TERRIGENOUS ORGANIC MATTER INPUT TO THE BLACK SEA ORIGINATING FROM DIFFERENT HINTERLAND REGIMES

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INTRODUCTION

We present geochemical proxy data, bulk radiocarbon (^{14}C) ages and compound-specific ^{14}C ages of terrigenous biomarkers from core-top samples collected along sample transects and from core locations in front of different river mouths around the Black Sea. The sample locations derive terrigenous input from different climatic hinterlands (***Figure 1***).

STUDY AREA

The Black Sea receives an annual river runoff of 350km³/a. This fluviatile runoff is mainly discharged by the rivers of the north-western coastline (255.4km³/a) which in total account for 73.4% of the riverine freshwater input. Especially the Danube river, the main tributary, draining 200km³/a transports enormous amounts of terrigenous organic matter to the Black Sea. The Dniester river discharges 9.1km³/a and the Azov Sea discharge amounts to 42.9km³/a. The Gülüç and Çatalağçi River together discharge 1.32km³/a and the Çoruh and Acharistsgali River amount for 8km³/a.

PROXIES

C/N ratio: elemental ratio $C_{HCl}/N_{non\ HCl}$

Branched and Isoprenoid Tetraether Index (BIT Index):
$(GDGT_{m/z1050}+GDGT_{m/z1036}+GDGT_{m/z1022})/(GDGT_{m/z1050}+GDGT_{m/z1036}+GDGT_{m/z1022}+GDGT_{m/z1092})$

Average Chain Length (ACL): $\Sigma(iX_i)/\Sigma X_i$ with X= abundance and i= 25, 27, 29, 31 and 33 carbon atoms for *n*-alkanes

Carbon Preference Index (CPI): $0.5*[\Sigma(X_i+X_{i+2}+...+X_n)/\Sigma(X_{i-1}+X_{i+1}+...+X_{n-1})+\Sigma(X_i+X_{i+2}+...+X_n)/\Sigma(X_{i+1}+X_{i+3}+...+X_{n+1})]$ with X= abundance, i= 25 and n= 33 for n-alkanes

METHODS

GC/FID
PCGC/PFC
HPLC/MS

The ^{14}C concentration of the *n*-fatty acids is corrected for the addition of one methyl group during PCGC-purification via mass balance equation.

DANUBE RIVER SULINA BRANCH

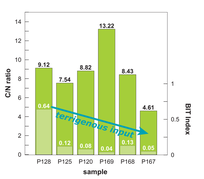

Figure 2: *C/N ratio and BIT Index for the Danube River Sulina branch transect.*

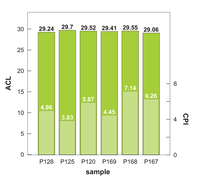

Figure 3: *Average chain length (ACL) and Carbon Preference Index (CPI) for the Danube River Sulina branch transect.*

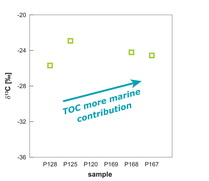

Figure 4: *Bulk $\delta^{13}C$ data for the Danube River Sulina branch transect.*

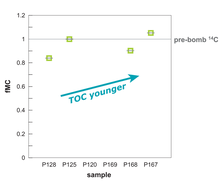

Figure 5: *Radiocarbon data (fraction modern carbon fMC) for the Danube River Sulina branch transect.*

DANUBE RIVER ST. GHEORGHE BRANCH

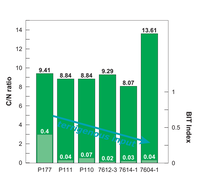

Figure 6: *C/N ratio and BIT Index for the Danube River St. Gheorghe branch transect.*

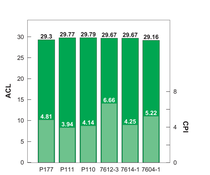

Figure 7: *Average chain length (ACL) and Carbon Preference Index (CPI) for the Danube River St. Gheorghe branch transect.*

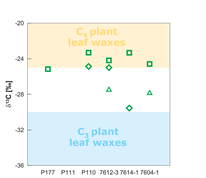

Figure 8: *Bulk and compound specific $\delta^{13}C$ data for the Danube River St. Gheorghe branch transect.*

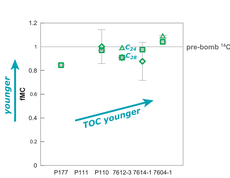

Figure 9: *Radiocarbon data (fraction modern carbon fMC) for the Danube River St. Gheorghe branch transect.*

DNIESTER RIVER

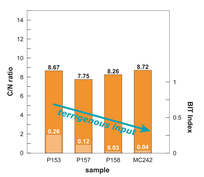

Figure 10: *C/N ratio and BIT Index for the Dniester River transect (.*

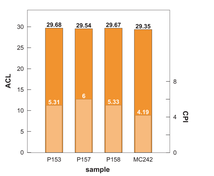

Figure 11: *Average chain length (ACL) and Carbon Preference Index (CPI) for the Dniester River transect.*

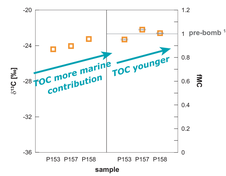

Figure 12: *Bulk and compound-specific $\delta^{13}C$ and radiocarbon data (fraction modern carbon fMC) for the Dniester River transect.*

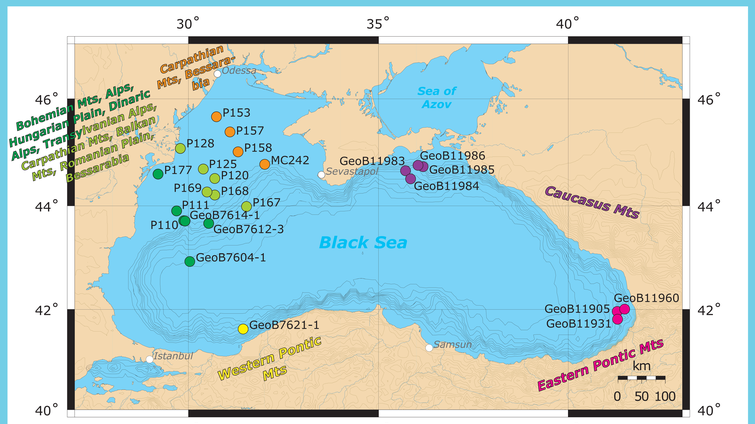

Figure 1: *Study area with core locations on transects in front of major rivers draining the Black Sea from different hinterland regimes.*

GÜLÜÇ & ÇATALAĞI RIVER

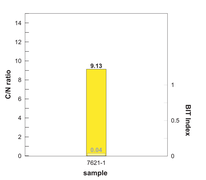

Figure 13: *C/N ratio and BIT Index for the Gülüç and Çatalağçi River core location.*

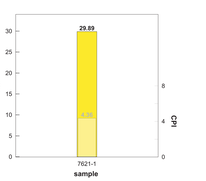

Figure 14: *Average chain length (ACL) and Carbon Preference Index (CPI) for the Gülüç and Çatalağçi River core location.*

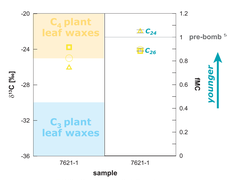

Figure 15: *Bulk and compound-specific $\delta^{13}C$ and radiocarbon data (fraction modern carbon fMC) for the Gülüç and Çatalağçi River core location.*

KERCH STRAIT/KUBAN & DON RIVER

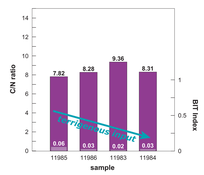

Figure 16: *C/N ratio and BIT Index for the Kerch Strait transect.*

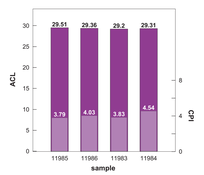

Figure 17: *Average chain length (ACL) and Carbon Preference Index (CPI) for the Kerch Strait transect.*

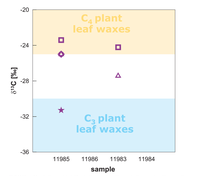

Figure 18: *Bulk and compound-specific $\delta^{13}C$ data for the Kerch Strait transect.*

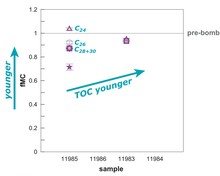

Figure 19: *Radiocarbon data (fraction modern carbon fMC) for the Kerch Strait transect.*

ÇORUH & ACHARISTSGALI RIVER

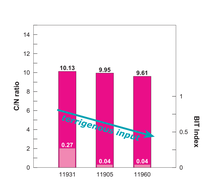

Figure 20: *C/N ratio and BIT Index for the Çoruh and Acharistsgali River transect.*

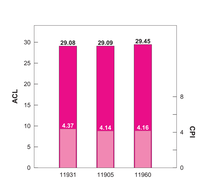

Figure 21: *Average chain length (ACL) and Carbon Preference Index (CPI) for the Çoruh and Acharistsgali River transect.*

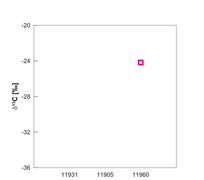

Figure 22: *Bulk $\delta^{13}C$ data for the Çoruh and Acharistsgali River transect.*

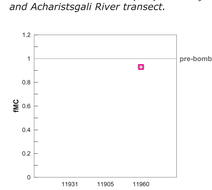

Figure 23: *Radiocarbon data (fraction modern carbon fMC) for the Çoruh and Acharistsgali River transect.*

DISCUSSION & CONCLUSION

PROXY DATA

- ***n*-alkanes show typical odd-over-even-predominance (OEP)**
- **average chain length of the *n*-alkanes indicates terrigenous C_3 plant origin for all samples**
- **$\delta^{13}C$ value of the *n*-C_{29+31} alkanes indicate C_3 plant origin of leaf waxes for core GeoB11985**
- **BIT Index values decrease with increasing distance from land**
- **C/N ratios vary between 7 and 10: generally high terrigenous input (defined by less molecular nitrogen)**
- **CPI values are higher in Western Black Sea transects: more phytoplankton contribution or (oil-seepage) contamination in the Eastern Black Sea?**

MOLECULAR AGE RELATIONSHIPS

- **long-chain *n*-fatty acids show increasing ages with increasing chain-length: higher resistance to degradation?**
- **long-chain *n*-alkanes are older than long-chain *n*-fatty acids**
- **good age agreement between *n*-C_{28+30} fatty acid and bulk organic carbon (TOC)**
- **TOC ages are decreasing with increasing distance from land**

TIMESCALES OF TERRIGENOUS ORGANIC MATTER TRANSPORT

- **pre-aging on land reflected by the old TOC and biomarker ^{14}C ages**
- **different residence times/reservoir ages for the different hinterlands: Danube River input oldest - highest soil reservoir age? Dniester River input youngest**

this study is still in progress...please ask!

ACKNOWLEDGEMENTS

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