Model call record

Sasha D. Hafner

11 January, 2022

Calculates emission factors

Check package version.

```
packageVersion('ALFAM2')
```

```
## [1] '1.5.5'
```

Parameter values.

```
ALFAM2pars02
```

```
##            int.f0    app.mthd.os.f0    app.rate.ni.f0         man.dm.f0
##       -0.60568338       -1.74351499       -0.01114900        0.39967070
## man.source.pig.f0    app.mthd.cs.f0            int.r1    app.mthd.bc.r1
##       -0.59202858       -7.63373787       -0.93921516        0.79352480
##         man.dm.r1       air.temp.r1        wind.2m.r1    app.mthd.ts.r1
##       -0.13988189        0.07354268        0.15026720       -0.45907135
## ts.cereal.hght.r1         man.ph.r1            int.r2      rain.rate.r2
##       -0.24471238        0.66500000       -1.79918546        0.39402156
##            int.r3    app.mthd.bc.r3    app.mthd.cs.r3         man.ph.r3
##       -3.22841225        0.56153956       -0.66647417        0.23800000
## incorp.shallow.f4 incorp.shallow.r3    incorp.deep.f4    incorp.deep.r3
##       -0.96496655       -0.58052689       -3.69494954       -1.26569562
```

```
dat
```

```
##      app.timing  air.temp  wind.2m  rain.rate  scenario        man.source
## 1         Marts  4.431012 4.058916 0.05996290 reference        Svinegylle
## 2         April  8.236460 3.844456 0.05521194 reference        Svinegylle
## 3           Maj 12.449250 3.483915 0.07029935 reference        Svinegylle
```

```
## 4       Sommer 16.876226 3.156240 0.10592531 reference        Svinegylle
## 5      Efterår 14.497748 3.322770 0.12826017 reference        Svinegylle
## 1.1      Marts  4.431012 4.058916 0.05996290 reference         Kvæggylle
## 2.1      April  8.236460 3.844456 0.05521194 reference         Kvæggylle
## 3.1        Maj 12.449250 3.483915 0.07029935 reference         Kvæggylle
## 4.1     Sommer 16.876226 3.156240 0.10592531 reference         Kvæggylle
## 5.1    Efterår 14.497748 3.322770 0.12826017 reference         Kvæggylle
## 1.2      Marts  4.431012 4.058916 0.05996290 reference Afgasset biomasse
## 2.2      April  8.236460 3.844456 0.05521194 reference Afgasset biomasse
## 3.2        Maj 12.449250 3.483915 0.07029935 reference Afgasset biomasse
## 4.2     Sommer 16.876226 3.156240 0.10592531 reference Afgasset biomasse
## 5.2    Efterår 14.497748 3.322770 0.12826017 reference Afgasset biomasse
## 1.3      Marts  4.431012 4.058916 0.05996290       low        Svinegylle
## 2.3      April  8.236460 3.844456 0.05521194       low        Svinegylle
## 3.3        Maj 12.449250 3.483915 0.07029935       low        Svinegylle
## 4.3     Sommer 16.876226 3.156240 0.10592531       low        Svinegylle
## 5.3    Efterår 14.497748 3.322770 0.12826017       low        Svinegylle
## 1.4      Marts  4.431012 4.058916 0.05996290       low         Kvæggylle
## 2.4      April  8.236460 3.844456 0.05521194       low         Kvæggylle
## 3.4        Maj 12.449250 3.483915 0.07029935       low         Kvæggylle
## 4.4     Sommer 16.876226 3.156240 0.10592531       low         Kvæggylle
## 5.4    Efterår 14.497748 3.322770 0.12826017       low         Kvæggylle
## 1.5      Marts  4.431012 4.058916 0.05996290       low Afgasset biomasse
## 2.5      April  8.236460 3.844456 0.05521194       low Afgasset biomasse
## 3.5        Maj 12.449250 3.483915 0.07029935       low Afgasset biomasse
## 4.5     Sommer 16.876226 3.156240 0.10592531       low Afgasset biomasse
## 5.5    Efterår 14.497748 3.322770 0.12826017       low Afgasset biomasse
## 1.6      Marts  4.431012 4.058916 0.05996290       mid        Svinegylle
## 2.6      April  8.236460 3.844456 0.05521194       mid        Svinegylle
## 3.6        Maj 12.449250 3.483915 0.07029935       mid        Svinegylle
## 4.6     Sommer 16.876226 3.156240 0.10592531       mid        Svinegylle
## 5.6    Efterår 14.497748 3.322770 0.12826017       mid        Svinegylle
## 1.7      Marts  4.431012 4.058916 0.05996290       mid         Kvæggylle
## 2.7      April  8.236460 3.844456 0.05521194       mid         Kvæggylle
## 3.7        Maj 12.449250 3.483915 0.07029935       mid         Kvæggylle
## 4.7     Sommer 16.876226 3.156240 0.10592531       mid         Kvæggylle
## 5.7    Efterår 14.497748 3.322770 0.12826017       mid         Kvæggylle
## 1.8      Marts  4.431012 4.058916 0.05996290       mid Afgasset biomasse
## 2.8      April  8.236460 3.844456 0.05521194       mid Afgasset biomasse
```

```
## 3.8         Maj 12.449250 3.483915 0.07029935       mid Afgasset biomasse
## 4.8      Sommer 16.876226 3.156240 0.10592531       mid Afgasset biomasse
## 5.8    Efterår 14.497748 3.322770 0.12826017       mid Afgasset biomasse
## 1.9       Marts  4.431012 4.058916 0.05996290      high         Svinegylle
## 2.9       April  8.236460 3.844456 0.05521194      high         Svinegylle
## 3.9         Maj 12.449250 3.483915 0.07029935      high         Svinegylle
## 4.9      Sommer 16.876226 3.156240 0.10592531      high         Svinegylle
## 5.9    Efterår 14.497748 3.322770 0.12826017      high         Svinegylle
## 1.10      Marts  4.431012 4.058916 0.05996290      high          Kvæggylle
## 2.10      April  8.236460 3.844456 0.05521194      high          Kvæggylle
## 3.10        Maj 12.449250 3.483915 0.07029935      high          Kvæggylle
## 4.10     Sommer 16.876226 3.156240 0.10592531      high          Kvæggylle
## 5.10   Efterår 14.497748 3.322770 0.12826017      high          Kvæggylle
## 1.11      Marts  4.431012 4.058916 0.05996290      high Afgasset biomasse
## 2.11      April  8.236460 3.844456 0.05521194      high Afgasset biomasse
## 3.11        Maj 12.449250 3.483915 0.07029935      high Afgasset biomasse
## 4.11     Sommer 16.876226 3.156240 0.10592531      high Afgasset biomasse
## 5.11   Efterår 14.497748 3.322770 0.12826017      high Afgasset biomasse
## 1.12      Marts  4.431012 4.058916 0.05996290     high2         Svinegylle
## 2.12      April  8.236460 3.844456 0.05521194     high2         Svinegylle
## 3.12        Maj 12.449250 3.483915 0.07029935     high2         Svinegylle
## 4.12     Sommer 16.876226 3.156240 0.10592531     high2         Svinegylle
## 5.12   Efterår 14.497748 3.322770 0.12826017     high2         Svinegylle
## 1.13      Marts  4.431012 4.058916 0.05996290     high2          Kvæggylle
## 2.13      April  8.236460 3.844456 0.05521194     high2          Kvæggylle
## 3.13        Maj 12.449250 3.483915 0.07029935     high2          Kvæggylle
## 4.13     Sommer 16.876226 3.156240 0.10592531     high2          Kvæggylle
## 5.13   Efterår 14.497748 3.322770 0.12826017     high2          Kvæggylle
## 1.14      Marts  4.431012 4.058916 0.05996290     high2 Afgasset biomasse
## 2.14      April  8.236460 3.844456 0.05521194     high2 Afgasset biomasse
## 3.14        Maj 12.449250 3.483915 0.07029935     high2 Afgasset biomasse
## 4.14     Sommer 16.876226 3.156240 0.10592531     high2 Afgasset biomasse
## 5.14   Efterår 14.497748 3.322770 0.12826017     high2 Afgasset biomasse
## 1.15      Marts  4.431012 4.058916 0.05996290       low         Svinegylle
## 2.15      April  8.236460 3.844456 0.05521194       low         Svinegylle
## 3.15        Maj 12.449250 3.483915 0.07029935       low         Svinegylle
## 4.15     Sommer 16.876226 3.156240 0.10592531       low         Svinegylle
## 5.15   Efterår 14.497748 3.322770 0.12826017       low         Svinegylle
## 1.16      Marts  4.431012 4.058916 0.05996290       low          Kvæggylle
```

```
## 2.16      April  8.236460 3.844456 0.05521194       low         Kvæggylle
## 3.16        Maj 12.449250 3.483915 0.07029935       low         Kvæggylle
## 4.16     Sommer 16.876226 3.156240 0.10592531       low         Kvæggylle
## 5.16    Efterår 14.497748 3.322770 0.12826017       low         Kvæggylle
## 1.17      Marts  4.431012 4.058916 0.05996290       low Afgasset biomasse
## 2.17      April  8.236460 3.844456 0.05521194       low Afgasset biomasse
## 3.17        Maj 12.449250 3.483915 0.07029935       low Afgasset biomasse
## 4.17     Sommer 16.876226 3.156240 0.10592531       low Afgasset biomasse
## 5.17    Efterår 14.497748 3.322770 0.12826017       low Afgasset biomasse
## 1.18      Marts  4.431012 4.058916 0.05996290       low        Svinegylle
## 2.18      April  8.236460 3.844456 0.05521194       low        Svinegylle
## 3.18        Maj 12.449250 3.483915 0.07029935       low        Svinegylle
## 4.18     Sommer 16.876226 3.156240 0.10592531       low        Svinegylle
## 5.18    Efterår 14.497748 3.322770 0.12826017       low        Svinegylle
## 1.19      Marts  4.431012 4.058916 0.05996290       low         Kvæggylle
## 2.19      April  8.236460 3.844456 0.05521194       low         Kvæggylle
## 3.19        Maj 12.449250 3.483915 0.07029935       low         Kvæggylle
## 4.19     Sommer 16.876226 3.156240 0.10592531       low         Kvæggylle
## 5.19    Efterår 14.497748 3.322770 0.12826017       low         Kvæggylle
## 1.20      Marts  4.431012 4.058916 0.05996290       low Afgasset biomasse
## 2.20      April  8.236460 3.844456 0.05521194       low Afgasset biomasse
## 3.20        Maj 12.449250 3.483915 0.07029935       low Afgasset biomasse
## 4.20     Sommer 16.876226 3.156240 0.10592531       low Afgasset biomasse
## 5.20    Efterår 14.497748 3.322770 0.12826017       low Afgasset biomasse
## 1.21      Marts  4.431012 4.058916 0.05996290       mid        Svinegylle
## 2.21      April  8.236460 3.844456 0.05521194       mid        Svinegylle
## 3.21        Maj 12.449250 3.483915 0.07029935       mid        Svinegylle
## 4.21     Sommer 16.876226 3.156240 0.10592531       mid        Svinegylle
## 5.21    Efterår 14.497748 3.322770 0.12826017       mid        Svinegylle
## 1.22      Marts  4.431012 4.058916 0.05996290       mid         Kvæggylle
## 2.22      April  8.236460 3.844456 0.05521194       mid         Kvæggylle
## 3.22        Maj 12.449250 3.483915 0.07029935       mid         Kvæggylle
## 4.22     Sommer 16.876226 3.156240 0.10592531       mid         Kvæggylle
## 5.22    Efterår 14.497748 3.322770 0.12826017       mid         Kvæggylle
## 1.23      Marts  4.431012 4.058916 0.05996290       mid Afgasset biomasse
## 2.23      April  8.236460 3.844456 0.05521194       mid Afgasset biomasse
## 3.23        Maj 12.449250 3.483915 0.07029935       mid Afgasset biomasse
## 4.23     Sommer 16.876226 3.156240 0.10592531       mid Afgasset biomasse
## 5.23    Efterår 14.497748 3.322770 0.12826017       mid Afgasset biomasse
```

```
## 1.24      Marts  4.431012 4.058916 0.05996290       mid        Svinegylle
## 2.24      April  8.236460 3.844456 0.05521194       mid        Svinegylle
## 3.24        Maj 12.449250 3.483915 0.07029935       mid        Svinegylle
## 4.24     Sommer 16.876226 3.156240 0.10592531       mid        Svinegylle
## 5.24    Efterår 14.497748 3.322770 0.12826017       mid        Svinegylle
## 1.25      Marts  4.431012 4.058916 0.05996290       mid         Kvæggylle
## 2.25      April  8.236460 3.844456 0.05521194       mid         Kvæggylle
## 3.25        Maj 12.449250 3.483915 0.07029935       mid         Kvæggylle
## 4.25     Sommer 16.876226 3.156240 0.10592531       mid         Kvæggylle
## 5.25    Efterår 14.497748 3.322770 0.12826017       mid         Kvæggylle
## 1.26      Marts  4.431012 4.058916 0.05996290       mid Afgasset biomasse
## 2.26      April  8.236460 3.844456 0.05521194       mid Afgasset biomasse
## 3.26        Maj 12.449250 3.483915 0.07029935       mid Afgasset biomasse
## 4.26     Sommer 16.876226 3.156240 0.10592531       mid Afgasset biomasse
## 5.26    Efterår 14.497748 3.322770 0.12826017       mid Afgasset biomasse
## 1.27      Marts  4.431012 4.058916 0.05996290      high        Svinegylle
## 2.27      April  8.236460 3.844456 0.05521194      high        Svinegylle
## 3.27        Maj 12.449250 3.483915 0.07029935      high        Svinegylle
## 4.27     Sommer 16.876226 3.156240 0.10592531      high        Svinegylle
## 5.27    Efterår 14.497748 3.322770 0.12826017      high        Svinegylle
## 1.28      Marts  4.431012 4.058916 0.05996290      high         Kvæggylle
## 2.28      April  8.236460 3.844456 0.05521194      high         Kvæggylle
## 3.28        Maj 12.449250 3.483915 0.07029935      high         Kvæggylle
## 4.28     Sommer 16.876226 3.156240 0.10592531      high         Kvæggylle
## 5.28    Efterår 14.497748 3.322770 0.12826017      high         Kvæggylle
## 1.29      Marts  4.431012 4.058916 0.05996290      high Afgasset biomasse
## 2.29      April  8.236460 3.844456 0.05521194      high Afgasset biomasse
## 3.29        Maj 12.449250 3.483915 0.07029935      high Afgasset biomasse
## 4.29     Sommer 16.876226 3.156240 0.10592531      high Afgasset biomasse
## 5.29    Efterår 14.497748 3.322770 0.12826017      high Afgasset biomasse
## 1.30      Marts  4.431012 4.058916 0.05996290      high        Svinegylle
## 2.30      April  8.236460 3.844456 0.05521194      high        Svinegylle
## 3.30        Maj 12.449250 3.483915 0.07029935      high        Svinegylle
## 4.30     Sommer 16.876226 3.156240 0.10592531      high        Svinegylle
## 5.30    Efterår 14.497748 3.322770 0.12826017      high        Svinegylle
## 1.31      Marts  4.431012 4.058916 0.05996290      high         Kvæggylle
## 2.31      April  8.236460 3.844456 0.05521194      high         Kvæggylle
## 3.31        Maj 12.449250 3.483915 0.07029935      high         Kvæggylle
## 4.31     Sommer 16.876226 3.156240 0.10592531      high         Kvæggylle
```

```
## 5.31    Efterår 14.497748 3.322770 0.12826017      high         Kvæggylle
## 1.32      Marts  4.431012 4.058916 0.05996290      high Afgasset biomasse
## 2.32      April  8.236460 3.844456 0.05521194      high Afgasset biomasse
## 3.32        Maj 12.449250 3.483915 0.07029935      high Afgasset biomasse
## 4.32     Sommer 16.876226 3.156240 0.10592531      high Afgasset biomasse
## 5.32    Efterår 14.497748 3.322770 0.12826017      high Afgasset biomasse
## 1.33      Marts  4.431012 4.058916 0.05996290     high2        Svinegylle
## 2.33      April  8.236460 3.844456 0.05521194     high2        Svinegylle
## 3.33        Maj 12.449250 3.483915 0.07029935     high2        Svinegylle
## 4.33     Sommer 16.876226 3.156240 0.10592531     high2        Svinegylle
## 5.33    Efterår 14.497748 3.322770 0.12826017     high2        Svinegylle
## 1.34      Marts  4.431012 4.058916 0.05996290     high2         Kvæggylle
## 2.34      April  8.236460 3.844456 0.05521194     high2         Kvæggylle
## 3.34        Maj 12.449250 3.483915 0.07029935     high2         Kvæggylle
## 4.34     Sommer 16.876226 3.156240 0.10592531     high2         Kvæggylle
## 5.34    Efterår 14.497748 3.322770 0.12826017     high2         Kvæggylle
## 1.35      Marts  4.431012 4.058916 0.05996290     high2 Afgasset biomasse
## 2.35      April  8.236460 3.844456 0.05521194     high2 Afgasset biomasse
## 3.35        Maj 12.449250 3.483915 0.07029935     high2 Afgasset biomasse
## 4.35     Sommer 16.876226 3.156240 0.10592531     high2 Afgasset biomasse
## 5.35    Efterår 14.497748 3.322770 0.12826017     high2 Afgasset biomasse
## 1.36      Marts  4.431012 4.058916 0.05996290     high2        Svinegylle
## 2.36      April  8.236460 3.844456 0.05521194     high2        Svinegylle
## 3.36        Maj 12.449250 3.483915 0.07029935     high2        Svinegylle
## 4.36     Sommer 16.876226 3.156240 0.10592531     high2        Svinegylle
## 5.36    Efterår 14.497748 3.322770 0.12826017     high2        Svinegylle
## 1.37      Marts  4.431012 4.058916 0.05996290     high2         Kvæggylle
## 2.37      April  8.236460 3.844456 0.05521194     high2         Kvæggylle
## 3.37        Maj 12.449250 3.483915 0.07029935     high2         Kvæggylle
## 4.37     Sommer 16.876226 3.156240 0.10592531     high2         Kvæggylle
## 5.37    Efterår 14.497748 3.322770 0.12826017     high2         Kvæggylle
## 1.38      Marts  4.431012 4.058916 0.05996290     high2 Afgasset biomasse
## 2.38      April  8.236460 3.844456 0.05521194     high2 Afgasset biomasse
## 3.38        Maj 12.449250 3.483915 0.07029935     high2 Afgasset biomasse
## 4.38     Sommer 16.876226 3.156240 0.10592531     high2 Afgasset biomasse
## 5.38    Efterår 14.497748 3.322770 0.12826017     high2 Afgasset biomasse
##      fraction red.dm man.dm man.ph incorp      app.mthd t.incorp app.rate.ni
## 1         raw      0  3.900    7.2   none Trailing hose       NA          30
## 2         raw      0  3.900    7.2   none Trailing hose       NA          30
```

```
## 3         raw      0  3.900    7.2   none Trailing hose       NA          30
## 4         raw      0  3.900    7.2   none Trailing hose       NA          30
## 5         raw      0  3.900    7.2   none Trailing hose       NA          30
## 1.1       raw      0  6.500    7.0   none Trailing hose       NA          30
## 2.1       raw      0  6.500    7.0   none Trailing hose       NA          30
## 3.1       raw      0  6.500    7.0   none Trailing hose       NA          30
## 4.1       raw      0  6.500    7.0   none Trailing hose       NA          30
## 5.1       raw      0  6.500    7.0   none Trailing hose       NA          30
## 1.2       raw      0  5.900    7.9   none Trailing hose       NA          30
## 2.2       raw      0  5.900    7.9   none Trailing hose       NA          30
## 3.2       raw      0  5.900    7.9   none Trailing hose       NA          30
## 4.2       raw      0  5.900    7.9   none Trailing hose       NA          30
## 5.2       raw      0  5.900    7.9   none Trailing hose       NA          30
## 1.3    liquid   0.55  1.755    7.4   none Trailing hose       NA          30
## 2.3    liquid   0.55  1.755    7.4   none Trailing hose       NA          30
## 3.3    liquid   0.55  1.755    7.4   none Trailing hose       NA          30
## 4.3    liquid   0.55  1.755    7.4   none Trailing hose       NA          30
## 5.3    liquid   0.55  1.755    7.4   none Trailing hose       NA          30
## 1.4    liquid   0.55  2.925    7.2   none Trailing hose       NA          30
## 2.4    liquid   0.55  2.925    7.2   none Trailing hose       NA          30
## 3.4    liquid   0.55  2.925    7.2   none Trailing hose       NA          30
## 4.4    liquid   0.55  2.925    7.2   none Trailing hose       NA          30
## 5.4    liquid   0.55  2.925    7.2   none Trailing hose       NA          30
## 1.5    liquid   0.55  2.655    8.1   none Trailing hose       NA          30
## 2.5    liquid   0.55  2.655    8.1   none Trailing hose       NA          30
## 3.5    liquid   0.55  2.655    8.1   none Trailing hose       NA          30
## 4.5    liquid   0.55  2.655    8.1   none Trailing hose       NA          30
## 5.5    liquid   0.55  2.655    8.1   none Trailing hose       NA          30
## 1.6    liquid   0.35  2.535    7.4   none Trailing hose       NA          30
## 2.6    liquid   0.35  2.535    7.4   none Trailing hose       NA          30
## 3.6    liquid   0.35  2.535    7.4   none Trailing hose       NA          30
## 4.6    liquid   0.35  2.535    7.4   none Trailing hose       NA          30
## 5.6    liquid   0.35  2.535    7.4   none Trailing hose       NA          30
## 1.7    liquid   0.35  4.225    7.2   none Trailing hose       NA          30
## 2.7    liquid   0.35  4.225    7.2   none Trailing hose       NA          30
## 3.7    liquid   0.35  4.225    7.2   none Trailing hose       NA          30
## 4.7    liquid   0.35  4.225    7.2   none Trailing hose       NA          30
## 5.7    liquid   0.35  4.225    7.2   none Trailing hose       NA          30
## 1.8    liquid   0.35  3.835    8.1   none Trailing hose       NA          30
```

```
## 2.8    liquid   0.35  3.835    8.1   none Trailing hose       NA          30
## 3.8    liquid   0.35  3.835    8.1   none Trailing hose       NA          30
## 4.8    liquid   0.35  3.835    8.1   none Trailing hose       NA          30
## 5.8    liquid   0.35  3.835    8.1   none Trailing hose       NA          30
## 1.9    liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 2.9    liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 3.9    liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 4.9    liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 5.9    liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 1.10   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 2.10   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 3.10   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 4.10   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 5.10   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 1.11   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 2.11   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 3.11   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 4.11   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 5.11   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 1.12   liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 2.12   liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 3.12   liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 4.12   liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 5.12   liquid   0.15  3.315    7.4   none Trailing hose       NA          30
## 1.13   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 2.13   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 3.13   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 4.13   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 5.13   liquid   0.15  5.525    7.2   none Trailing hose       NA          30
## 1.14   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 2.14   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 3.14   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 4.14   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 5.14   liquid   0.15  5.015    8.1   none Trailing hose       NA          30
## 1.15    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 2.15    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 3.15    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 4.15    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 5.15    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
```

```
## 1.16    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 2.16    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 3.16    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 4.16    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 5.16    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 1.17    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 2.17    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 3.17    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 4.17    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 5.17    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 1.18    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 2.18    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 3.18    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 4.18    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 5.18    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 1.19    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 2.19    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 3.19    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 4.19    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 5.19    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 1.20    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 2.20    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 3.20    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 4.20    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 5.20    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 1.21    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 2.21    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 3.21    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 4.21    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 5.21    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 1.22    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 2.22    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 3.22    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 4.22    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 5.22    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 1.23    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 2.23    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 3.23    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 4.23    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
```

```
## 5.23    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 1.24    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 2.24    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 3.24    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 4.24    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 5.24    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 1.25    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 2.25    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 3.25    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 4.25    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 5.25    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 1.26    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 2.26    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 3.26    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 4.26    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 5.26    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 1.27    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 2.27    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 3.27    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 4.27    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 5.27    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 1.28    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 2.28    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 3.28    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 4.28    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 5.28    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 1.29    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 2.29    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 3.29    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 4.29    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 5.29    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 1.30    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 2.30    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 3.30    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 4.30    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 5.30    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 1.31    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 2.31    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 3.31    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
```

```
## 4.31    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 5.31    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 1.32    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 2.32    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 3.32    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 4.32    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 5.32    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 1.33    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 2.33    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 3.33    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 4.33    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 5.33    solid   <NA> 15.000    7.2   deep     Broadcast        4          30
## 1.34    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 2.34    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 3.34    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 4.34    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 5.34    solid   <NA> 15.000    7.0   deep     Broadcast        4          30
## 1.35    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 2.35    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 3.35    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 4.35    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 5.35    solid   <NA> 15.000    7.9   deep     Broadcast        4          30
## 1.36    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 2.36    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 3.36    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 4.36    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 5.36    solid   <NA> 15.000    7.2   none     Broadcast       NA          30
## 1.37    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 2.37    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 3.37    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 4.37    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 5.37    solid   <NA> 15.000    7.0   none     Broadcast       NA          30
## 1.38    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 2.38    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 3.38    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 4.38    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
## 5.38    solid   <NA> 15.000    7.9   none     Broadcast       NA          30
##       ct tan.app  id
## 1    168     100   1
```

```
## 2    168     100   2
## 3    168     100   3
## 4    168     100   4
## 5    168     100   5
## 1.1  168     100   6
## 2.1  168     100   7
## 3.1  168     100   8
## 4.1  168     100   9
## 5.1  168     100  10
## 1.2  168     100  11
## 2.2  168     100  12
## 3.2  168     100  13
## 4.2  168     100  14
## 5.2  168     100  15
## 1.3  168     100  16
## 2.3  168     100  17
## 3.3  168     100  18
## 4.3  168     100  19
## 5.3  168     100  20
## 1.4  168     100  21
## 2.4  168     100  22
## 3.4  168     100  23
## 4.4  168     100  24
## 5.4  168     100  25
## 1.5  168     100  26
## 2.5  168     100  27
## 3.5  168     100  28
## 4.5  168     100  29
## 5.5  168     100  30
## 1.6  168     100  31
## 2.6  168     100  32
## 3.6  168     100  33
## 4.6  168     100  34
## 5.6  168     100  35
## 1.7  168     100  36
## 2.7  168     100  37
## 3.7  168     100  38
## 4.7  168     100  39
## 5.7  168     100  40
```

```
## 1.8  168     100  41
## 2.8  168     100  42
## 3.8  168     100  43
## 4.8  168     100  44
## 5.8  168     100  45
## 1.9  168     100  46
## 2.9  168     100  47
## 3.9  168     100  48
## 4.9  168     100  49
## 5.9  168     100  50
## 1.10 168     100  51
## 2.10 168     100  52
## 3.10 168     100  53
## 4.10 168     100  54
## 5.10 168     100  55
## 1.11 168     100  56
## 2.11 168     100  57
## 3.11 168     100  58
## 4.11 168     100  59
## 5.11 168     100  60
## 1.12 168     100  61
## 2.12 168     100  62
## 3.12 168     100  63
## 4.12 168     100  64
## 5.12 168     100  65
## 1.13 168     100  66
## 2.13 168     100  67
## 3.13 168     100  68
## 4.13 168     100  69
## 5.13 168     100  70
## 1.14 168     100  71
## 2.14 168     100  72
## 3.14 168     100  73
## 4.14 168     100  74
## 5.14 168     100  75
## 1.15 168     100  76
## 2.15 168     100  77
## 3.15 168     100  78
## 4.15 168     100  79
```

```
## 5.15 168     100  80
## 1.16 168     100  81
## 2.16 168     100  82
## 3.16 168     100  83
## 4.16 168     100  84
## 5.16 168     100  85
## 1.17 168     100  86
## 2.17 168     100  87
## 3.17 168     100  88
## 4.17 168     100  89
## 5.17 168     100  90
## 1.18 168     100  91
## 2.18 168     100  92
## 3.18 168     100  93
## 4.18 168     100  94
## 5.18 168     100  95
## 1.19 168     100  96
## 2.19 168     100  97
## 3.19 168     100  98
## 4.19 168     100  99
## 5.19 168     100 100
## 1.20 168     100 101
## 2.20 168     100 102
## 3.20 168     100 103
## 4.20 168     100 104
## 5.20 168     100 105
## 1.21 168     100 106
## 2.21 168     100 107
## 3.21 168     100 108
## 4.21 168     100 109
## 5.21 168     100 110
## 1.22 168     100 111
## 2.22 168     100 112
## 3.22 168     100 113
## 4.22 168     100 114
## 5.22 168     100 115
## 1.23 168     100 116
## 2.23 168     100 117
## 3.23 168     100 118
```

```
## 4.23 168     100 119
## 5.23 168     100 120
## 1.24 168     100 121
## 2.24 168     100 122
## 3.24 168     100 123
## 4.24 168     100 124
## 5.24 168     100 125
## 1.25 168     100 126
## 2.25 168     100 127
## 3.25 168     100 128
## 4.25 168     100 129
## 5.25 168     100 130
## 1.26 168     100 131
## 2.26 168     100 132
## 3.26 168     100 133
## 4.26 168     100 134
## 5.26 168     100 135
## 1.27 168     100 136
## 2.27 168     100 137
## 3.27 168     100 138
## 4.27 168     100 139
## 5.27 168     100 140
## 1.28 168     100 141
## 2.28 168     100 142
## 3.28 168     100 143
## 4.28 168     100 144
## 5.28 168     100 145
## 1.29 168     100 146
## 2.29 168     100 147
## 3.29 168     100 148
## 4.29 168     100 149
## 5.29 168     100 150
## 1.30 168     100 151
## 2.30 168     100 152
## 3.30 168     100 153
## 4.30 168     100 154
## 5.30 168     100 155
## 1.31 168     100 156
## 2.31 168     100 157
```

```
## 3.31 168     100 158
## 4.31 168     100 159
## 5.31 168     100 160
## 1.32 168     100 161
## 2.32 168     100 162
## 3.32 168     100 163
## 4.32 168     100 164
## 5.32 168     100 165
## 1.33 168     100 166
## 2.33 168     100 167
## 3.33 168     100 168
## 4.33 168     100 169
## 5.33 168     100 170
## 1.34 168     100 171
## 2.34 168     100 172
## 3.34 168     100 173
## 4.34 168     100 174
## 5.34 168     100 175
## 1.35 168     100 176
## 2.35 168     100 177
## 3.35 168     100 178
## 4.35 168     100 179
## 5.35 168     100 180
## 1.36 168     100 181
## 2.36 168     100 182
## 3.36 168     100 183
## 4.36 168     100 184
## 5.36 168     100 185
## 1.37 168     100 186
## 2.37 168     100 187
## 3.37 168     100 188
## 4.37 168     100 189
## 5.37 168     100 190
## 1.38 168     100 191
## 2.38 168     100 192
## 3.38 168     100 193
## 4.38 168     100 194
## 5.38 168     100 195
```

Run model

With set 2 parameters

```
preds <- ALFAM2mod(dat, pars = ALFAM2pars02, app.name = 'tan.app', time.name = 'ct',
                   time.incorp = 't.incorp', group = 'id', warn = TRUE, prep = TRUE)
```

```
## User-supplied parameters are being used.
## Incorporation applied (for group 106).
## Incorporation applied (for group 107).
## Incorporation applied (for group 108).
## Incorporation applied (for group 109).
## Incorporation applied (for group 110).
## Incorporation applied (for group 111).
## Incorporation applied (for group 112).
## Incorporation applied (for group 113).
## Incorporation applied (for group 114).
## Incorporation applied (for group 115).
## Incorporation applied (for group 116).
## Incorporation applied (for group 117).
## Incorporation applied (for group 118).
## Incorporation applied (for group 119).
## Incorporation applied (for group 120).
## Incorporation applied (for group 136).
## Incorporation applied (for group 137).
## Incorporation applied (for group 138).
## Incorporation applied (for group 139).
## Incorporation applied (for group 140).
## Incorporation applied (for group 141).
```

```
## Incorporation applied (for group 142).
## Incorporation applied (for group 143).
## Incorporation applied (for group 144).
## Incorporation applied (for group 145).
## Incorporation applied (for group 146).
## Incorporation applied (for group 147).
## Incorporation applied (for group 148).
## Incorporation applied (for group 149).
## Incorporation applied (for group 150).
## Incorporation applied (for group 166).
## Incorporation applied (for group 167).
## Incorporation applied (for group 168).
## Incorporation applied (for group 169).
## Incorporation applied (for group 170).
## Incorporation applied (for group 171).
## Incorporation applied (for group 172).
## Incorporation applied (for group 173).
## Incorporation applied (for group 174).
## Incorporation applied (for group 175).
## Incorporation applied (for group 176).
## Incorporation applied (for group 177).
## Incorporation applied (for group 178).
## Incorporation applied (for group 179).
## Incorporation applied (for group 180).
## Incorporation applied (for group 76).
## Incorporation applied (for group 77).
```

```
## Incorporation applied (for group 78).
## Incorporation applied (for group 79).
## Incorporation applied (for group 80).
## Incorporation applied (for group 81).
## Incorporation applied (for group 82).
## Incorporation applied (for group 83).
## Incorporation applied (for group 84).
## Incorporation applied (for group 85).
## Incorporation applied (for group 86).
## Incorporation applied (for group 87).
## Incorporation applied (for group 88).
## Incorporation applied (for group 89).
## Incorporation applied (for group 90).
## Warning in ALFAM2mod(dat, pars = ALFAM2pars02, app.name = "tan.app", time.name = "ct", : Running with 17 parameters. Dropped 7 with no
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   app.mthd.cs.f0
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   app.mthd.cs.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##
## These secondary parameters are being used:
##   int.f0
##   app.rate.ni.f0
##   man.dm.f0
##   man.source.pig.f0
##   int.r1
##   app.mthd.bc.r1
##   man.dm.r1
##   air.temp.r1
```

```
##   wind.2m.r1
##   man.ph.r1
##   int.r2
##   rain.rate.r2
##   int.r3
##   app.mthd.bc.r3
##   man.ph.r3
##   incorp.deep.f4
##   incorp.deep.r3
```

Add results to main df

```
dat$EF <- signif(preds$er, 4)
dat$EFp <- 100 * signif(preds$er, 4)
```