Model/study	Description	CH_4 uptake calculation (J_{CH_4})	Eq.
P96 Potter et al. (1996)	P96 is the model based on Fick's first law. The calculation of the uptake flux is approximated numerically and based on the diffusion of CH_4 into soil.	$J_{CH_4} = D_{CH_4} \frac{\Delta C_{CH_4}}{\Delta_z}$	(11)
R99 Ridgwell et al. (1999)	R99 extends the P96 model by including an explicit term for microbial oxidation of CH_4 in soil. The uptake flux is approximated numerically, using Fick's first law and adopting a first-order rate law for microbial oxidation, assuming that oxidation occurs in a thin ϵ cm layer located at 6 cm depth.	$J_{CH_4} = \frac{C_{CH_4} D_{CH_4}}{z_d} \left(1 - \frac{D_{CH_4}}{D_{CH_4} + k_d z_d}\right)$	(12)
C07 Curry (2007)	C07 adopts the diffusion–reaction equation that underlies R99. However, C07 solves the equation analytically (as opposed to semi-numerically). The model also improves representation of soil moisture influence on the microbial oxidation rate. C07 refines methanotrophy response at subzero temperatures on the basis of observations.	$J_{CH_4} = C_{CH_4} r_N r_w \sqrt{D_{CH_4} k}_d$	(13)
MeMo This study	This study incorporates a general mathematical description of CH_4 uptake flux, allowing for complete consumption of CH_4 at an initially unknown depth L and CH_4 flux through the lower boundary. Refines representation of the influence of soil moisture, temperature and nitrogen deposition on CH_4 oxidation.	$J_{CH_4} = -D_{CH_4} \left(-A\sqrt{\frac{k_d}{D_{CH_4}}} + B\sqrt{\frac{k_d}{D_{CH_4}}}\right)$	(10)