



*Supplement of*

## **Organic matter characteristics of a rapidly eroding permafrost cliff in NE Siberia (Lena Delta, Laptev Sea region)**

**Charlotte Haugk et al.**

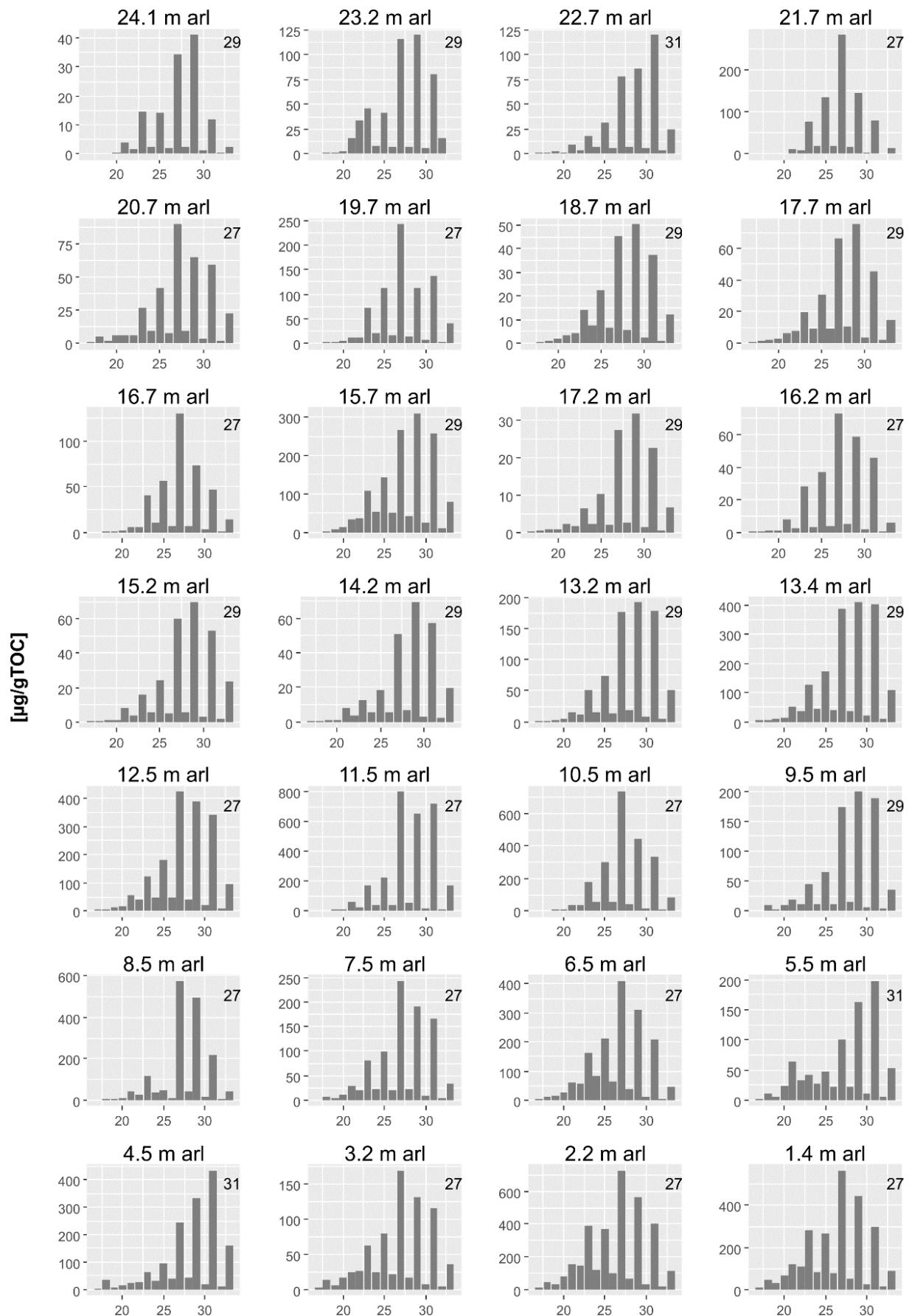
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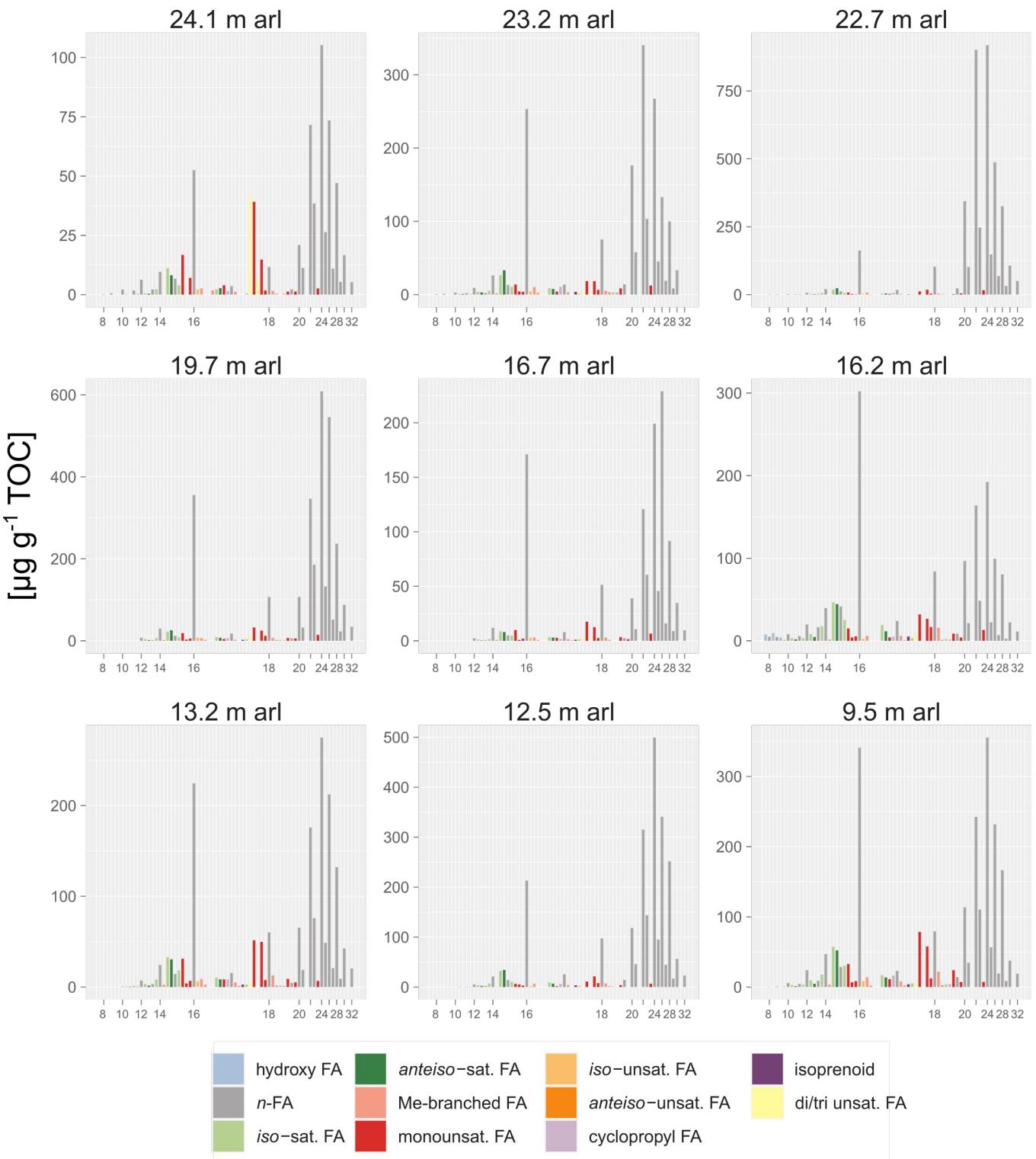
## 1 Supplementary Figures and Tables

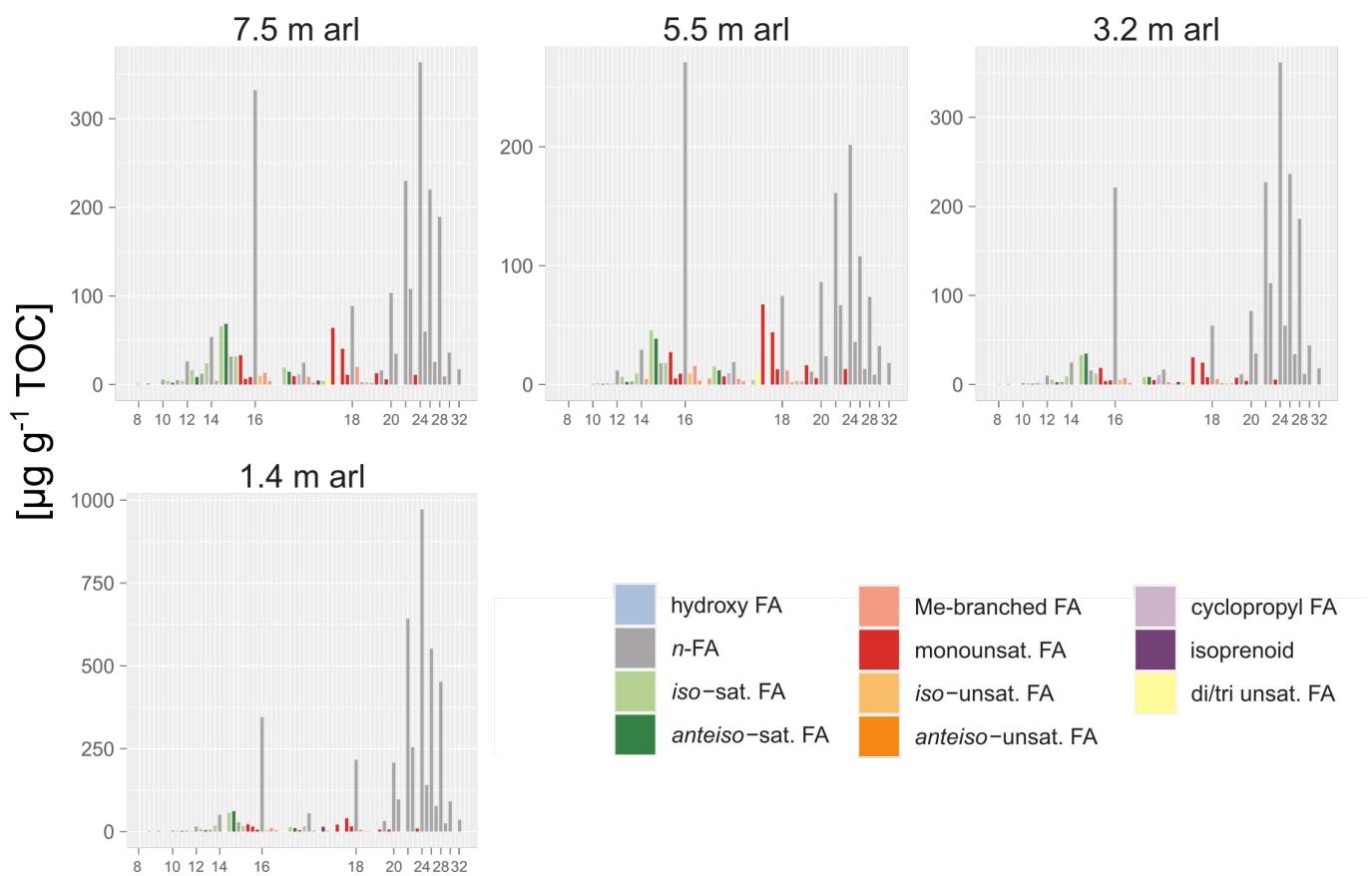
**Table S1:** Results of Kruskal-Wallis rank sum test for the Sobo-Sise Yedoma cliff with H-value, p-value, degrees of freedom (df) and indication of significance (p<0.05).

Kruskal-Wallis rank sum test	Unit	H-value	p-value	df	Significance
TOC	wt%	13.565	0.001133	2	yes
C/N		8.9772	0.01124	2	yes
[short chain <i>n</i> -alkanes]	μg g <sup>-1</sup> TOC	6.2937	0.04299	2	yes
[long <i>n</i> -alkanes]	μg g <sup>-1</sup> TOC	5.3474	0.06899	2	no
ACL		2.0851	0.3525	2	no
CPI		1.8262	0.4013	2	no
[short chain <i>n</i> -fatty acids]	μg g <sup>-1</sup> TOC	0.91209	0.6338	2	no
[mid chain <i>n</i> -fatty acids]	μg g <sup>-1</sup> TOC	0.12912	0.9375	2	no
[long chain <i>n</i> -fatty acids]	μg g <sup>-1</sup> TOC	0.51648	0.7724	2	no
HPFA		6.1951	0.04516	2	yes
( <i>iso</i> + <i>anteiso</i> )/(mid and long chain <i>n</i> -FAs)		4.8619	0.08795	2	no

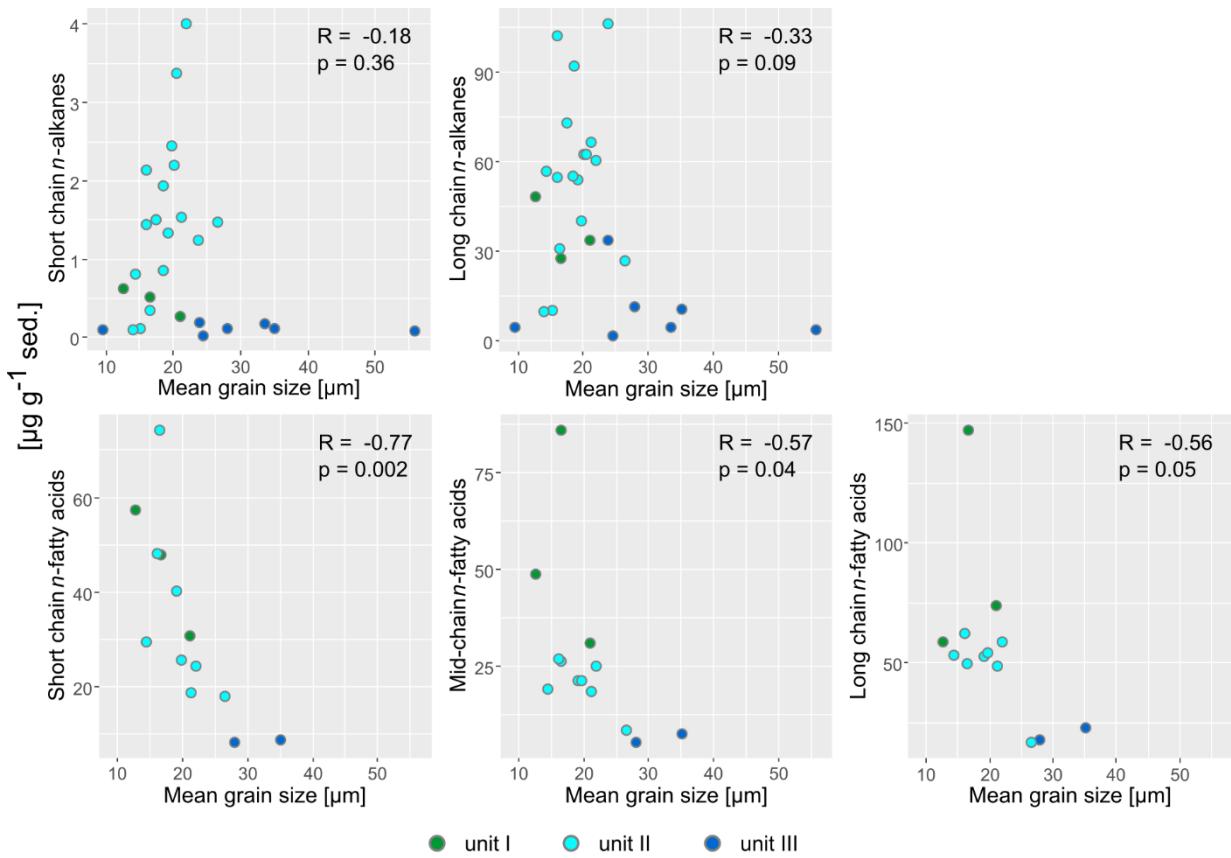


**Figure S1:** *n*-Alkane distribution of the Sobo-Sise Yedoma cliff. Depths are indicated above graphs in meters above river level (arl). The dominant *n*-alkane chain length is indicated in the upper right corner. We found *n*-alkanes of chain length C<sub>14</sub>-C<sub>33</sub>. Concentrations are expressed in µg g<sup>-1</sup> TOC.





**Figure S3 (continuation):** Fatty acid (FA) distribution of the Sobo-Sise Yedoma cliff. Depths are indicated above graphs in meters above river level (arl). Concentrations are expressed in  $\mu\text{g g}^{-1}$  TOC. See Table S2 for a list of identified FAs and their compound classes.



**Figure S4:** Boxplots of mean grain size vs. biomarker concentrations (in  $\mu\text{g g}^{-1}$  sed.) of the Sobo-Sise Yedoma Cliff. Upper row: short (left) and long (right) chain  $n$ -alkane concentrations. Lower row: short (left), mid (middle) and long (right) chain  $n$ -fatty acid concentrations. Unit I corresponds to Marine Isotope Stage (MIS) 1, unit II to MIS 2 and unit III to MIS 3. Pearson correlation coefficient R and p-value indicated in right corner of graphs. Note: sample SOB18-01-18 at 15.7 m arl was left out here as the mean grain size in this sample was an outlier (225  $\mu\text{m}$ ) compared to the average (29  $\mu\text{m}$ ).

**Table S2:** List of identified fatty acids (FAs) and their compound classes as used in Figure S2: hydroxy-FA,  $n$ -FA, *iso* saturated (sat.) FA, *anteiso* sat., methyl (Me) -branched FA, monounsat. FA, isoprenoid FA, di/tri unsat. FA and cyclopropyl FA.

Name	Abbr.	FA Class
3 Hydroxy-hexanoic acid	3OH-6:0	hydroxy-FA
Octanoic acid	8:0	$n$ -FA
3-Hydroxy-heptanoic acid	3OH-7:0	hydroxy-FA
Nonanoic acid	9:0	$n$ -FA
3 Hydroxy-octanoic acid	3OH-8:0	hydroxy-FA
8 Methyl-nonanoic acid	iso10:0	<i>iso</i> sat. FA
Decanoic acid	10:0	$n$ -FA
9 Methyl-decanoic acid	iso11:0	<i>iso</i> sat. FA
8 Methyl-decanoic acid	ai11:0	<i>anteiso</i> sat. FA
Undecanoic acid	11:0	$n$ -FA
10 Methyl-undecanoic acid	iso12:0	<i>iso</i> sat. FA
Dodecanoic acid	12:0	$n$ -FA
11 Methyl-dodecanoic acid	iso13:0	<i>iso</i> sat. FA

10 Methyl-dodecanoic acid	ai13:0	anteiso sat. FA
Tridecanoic acid	13:0	<i>n</i> -FA
12 Methyl-tridecanoic acid	iso14:0	iso sat. FA
Tetradecanoic acid	14:0	<i>n</i> -FA
10 Methyl-tetradecanoic acid	10Me-14:0	Me-branched FA
13 Methyl-tetradecanoic acid	iso15:0	iso sat. FA
12 Methyl-tetradecanoic acid	ai15:0	anteiso sat. FA
Pentadecanoic acid	15:0	<i>n</i> -FA
14 Methylpentadecanoic acid	iso16:0	iso sat. FA
Hexadec-9( <i>Z</i> )-enoic acid	16:1 $\omega$ 7c	monounsat. FA
Hexadec-9( <i>E</i> )-enoic acid	16:1 $\omega$ 7t	monounsat. FA
Hexadec-11-enoic acid	16:1 $\omega$ 5	monounsat. FA
Hexadecanoic acid	16:0	<i>n</i> -FA
15 Methyl-hexadec-9-enoic acid	iso17:1 $\omega$ 7	iso unsat. FA
10 Methyl-hexadecanoic acid	10Me-16:0	Me-branched FA
12 Methyl-hexadecanoic acid	12Me-16:0	Me-branched FA
14 Methyl-hexadec-9-enoic acid	ai17:1 $\omega$ 7	anteiso unsat. FA
Methyl-hexadecanoic acid	Me-16:0	Me-branched FA
15 Methyl-hexadecanoic acid	iso17:0	iso sat. FA
14 Methyl-hexadecanoic acid	ai17:0	anteiso sat.FA
Heptadecenoic acid	17:1	monounsat. FA
9,10-Methylene-hexadecanoic acid	cyclo-C17	cyclopropyl FA
Heptadecanoic acid	17:0	<i>n</i> -FA
10 Methyl-heptadecanoic acid	10Me-17:0	Me-branched FA
Methyl-heptadecanoic acid	Me-17:0	Me-branched FA
3,7,11,15-tetramethyl-hexadecanoic acid	phytanoic acid	isoprenoid FA
16 Methyl-heptadecanoic acid	iso18:0	iso sat. FA
Octadec-9,12-dienoic acid	18:2 $\omega$ 6,9	di/tri unsat. FA
Octadec-9( <i>Z</i> )-enoic acid	18:1 $\omega$ 9c	monounsat. FA
Octadec-9,12,15-trienoic acid	18:3 $\omega$ 3,6,9	di/tri unsat. FA
Octadec-11( <i>Z</i> )-enoic acid	18:1 $\omega$ 7c	monounsat. FA
Octadec-11( <i>E</i> )-enoic acid	18:1 $\omega$ 7t	monounsat. FA
Octadecanoic acid	18:0	<i>n</i> -FA
10 Methyl-octadecanoic acid	10Me-18:0	Me-branched FA
12 Methyl-octadecanoic acid	12Me-18:0	Me-branched FA
17 Methyl-octadecanoic acid	iso19:0	iso sat. FA
9,10-Methylene-octadecanoic acid	cyclo-19	cyclopropyl FA

Nonadecenoic acid	19:1	monounsat. FA
Nonadecanoic acid	19:0	<i>n</i> -FA
Eicosenoic acid	20:1	monounsat. FA
Eicosanoic acid	20:0	<i>n</i> -FA
Uneicosanoic acid	21:0	<i>n</i> -FA
Heneicosanoic acid	22:0	<i>n</i> -FA
Tricosanoic acid	23:0	<i>n</i> -FA
Tetracosenoic acid	24:1	monounsat. FA
Tetracosanoic acid	24:0	<i>n</i> -FA
Pentacosanoic acid	25:0	<i>n</i> -FA
Uneicosanoic acid	21:0	<i>n</i> -FA
Heneicosanoic acid	22:0	<i>n</i> -FA
Tricosanoic acid	23:0	<i>n</i> -FA
Tetracosenoic acid	24:1	monounsat. FA
Tetracosanoic acid	24:0	<i>n</i> -FA
Pentacosanoic acid	25:0	<i>n</i> -FA
Hexacosanoic acid	26:0	<i>n</i> -FA
Heptacosanoic acid	27:0	<i>n</i> -FA
Octacosanoic acid	28:0	<i>n</i> -FA
Nonacosanoic acid	29:0	<i>n</i> -FA
Triacontanoic acid	30:0	<i>n</i> -FA
Dotriacontanoic acid	32:0	<i>n</i> -FA
Nonacosanoic acid	29:0	<i>n</i> -FA
Triacontanoic acid	30:0	<i>n</i> -FA
Dotriacontanoic acid	32:0	<i>n</i> -FA