

$$\frac{dx(t)}{dt} = x(t) = I(t) \cdot b + x(t) \cdot re(t) \cdot A$$

Name

Yasso11

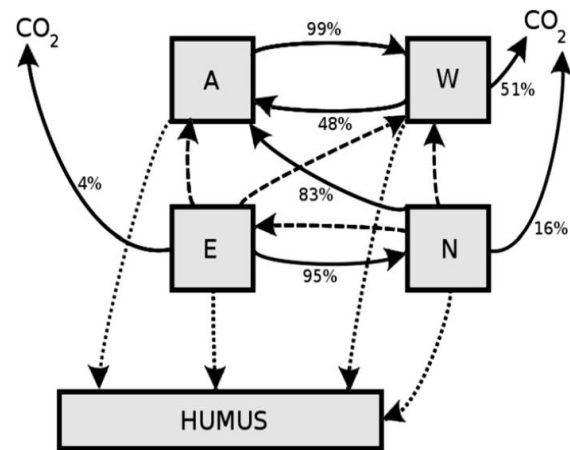
Important publications

Karhu et al., 2012;

Tuomi et al., 2011, 2009

Special features

- texture independent
- original model uses probability distributions for decay rates
- the conceptual pools are heavily interlinked, FOMs are distributed between 4 pools



pool concept of Yasso (from Tuomi et al., 2011)

Input distribution: b

According to (Karhu et al., 2012) all Inputs get distributed according to six classes. b =

	cereal_roots	straw	green_manure	farmyard	peat	sphagnum
A	0.71	0.74	0.451	0.645	0.091	0.653
W	0.08	0.094	0.358	0.123	0.012	0.069
E	0.03	0.021	0.034	0.072	0.014	0.037
N	0.18	0.144	0.157	0.161	0.829	0.241
H	0	0	0	0	0.053	0

Initialisation: x(t₀)

There is no official intialisation routine.

Assuming an initial C input only from cereal roots the establishing fractions at equilibrium are:

pool	flow rates from Tuomi 2009	flow rates from Tuomi 2011
A	6.71%	11.49%
W	0.43%	1.45%
E	0.39%	0.57%
N	4.04%	35.56%
H	88.44%	50.92%

Environmental response: re(t)

$$re(t) = rT(t) * rW(t)$$

$$rT(t) = e^{(0.095 \cdot T(t) - 0.0014 \cdot T(t)^2)}$$

$$rW(t) = 1 - e^{-1.21 \cdot P(t)}$$

with

T(t) = monthly air Temperature [°C]

P(t) = annual sum of Precipitation [m]

Mass flow Matrix: A

Flow rates are in [a^{-1}] from (Tuomi et al., 2011). The shown values are rounded means. Rows are flows into each pool; columns are flows from each pool.

	CO ₂	A	W	E	N	H
CO ₂		0.004	2.932	0.019	0.004	0.0017
A		-0.73	2.784	0.003	0.026	
W		0.7227	-5.8		3.1e-4	
E				-0.29	9.3e-4	
N			0.058	0.267	-0.031	
H		0.0033	0.026	1.3e-3	1.4e-4	-0.0017

References

- Karhu, K., Gärdenäs, A.I., Heikkinen, J., Vanhala, P., Tuomi, M., Liski, J., 2012. Impacts of organic amendments on carbon stocks of an agricultural soil — Comparison of model-simulations to measurements. *Geoderma* 189–190, 606–616. <https://doi.org/10.1016/j.geoderma.2012.06.007>
- Tuomi, M., Rasinmäki, J., Repo, A., Vanhala, P., Liski, J., 2011. Soil carbon model Yasso07 graphical user interface. *Environ. Model. Softw.* 26, 1358–1362. <https://doi.org/10.1016/j.envsoft.2011.05.009>
- Tuomi, M., Thum, T., Järvinen, H., Fronzek, S., Berg, B., Harmon, M., Trofymow, J.A., Sevanto, S., Liski, J., 2009. Leaf litter decomposition—Estimates of global variability based on Yasso07 model. *Ecol. Model.* 220, 3362–3371. <https://doi.org/10.1016/j.ecolmodel.2009.05.016>