**Supplementary materials**

**Philosophical transactions B**

**Shifting levels of ecological network’s analysis reveals different system properties**

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< **Table A3 >** Biplot statistics for the comparison of Cliff’s δ between levels for the FCI trinomial (Finn Cycling Index) as shown in Figure 5 of the main article (comparisons shown in the figure and statistics given in the results section are highlighted in light grey), add additional flows and compartments evaluated. “Slope” is the slope of a regression line going through origin, shown as a red line in Figure 5, and “R2” is the degree of explanation in the regression and indicates the level of dispersion (high R2 values indicates low dispersion, low R2 values indicates high dispersion). “Distance” is the average shortest distance between all pairwise comparison (dots) and the black line 1:1 line in Figure 5 (black diagonal line, which indicates identical results between levels). Node (or compartment) names are given as three-letters abbreviation, see Figure 3 in main article for details.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **FCI** | | | | | | |
|  | **via DOC** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flows related to bacteria activity | DOCBAC | 0.33 | 0.42 | 0.42 | 0.60 | 0.60 | 0.28 |
| BACRES | 0.23 | 0.13 | 0.40 | 0.56 | 0.34 | 0.34 |
| BACDOC | 0.82 | 0.85 | 0.10 | 1.23 | 0.82 | 0.19 |
| BACHNF | 0.34 | 0.44 | 0.41 | 0.60 | 0.58 | 0.28 |
| BACROT | -0.05 | 0.00 | 0.48 | 0.03 | 0.00 | 0.54 |
| BACCLA | 0.29 | 0.10 | 0.32 | 0.50 | 0.14 | 0.40 |
| BACCIL | 0.49 | 0.37 | 0.26 | 0.82 | 0.44 | 0.30 |
| BACDET | 0.49 | 0.47 | 0.26 | 0.86 | 0.60 | 0.23 |
| BACVIR | -0.02 | 0.00 | 0.68 | 0.09 | 0.02 | 0.63 |
| Flow to DOC […toDOC] | PH3DOC | 0.20 | 0.08 | 0.40 | 0.40 | 0.15 | 0.41 |
| PH2DOC | -0.09 | 0.02 | 0.57 | -0.17 | 0.03 | 0.66 |
| PH1DOC | 0.00 | 0.00 | 0.49 | 0.01 | 0.00 | 0.56 |
| HNFDOC | 0.39 | 0.46 | 0.34 | 0.69 | 0.61 | 0.24 |
| CILDOC | 0.33 | 0.21 | 0.34 | 0.54 | 0.24 | 0.36 |
| ROTDOC | -0.17 | 0.11 | 0.70 | -0.16 | 0.04 | 0.72 |
| CLADOC | -0.13 | 0.03 | 0.50 | 0.00 | 0.00 | 0.54 |
| COPDOC | 0.01 | 0.00 | 0.53 | 0.18 | 0.04 | 0.52 |
| VIRDOC | 0.01 | 0.00 | 0.58 | 0.15 | 0.04 | 0.55 |
| DETDOC | 0.40 | 0.46 | 0.33 | 0.75 | 0.69 | 0.20 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.25\* | 0.22 | 0.43 | 0.44\* | 0.28 | 0.42 |
|  | **via DET** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flow to DET […toDET] | PH3DET | -0.23 | 0.11 | 0.82 | -0.06 | 0.01 | 0.72 |
| PH2DET | 0.32 | 0.07 | 0.42 | 0.19 | 0.02 | 0.46 |
| BACDET | 0.58 | 0.30 | 0.33 | 0.86 | 0.60 | 0.23 |
| HNFDET | 0.49 | 0.29 | 0.36 | 0.73 | 0.62 | 0.23 |
| CILDET | 0.44 | 0.14 | 0.40 | 0.52 | 0.18 | 0.38 |
| ROTDET | -0.01 | 0.00 | 0.60 | -0.17 | 0.04 | 0.68 |
| CLADET | 0.18 | 0.01 | 0.44 | -0.20 | 0.02 | 0.53 |
| COPDET | 0.37 | 0.12 | 0.41 | 0.21 | 0.04 | 0.48 |
| Flow from DET [DETto…] | DETCIL | 0.31 | 0.07 | 0.42 | 0.44 | 0.13 | 0.40 |
| DETROT | -0.01 | 0.00 | 0.55 | -0.17 | 0.03 | 0.62 |
| DETCLA | -0.14 | 0.02 | 0.58 | -0.38 | 0.14 | 0.67 |
| DETCOP | 0.28 | 0.05 | 0.42 | 0.10 | 0.01 | 0.50 |
| DETDOC | 0.61 | 0.48 | 0.29 | 0.75 | 0.69 | 0.20 |
| DETLOS | -0.30 | 0.17 | 0.82 | -0.12 | 0.02 | 0.71 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.21 | 0.13 | 0.49 | 0.19 | 0.18 | 0.49 |
|  | | | | | | | |
|  |  | **Node vs. Network level** | | |  | | |
|  | **Node name** | **Slope** | **R2** | **Distance** |  |  |  |
| Compartments | fciBAC | 1.37 | 0.80 | 0.21 |  |  |  |
| fciCIL | 1.06 | 0.84 | 0.16 |  |  |  |
| fciCLA | 0.21 | 0.03 | 0.47 |  |  |  |
| fciCOP | 0.14 | 0.03 | 0.54 |  |  |  |
| fciDET | 0.85 | 0.68 | 0.21 |  |  |  |
| fciDOC | 1.37 | 0.80 | 0.21 |  |  |  |
| fciHNF | 0.77 | 0.69 | 0.20 |  |  |  |
| fciROT | -0.20 | 0.06 | 0.73 |  |  |  |
| fciVIR | -0.17 | 0.02 | 0.56 |  |  |  |
|  | | | | | | | |
|  | **Mean value all nodes** | 0.68\* | 0.44 | 0.36 |  |  |  |

\*mean value of the slope is calculated from the absolute value of the slopes

< **Table A4 >** Biplot statistics for the comparison of Cliff’s δ between levels for the MTL trinomial (Mean Trophic Level index) as shown in Figure 6 of the main article (comparisons shown in the figure and statistics given in the results section are highlighted in light grey), add additional flows and compartments evaluated. “Slope” is the slope of a regression line going through origin, shown as a red line in Figure 6, and “R2” is the degree of explanation in the regression and indicates the level of dispersion (high R2 values indicates low dispersion, low R2 values indicates high dispersion). “Distance” is the average shortest distance between all pairwise comparison (dots) and the black line 1:1 line in Figure 6 (black diagonal line, which indicates identical results between levels). Node (or compartment) names are given as three-letters abbreviation, see Figure 3 in main article for details.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **MTL** | | | | | | |
|  | **via CIL** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flow to CIL […toCIL] | PH2CIL | -0.82 | 0.68 | 0.91 | -0.79 | 0.53 | 0.92 |
| PH1CIL | 0.41 | 0.11 | 0.44 | 0.34 | 0.06 | 0.49 |
| BACCIL | 0.95 | 0.50 | 0.29 | 0.8 | 0.3 | 0.39 |
| HNFCIL | 0.76 | 0.60 | 0.24 | 0.64 | 0.36 | 0.34 |
| from CIL [CILto…] | CILROT | -0.48 | 0.21 | 0.76 | -0.42 | 0.13 | 0.76 |
| CILCLA | -0.41 | 0.07 | 0.60 | -0.74 | 0.21 | 0.7 |
| CILCOP | 0.30 | 0.07 | 0.48 | 0.20 | 0.03 | 0.54 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.59\* | 0.32 | 0.53 | 0.56\* | 0.23 | 0.59 |
|  | | | | | | | |
|  | **via CLA** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flow to CIL […toCIL] | PH3CLA | -0.03 | 0.00 | 0.59 | 0.41 | 0.15 | 0.45 |
| PH2CLA | -0.61 | 0.61 | 0.76 | -0.93 | 0.71 | 0.95 |
| PH1CLA | 0.59 | 0.32 | 0.29 | 0.51 | 0.12 | 0.47 |
| BACCLA | 0.31 | 0.08 | 0.37 | 0.71 | 0.20 | 0.42 |
| HNFCLA | 0.76 | 0.50 | 0.23 | 0.99 | 0.42 | 0.36 |
| fr. CLA [CLAto…] | CILCLA | -0.54 | 0.22 | 0.55 | -0.74 | 0.21 | 0.70 |
| CLACOP | -0.07 | 0.01 | 0.50 | 0.04 | 0.00 | 0.57 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.42\* | 0.25 | 0.47 | 0.62\* | 0.26 | 0.56 |
|  | | | | | | | |
|  | **via COP** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flow to COP […toCOP] | PH3COP | -0.21 | 0.06 | 0.65 | 0.36 | 0.11 | 0.46 |
| PH2COP | 0.06 | 0.00 | 0.43 | -0.94 | 0.32 | 0.72 |
| PH1COP | 0.59 | 0.28 | 0.34 | 0.50 | 0.12 | 0.46 |
| HNFCOP | 0.90 | 0.50 | 0.25 | 0.77 | 0.22 | 0.42 |
| CILCOP | 0.63 | 0.43 | 0.29 | 0.20 | 0.03 | 0.54 |
| ROTCOP | -0.05 | 0.00 | 0.48 | -0.19 | 0.03 | 0.66 |
| CLACOP | 0.55 | 0.28 | 0.31 | 0.04 | 0.00 | 0.57 |
| from COP [CPÅto…] | COPDET | 0.27 | 0.08 | 0.43 | 0.39 | 0.09 | 0.48 |
| COPDOC | 0.22 | 0.07 | 0.47 | 0.32 | 0.09 | 0.49 |
| COPLOS | 0.21 | 0.06 | 0.48 | 0.30 | 0.08 | 0.50 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.37\* | 0.18 | 0.41 | 0.40\* | 0.11 | 0.53 |
|  | | | | | | | |
|  |  | **Node vs. Network level** | | |  | | |
|  | **Node name** | **Slope** | **R2** | **Distance** |  |  |  |
| Compartments | mtlCIL | 0.97 | 0.80 | 0.16 |  |  |  |
| mtlCLA | 1.11 | 0.61 | 0.29 |  |  |  |
| mtlCOP | 0.53 | 0.17 | 0.44 |  |  |  |
| mtlHNF | 0.34 | 0.14 | 0.47 |  |  |  |
| mtlROT | 0.56 | 0.10 | 0.48 |  |  |  |
| mtlVIR | 0.27 | 0.06 | 0.51 |  |  |  |
|  | | | | | | | |
|  | **Mean value all nodes** | 0.63 | 0.31 | 0.39 |  |  |  |

\*mean value of the slope is calculated from the absolute value of the slopes

**< Table A5 >** Biplot statistics for the comparison of Cliff’s δ between levels for the SOI trinomial (System Omnivory Index) as shown in Figure 7 of the main article (comparisons shown in the figure and statistics given in the results section are highlighted in light grey), add additional flows and compartments evaluated. “Slope” is the slope of a regression line going through origin, shown as a red line in Figure 7, and “R2” is the degree of explanation in the regression and indicates the level of dispersion (high R2 values indicates low dispersion, low R2 values indicates high dispersion). “Distance” is the average shortest distance between all pairwise comparison (dots) and the black line 1:1 line in Figure 7 (black diagonal line, which indicates identical results between levels). Node (or compartment) names are given as three-letters abbreviation, see Figure 3 in main article for details.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **SOI** | | | | | | |
|  | **via CIL** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flow to CIL […toCIL] | PH2CIL | -0.74 | 0.64 | 0.86 | -0.69 | 0.39 | 0.91 |
| PH1CIL | 0.34 | 0.09 | 0.43 | 0.50 | 0.13 | 0.46 |
| BACCIL | 0.86 | 0.48 | 0.28 | 1.25 | 0.70 | 0.27 |
| HNFCIL | 0.70 | 0.58 | 0.25 | 0.95 | 0.76 | 0.20 |
| from CIL [CILto…] | CILROT | -0.36 | 0.14 | 0.71 | -0.24 | 0.04 | 0.71 |
| CILCLA | -0.35 | 0.06 | 0.56 | -0.33 | 0.04 | 0.64 |
| CILCOP | 0.24 | 0.05 | 0.48 | 0.05 | 0.00 | 0.57 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.51\* | 0.29 | 0.51 | 0.57\* | 0.29 | 0.54 |
|  | | | | | | | |
|  | **via CLA** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flow to CIL […toCIL] | PH3CLA | 0.02 | 0.00 | 0.55 | 0.31 | 0.09 | 0.51 |
| PH2CLA | -0.58 | 0.64 | 0.74 | -0.63 | 0.31 | 0.85 |
| PH1CLA | 0.53 | 0.29 | 0.28 | 0.75 | 0.24 | 0.42 |
| BACCLA | 0.25 | 0.06 | 0.36 | 0.90 | 0.31 | 0.38 |
| HNFCLA | 0.70 | 0.48 | 0.23 | 1.09 | 0.48 | 0.33 |
| fr. CLA [CLAto…] | CILCLA | -0.51 | 0.23 | 0.53 | -0.33 | 0.04 | 0.64 |
| CLACOP | -0.16 | 0.03 | 0.51 | -0.13 | 0.01 | 0.61 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.39\* | 0.25 | 0.46 | 0.59\* | 0.21 | 0.54 |
|  | | | | | | | |
|  | **via COP** | | | | | | |
|  |  | **Flow vs. Node level** | | | **Flow vs. Network level** | | |
|  | **Flow name** | **Slope** | **R2** | **Distance** | **Slope** | **R2** | **Distance** |
| Flow to COP […toCOP] | PH3COP | 0.12 | 0.02 | 0.52 | 0.40 | 0.13 | 0.46 |
| PH2COP | -0.39 | 0.09 | 0.54 | -0.67 | 0.15 | 0.68 |
| PH1COP | 0.58 | 0.26 | 0.34 | 0.72 | 0.24 | 0.42 |
| HNFCOP | 0.94 | 0.53 | 0.24 | 0.32 | 0.04 | 0.51 |
| CILCOP | 0.44 | 0.20 | 0.36 | 0.05 | 0.00 | 0.57 |
| ROTCOP | -0.03 | 0.00 | 0.52 | 0.00 | 0.00 | 0.62 |
| CLACOP | 0.32 | 0.09 | 0.40 | -0.13 | 0.01 | 0.61 |
| from COP [CPÅto…] | COPDET | 0.38 | 0.14 | 0.39 | 0.27 | 0.04 | 0.53 |
| COPDOC | 0.32 | 0.15 | 0.42 | 0.25 | 0.05 | 0.54 |
| COPLOS | 0.30 | 0.13 | 0.43 | 0.23 | 0.04 | 0.55 |
|  | | | | | | | |
|  | **Mean value all flows** | 0.38\* | 0.16 | 0.42 | 0.30\* | 0.07 | 0.55 |
|  | | | | | | | |
|  |  | **Node vs. Network level** | | |  | | |
|  | **Node name** | **Slope** | **R2** | **Distance** |  |  |  |
| Compartments | soiCIL | 1.06 | 0.79 | 0.19 |  |  |  |
| soiCLA | 1.14 | 0.54 | 0.33 |  |  |  |
| soiCOP | 0.80 | 0.37 | 0.33 |  |  |  |
| soiHNF | -0.62 | 0.47 | 1.03 |  |  |  |
| soiROT | 1.01 | 0.34 | 0.39 |  |  |  |
| soiVIR | -0.37 | 0.09 | 0.74 |  |  |  |
|  | | | | | | | |
|  | **Mean value all nodes** | 0.83 | 0.43 | 0.50 |  |  |  |

< **Table A6** > Summary values of distance for A) all trinomials presented within the main article (values are taken from light-gray marked cells in table A3, A4, A5, which are those comparisons shown in Figure 5, 6, and 7 of the main article), and B) the average distance for all trinomials compared (values are taken the “Mean value” row from table A3, A4, A5).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A)** | **All trinomials figure 5, 6, and 7 in main article** | | | |
|  |  | **Flow vs. Node** | **Flow vs. Network** | **Node vs. Network** |
| **FCI** | **DOC** | 0.10 | 0.19 | 0.21 |
|  | **DET** | 0.29 | 0.20 | 0.21 |
| **MTL** | **CIL** | 0.24 | 0.34 | 0.16 |
|  | **CLA** | 0.23 | 0.36 | 0.29 |
|  | **COP** | 0.25 | 0.42 | 0.44 |
| **SOI** | **CIL** | 0.25 | 0.20 | 0.19 |
|  | **CLA** | 0.23 | 0.33 | 0.33 |
|  | **COP** | 0.24 | 0.51 | 0.33 |
|  | | | | |
|  | **Average** | **0.23** | **0.32** | **0.25** |
|  | | | | |
| **B)** | **All trinomials compared table A3, A4, and A5** | | | |
|  |  | **Flow vs. Node** | **Flow vs. Network** | **Node vs. Network** |
| **FCI** | **DOC** | 0.43 | 0.42 | 0.36 |
|  | **DET** | 0.49 | 0.49 |
| **MTL** | **CIL** | 0.53 | 0.59 | 0.39 |
|  | **CLA** | 0.47 | 0.56 |
|  | **COP** | 0.41 | 0.53 |
| **SOI** | **CIL** | 0.51 | 0.54 | 0.50 |
|  | **CLA** | 0.46 | 0.54 |
|  | **COP** | 0.42 | 0.55 |
|  | | | | |
|  | **Average** | **0.47** | **0.53** | **0.42** |