Distribution patterns and origins of *n*-Alkan-2-ones in surface peat and *Sphagnum* in Chinese peatlands

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**Abstract**

*n*-Alkan-2-ones occur widely in peat deposits. Previous studies have indicated several possible origins for the *n*-alkan-2-ones, e.g. directly from peat-forming plant leaf waxes, oxidation products of *n*-alkanes and/or β-oxidation and decarboxylation of *n*-fatty acids. However, the distribution patterns of *n*-alkan-2-ones in different peatlands were not consistent, suggesting that the source of these compounds might have regional difference. In this study, the lipid distributions (*n*-alkanes, *n*-alkan-2-ones and *n*-alkanoic acids) in surface peat from five Chinese peatlands (YC, HN, DJH, SWGT and REG) were determined, together with the occurrence of *n*-alkan-2-ones in fresh *Sphagnum*.

In most cases the *n*-alkan-2-ones ranged from $C_{21}$ to $C_{31}$, exhibiting an odd/even carbon number predominance. Interestingly, the *n*-alkan-2-one distributions in YC, HN, DJH and SWGT maximized at $C_{27}$, consistent with previous studies in the higher latitude of the Northern Hemisphere. This suggested that there may be some similarities in the source of *n*-alkan-2-ones in these four peatlands. In contrast, the non-*Sphagnum* REG had a completely different distribution pattern of *n*-alkan-2-ones, with a maximum at $C_{23}$. The correlation analysis revealed that there are positive correlation between $C_{23}$ and $C_{25}$ *n*-alkan-2-ones, also between $C_{29}$ and $C_{31}$ *n*-alkan-2-ones in YC, HN, DJH and SWGT peatlands. Meanwhile, slight negative correlations were also found between medium chain ketones ($C_{21}$, $C_{23}$, $C_{25}$) and long chain ketones ($C_{29}$, $C_{31}$, $C_{33}$), illustrating possible different sources of the former and the latter.

In REG, the distribution of *n*-alkanoic acids in REG had a good correlation with *n*-alkan-2-ones, supporting that *n*-alkan-2-ones in this non-*Sphagnum* peatland may be produced by β-oxidation and decarboxylation of *n*-fatty acids. In contrast, the distribution patterns of *n*-alkanes in all peatland were different to those of *n*-alkan-2-ones, suggesting that the microbial oxidation of *n*-alkanes may not be the main source of *n*-alkan-2-ones. For *n*-alkanoic acids, in all samples from five peatlands, the $C_{24}$ *n*-fatty acid was predominant. The β-oxidation and decarboxylation of the dominant $C_{24}$ *n*-fatty acid would yield $C_{23}$ *n*-alkan-2-ones, which was only minor components in YC, HN, DJH and SWGT peatlands. *Sphagnum* samples collected from YC, DJH and SWGT were all dominated by $C_{27}$, consistent with previous studies. Thus, it is probably that peat moss species are important sources of *n*-alkan-2-ones in *Sphagnum* dominated settings. It is interesting to further discuss how environmental factors control the distribution of *n*-alkan-2-ones in these peatland samples.

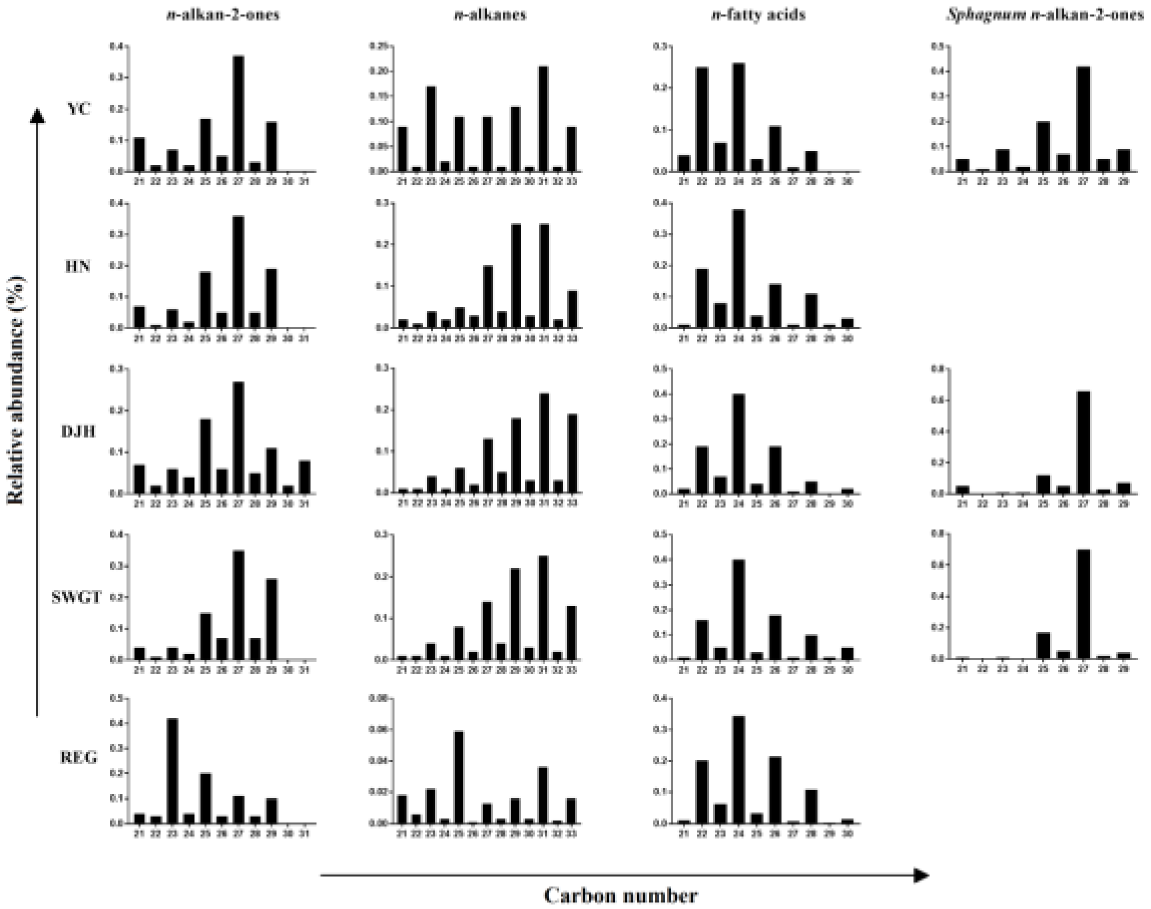


***Figure 1*** *The distributions of n-alkan-2-ones, n-alkanes, n-fatty acids in surface peat and n-alkan-2-ones in Sphagnum collected from YC, HN, DJH, SWGT and REG peatlands.*

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