6 . . . due to differences in residence times,

l 8 . . . fractionated into

l 15 . . . in formation processes of

l 17 . . . under a combination of biotic and

l 22 . . . Below 60 m, the

l 23 . . . limited the transfer of

p43

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l 3 . . . the enzymatic cleavage of esters bonds

l 15,16 . . . lipid metabolite accumulation may be infer the presence of zooplankton

l 25 . . . acids and alcohols (Gurr and James, 1980)

p44

l 22 . . . transfer to depth and dissolution of their

l 23 . . . been related to

l 28 . . . in sedimenting particles

p45

l 3 . . . hydrocarbon to depth

l 9 . . . the high HC proportion

l 15 . . . in total carbon, most lipids being in the form of membrane phospholipids

l 22 . . . abundance (above 9Œ

l 24 . . . naturally occurring mixed populations

l 27 . . . does not support the idea that these PL would represent the only BB increase. The phospholipid

p46

l 19 . . . correlations (Fig. 9)

l 20 . . . concentrations of phosphoglycerides

p47

l 14 . . . may be of further use in environmental studies.

l 21 . . . varied down the water

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l 2,3 . . . Under these conditions,

l 3 . . . layer suggested strongly that

l 4 . . . was benefitting from DOM release from sinking

l 5 . . . POM before the winter convection.

p49

l 26 . . . analysis, J. Planar Chromat., 6, 307-312, 1993.

l 30 . . . community structure

p51 l 28 . . . colloids,

p52 l 33 . . . by Chromarod

p53 l 9,10 . . . and in Bedford Basin,

p54 l 3 . . . Sieburth, J. McN. and

p57 Triglycerides = Triacylglycerols

1.3 Diglycerides = 1,3 Diacylglycerols

1.2 Diglycerides = 1,2 Diacylglycerols

Monoglycerides = Monoacylglycerols

Monogalactosyldiglycerides = Monoglactosyl diacylglycerols

p59 weighted = weighed

picnoclyne = pycnocline

p60 that enabled to characterize the physics and hydrology = that enabled the characterization of the physics and hydrology

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p64 et = and

p65 Phytodétritus = Phytodetritus

Triglycerides = Triacylglycerols

p67 Jours Julien = Julian day

Triglycerides = Triacylglycerols

P69 LT = TL

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