Benchmark estimates for aboveground litterfall data derived from ecosystem models – Supplementary Material

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Supplementary Material

Table S1. Leaf longevities for each plant functional type (PFT) of different models.

| Model     | PFT                                           | Leaf longevity (yr) |
|-----------|-----------------------------------------------|---------------------|
| Biome-BGC | Deciduous broadleaf forest                    | 1.00                |
| Biome-BGC | Deciduous needleleaf forest                   | 1.00                |
| Biome-BGC | Evergreen broadleaf forest – tropical         | 2.00                |
| Biome-BGC | Evergreen needleleaf forest - cool climate    | 4.00                |
| Biome-BGC | Evergreen shrubs                              | 4.00                |
| Biome-BGC | C3 grasses                                    | 1.00                |
| Biome-BGC | C4 grasses                                    | 1.00                |
| IBIS      | Tropical broadleaf evergreen trees            | 1.00                |
| IBIS      | Tropical broadleaf drought - deciduous trees  | 1.00                |
| IBIS      | Warm - temperate broadleaf evergreen trees    | 1.00                |
| IBIS      | Temperate conifer evergreen trees             | 2.00                |
| IBIS      | Temperate broadleaf cold - deciduous trees   | 1.00                |
| IBIS      | Boreal conifer evergreen trees                | 2.50                |
| IBIS      | Boreal broadleaf cold - deciduous trees       | 1.00                |
| IBIS      | Boreal conifer cold - deciduous trees         | 1.00                |
| IBIS      | Evergreen shrubs                              | 1.50                |
| IBIS      | Deciduous shrubs                              | 1.00                |
| IBIS      | Warm (C4) grasses                             | 1.25                |
| IBIS      | Cool (C3) grasses                             | 1.50                |
| LPJ       | Tropical broadleaf evergreen trees            | 2.00                |
| LPJ       | Tropical broadleaf raingreen trees            | 1.00                |
| Vegetation Type                                      | Value |
|-----------------------------------------------------|-------|
| Temperate needleleaf evergreen trees                | 2.00  |
| Temperate broadleaf evergreen trees                 | 1.00  |
| Temperate broadleaf summergreen trees               | 1.00  |
| Boreal needleleaf evergreen trees                   | 2.00  |
| Boreal needleleaf summergreen trees                 | 1.00  |
| Boreal broadleaf summergreen trees                  | 1.00  |
| C3 perennial grasses                                 | 1.00  |
| C4 perennial grasses                                 | 1.00  |

**ORCHIDEE-MICT**

| Vegetation Type                                      | Value |
|-----------------------------------------------------|-------|
| Tropical broadleaf evergreen trees                  | 2.00  |
| Tropical broadleaf dry-season deciduous trees       | 0.49  |
| Temperate needleleaf evergreen trees                | 2.49  |
| Temperate broadleaf evergreen trees                 | 2.00  |
| Temperate broadleaf summer-green trees              | 0.44  |
| Boreal needleleaf evergreen trees                   | 2.49  |
| Boreal broadleaf summer-green trees                 | 0.60  |
| Boreal needleleaf summer-green trees                | 0.33  |
| Natural C3 grasses                                   | 0.22  |
| Natural C4 grasses                                   | 0.33  |
| Agricultural C3 grasses                              | 0.25  |
| Agricultural C4 grasses                              | 0.25  |

**VISIT**

| Vegetation Type                                      | Value |
|-----------------------------------------------------|-------|
| Tropical evergreen forest                            | 0.71  |
| Tropical seasonal forest                             | 0.66  |
| Temperate (mixed) forest                             | 0.71  |
| Evergreen needleleaf forest                          | 1.41  |
| Deciduous needleleaf forest                           | 0.21  |
| Woodland                                             | 0.99  |
| Grassland                                            | 0.94  |
| Savanna                                              | 0.37  |
| Tundra                                               | 1.97  |
Figure S1. Distribution maps of correlation coefficients between aboveground litterfall production (cLitter) and heterotrophic respiration (RH) simulated by: (a) Biome-BGC, (b) IBIS, (c) LPJ, (d) ORCHIDEE-MICT and (e) VISIT, where colors indicate significant negative correlations (SNC, p<0.05), negative correlations (NC), positive correlations (PC) and significant positive correlations (SPC, p<0.05).

Figure S2. Distribution map of correlation coefficients between cLitter predicted by RF and (a) CRU-NCEP v8 (National Centers for Environmental Prediction) mean annual temperature (Temp), (b) the Global Inventory Modeling and Mapping Studies (GIMMS) annual mean normalized difference vegetation index (NDVI), where colors
indicate significant negative correlations (SNC, p<0.05), negative correlations (NC), positive correlations (PC), and significant positive correlations (SPC, p<0.05).

Figure S3. Relations between observed aboveground litterfall and (a) annual mean air temperature; (b) annual mean normalized difference vegetation index (NDVI).