Table S3. Model Description

Equations:

$$d(ERG)/dt = \frac{k15}{1+(DRG/J15)^2} - k16 * ERG \quad (1)$$

$$d(DRG)/dt = k17p * ERG + \frac{k17*(DRG/J17)^2}{1+(DRG/J17)^2} - K18 * DRG \quad (2)$$

$$d(ppRB)/dt = v29 + v30 + v43 - v44 \quad (3)$$

$$d(E2F)/dt = v29 + v45 + v47 - v46 - v48 + ke2f * E2F * mass - kde2fcdc20 * E2F * Cdc20A - kde2fcdh1 * E2F * Cdh1 \quad (4)$$

$$d(pE2F)/dt = v30 + v49 + v46 - v47 - v50 - kde2fcdc20 * pE2F * Cdc20A - kde2fcdh1 * pE2F * Cdh1 \quad (5)$$

$$d(Rb)/dt = v44 + v45 + v49 - v48 - v50 - v43 \quad (6)$$

$$d(E2FRB)/dt = v51 + v48 - v52 - v29 - v45 \quad (7)$$

$$d(pE2FRB)/dt = v52 + v50 - v51 - v30 - v49 \quad (8)$$

$$d(actCycD)/dt = k9 * DRG + Vdi * TriD + k24r * TriD - k24 * actCycD * freeCKI - k10 * actCycD \quad (9)$$

$$d(TriD)/dt = k24 * actCycD * freeCKI - k24r * TriD - Vdi * TriD - k10 * TriD \quad (10)$$

$$d(actCycACdk1)/dt = a1frac * ((ksap + ksapp * E2F + ksappp * TFAB) * mass * 2 + (Vdi + kdia) * TriA) - (Vda + kasa * freeCKI) * actCycACdk1 \quad (11)$$

$$d(actCycACdk2)/dt = (1 - a1frac) * ((ksap + ksapp * E2F + ksappp * TFAB) * mass * 2 + (Vdi + kdia) * TriA) - (Vda + kasa * freeCKI) * actCycACdk2 \quad (12)$$

$$d(actCycB)/dt = Vsb * mass * 2 + V25 * (cycB - actCycB) - (Vdb + Vwee) * actCycB \quad (13)$$

$$d(actCycE)/dt = (ksep + ksepp * E2F) * mass * 2 + (Vdi + kdie) * TriE - (Vde + kase * freeCKI) * actCycE \quad (14)$$

$$d(cycA)/dt = (ksap + ksapp * E2F + ksappp * TFAB) * mass * 2 - Vda * cycA \quad (15)$$

$$d(cycB)/dt = Vsb * mass * 2 - Vdb * cycB \quad (16)$$

$$d(cycE)/dt = (ksep + ksepp * E2F) * mass * 2 - Vde * cycE \quad (17)$$

$$d(CKI)/dt = Vsi - Vdi * CKI \quad (18)$$

$$d(Cdh1)/dt = \frac{(kah1p+kah1pp*Cdc20A)*(1-Cdh1)}{Jah1+1-Cdh1} - \frac{(kih1pp*(actCycACdk1+actCycACdk2)+kih1ppp*actCycB)*Cdh1}{Jih1+Cdh1} \quad (19)$$

$$d(preMPF)/dt = Vwee * (cycB - preMPF) - (V25 + Vdb) * preMPF \quad (21)$$

$$d(TriA)/dt = kasa * (cycA - TriA) * freeCKI - (kdia + Vda + Vdi) * TriA \quad (22)$$

$$d(APCP)/dt = \frac{kaAPC*actCycB*(1-APCP)}{JaAPC+1-APCP} - \frac{kiAPC*APCP}{JiAPC+APCP} \quad (23)$$

$$d(Cdc20A)/dt = \frac{ka20*APCP*(Cdc20T-Cdc20A)}{Ja20+Cdc20T-Cdc20A} - (\frac{ki20}{Ji20+Cdc20A} + kd20) * Cdc20A \quad (24)$$

$$d(Cdc20T)/dt = (ks20pp * actCycB)/(J20 + actCycB) - kd20 * Cdc20T \quad (25)$$

$$d(mass)/dt = u * mass \quad (26)$$

Definitions:

$v29 = E2FRB * (K20 * ((actCycD + TriD) * LD + LA * (actCycACdk1 + actCycACdk2) + LB * actcycB + LE * actCycE))$

$v30 = pE2FRB * (K20 * (LD * (actCycD + TriD) + LA * (actCycACDk1 + actCycACdk2) + LB * actCycB + LE * actCycE))$

$v43 = RB * (K20 * (LD * (actCycD + TriD) + LA * (actCycACdk1 + actCycACdk2) LB * actCycB + LE * actCycE))$

$v44 = ppRB * (K19a * (PP1T - PP1A) + K19 * PP1A)$

$v45 = K26R * E2FRB$

$v46 = E2F * (K23a * (actCycACdk1 + actCycACdk2) + K23b * actCycB)$

$v47 = K22 * pE2F$

$v48 = K26 * E2F * RB$

$v49 = K26R * pE2FRB$

$v50 = K26 * RB * pE2F$

$v51 = K22 * pE2FRB$

$v52 = E2FRB * (K23a * (actCycACdk1 + actCycACdk2) + K23b * actCycB$

$Vatf = katfpp * (actCycACdk1 + actCycACdk2) + katfppp * actCycE + katfpppp * actCycD$

$Vde = kdep + kdepp * actCycE + kdeppp * (actCycACdk1 + actCycACdk2) + kdepppp * actCycB$

$Vda = kdap + kdapp * Cdc20A + kacdh1 * Cdh1$

$TFAB = G(kafab * (actCycACdk1 + actCycACdk2), kifb, Jafb, Jifb)$

$Vsi = ksip$

$Vsb = ksbp + ksbpp * TFAB + ksbppp * actCycB + ksbppp * E2F$

$Vdb = kdbp + kdbpp * Cdh1 + kdbppp * Cdc20A$

$Wee1 = G(kaweep, kiwee * (actCycACdk1 + actCycACdk2) + kiweeb * actCycB, Jawee, Jiwee)$

$Vwee = kweep + kweepp * Wee1$

$Cdc25 = G(ka25 * actCycB, ki25p, Ja25, Ji25)$

$V25 = k25p + k25pp * Cdc25$

$Vdi = (kdip + kdipp * (actCycACdk1 + actCycACdk2) + kdippp * actCycB + kdipppp * actCycE)$

$TriE = cycE - actCycE$

$freeCKI = CKI - TriA - TriE - TriD$

$CdkCycBCKI = cycB - actCycB - preMPF$

$Cdk1PCycB = cycB - actCycB$

$PP1A = PP1T \ / \ K21 * (FE * (actCycACdk1 + actCycACdk2 + actCycE) + FB * actCycB + 1)$

Where G(…) is the Goldbeter-Koshland Function:

$$B(A_1, A_2, A_3, A_4) = A_2 - A_1 + A_3 * A_2 - A_4 * A_1$$

$$G(A_1, A_2, A_3, A_4) = \frac{2 * A_4 * A_1}{B(A_1, A_2, A_3, A_4) + \sqrt{B(A_1, A_2, A_3, A_4) - 4 * (A_2 - A_1) * A_3 * A_1}}$$

Kinetic Rate Constants:

a1frac	=	0.081283	kah1p	=	155.8708	ksep	=	1.562461
FB	=	2	kah1pp	=	176350	ksepp	=	8.8175
FE	=	25	kasa	=	19733.57	ksip	=	390.9926
J15	=	0.1	kase	=	19733.57	kweep	=	234.8312
J17	=	0.3	katfpp	=	58.70692	kweepp	=	17635
J20	=	100	katfppp	=	97.80724	LA	=	30
Ja20	=	0.005	katfpppp	=	77.63932	LB	=	0.5
Ja25	=	0.005	kaweep	=	13.8188	LD	=	3.3
JaAPC	=	0.01	kd20	=	17.635	LE	=	10
Jafb	=	0.01	kdap	=	0.516094	PP1T	=	1
Jah1	=	0.15	kdapp	=	2645.25	u	=	0.693937
Jatf	=	0.01	kdbp	=	0.853181			
Jawee	=	0.05	kdbpp	=	176.35			
Jaweeb	=	0.05	kdbppp	=	387.97			
Ji20	=	0.005	kde2fcdc20	=	881.75			
Ji25	=	0.031623	kde2fcdh1	=	1.7635			
JiAPC	=	0.001	kdep	=	1.961012			
Jifb	=	0.001	kdepp	=	1.973357			
Jih1	=	0.01	kdeppp	=	176.35			
Jitf	=	0.01	kdepppp	=	3527			
Jiwee	=	0.05	kdia	=	196.0783			
k10	=	88.175	kdie	=	196.0783			
k15	=	5.2905	kdip	=	196.0783			
k16	=	44.0875	kdipp	=	978.0688			
k17	=	2645.25	kdippp	=	1960.837			
k17p	=	2.64525	kdipppp	=	978.0688			
k18	=	176.35	ke2f	=	4.2324			
K19	=	35.27	ki20	=	17.635			
K19a	=	440.875	ki25p	=	35.27			
K20	=	176.35	kiAPC	=	3.862259			
K21	=	1	kifb	=	9.827456			
K22	=	3.527	kih1pp	=	17635			
K23a	=	0.17635	kih1ppp	=	1763.5			
K23b	=	1.7635	kitfp	=	48.96181			
k24	=	1763.5	kitfpp	=	19.60836			
k24r	=	176.35	kitfppp	=	19.60836			
k25p	=	61.474	kiwee	=	0.145			
k25pp	=	30515.96	kiweeb	=	5			
K26	=	17635	ks20pp	=	105.81			
K26R	=	35.27	ksap	=	16.75325			
k9	=	45.851	ksapp	=	0.10581			
ka20	=	292.669	ksappp	=	20.28025			
ka25	=	8.85277	ksbp	=	6.7013			
kaAPC	=	2.33401	ksbpp	=	15.8715			
kacdh1	=	264.525	ksbppp	=	1.7635			
kafab	=	0.296268	ksbpppp	=	0.617225			