

Supplement of Biogeosciences, 11, 3043–3056, 2014
<http://www.biogeosciences.net/bg-11-3043-2014/>
doi:10.5194/bg-11-3043-2014-supplement
© Author(s) 2014. CC Attribution 3.0 License.



Supplement of

DOC sources and DOC transport pathways in a small headwater catchment as revealed by carbon isotope fluctuation during storm events

T. Lambert et al.

Correspondence to: T. Lambert (tlambert@ulg.ac.be)

Supplementary informations

1

2 **Supplementary Table 1:** Discharge, DOC concentration and isotopic composition and major anion
3 concentrations for stream waters sampled at the outlet of the catchment during the six storm events
4 (n.d. = no data).

5 **Supplementary Table 2:** Carbon isotopic composition of SOC, Water Extractable Organic Carbon
6 (WEOC) and DOC in the uppermost (0-15 cm) soil horizons in riparian wetland and upland
7 domains. WEOC was obtained from air-dried soil samples mixed with deionized water (soil:water
8 ratio = 1/4), shaken during 4 hours at 250 rpm then filtered at 0.7 and then 0.2 μm (n.d. = no data).

9 **Supplementary Figure 1:** Temporal variations in nitrate and sulfate concentrations at the
10 catchment outlet during the study period. Monitored storm events are indicated by numbers.

Supplemental Table 1

| Event | Date | Discharge (L s ⁻¹) | DOC (mg L ⁻¹) | $\delta^{13}\text{C}_{\text{DOC}}$ (‰) | Cl (mg L ⁻¹) | NO ₃ (mg L ⁻¹) | SO ₄ (mg L ⁻¹) |
|----------------|----------------|--------------------------------|---------------------------|--|--------------------------|---------------------------------------|---------------------------------------|
| Event 1 | 11/11/10 4:00 | 18.3 | 11.5 | -28.1 | 35.9 | 50.8 | 18.6 |
| | 11/11/10 10:27 | 28.8 | 13.2 | -28.6 | 33.1 | 39.2 | 16.0 |
| | 11/11/10 11:07 | 46.0 | 13.5 | -28.5 | 32.8 | 43.4 | 15.5 |
| | 11/11/10 11:47 | 63.3 | 13.5 | -28.4 | 32.1 | 40.8 | 15.2 |
| | 11/11/10 12:27 | 78.8 | 14.1 | -28.3 | 31.1 | 38.0 | 14.9 |
| | 11/11/10 13:07 | 89.9 | 15.8 | -28.4 | 30.2 | 35.9 | 15.1 |
| | 11/11/10 13:47 | 90.9 | 16.7 | -28.5 | 30.5 | 35.1 | 15.0 |
| | 11/11/10 14:27 | 90.9 | 17.4 | -28.3 | 30.6 | 35.7 | 15.2 |
| | 11/11/10 15:07 | 90.9 | 17.5 | -28.3 | 31.1 | 36.8 | 15.6 |
| | 11/11/10 15:47 | 88.8 | 17.6 | -28.4 | 31.9 | 38.4 | 16.3 |
| | 11/11/10 16:27 | 85.8 | 17.8 | -28.3 | 32.5 | 40.1 | 17.2 |
| | 11/11/10 17:07 | 80.8 | 17.6 | -28.0 | 33.0 | 41.1 | 17.5 |
| | 11/11/10 17:47 | 76.8 | 17.3 | -28.2 | 32.8 | 42.6 | 17.7 |
| | 11/11/10 18:27 | 71.9 | 17.1 | -28.2 | 33.4 | 44.3 | 17.8 |
| | 11/11/10 19:07 | 69.1 | 16.7 | -28.1 | 34.1 | 45.5 | 18.6 |
| | 11/11/10 19:47 | 66.2 | 16.5 | -27.8 | 33.8 | 46.0 | 18.6 |
| | 11/11/10 21:07 | 64.3 | 16.6 | -27.9 | 34.9 | 49.3 | 19.1 |
| | 11/11/10 22:27 | 63.3 | 16.2 | -27.8 | 34.4 | 49.3 | 18.7 |
| | 11/11/10 23:47 | 59.6 | 16.5 | -28.1 | 35.0 | 51.2 | 19.0 |
| | 12/11/10 1:07 | 54.1 | 15.0 | -27.8 | 36.0 | 53.4 | 19.4 |
| | 12/11/10 1:47 | 51.3 | 15.7 | -27.8 | 37.4 | 54.6 | 20.0 |
| 12/11/10 18:00 | 38.7 | 10.3 | n.d. | 37.8 | 62.4 | 18.1 | |
| Event 2 | 3/12/10 18:00 | 41.7 | 3.5 | -28.1 | 32.9 | 77.4 | 7.4 |
| | 4/12/10 5:49 | 82.8 | 7.4 | -28.9 | 28.1 | 54.5 | 8.0 |
| | 4/12/10 6:29 | 120.9 | 7.7 | -29.0 | 28.5 | 55.0 | 8.0 |
| | 4/12/10 7:09 | 150.2 | 9.4 | -28.9 | 27.8 | 49.7 | 8.2 |
| | 4/12/10 7:49 | 173.9 | 10.8 | n.d. | n.d. | n.d. | n.d. |
| | 4/12/10 8:29 | 177.3 | 11.6 | -28.8 | 26.7 | 41.8 | 8.8 |
| | 4/12/10 9:09 | 177.3 | 12.2 | n.d. | 26.6 | 41.6 | 8.9 |
| | 4/12/10 9:49 | 176.9 | 12.9 | -28.8 | 27.0 | 42.2 | 9.1 |
| | 4/12/10 10:29 | 171.3 | 12.0 | -28.5 | 26.6 | 42.1 | 9.1 |
| | 4/12/10 11:09 | 164.4 | 11.5 | -28.5 | n.d. | n.d. | n.d. |
| | 4/12/10 11:49 | 162.4 | 11.2 | -28.3 | 26.6 | 44.2 | 9.2 |
| | 4/12/10 12:29 | 161.2 | 11.1 | n.d. | 27.1 | 45.9 | 9.5 |
| | 4/12/10 13:09 | 161.2 | 10.9 | -27.2 | 27.0 | 47.0 | 9.5 |
| | 4/12/10 13:49 | 161.2 | 10.5 | -27.1 | 26.7 | 47.5 | 9.5 |
| | 4/12/10 14:29 | 148.1 | 10.2 | -27.1 | 26.8 | 48.0 | 9.6 |
| | 4/12/10 15:09 | 145.8 | 10.1 | -27.2 | 27.0 | 49.4 | 9.8 |
| | 4/12/10 15:49 | 133.1 | 10.3 | -27.2 | 27.2 | 50.2 | 10.0 |
| | 4/12/10 16:29 | 127.4 | 9.8 | n.d. | 27.7 | 51.4 | 10.0 |
| | 4/12/10 17:09 | 128.6 | 10.2 | -27.1 | 27.7 | 51.8 | 10.0 |
| | 4/12/10 17:49 | 132.0 | 9.1 | -27.0 | 26.6 | 50.0 | 9.5 |
| | 4/12/10 18:29 | 148.2 | 11.1 | -27.0 | 26.8 | 49.6 | 9.7 |
| | 4/12/10 19:09 | 154.1 | 9.9 | -26.9 | 26.5 | 49.1 | 9.7 |
| | 4/12/10 19:49 | 154.1 | 10.2 | -26.9 | 27.3 | 50.4 | 9.8 |
| | 4/12/10 20:29 | 152.9 | 10.1 | -27.0 | 27.0 | 49.7 | 9.8 |
| | 4/12/10 21:09 | 144.6 | 10.0 | n.d. | 27.0 | 50.1 | 9.9 |
| | 5/12/10 18:00 | 98.5 | 7.4 | n.d. | 30.0 | 63.1 | 10.0 |
| Event 3 | 18/12/10 18:00 | 75.3 | 8.1 | n.d. | 30.3 | 76.6 | 5.1 |
| | 19/12/10 6:47 | 88.8 | 6.6 | -28.9 | 27.8 | 54.2 | 7.8 |
| | 19/12/10 7:27 | 187.4 | 6.7 | -28.4 | 25.4 | 49.9 | 7.6 |
| | 19/12/10 8:07 | 244.8 | 8.5 | -28.6 | 23.4 | 41.8 | 7.1 |
| | 19/12/10 8:47 | 307.6 | 10.7 | -28.6 | 25.6 | 37.7 | 7.2 |
| | 19/12/10 9:27 | 379.1 | 11.1 | -28.7 | 21.3 | 31.8 | 6.7 |

| | | | | | | |
|----------------|-------|------|-------|------|------|-----|
| 19/12/10 10:07 | 421.5 | 11.5 | -28.7 | 19.7 | 28.2 | 6.7 |
| 19/12/10 10:47 | 449.5 | 11.8 | -28.4 | 19.6 | 26.9 | 6.7 |
| 19/12/10 11:27 | 453.1 | 12.4 | -28.5 | 20.7 | 27.7 | 7.1 |
| 19/12/10 12:07 | 414.6 | 12.3 | -27.8 | 21.4 | 29.0 | 7.5 |
| 19/12/10 12:47 | 372.5 | 12.5 | -27.9 | 22.5 | 31.8 | 8.0 |
| 19/12/10 13:27 | 268.9 | 12.2 | -27.7 | 23.2 | 35.1 | 8.3 |
| 19/12/10 14:07 | 244.8 | 11.8 | -27.5 | 23.9 | 38.1 | 8.6 |
| 19/12/10 14:47 | 224.1 | 11.3 | -27.4 | 24.0 | 39.4 | 8.9 |
| 19/12/10 15:27 | 192.5 | 10.7 | -27.4 | 24.6 | 42.3 | 9.2 |
| 19/12/10 16:07 | 172.3 | 10.6 | -27.2 | 25.2 | 44.9 | 9.3 |
| 19/12/10 16:47 | 162.5 | 10.0 | -27.2 | 25.9 | 47.3 | 9.4 |
| 19/12/10 17:27 | 148.2 | 9.3 | -27.2 | 26.1 | 48.9 | 9.6 |
| 19/12/10 18:07 | 142.3 | 8.9 | -27.0 | 26.3 | 50.3 | 9.6 |
| 19/12/10 18:47 | 133.1 | 8.7 | -27.0 | 26.7 | 52.0 | 9.7 |
| 19/12/10 19:27 | 130.8 | 8.3 | -27.0 | 27.3 | 54.2 | 9.8 |
| 19/12/10 20:07 | 119.6 | 8.1 | -27.1 | 27.7 | 55.6 | 9.8 |
| 19/12/10 20:47 | 118.5 | 7.8 | -27.1 | 27.9 | 56.9 | 9.9 |
| 19/12/10 21:27 | 113.1 | 7.4 | -27.0 | 28.2 | 57.9 | 9.8 |
| 20/12/10 18:00 | 118.7 | 7.3 | n.d. | 28.4 | 59.6 | 9.3 |
| Event 4 | | | | | | |
| 5/1/11 18:00 | 57.1 | 3.6 | -29.0 | 32.0 | 77.3 | 7.5 |
| 6/1/11 6:03 | 59.1 | 6.4 | -28.6 | 28.5 | 59.6 | 7.4 |
| 6/1/11 6:43 | 77.2 | 5.7 | -28.6 | 27.9 | 60.3 | 7.3 |
| 6/1/11 7:23 | 109.0 | 7.1 | -28.7 | 26.6 | 54.6 | 7.1 |
| 6/1/11 8:03 | 137.9 | 8.7 | -28.5 | 26.2 | 49.7 | 7.1 |
| 6/1/11 8:43 | 163.2 | 10.3 | -28.6 | 26.1 | 46.1 | 7.3 |
| 6/1/11 9:23 | 164.9 | 11.3 | -28.7 | 24.6 | 42.1 | 8.0 |
| 6/1/11 10:03 | 169.8 | 11.5 | -28.8 | 25.0 | 42.6 | 7.2 |
| 6/1/11 10:43 | 168.3 | 11.9 | -28.7 | 24.8 | 42.7 | 7.4 |
| 6/1/11 11:23 | 161.5 | 12.2 | -28.6 | 25.9 | 43.9 | 7.7 |
| 6/1/11 12:03 | 146.3 | 12.1 | -28.3 | 26.2 | 44.9 | 7.9 |
| 6/1/11 12:43 | 140.0 | 10.9 | -28.5 | 26.3 | 46.0 | 8.0 |
| 6/1/11 13:23 | 131.9 | 8.7 | -28.2 | 26.5 | 47.5 | 8.1 |
| 6/1/11 14:03 | 130.5 | 10.3 | -28.3 | 26.8 | 48.9 | 8.3 |
| 6/1/11 14:43 | 129.6 | 9.9 | -28.1 | 27.3 | 50.9 | 8.4 |
| 6/1/11 15:23 | 124.6 | 9.5 | -28.3 | 27.5 | 52.1 | 8.5 |
| 6/1/11 16:03 | 116.7 | 9.3 | -28.2 | 28.0 | 53.9 | 8.7 |
| 6/1/11 16:43 | 110.0 | 8.8 | -28.1 | 28.0 | 54.6 | 8.6 |
| 6/1/11 17:23 | 108.8 | 8.6 | -28.1 | 28.2 | 55.9 | 8.7 |
| 6/1/11 18:03 | 106.3 | 8.2 | -28.0 | 28.3 | 56.7 | 8.7 |
| 6/1/11 18:43 | 105.5 | 8.1 | -28.0 | 28.7 | 58.2 | 8.8 |
| 6/1/11 19:23 | 104.6 | 8.0 | -27.9 | 28.4 | 58.2 | 8.7 |
| 6/1/11 20:03 | 103.7 | 7.8 | -28.1 | 28.1 | 56.9 | 8.7 |
| 6/1/11 20:43 | 104.0 | 8.0 | -28.1 | 28.1 | 56.8 | 8.7 |
| 6/1/11 21:23 | 106.3 | 6.4 | -28.2 | 28.1 | 56.1 | 8.7 |
| 7/1/11 18:00 | 93.3 | 7.5 | n.d. | 29.1 | 62.0 | 9.1 |
| Event 5 | | | | | | |
| 12/2/11 18:00 | 51.2 | 3.6 | -28.9 | 31.6 | 75.8 | 7.1 |
| 13/2/11 10:04 | 72.8 | 7.4 | -28.7 | 28.4 | 61.7 | 6.7 |
| 13/2/11 10:44 | 82.8 | 5.3 | n.d. | 29.3 | 68.9 | 6.9 |
| 13/2/11 11:24 | 93.7 | 6.1 | n.d. | 28.8 | 62.7 | 7.2 |
| 13/2/11 12:04 | 105.7 | 8.9 | -28.6 | 34.6 | 59.9 | 7.5 |
| 13/2/11 12:44 | 111.8 | 8.4 | n.d. | 28.0 | 55.3 | 6.6 |
| 13/2/11 13:24 | 114.8 | 9.6 | n.d. | 27.5 | 52.3 | 6.8 |
| 13/2/11 14:04 | 114.2 | 10.5 | -28.6 | 27.0 | 50.0 | 6.6 |
| 13/2/11 14:44 | 114.0 | 11.2 | -28.5 | 26.7 | 49.3 | 6.6 |
| 13/2/11 15:24 | 117.1 | 11.4 | -28.7 | 26.4 | 48.8 | 6.6 |
| 13/2/11 16:04 | 127.7 | 11.7 | -28.6 | 26.2 | 48.6 | 6.8 |
| 13/2/11 16:44 | 142.4 | 11.7 | -28.6 | 25.6 | 47.2 | 6.8 |

| | | | | | | | |
|----------------|---------------|-------|------|-------|------|------|-----|
| | 13/2/11 17:24 | 159.0 | 11.9 | -28.5 | 25.2 | 45.9 | 6.7 |
| | 13/2/11 18:04 | 167.3 | 12.8 | -28.6 | 25.0 | 44.5 | 6.8 |
| | 13/2/11 18:44 | 164.6 | 12.9 | -28.4 | 24.1 | 42.4 | 6.8 |
| | 13/2/11 19:24 | 154.1 | 13.3 | -28.6 | 24.1 | 42.5 | 7.0 |
| | 13/2/11 20:04 | 143.1 | 13.9 | -28.8 | 24.6 | 43.5 | 7.5 |
| | 13/2/11 20:44 | 132.2 | 14.1 | -28.5 | 25.6 | 44.9 | 7.5 |
| | 13/2/11 21:24 | 122.9 | 14.1 | -28.5 | 26.8 | 46.6 | 7.7 |
| | 13/2/11 22:04 | 114.6 | 13.8 | -28.6 | 27.5 | 48.8 | 8.0 |
| | 13/2/11 22:44 | 108.8 | 12.7 | -28.4 | 27.8 | 50.4 | 8.1 |
| | 13/2/11 23:24 | 104.1 | 12.2 | -28.5 | 28.0 | 52.1 | 8.1 |
| | 14/2/11 0:04 | 100.3 | 11.4 | -28.5 | 28.6 | 54.4 | 8.3 |
| | 14/2/11 0:44 | 96.2 | 11.0 | -28.5 | 28.8 | 56.9 | 6.7 |
| | 14/2/11 1:24 | 93.1 | 10.2 | -28.7 | 28.9 | 57.0 | 8.6 |
| | 14/2/11 18:00 | 79.5 | 6.6 | n.d. | 31.0 | 64.7 | 8.2 |
| Event 6 | 18/2/11 18:00 | 51.2 | 3.4 | -28.9 | 31.0 | 75.9 | 7.9 |
| | 19/2/11 0:31 | 77.7 | 8.0 | -28.8 | 29.6 | 58.2 | 7.2 |
| | 19/2/11 1:11 | 83.1 | 7.6 | -28.7 | 29.3 | 59.6 | 7.2 |
| | 19/2/11 1:51 | 105.8 | 9.2 | -28.8 | 27.0 | 51.3 | 6.8 |
| | 19/2/11 2:31 | 164.7 | 10.5 | -28.8 | 23.8 | 42.4 | 5.9 |
| | 19/2/11 3:11 | 226.8 | 12.6 | -28.8 | 23.2 | 37.5 | 5.9 |
| | 19/2/11 3:51 | 245.1 | 15.5 | -28.8 | 24.5 | 34.5 | 6.1 |
| | 19/2/11 4:31 | 243.7 | 17.5 | -28.4 | 25.7 | 33.5 | 6.4 |
| | 19/2/11 5:11 | 227.2 | 17.8 | -28.4 | 26.8 | 35.1 | 6.7 |
| | 19/2/11 5:51 | 210.3 | 18.2 | -28.3 | 27.5 | 37.8 | 7.1 |
| | 19/2/11 6:31 | 191.5 | 17.0 | -28.2 | 27.4 | 39.8 | 7.4 |
| | 19/2/11 7:11 | 174.6 | 15.5 | -28.3 | 28.2 | 44.3 | 7.9 |
| | 19/2/11 7:51 | 160.6 | 16.7 | -28.4 | 27.7 | 42.1 | 7.7 |
| | 19/2/11 8:31 | 149.1 | 14.5 | -28.3 | 28.0 | 46.1 | 8.1 |
| | 19/2/11 9:11 | 139.1 | 13.3 | -28.3 | 27.7 | 46.9 | 8.0 |
| | 19/2/11 9:51 | 130.7 | 12.7 | -28.3 | 27.6 | 49.1 | 8.1 |
| | 19/2/11 10:31 | 124.3 | 11.8 | -28.1 | 27.9 | 50.5 | 8.2 |
| | 19/2/11 11:11 | 119.3 | 11.3 | n.d. | 27.8 | 51.6 | 8.3 |
| | 19/2/11 11:51 | 115.2 | 10.5 | -28.1 | 27.4 | 51.9 | 8.2 |
| | 19/2/11 12:31 | 111.0 | 10.4 | -28.3 | 28.4 | 54.8 | 8.5 |
| | 19/2/11 13:11 | 107.8 | 10.1 | -28.3 | 28.0 | 55.2 | 8.6 |
| | 19/2/11 13:51 | 104.6 | 9.0 | n.d. | 28.3 | 57.1 | 8.6 |
| | 19/2/11 14:31 | 102.5 | 9.1 | -28.2 | 27.9 | 55.7 | 8.5 |
| | 19/2/11 15:11 | 99.5 | 8.6 | -28.2 | 28.4 | 58.4 | 8.6 |
| | 19/2/11 15:51 | 98.4 | 8.0 | n.d. | 28.1 | 58.0 | 8.6 |
| | 20/2/11 18:00 | 76.5 | 4.8 | n.d. | 30.8 | 72.1 | 8.8 |

12

13

End of supplementary Table 1

14

Supplementary Table 2

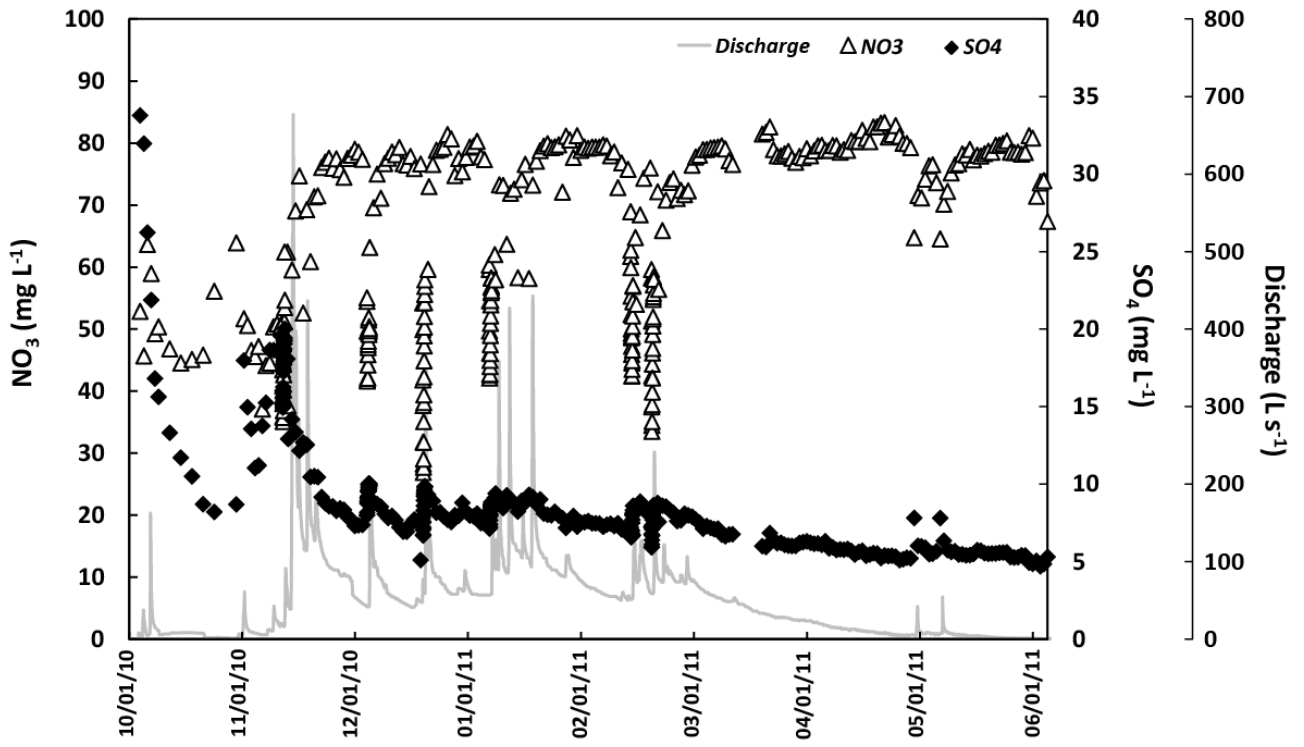
| Site | Distance to stream (m) | SOC | WEOC* | DOC |
|---------------------|------------------------|------------------------------|------------------------------|---------------------------|
| | | $\delta^{13}\text{C}$ (‰) | $\delta^{13}\text{C}$ (‰) | $\delta^{13}\text{C}$ (‰) |
| Wetland domain | 10 | -29.8 | -28.6 | 29.1±0.1** |
| Upland domain (PK2) | 95 | -27.0 | -25.6 | n.d. |
| Upland domain (PK3) | 190 | -26.4 | -24.9 | n.d. |
| Upland domain (PK4) | 240 | -26.5 | -24.3 | n.d. |

* WEOC : Water Extractable Organic Carbon

** Data measured in riparian soils at the beginning of the hydrological period B before the inputs of ^{13}C -enriched DOC from upland soils.

End of supplementary Table 2

Supplementary Figure 1



17

18

19

20