**Supplementary Materials**

Table SM1. Individual Δ14CCO2 monthly values for three sampling sites.

|  |  |  |  |
| --- | --- | --- | --- |
| Sampling month, Δ14CCO2 | Δ14CCO2 | | |
| Rijeka | Gornje Jelenje | Parg |
| Jan-21 | -13.8 ± 1.0 | -15.4 ± 0.6 | -18.2 ± 0.6 |
| Feb-21 | -27.5 ± 0.3 | -5.7 ± 0.3 | -5.5 ± 0.3 |
| Mar-21 | -38.2 ± 0.7 | -20.2 ± 0.6 | -11.9 ± 0.7 |
| Apr-21 | -21.9 ± 0.6 | -19.0 ± 0.6 | -2.7 ± 0.6 |
| May-21 | -13.7 ± 0.7 | -14.8 ± 0.6 | -10.5 ± 0.6 |
| Jun-21 | -11.1 ± 0.3 | -12.6 ± 0.6 | -0.3 ± 0.7 |
| Jul-21 | -8.5 ± 0.3 | -2.7 ± 0.6 | 13.3 ± 0.6 |
| Aug-21 | -18.9 ± 0.3 | -6.4 ± 0.6 | 10.7 ± 0.6 |
| Sep-21 | -5.5 ±0.7 | -1.8 ± 0.6 | 24.8 ± 0.6 |
| Oct-21 | -41.2 ± 0.6 | -0.2 ± 0.6 | 4.0 ± 0.6 |
| Nov-21 | -20.2 ± 0.3 | -1.3 ± 0.3 | -1.2 ± 0.3 |
| Dec-21 | -34.3 ± 0.7 | -17.5 ± 0.8 | -2.5 ± 0.7 |
| **mean** | **-22 ± 12** | **-10 ± 8** | **0 ± 12** |
| min | -41 ± 6 | -20 ± 6 | -18 ± 6 |
| max | -6 ± 7 | 0 ± 6 | 25 ± 6 |

Table SM2. Individual δ13CCO2 daily values for three sampling sites.

|  |  |  |  |
| --- | --- | --- | --- |
| Sampling date, δ13CCO2 | δ13CCO2 | | |
| Rijeka | Gornje Jelenje | Parg |
| 1.3.2021 | -10.8 ± 0.3 | -10.7 ± 0.3 | -11.8 ± 0.3 |
| 30.3.2021 | -11.6 ± 0,3 | -11.1 ± 0.3 | -11.1 ± 0.3 |
| 1.5.2021 | -11.1 ± 0.5 | -11.4 ± 0.3 | -11.2 ± 0.3 |
| 1.6.2021 | -10.7 ± 0.4 | -11.1 ± 0.3 | -10.6 ± 0.3 |
| 1.7.2021. | -11.4 ± 0.3 | -11.6 ± 0.3 | -11.3 ± 0.3 |
| 1.8.2021. | -11.1 ± 0.3 | -10.8 ± 0.3 | -10.5 ± 0.3 |
| 30.8.2021. | -11.6 ±0.3 | -10.6 ± 0.5 | -10.5 ± 0.3 |
| 30.9.2021 | -12.3 ±0.3 | -12.3 ± 0.3 | -11.9 ± 0.3 |
| 30.10.2021 | -12.4 ± 0.3 | -12.0 ± 0-3 | -12.2 ± 0.3 |
| 30.11.2021 | -12.0 ± 0.3 | -13.0 ± 0.3 | -12.0 ± 0.5 |
| 28.12.2021 | -13.1 ± 0.6 | -12.0 ± 0.3 | -12.4 ± 0.3 |
| **mean** | **-11.6 ± 0.7** | **-11.5 ± 0.8** | **-11.4 ± 0.7** |
| min | -13.1 ± 0.6 | -13.0 ± 0.3 | -12.4 ± 0.3 |
| max | -10.7 ± 0.4 | -10.6 ± 0.3 | -10.5 ± 0.3 |

Table SM3. z values\* and differences between sites, Δ14C. Significant z vales and differences are red. (R - Rijeka, GJ – Gornje Jelenje, P – Parg)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sampling month, Δ14CCO2 | z (R-GJ)  14C | z (GJ-P)  14C | z (R-P)  14C | Δ 14C  R-GJ | Δ 14C  GJ-P | Δ 14C  R-P |
| Jan-21 | 0.13 | 0.31 | 0.37 | 1.6 | 2.8 | 4.4 |
| Feb-21 | -5.74 | -0.05 | -5.79 | -21.7 | -0.2 | -21.9 |
| Mar-21 | -1.99 | -0.89 | -2.82 | -18.0 | -8.2 | -26.3 |
| Apr-21 | -0.34 | -1.84 | -2.18 | -3.0 | -16.3 | -19.2 |
| May-21 | 0.12 | -0.48 | -0.34 | 1.1 | -4.3 | -3.2 |
| Jun-21 | 0.22 | -1.34 | -1.47 | 1.5 | -12.3 | -10.8 |
| Jul-21 | -0.85 | -1.81 | -3.20 | -5.8 | -16.0 | -21.7 |
| Aug-21 | -1.84 | -1.95 | -4.30 | -12.5 | -17.1 | -29.5 |
| Sep-21 | -0.39 | -3.01 | -3.20 | -3.7 | -26.6 | -30.2 |
| Oct-21 | -4.67 | -0.49 | -5.20 | -40.9 | -4.3 | -45.2 |
| Nov-21 | -5.07 | -0.03 | -5.00 | -18.8 | -0.1 | -18.9 |
| Dec-21 | -1.63 | -1.43 | -3.24 | -16.9 | -15.0 | -31.8 |

* In order to determine the significance of the differences between Δ14C and δ13C values between the sites, z test between sampling sites (Rijeka – Parg, Gornje Jelenje – Parg, Rijeka – Gornje Jelenje) has been performed:

where and represent respective values, and σ1 and σ2 respective measurement uncertainties from Tables 1 and 2. z values are presented in tables 3 and 4.

Table SM4. z values and differences between sites, δ13C. Significant z vales and differences are red. (R - Rijeka, GJ – Gornje Jelenje, P – Parg)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sampling date, δ13CCO2 | z (R-GJ)  13C | z (GJ-P)  13C | z (R-P)  13C | Δ δ13C  R-GJ | Δ δ13C  GJ-P | Δ δ13C  R-P |
| 1.3.2021 | -0.24 | 2.59 | 2.36 | -0.1 | 1.1 | 1 |
| 30.3.2021 | -1.18 | 0 | -1.18 | -0.5 | 0 | -0.5 |
| 1.5.2021 | 0.52 | -0.47 | 0.6 | 0.3 | -0.2 | 0.1 |
| 1.6.2021 | 0.80 | -1.18 | -0.2 | 0.4 | -0.5 | -0.1 |
| 1.7.2021. | 0.47 | -0.71 | -0.24 | 0.2 | -0.3 | -0.1 |
| 1.8.2021. | -0.71 | -0.71 | -1.41 | -0.3 | -0.3 | -0.6 |
| 30.8.2021. | -1.71 | -0.171 | -2.59 | -1 | -0.1 | -1.1 |
| 30.9.2021 | 0 | -0.941 | -0.94 | 0 | -0.4 | -0.4 |
| 30.10.2021 | -0.94 | 0.471 | -0.47 | -0.4 | 0.2 | -0.2 |
| 30.11.2021 | 2.36 | -1.711 | 0 | 1 | -1 | 0 |
| 28.12.2021 | -1.64 | 0.941 | -1.04 | -1.1 | 0.4 | -0.7 |

Table SM5. Calculated shares of fossil CO2 component at Rijeka and Gornje Jelenje sites.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Calculated with Parg site as a background  (%) | | Calculated with Jungfraujoch site as a background (%) | |
| Sampling month | Rijeka | Gornje Jelenje | Rijeka | Gornje Jelenje |
| Jan-21 | -0.44 | -0.28 | 1.07 | 1.23 |
| Feb-21 | 2.21 | 0.02 | 2.77 | 0.61 |
| Mar-21 | 2.66 | 0.83 | 3.70 | 1.89 |
| Apr-21 | 1.93 | 1.63 | 2.37 | 2.08 |
| May-21 | 0.32 | 0.43 | 0.72 | 0.83 |
| Jun-21 | 1.08 | 1.22 | 0.63 | 0.78 |
| Jul-21 | 2.14 | 1.58 | 1.37 | 0.80 |
| Aug-21 | 2.92 | 1.69 | 1.97 | 0.72 |
| Sep-21 | 2.95 | 2.59 | 0.67 | 0.30 |
| Oct-21 | 4.50 | 0.42 | 4.30 | 0.21 |
| Nov-21 | 1.89 | 0.01 | 1.98 | 0.10 |
| Dec-21 | 3.19 | 1.50 | 3.11 | 1.43 |
| Average | **2.11** | **0.97** | **2.06** | **0.91** |
| Standard deviation | 1.33 | 0.87 | 1.23 | 0.63 |

Calculation of fossil CO2 share:

(1)

(2)

where a represents Δ14CCO2 from Rijeka or Gornje Jelenje, and b represents background Δ14C (Parg and Jungfraujoch) value, -1000 is Δ14C of fossil CO2 and X is a share of fossil CO2.

Table SM6. z values for δ13C between Jungfraujoch station (average from 2017) and Croatian stations Rijeka, Gornje Jelenje and Parg (marked R, GJ and P, respectively; averages from 2021)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| δ13C JFJ | δ13C Rijeka | δ13C G. Jelenje | δ13C Parg | z (JFJ-R) | z (JFJ-GJ) | z (JFJ-P) |
| -11.4 ± 0.7 | -11.6 ± 0.7 | -11.5 ± 0.7 | -11.4 ± 0.7 | 0.24 | 0.11 | 0.01 |