Soil-air interface.

Using the functionality of COMETS, one can design simulations which go beyond in silico corollaries of lab experiments to make predictions for environments mimicking natural ecosystems, which is a necessary step for understanding natural ecology from first principles. In this example, we consider a simulation of a soil environment. We use source-and-sink functions to model how a root provides organic acids to the environment while removing ammonia (Huang et al 2014 Botany). While we restrict the root functionality to a source/sink, one could use functionality demonstrated above, for example extracellular enzymes, to generate feedback loops between microbe-produced metabolites and root exudation. We use fixed metabolite concentrations to mimic the largely unchanging air interface above a root, which generates an oxygen gradient. Additionally, since soil is characterized by strong spatial structure with many impenetrable barriers that localized interactions (Nunan 2017), we place "rock" barriers throughout the simulation area. A more complex simulation could use varying diffusion constants for metabolites, as described in a previous protocol (Virtual Petri Dish). Similarly, we use standard diffusion of biomass, but this could be changed to use pushing force or non-linear diffusion for a potentially increased realism.

In [1]:
```python
import cobra
import sys
import copy
import numpy as np
from matplotlib import pyplot as plt
import cometspy as c
```

Para nuestro proyecto, utilizaremos Escherichia coli (modelo iAF1260), Pseudomonas putida (modelo iJN1463) y Saccharomyces Cerevisiae (modelo iMM904), recuperados de la base de datos BIGG.

Cambiamos los bounds de las funciones objetivo de los modelos:

In [2]:
```python
model_dir = "./modelos" # model location
iMM = cobra.io.read_sbml_model(model_dir + '/iMM904.xml')
iJN = cobra.io.read_sbml_model(model_dir + '/iJN1463.xml')

iJN.reactions.get_by_id('BIOMASS_KT2440_WT3').lower_bound = 0
iJN.reactions.get_by_id('BIOMASS_KT2440_WT3').upper_bound = 1000

iMM.reactions.get_by_id('BIOMASS_SC5_notrace').lower_bound = 0
iMM.reactions.get_by_id('BIOMASS_SC5_notrace').upper_bound = 1000
```

Luego se convierten estos modelos al formato de COMETS. Se utilizan funciones helper para dos cosas: a) Asegurar que el modelo en COMETS no confunda las reacciones de "sink" con las de exchange, ya que en COBRA están desbalanceadas y por tanto se parecen a las de exchange, y b) abrir todos los bounds de las reacciones de exchange, para que COMETS controle la composición del medio.

In [3]:
```python
iMM_comets = c.model(iMM)
iMM_comets.ensure_sinks_are_not_exchanges()
iMM_comets.open_exchanges()

iJN_comets = c.model(iJN)
iJN_comets.ensure_sinks_are_not_exchanges()
iJN_comets.open_exchanges()
```

El mundo que se simulará tendrá dimensiones de 30x30. El eje de la izquierda (x = 0) corresponde a la raíz, y el eje superior (y = 0) corresponde al aire. La biomasa y las rocas se distribuyen en el resto del grid. Donde hayan rocas no puede haber ni biomasa ni metabolitos, así que seleccionamos esos lugares primero. Para esta simulación, se generarán 3 rocas con un un tamaño medio de 1 cuadraditos. Para generar las piedras se utiliza la función helper grow_rocks.

In [4]:
```python
from cometspy.utils import grow_rocks, pick_random_locations

grid_size = 5 # 100
n_rocks = 3 # 70
rock_locs = grow_rocks(n = n_rocks, xrange = [1,grid_size-1],yrange = [1,grid_size-1],mean_size = 1)
```

Cada especie será plantada en 20 lugares sin sobreponerse. Para esto se utiliza la función helper pick_random_locations, la cual toma como argumento una tupla generada anteriormente que marca lugares "prohibidos", como los cuadrados donde se encuentran las rocas.

Generamos una copia de rock_locs para no cambiarla accidentalmente, y la llamamos forbbiden_locs:

In [5]:
```python
import copy
forbidden_locs = copy.deepcopy(rock_locs)
```

Ahora elegimos al azar los lugares para cada especie, y los vamos añadiendo a la lista forbidden locs para que no se sobrepongan:

In [6]:
```python
founders_per_species = 2 # 60
```
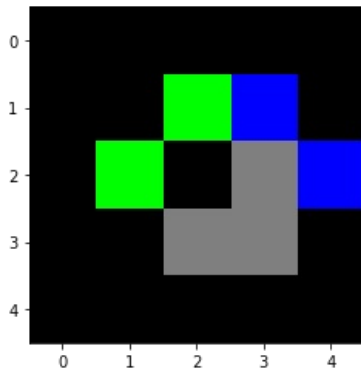
```
iMM_locs = pick_random_locations(n = founders_per_species,
                                 xrange = [1,grid_size], yrange = [1,grid_size],
                                 forbidden_locs = forbidden_locs)
forbidden_locs.extend(iMM_locs)
iJN_locs = pick_random_locations(founders_per_species, [1,grid_size],[1,grid_size], forbidden_locs)
```

Para graficar los lugares utilizamos matplotlib:

In [7]:
```python
from matplotlib import pyplot as plt
initial_image = np.zeros((grid_size,grid_size,3))
for rock in rock_locs:
    initial_image[rock[0],rock[1],0:3] = 0.5
for loc in iMM_locs:
    initial_image[loc[0],loc[1],1] = 1
for loc in iJN_locs:
    initial_image[loc[0],loc[1],2] = 1
plt.imshow(initial_image)
```

Out[7]: <matplotlib.image.AxesImage at 0x22ff935ab20>

Generamos el layout y agregamos las rocas:

In [8]:
```python
# iAF
iMM_initial_pop = []
for loc in iJN_locs:
    iMM_initial_pop.append([loc[0], loc[1], 1.e-8])
iMM_comets.initial_pop = iMM_initial_pop
# iJN
iJN_initial_pop = []
for loc in iJN_locs:
    iJN_initial_pop.append([loc[0], loc[1], 1.e-8])
iJN_comets.initial_pop = iJN_initial_pop
```

Setteamos las poblaciones iniciales para cada especie, con esto los modelos están listos y los añadimos al layout:

In [9]:
```python
layout = c.layout([iMM_comets, iJN_comets])
layout.grid = [grid_size,grid_size]
layout.add_barriers(rock_locs)
```

Añadimos los metabolitos que estarán inicialmente disponibles en el ambiente. Usamos la función helper add_typical_trace_metabolites() para las trazas típicas. Bajamos el valor del oxígeno dado que la idea es que el que esté disponible difunda desde la atmósfera. Añadimos algunos metabolitos que no se añadieron con la función helper:

In [10]:
```python
layout.add_typical_trace_metabolites()
layout.set_specific_metabolite('o2_e',0.00001)
layout.set_specific_metabolite('hco3_e',1000)
layout.set_specific_metabolite('co2_e',1000)
#layout.set_specific_metabolite('h2_e',1000)
layout.set_specific_metabolite('so3_e',1000)
layout.set_specific_metabolite('nh4_e',0.000001)

layout.set_specific_metabolite('glc__D_e',0.0000001)
layout.set_specific_metabolite('meoh_e',0.00000001)
layout.set_specific_metabolite('cys__L_e',0.0000001)
layout.set_specific_metabolite('nac_e',0.00000001)
layout.set_specific_metabolite('4abz_e',0.0000001)
```

Para la capa de aire, dejamos el oxígeno en un valor constante. Al fondo también dejamos al oxígeno en un valor fijo e igual a 0, para simular el efecto de difusión. De manera similar, hacemos lo mismo con el amoniaco y la raíz en la parte izquierda:

```python
# set static media of O2 and CO2 at the top and bottom-- the "air" and continuous loss of O2 downwards
for x in range(grid_size):
    layout.set_specific_static_at_location('o2_e', (x,0), .0001) # top
    layout.set_specific_static_at_location('o2_e', (x,grid_size-1), 0.) # bottom
    layout.set_specific_static_at_location('co2_e', (x,0), .0001)

for x in range(grid_size):
    layout.set_specific_static_at_location('nh4_e', (0,x), 0.0)
```

La raíz consume todo el amoniaco, pero es una fuente de acidos orgánicos y metanol para el ambiente. Asumiendo una tasa fija:

```python
for x in range(grid_size):
    layout.set_specific_refresh_at_location('cit_e', (0,x), .000001)
    layout.set_specific_refresh_at_location('meoh_e', (0,x), .000001)
    layout.set_specific_refresh_at_location('succ_e', (0,x), .000001)
```

El layout y los modelos están listos, ahora setteamos los parámetros de la simulación:

```python
params = c.params()
params.set_param('timeStep', 0.1)
params.set_param('maxCycles', 1000)
params.set_param('maxSpaceBiomass', 10)
params.set_param('deathRate', 0.0001) # die at rate of 1/10000 per hour
params.set_param('writeBiomassLog', True)
params.set_param('BiomassLogRate', 500)
params.set_param('writeMediaLog', True)
params.set_param('MediaLogRate', 500)
params.set_param("writeFluxLog", True)
params.set_param("FluxLogRate", 500)
params.set_param('numRunThreads', 3)
params.set_param('defaultKm', 0.000001)
```

Ahora creamos el objeto de la simulación y la corremos. Ojito que se demora y el pc empieza a despegar.

```python
sim = c.comets(layout, params)
sim.run(False)
```

```
Running COMETS simulation ...
Done!
```

```python
print(sim.run_output)
print(sim.run_errors)
```

```
-script
running script file: C:\Users\ronal\Desktop\Testing\Simulacion_suelo_testing_2_IMM/.current_script_0x22ff9b82a90
Current Java version: 17.0.1
Parameters file .current_global_0x22ff9b82a90 loaded.
Parameters file .current_package_0x22ff9b82a90 loaded.
Loading layout file '.current_layout_0x22ff9b82a90'...
null\COMETS_manifest.txt (El sistema no puede encontrar la ruta especificada)
Unable to initialize manifest file.
Continuing without writing manifest file.
Found 2 model files!
Loading '.\iMM904.cmd' ...
Academic license - for non-commercial use only - expires 2021-12-02
Academic license - for non-commercial use only - expires 2021-12-02
Done!
 Testing default parameters...
Done!
Optimizer status code = 5 (looks ok!)
objective solution = 133.8587770175764
Loading '.\iJN1463.cmd' ...
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Done!
 Testing default parameters...
Done!
Optimizer status code = 5 (looks ok!)
objective solution = 237.06607191111198
Constructing world...
Done!
medialist       12dgr160_e      12dgr180_e      13BDglcn_e      13dampp_e       15dap_e 1ag160_e        1ag180_e
1ag181d9_e      1ag182d9d12_e   25dkglcn_e      26dap__M_e      2ameph_e        2ddglcn_e       2dhglcn_e
2hb_e   2m35mdntha_e    2mbac_e 2mbald_e        2mbtoh_e        2mppal_e        2phetoh_e       34dhbz_e
34dhcinm_e      34dhphe_e       35dnta_e        3c3hmp_e        3h4atb_e        3mb_e   3mbald_e        3mop_e
```

```
                3oxoadp_e      4abut_e 4abz_e  4hbz_e   4hpro_DC_e       4hpro_LT_e        4hptn_e 4oxptn_e          5aop_e  5aptn_e 5
g2oxpt_e        5mcsn_e 5oxpro_e       6atha_e 6hnac_e 8aonn_e LalaLglu_e       Nbfortyr_e        Ncbmpts_e
R3hdec4e_e      R_3h4atba_e     R_3h6atha_e     R_3hcmrs7e_e    R_3hdcaa_e      R_3hdd5ea_e     R_3hdd6e_e
R_3hdda_e       R_3hhdca_e      R_3hhpa_e       R_3hhxa_e       R_3hnonaa_e     R_3hocta_e      R_3hpba_e
R_3hpdeca_e     R_3hphpa_e      R_3hphxa_e      R_3hpnona_e     R_3hpocta_e     R_3hppta_e      R_3hpt_e
R_3htd58e_e     R_3htd5e_e      R_3httdca_e     T4hcinnm_e      abt_e   ac_e    acac_e  acald_e aces_e
acmtsoxin_e     acon_C_e        acpptrn_e       acser_e actn__R_e       ade_e   adn_e   adocbl_e        ag_e
agm_e   akg_e   ala_B_e ala__D_e        ala__L_e        alaala_e        alahis_e        alaleu_e        alathr_e
alatrp_e        algac_MG_14_e   algac_MG_23_e   algac_MG_32_e   algac_MG_41_e   algac_M_e       alltn_e alltt_e a
met_e   apc_e   arab__D_e       arab__L_e       arbtn_e arbtn_fe3_e     arg__D_e        arg__L_e        asn__D_e
asn__L_e        aso3_e  aso4_e  asp__L_e        balaala_e       balabala_e      balagly_e       balaleu_e
balamd_e        bhb_e   biliverd_e      btd_RR_e        btn_e   butso3_e        bz_e    ca2_e   carn_e
catechol_e      cbi_e   cbl1_e  cd2_e   cell4_e cgly_e  chol_e  chols_e chor_e  cinnm_e cit_e   cl_e    cm_e
cmcbtt_e        co2_e   co_e    cobalt2_e       confrl_e        creat_e crn_e   cro2_e  cro4_e  crtn_e  csn_e
cu2_e   cu_e    cyan_e  cys__D_e        cys__L_e        cytd_e  d2one_e d3one_e d4one_e dad_2_e dag181d9_e
dag182d9d12_e   dann_e  dca_e   dcyt_e  ddca_e  dgsn_e  dgudbutn_e      din_e   dmanur_e        dmgly_e dmso2_e d
opa_e   dttp_e  duri_e  ecto__L_e       enter_e epist_e epistest_SC_e   ergst_e ergstest_SC_e   etha_e  ethso3_e
etoh_e  fald_e  fcmcbtt_e       fe2_e   fe3_e   fe3dcit_e       fe3mcbtt_e      fe3pyovd_e      fe3pyovd_kt_e
fecost_e        fecostest_SC_e  fecrm_e fecrm_un_e      feenter_e       feoxam_e        feoxam_un_e     fer_e
fmn_e   for_e   fru_e   fum_e   g3pc_e  g3pi_e  ga_e    gal_e   galct__D_e      galur_e gam6p_e gcald_e glc__D_e
glcn_e  glcr_e  glcur_e gln__L_e        glu__L_e        glutar_e        glx_e   gly_e   glyald_e        glyb_e
glyc__R_e       glyc_e  glyclt_e        glycol_e        glygln_e        glyglu_e        glygly_e        glymet_e
glyphe_e        glyser_e        gsn_e   gthox_e gthrd_e gua_e   gudac_e gudptn_e        h2o2_e  h2o_e   h2s_e
h_e     hco3_e  hcys__L_e       hdca_e  hdcea_e hexc_e  hg2_e   hgentis_e       his__L_e        hisgly_e
hishis_e        hom__L_e        hpta_e  hxa_e   hxan_e  iamac_e iamoh_e ibutac_e        ibutoh_e        icit_e
id3acald_e      ile__L_e        ind3ac_e        ind3eth_e       indole_e        inost_e ins_e   isetac_e
k_e     lac__D_e        lac__L_e        lanost_e        lanostest_SC_e  leu__D_e        leu__L_e        leuleu_e
lnlc_e  lpspput_e       lys__D_e        lys__L_e        m_xyl_e mal__D_e        mal__L_e        malt_e  man_e
manur_e mcbtt_e melib_e meoh_e  met__D_e        met__L_e        mg2_e   mmet_e  mn2_e   mobd_e  mso3_e  mtsoxin_e
n2one_e na1_e   nac_e   nadp_e  nh4_e   ni2_e   nmn_e   no2_e   no3_e   no_e    nona_e  o2_e    o_xyl_e oaa_e
ocdca_e ocdcea_e        ocdcya_e        octa_e  orn__D_e        orn_e   orot_e  oxa_e   p_xyl_e pac_e   pacald_e
pap_e   pb2_e   pc_SC_e pea_e   peamn_e pectin_e        pentso3_e       pepd_e  phe__D_e        phe__L_e
pheac_e phedca_e        phehpa_e        phehxa_e        pheme_e phenona_e       pheocta_e       phept_e phpyr_e p
i_e     pnto__R_e       ppa_e   ppi_e   pptrn_e prealg_MG_14_e  prealg_MG_23_e  prealg_MG_32_e  prealg_MG_41_e
prealginate_G_e pro__D_e        pro__L_e        progly_e        pta_e   ptd1ino_SC_e    ptrc_e  ptsla_e pydam_e p
yovd_e  pyovd_kt_e      pyr_e   quin_e  rib__D_e        ribflv_e        sbo3_e  sbt__D_e        sbt__L_e
sel_e   ser__D_e        ser__L_e        sheme_e skm_e   so2_e   so3_e   so4_e   spmd_e  sprm_e  srb__L_e
succ_e  sucr_e  sulfac_e        tag160_e        tag180_e        tag181d9_e      tag182d9d12_e   taur_e  tcynt_e t
hm_e    thmmp_e thmpp_e thr__L_e        thym_e  thymd_e tmanur_e        tnt_e   tol_e   tre_e   trp__L_e
tsul_e  ttdca_e ttdcea_e        ttrcyc_e        tungs_e tyr__D_e        tyr__L_e        und2one_e       ura_e
urea_e  uri_e   vacc_e  val__D_e        val__L_e        vanln_e vanlt_e xan_e   xtsn_e  xyl__D_e        xylt_e
zn2_e   zymst_e zymstest_SC_e
Cycle 1
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FBARunThread-0 starting up.
FBARunThread-1 starting up.
FBARunThread-2 starting up.
Total biomass:
Model iMM904.cmd: 2.0537489121422508E-8
Model iJN1463.cmd: 2.0532609415844887E-8
Cycle 2
Total biomass:
Model iMM904.cmd: 2.110266210473236E-8
Model iJN1463.cmd: 2.109192831926961E-8
Cycle 3
Total biomass:
Model iMM904.cmd: 2.181611684424731E-8
Model iJN1463.cmd: 2.17771429851636E-8
Cycle 4
Total biomass:
Model iMM904.cmd: 2.257426147689821E-8
Model iJN1463.cmd: 2.2502700451671144E-8
Cycle 5
Total biomass:
Model iMM904.cmd: 2.337897076255515E-8
Model iJN1463.cmd: 2.3270863068371057E-8
Cycle 6
Total biomass:
Model iMM904.cmd: 2.4233118481044523E-8
Model iJN1463.cmd: 2.4084153713656878E-8
Cycle 7
Total biomass:
```

```
Model iMM904.cmd: 2.5139753182498304E-8
Model iJN1463.cmd: 2.4945240998687556E-8
Cycle 8
Total biomass:
Model iMM904.cmd: 2.6102098921688895E-8
Model iJN1463.cmd: 2.585694958783211E-8
Cycle 9
Total biomass:
Model iMM904.cmd: 2.7123567354423526E-8
Model iJN1463.cmd: 2.682226940758678E-8
Cycle 10
Total biomass:
Model iMM904.cmd: 2.8207798464581116E-8
Model iJN1463.cmd: 2.784436530917126E-8
Cycle 11
Total biomass:
Model iMM904.cmd: 2.9358654550489393E-8
Model iJN1463.cmd: 2.8926587290521934E-8
Cycle 12
Total biomass:
Model iMM904.cmd: 3.0580233750946864E-8
Model iJN1463.cmd: 3.007248131636439E-8
Cycle 13
Total biomass:
Model iMM904.cmd: 3.187688439943117E-8
Model iJN1463.cmd: 3.1285796883556407E-8
Cycle 14
Total biomass:
Model iMM904.cmd: 3.3253410751495954E-8
Model iJN1463.cmd: 3.2570554704274396E-8
Cycle 15
Total biomass:
Model iMM904.cmd: 3.471471100903322E-8
Model iJN1463.cmd: 3.3930961182028014E-8
Cycle 16
Total biomass:
Model iMM904.cmd: 3.626591386755671E-8
Model iJN1463.cmd: 3.5371450582381074E-8
Cycle 17
Total biomass:
Model iMM904.cmd: 3.791252199799571E-8
Model iJN1463.cmd: 3.689673404194284E-8
Cycle 18
Total biomass:
Model iMM904.cmd: 3.966037348668462E-8
Model iJN1463.cmd: 3.851179728217761E-8
Cycle 19
Total biomass:
Model iMM904.cmd: 4.1515674748556355E-8
Model iJN1463.cmd: 4.022191779331438E-8
Cycle 20
Total biomass:
Model iMM904.cmd: 4.3485000986475715E-8
Model iJN1463.cmd: 4.203268187399598E-8
Cycle 21
Total biomass:
Model iMM904.cmd: 4.556491249040253E-8
Model iJN1463.cmd: 4.394856213903366E-8
Cycle 22
Total biomass:
Model iMM904.cmd: 4.7687755172251166E-8
Model iJN1463.cmd: 4.5965322692785017E-8
Cycle 23
Total biomass:
Model iMM904.cmd: 4.98565504840882E-8
Model iJN1463.cmd: 4.808899410331137E-8
Cycle 24
Total biomass:
Model iMM904.cmd: 5.2074388213953685E-8
Model iJN1463.cmd: 5.032582100970863E-8
Cycle 25
Total biomass:
Model iMM904.cmd: 5.434450888966006E-8
Model iJN1463.cmd: 5.268235141416342E-8
Cycle 26
Total biomass:
Model iMM904.cmd: 5.6670350245190624E-8
Model iJN1463.cmd: 5.5165465039627726E-8
Cycle 27
Total biomass:
Model iMM904.cmd: 5.904815016471597E-8
Model iJN1463.cmd: 5.7783471327232356E-8
Cycle 28
```

```
Total biomass:
Model iMM904.cmd: 6.149366207090368E-8
Model iJN1463.cmd: 6.054316764058156E-8
Cycle 29
Total biomass:
Model iMM904.cmd: 6.400742519013987E-8
Model iJN1463.cmd: 6.344581354258587E-8
Cycle 30
Total biomass:
Model iMM904.cmd: 6.659377205244382E-8
Model iJN1463.cmd: 6.649441365956659E-8
Cycle 31
Total biomass:
Model iMM904.cmd: 6.925683904909154E-8
Model iJN1463.cmd: 6.969710494375981E-8
Cycle 32
Total biomass:
Model iMM904.cmd: 7.199729711931335E-8
Model iJN1463.cmd: 7.306244115454597E-8
Cycle 33
Total biomass:
Model iMM904.cmd: 7.481912724985381E-8
Model iJN1463.cmd: 7.659941547421222E-8
Cycle 34
Total biomass:
Model iMM904.cmd: 7.775624000989413E-8
Model iJN1463.cmd: 8.034582180547886E-8
Cycle 35
Total biomass:
Model iMM904.cmd: 8.078830235903939E-8
Model iJN1463.cmd: 8.428722719622415E-8
Cycle 36
Total biomass:
Model iMM904.cmd: 8.391352795427057E-8
Model iJN1463.cmd: 8.843311131875244E-8
Cycle 37
Total biomass:
Model iMM904.cmd: 8.712973705700255E-8
Model iJN1463.cmd: 9.282044274848798E-8
Cycle 38
Total biomass:
Model iMM904.cmd: 9.033211902843615E-8
Model iJN1463.cmd: 9.743460909129578E-8
Cycle 39
Total biomass:
Model iMM904.cmd: 9.354232227331347E-8
Model iJN1463.cmd: 1.0228384732525895E-7
Cycle 40
Total biomass:
Model iMM904.cmd: 9.67656362742387E-8
Model iJN1463.cmd: 1.0734937989438798E-7
Cycle 41
Total biomass:
Model iMM904.cmd: 1.000146135657138E-7
Model iJN1463.cmd: 1.1265283263630368E-7
Cycle 42
Total biomass:
Model iMM904.cmd: 1.0332392918030838E-7
Model iJN1463.cmd: 1.1821800877982857E-7
Cycle 43
Total biomass:
Model iMM904.cmd: 1.0667853584457916E-7
Model iJN1463.cmd: 1.24053779450072E-7
Cycle 44
Total biomass:
Model iMM904.cmd: 1.1009533746945774E-7
Model iJN1463.cmd: 1.3023181419046842E-7
Cycle 45
Total biomass:
Model iMM904.cmd: 1.135628209137599E-7
Model iJN1463.cmd: 1.3672179855807187E-7
Cycle 46
Total biomass:
Model iMM904.cmd: 1.1706635699935957E-7
Model iJN1463.cmd: 1.4352282615914586E-7
Cycle 47
Total biomass:
Model iMM904.cmd: 1.206166959595543E-7
Model iJN1463.cmd: 1.506429436075328E-7
Cycle 48
Total biomass:
Model iMM904.cmd: 1.2423707457887664E-7
Model iJN1463.cmd: 1.581110779873241E-7
```

```
Cycle 49
Total biomass:
Model iMM904.cmd: 1.2790945517657984E-7
Model iJN1463.cmd: 1.6594449723172672E-7
Cycle 50
Total biomass:
Model iMM904.cmd: 1.3167258595803738E-7
Model iJN1463.cmd: 1.741514173253760E-7
Cycle 51
Total biomass:
Model iMM904.cmd: 1.3552573537091883E-7
Model iJN1463.cmd: 1.8274863072277792E-7
Cycle 52
Total biomass:
Model iMM904.cmd: 1.3950896894788315E-7
Model iJN1463.cmd: 1.917848185196675E-7
Cycle 53
Total biomass:
Model iMM904.cmd: 1.436177952907064E-7
Model iJN1463.cmd: 2.01275229018753E-7
Cycle 54
Total biomass:
Model iMM904.cmd: 1.4784984564372562E-7
Model iJN1463.cmd: 2.1124025588136224E-7
Cycle 55
Total biomass:
Model iMM904.cmd: 1.5219532677775218E-7
Model iJN1463.cmd: 2.2170621030348212E-7
Cycle 56
Total biomass:
Model iMM904.cmd: 1.5665043682307357E-7
Model iJN1463.cmd: 2.3269159495207677E-7
Cycle 57
Total biomass:
Model iMM904.cmd: 1.6121337350965462E-7
Model iJN1463.cmd: 2.4421943187264627E-7
Cycle 58
Total biomass:
Model iMM904.cmd: 1.6588972850060553E-7
Model iJN1463.cmd: 2.563202933656236E-7
Cycle 59
Total biomass:
Model iMM904.cmd: 1.706780427084983E-7
Model iJN1463.cmd: 2.69025801987318E-7
Cycle 60
Total biomass:
Model iMM904.cmd: 1.7557060893781626E-7
Model iJN1463.cmd: 2.8236513087749296E-7
Cycle 61
Total biomass:
Model iMM904.cmd: 1.8056879930460921E-7
Model iJN1463.cmd: 2.963650487200148E-7
Cycle 62
Total biomass:
Model iMM904.cmd: 1.8568602122964576E-7
Model iJN1463.cmd: 3.110456084723788E-7
Cycle 63
Total biomass:
Model iMM904.cmd: 1.909306628025326E-7
Model iJN1463.cmd: 3.264492624577419E-7
Cycle 64
Total biomass:
Model iMM904.cmd: 1.963166735187568E-7
Model iJN1463.cmd: 3.4261400169733684E-7
Cycle 65
Total biomass:
Model iMM904.cmd: 2.018249549545726E-7
Model iJN1463.cmd: 3.595267949258605E-7
Cycle 66
Total biomass:
Model iMM904.cmd: 2.0742912044846616E-7
Model iJN1463.cmd: 3.772490367839283E-7
Cycle 67
Total biomass:
Model iMM904.cmd: 2.1314550826061969E-7
Model iJN1463.cmd: 3.957908089164693E-7
Cycle 68
Total biomass:
Model iMM904.cmd: 2.189813502603424E-7
Model iJN1463.cmd: 4.1519726994541493E-7
Cycle 69
Total biomass:
Model iMM904.cmd: 2.2497230683453223E-7
```

```
Model iJN1463.cmd: 4.3553133315685584E-7
Cycle 70
Total biomass:
Model iMM904.cmd: 2.3111670281792452E-7
Model iJN1463.cmd: 4.56839280206684E-7
Cycle 71
Total biomass:
Model iMM904.cmd: 2.3741636185557276E-7
Model iJN1463.cmd: 4.791674680429595E-7
Cycle 72
Total biomass:
Model iMM904.cmd: 2.438774376828743E-7
Model iJN1463.cmd: 5.025668861875289E-7
Cycle 73
Total biomass:
Model iMM904.cmd: 2.5049886594904736E-7
Model iJN1463.cmd: 5.27083152268949E-7
Cycle 74
Total biomass:
Model iMM904.cmd: 2.5727962232657735E-7
Model iJN1463.cmd: 5.527746812786339E-7
Cycle 75
Total biomass:
Model iMM904.cmd: 2.642178544500628E-7
Model iJN1463.cmd: 5.796972916104362E-7
Cycle 76
Total biomass:
Model iMM904.cmd: 2.713221528499579E-7
Model iJN1463.cmd: 6.079438945644323E-7
Cycle 77
Total biomass:
Model iMM904.cmd: 2.786294704907941E-7
Model iJN1463.cmd: 6.37558949212952E-7
Cycle 78
Total biomass:
Model iMM904.cmd: 2.8612077232128295E-7
Model iJN1463.cmd: 6.686118612500169E-7
Cycle 79
Total biomass:
Model iMM904.cmd: 2.9379768439819724E-7
Model iJN1463.cmd: 7.011758967750716E-7
Cycle 80
Total biomass:
Model iMM904.cmd: 3.0167687689510057E-7
Model iJN1463.cmd: 7.353249434570549E-7
Cycle 81
Total biomass:
Model iMM904.cmd: 3.097322734736735E-7
Model iJN1463.cmd: 7.71124679871459E-7
Cycle 82
Total biomass:
Model iMM904.cmd: 3.1799543706530696E-7
Model iJN1463.cmd: 8.086370266556375E-7
Cycle 83
Total biomass:
Model iMM904.cmd: 3.265105928881944E-7
Model iJN1463.cmd: 8.479500335038624E-7
Cycle 84
Total biomass:
Model iMM904.cmd: 3.3526866160404643E-7
Model iJN1463.cmd: 8.890659037221238E-7
Cycle 85
Total biomass:
Model iMM904.cmd: 3.442266503736072E-7
Model iJN1463.cmd: 9.318913646540179E-7
Cycle 86
Total biomass:
Model iMM904.cmd: 3.533733799832532E-7
Model iJN1463.cmd: 9.764720422485539E-7
Cycle 87
Total biomass:
Model iMM904.cmd: 3.627282017234455E-7
Model iJN1463.cmd: 1.022890307293644E-6
Cycle 88
Total biomass:
Model iMM904.cmd: 3.7231618307129223E-7
Model iJN1463.cmd: 1.070980844797217E-6
Cycle 89
Total biomass:
Model iMM904.cmd: 3.8215518544412547E-7
Model iJN1463.cmd: 1.1208344860810804E-6
Cycle 90
Total biomass:
```

```
Model iMM904.cmd: 3.922564431146333E-7
Model iJN1463.cmd: 1.1725686325315415E-6
Cycle 91
Total biomass:
Model iMM904.cmd: 4.0263068802514254E-7
Model iJN1463.cmd: 1.2262944370493402E-6
Cycle 92
Total biomass:
Model iMM904.cmd: 4.1328952740661017E-7
Model iJN1463.cmd: 1.282130838490242E-6
Cycle 93
Total biomass:
Model iMM904.cmd: 4.242415520885871E-7
Model iJN1463.cmd: 1.3402004193549318E-6
Cycle 94
Total biomass:
Model iMM904.cmd: 4.3549818310162455E-7
Model iJN1463.cmd: 1.400630400176705E-6
Cycle 95
Total biomass:
Model iMM904.cmd: 4.470698646489732E-7
Model iJN1463.cmd: 1.4635464905331735E-6
Cycle 96
Total biomass:
Model iMM904.cmd: 4.5900485180654047E-7
Model iJN1463.cmd: 1.5289232404270839E-6
Cycle 97
Total biomass:
Model iMM904.cmd: 4.71341453169716E-7
Model iJN1463.cmd: 1.5969466318676503E-6
Cycle 98
Total biomass:
Model iMM904.cmd: 4.841693390503643E-7
Model iJN1463.cmd: 1.6677935680278885E-6
Cycle 99
Total biomass:
Model iMM904.cmd: 4.974201549339587E-7
Model iJN1463.cmd: 1.7414497777096052E-6
Cycle 100
Total biomass:
Model iMM904.cmd: 5.110793325693715E-7
Model iJN1463.cmd: 1.8180779164158266E-6
Cycle 101
Total biomass:
Model iMM904.cmd: 5.251348106534918E-7
Model iJN1463.cmd: 1.8978235337105033E-6
Cycle 102
Total biomass:
Model iMM904.cmd: 5.394799521201301E-7
Model iJN1463.cmd: 1.9808766742865773E-6
Cycle 103
Total biomass:
Model iMM904.cmd: 5.542513793200296E-7
Model iJN1463.cmd: 2.067284638316198E-6
Cycle 104
Total biomass:
Model iMM904.cmd: 5.692963161092025E-7
Model iJN1463.cmd: 2.1572159859754996E-6
Cycle 105
Total biomass:
Model iMM904.cmd: 5.846269354574685E-7
Model iJN1463.cmd: 2.2508854047046504E-6
Cycle 106
Total biomass:
Model iMM904.cmd: 6.003315238691354E-7
Model iJN1463.cmd: 2.3485024912356842E-6
Cycle 107
Total biomass:
Model iMM904.cmd: 6.164786150707394E-7
Model iJN1463.cmd: 2.450024350088632E-6
Cycle 108
Total biomass:
Model iMM904.cmd: 6.33025479683486E-7
Model iJN1463.cmd: 2.5550058665008684E-6
Cycle 109
Total biomass:
Model iMM904.cmd: 6.501176171134196E-7
Model iJN1463.cmd: 2.663734407293579E-6
Cycle 110
Total biomass:
Model iMM904.cmd: 6.676228879049672E-7
Model iJN1463.cmd: 2.7763246350209307E-6
Cycle 111
```

```
Total biomass:
Model iMM904.cmd: 6.855332013543691E-7
Model iJN1463.cmd: 2.893058513437223E-6
Cycle 112
Total biomass:
Model iMM904.cmd: 7.038771707207594E-7
Model iJN1463.cmd: 3.0141566294079234E-6
Cycle 113
Total biomass:
Model iMM904.cmd: 7.226769010086193E-7
Model iJN1463.cmd: 3.1398434141022713E-6
Cycle 114
Total biomass:
Model iMM904.cmd: 7.41941628534754E-7
Model iJN1463.cmd: 3.270371566862325E-6
Cycle 115
Total biomass:
Model iMM904.cmd: 7.616784566443298E-7
Model iJN1463.cmd: 3.4059988598810903E-6
Cycle 116
Total biomass:
Model iMM904.cmd: 7.81983730598149E-7
Model iJN1463.cmd: 3.5467747777525498E-6
Cycle 117
Total biomass:
Model iMM904.cmd: 8.028999741467797E-7
Model iJN1463.cmd: 3.6932995704172393E-6
Cycle 118
Total biomass:
Model iMM904.cmd: 8.244073804925238E-7
Model iJN1463.cmd: 3.845688955797651E-6
Cycle 119
Total biomass:
Model iMM904.cmd: 8.465682093033365E-7
Model iJN1463.cmd: 4.004242013800757E-6
Cycle 120
Total biomass:
Model iMM904.cmd: 8.692180593174754E-7
Model iJN1463.cmd: 4.169084091578102E-6
Cycle 121
Total biomass:
Model iMM904.cmd: 8.923080479813598E-7
Model iJN1463.cmd: 4.340089283937178E-6
Cycle 122
Total biomass:
Model iMM904.cmd: 9.157811463016384E-7
Model iJN1463.cmd: 4.517360934414843E-6
Cycle 123
Total biomass:
Model iMM904.cmd: 9.396143214990687E-7
Model iJN1463.cmd: 4.700624426180332E-6
Cycle 124
Total biomass:
Model iMM904.cmd: 9.639200848471685E-7
Model iJN1463.cmd: 4.889958088537472E-6
Cycle 125
Total biomass:
Model iMM904.cmd: 9.886992128357878E-7
Model iJN1463.cmd: 5.085614389272828E-6
Cycle 126
Total biomass:
Model iMM904.cmd: 1.0139145923336305E-6
Model iJN1463.cmd: 5.286281884878835E-6
Cycle 127
Total biomass:
Model iMM904.cmd: 1.0396697321409508E-6
Model iJN1463.cmd: 5.484683454968722E-6
Cycle 128
Total biomass:
Model iMM904.cmd: 1.0658980381482425E-6
Model iJN1463.cmd: 5.679283197025116E-6
Cycle 129
Total biomass:
Model iMM904.cmd: 1.0928181221731192E-6
Model iJN1463.cmd: 5.868902166385558E-6
Cycle 130
Total biomass:
Model iMM904.cmd: 1.1204220464681532E-6
Model iJN1463.cmd: 6.054360494248652E-6
Cycle 131
Total biomass:
Model iMM904.cmd: 1.148742815335009E-6
Model iJN1463.cmd: 6.231206414723712E-6
```

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Cycle 132
Total biomass:
Model iMM904.cmd: 1.1778529145687183E-6
Model iJN1463.cmd: 6.407540467123049E-6
Cycle 133
Total biomass:
Model iMM904.cmd: 1.207934561560588E-6
Model iJN1463.cmd: 6.580847147510594E-6
Cycle 134
Total biomass:
Model iMM904.cmd: 1.2385895995055704E-6
Model iJN1463.cmd: 6.75096420411456E-6
Cycle 135
Total biomass:
Model iMM904.cmd: 1.269798512420477E-6
Model iJN1463.cmd: 6.917517966482124E-6
Cycle 136
Total biomass:
Model iMM904.cmd: 1.3017160822565284E-6
Model iJN1463.cmd: 7.0818774430910666E-6
Cycle 137
Total biomass:
Model iMM904.cmd: 1.3343838595957764E-6
Model iJN1463.cmd: 7.244449137428413E-6
Cycle 138
Total biomass:
Model iMM904.cmd: 1.3675312348723032E-6
Model iJN1463.cmd: 7.402659135020015E-6
Cycle 139
Total biomass:
Model iMM904.cmd: 1.4003886637915796E-6
Model iJN1463.cmd: 7.554254571894048E-6
Cycle 140
Total biomass:
Model iMM904.cmd: 1.432385869250751E-6
Model iJN1463.cmd: 7.696902175381548E-6
Cycle 141
Total biomass:
Model iMM904.cmd: 1.4644938932824002E-6
Model iJN1463.cmd: 7.832875555039173E-6
Cycle 142
Total biomass:
Model iMM904.cmd: 1.4965441860568958E-6
Model iJN1463.cmd: 7.962136612149898E-6
Cycle 143
Total biomass:
Model iMM904.cmd: 1.5310517097859918E-6
Model iJN1463.cmd: 8.08625079540138E-6
Cycle 144
Total biomass:
Model iMM904.cmd: 1.5647278439846679E-6
Model iJN1463.cmd: 8.204880618500807E-6
Cycle 145
Total biomass:
Model iMM904.cmd: 1.5979249766797058E-6
Model iJN1463.cmd: 8.318290181362328E-6
Cycle 146
Total biomass:
Model iMM904.cmd: 1.6306402148780897E-6
Model iJN1463.cmd: 8.426757619484195E-6
Cycle 147
Total biomass:
Model iMM904.cmd: 1.6602134501417074E-6
Model iJN1463.cmd: 8.529865316931374E-6
Cycle 148
Total biomass:
Model iMM904.cmd: 1.6886018920678818E-6
Model iJN1463.cmd: 8.629544009149277E-6
Cycle 149
Total biomass:
Model iMM904.cmd: 1.717089484357736E-6
Model iJN1463.cmd: 8.725380484296425E-6
Cycle 150
Total biomass:
Model iMM904.cmd: 1.7435347587718353E-6
Model iJN1463.cmd: 8.818092230125261E-6
Cycle 151
Total biomass:
Model iMM904.cmd: 1.7689070484023318E-6
Model iJN1463.cmd: 8.905543662938855E-6
Cycle 152
Total biomass:
Model iMM904.cmd: 1.7938383419779293E-6
```

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Model iJN1463.cmd: 8.985116063576914E-6
Cycle 153
Total biomass:
Model iMM904.cmd: 1.8181280822261324E-6
Model iJN1463.cmd: 9.057140214727609E-6
Cycle 154
Total biomass:
Model iMM904.cmd: 1.8419116664356403E-6
Model iJN1463.cmd: 9.125315533839355E-6
Cycle 155
Total biomass:
Model iMM904.cmd: 1.8646734024803657E-6
Model iJN1463.cmd: 9.189465979464453E-6
Cycle 156
Total biomass:
Model iMM904.cmd: 1.886800503404593E-6
Model iJN1463.cmd: 9.250443989599649E-6
Cycle 157
Total biomass:
Model iMM904.cmd: 1.908594185398234E-6
Model iJN1463.cmd: 9.308630856668914E-6
Cycle 158
Total biomass:
Model iMM904.cmd: 1.928778172060048E-6
Model iJN1463.cmd: 9.364647926369957E-6
Cycle 159
Total biomass:
Model iMM904.cmd: 1.948760692211271E-6
Model iJN1463.cmd: 9.4177480833382E-6
Cycle 160
Total biomass:
Model iMM904.cmd: 1.9683106018717948E-6
Model iJN1463.cmd: 9.469529225864228E-6
Cycle 161
Total biomass:
Model iMM904.cmd: 1.987765492297737E-6
Model iJN1463.cmd: 9.519903042693598E-6
Cycle 162
Total biomass:
Model iMM904.cmd: 2.006950027787808E-6
Model iJN1463.cmd: 9.569476347699005E-6
Cycle 163
Total biomass:
Model iMM904.cmd: 2.0256883512403885E-6
Model iJN1463.cmd: 9.617934207796075E-6
Cycle 164
Total biomass:
Model iMM904.cmd: 2.0443738687730526E-6
Model iJN1463.cmd: 9.664187889750238E-6
Cycle 165
Total biomass:
Model iMM904.cmd: 2.0625078058125786E-6
Model iJN1463.cmd: 9.709495708133581E-6
Cycle 166
Total biomass:
Model iMM904.cmd: 2.0806562706509404E-6
Model iJN1463.cmd: 9.753316285284545E-6
Cycle 167
Total biomass:
Model iMM904.cmd: 2.0990882599957387E-6
Model iJN1463.cmd: 9.79603376750005E-6
Cycle 168
Total biomass:
Model iMM904.cmd: 2.1173326746487165E-6
Model iJN1463.cmd: 9.838501417241843E-6
Cycle 169
Total biomass:
Model iMM904.cmd: 2.135480917986707E-6
Model iJN1463.cmd: 9.88070864480497E-6
Cycle 170
Total biomass:
Model iMM904.cmd: 2.153108894912171E-6
Model iJN1463.cmd: 9.922926154416926E-6
Cycle 171
Total biomass:
Model iMM904.cmd: 2.170435066146272E-6
Model iJN1463.cmd: 9.964957569648496E-6
Cycle 172
Total biomass:
Model iMM904.cmd: 2.1874227075806194E-6
Model iJN1463.cmd: 1.0005912651386334E-5
Cycle 173
Total biomass:
```

```
Model iMM904.cmd: 2.2045908934665105E-6
Model iJN1463.cmd: 1.004592005558818E-5
Cycle 174
Total biomass:
Model iMM904.cmd: 2.2213240389482817E-6
Model iJN1463.cmd: 1.0085829759467366E-5
Cycle 175
Total biomass:
Model iMM904.cmd: 2.237856656124763E-6
Model iJN1463.cmd: 1.0124608167107947E-5
Cycle 176
Total biomass:
Model iMM904.cmd: 2.2548779724769485E-6
Model iJN1463.cmd: 1.0166653561917778E-5
Cycle 177
Total biomass:
Model iMM904.cmd: 2.271705534169575E-6
Model iJN1463.cmd: 1.0206230706127564E-5
Cycle 178
Total biomass:
Model iMM904.cmd: 2.2876346768388645E-6
Model iJN1463.cmd: 1.0244816844292844E-5
Cycle 179
Total biomass:
Model iMM904.cmd: 2.303174523215977E-6
Model iJN1463.cmd: 1.0281949645898853E-5
Cycle 180
Total biomass:
Model iMM904.cmd: 2.3187465097220392E-6
Model iJN1463.cmd: 1.0317987429803782E-5
Cycle 181
Total biomass:
Model iMM904.cmd: 2.3339629677158835E-6
Model iJN1463.cmd: 1.0354049062543387E-5
Cycle 182
Total biomass:
Model iMM904.cmd: 2.349082641618155E-6
Model iJN1463.cmd: 1.0391161821729932E-5
Cycle 183
Total biomass:
Model iMM904.cmd: 2.3640860027007667E-6
Model iJN1463.cmd: 1.0428704793339739E-5
Cycle 184
Total biomass:
Model iMM904.cmd: 2.379629176547675E-6
Model iJN1463.cmd: 1.046582602259318E-5
Cycle 185
Total biomass:
Model iMM904.cmd: 2.395420705486003E-6
Model iJN1463.cmd: 1.0502761081650322E-5
Cycle 186
Total biomass:
Model iMM904.cmd: 2.410928619970754E-6
Model iJN1463.cmd: 1.053973524588918E-5
Cycle 187
Total biomass:
Model iMM904.cmd: 2.42667162646436E-6
Model iJN1463.cmd: 1.0575712231959875E-5
Cycle 188
Total biomass:
Model iMM904.cmd: 2.4418072026818485E-6
Model iJN1463.cmd: 1.0610894842184179E-5
Cycle 189
Total biomass:
Model iMM904.cmd: 2.4571278996419902E-6
Model iJN1463.cmd: 1.0644484641386892E-5
Cycle 190
Total biomass:
Model iMM904.cmd: 2.4726237111928156E-6
Model iJN1463.cmd: 1.0678558131048802E-5
Cycle 191
Total biomass:
Model iMM904.cmd: 2.487808473542643E-6
Model iJN1463.cmd: 1.0713330022274535E-5
Cycle 192
Total biomass:
Model iMM904.cmd: 2.50333588380064142E-6
Model iJN1463.cmd: 1.0747910393486294E-5
Cycle 193
Total biomass:
Model iMM904.cmd: 2.5186656403787864E-6
Model iJN1463.cmd: 1.0782150325542109E-5
Cycle 194
```

```
Total biomass:
Model iMM904.cmd: 2.533607449986178E-6
Model iJN1463.cmd: 1.0815812310417738E-5
Cycle 195
Total biomass:
Model iMM904.cmd: 2.5482302164174364E-6
Model iJN1463.cmd: 1.0848725425258924E-5
Cycle 196
Total biomass:
Model iMM904.cmd: 2.563212037013801E-6
Model iJN1463.cmd: 1.0881101020217148E-5
Cycle 197
Total biomass:
Model iMM904.cmd: 2.57855097892723E-6
Model iJN1463.cmd: 1.0913308488104716E-5
Cycle 198
Total biomass:
Model iMM904.cmd: 2.5930295723899813E-6
Model iJN1463.cmd: 1.094668462981011E-5
Cycle 199
Total biomass:
Model iMM904.cmd: 2.607463566081002E-6
Model iJN1463.cmd: 1.0980495557669319E-5
Cycle 200
Total biomass:
Model iMM904.cmd: 2.622209067454155E-6
Model iJN1463.cmd: 1.1012239597025307E-5
Cycle 201
Total biomass:
Model iMM904.cmd: 2.637267505681379E-6
Model iJN1463.cmd: 1.1043905324361516E-5
Cycle 202
Total biomass:
Model iMM904.cmd: 2.6516845204953636E-6
Model iJN1463.cmd: 1.107632295226723E-5
Cycle 203
Total biomass:
Model iMM904.cmd: 2.666297796161933E-6
Model iJN1463.cmd: 1.1108673225363797E-5
Cycle 204
Total biomass:
Model iMM904.cmd: 2.6811350188945348E-6
Model iJN1463.cmd: 1.1140625001111126E-5
Cycle 205
Total biomass:
Model iMM904.cmd: 2.695906754687335E-6
Model iJN1463.cmd: 1.1173083999104953E-5
Cycle 206
Total biomass:
Model iMM904.cmd: 2.7111528086933E-6
Model iJN1463.cmd: 1.1204921081380111E-5
Cycle 207
Total biomass:
Model iMM904.cmd: 2.7263498360368108E-6
Model iJN1463.cmd: 1.123607873823029E-5
Cycle 208
Total biomass:
Model iMM904.cmd: 2.740792136035828E-6
Model iJN1463.cmd: 1.1267228285843483E-5
Cycle 209
Total biomass:
Model iMM904.cmd: 2.7551960791251578E-6
Model iJN1463.cmd: 1.1299383714896108E-5
Cycle 210
Total biomass:
Model iMM904.cmd: 2.7696948552374826E-6
Model iJN1463.cmd: 1.1330852212648476E-5
Cycle 211
Total biomass:
Model iMM904.cmd: 2.7847524137189515E-6
Model iJN1463.cmd: 1.136305122863899E-5
Cycle 212
Total biomass:
Model iMM904.cmd: 2.79960560061021387E-6
Model iJN1463.cmd: 1.1394649421922176E-5
Cycle 213
Total biomass:
Model iMM904.cmd: 2.8138350347907903E-6
Model iJN1463.cmd: 1.142675960429646E-5
Cycle 214
Total biomass:
Model iMM904.cmd: 2.8282163819577E-6
Model iJN1463.cmd: 1.145797630441213E-5
```

```
Cycle 215
Total biomass:
Model iMM904.cmd: 2.8426957951726257E-6
Model iJN1463.cmd: 1.1489017616535737E-5
Cycle 216
Total biomass:
Model iMM904.cmd: 2.857045568631101E-6
Model iJN1463.cmd: 1.1519221202258336E-5
Cycle 217
Total biomass:
Model iMM904.cmd: 2.8701901229431644E-6
Model iJN1463.cmd: 1.1550874432384172E-5
Cycle 218
Total biomass:
Model iMM904.cmd: 2.8842719729345984E-6
Model iJN1463.cmd: 1.1581198459013659E-5
Cycle 219
Total biomass:
Model iMM904.cmd: 2.8981414078440563E-6
Model iJN1463.cmd: 1.1611534682599385E-5
Cycle 220
Total biomass:
Model iMM904.cmd: 2.9125798377079975E-6
Model iJN1463.cmd: 1.1640237614627956E-5
Cycle 221
Total biomass:
Model iMM904.cmd: 2.9270561929486293E-6
Model iJN1463.cmd: 1.1670568485882172E-5
Cycle 222
Total biomass:
Model iMM904.cmd: 2.9420084030809057E-6
Model iJN1463.cmd: 1.1699085858577785E-5
Cycle 223
Total biomass:
Model iMM904.cmd: 2.9564665764190787E-6
Model iJN1463.cmd: 1.1726547977416687E-5
Cycle 224
Total biomass:
Model iMM904.cmd: 2.96950986240912E-6
Model iJN1463.cmd: 1.175590494435947E-5
Cycle 225
Total biomass:
Model iMM904.cmd: 2.983028662423678E-6
Model iJN1463.cmd: 1.1787255737668195E-5
Cycle 226
Total biomass:
Model iMM904.cmd: 2.9968923632794938E-6
Model iJN1463.cmd: 1.1817967829530481E-5
Cycle 227
Total biomass:
Model iMM904.cmd: 3.00974092532482E-6
Model iJN1463.cmd: 1.1847845392020243E-5
Cycle 228
Total biomass:
Model iMM904.cmd: 3.022725769420789E-6
Model iJN1463.cmd: 1.18749845929242E-5
Cycle 229
Total biomass:
Model iMM904.cmd: 3.0355651530634312E-6
Model iJN1463.cmd: 1.1903174445868052E-5
Cycle 230
Total biomass:
Model iMM904.cmd: 3.0486904220990735E-6
Model iJN1463.cmd: 1.1931285860076222E-5
Cycle 231
Total biomass:
Model iMM904.cmd: 3.061938611190882E-6
Model iJN1463.cmd: 1.1959378661825925E-5
Cycle 232
Total biomass:
Model iMM904.cmd: 3.074802697097782E-6
Model iJN1463.cmd: 1.198793341149711E-5
Cycle 233
Total biomass:
Model iMM904.cmd: 3.0876303679065616E-6
Model iJN1463.cmd: 1.201624424182048E-5
Cycle 234
Total biomass:
Model iMM904.cmd: 3.0996376233513257E-6
Model iJN1463.cmd: 1.2045258084231199E-5
Cycle 235
Total biomass:
Model iMM904.cmd: 3.1109230283513546E-6
```

```
Model iJN1463.cmd: 1.2076436352759836E-5
Cycle 236
Total biomass:
Model iMM904.cmd: 3.1238186315198283E-6
Model iJN1463.cmd: 1.2104466434272192E-5
Cycle 237
Total biomass:
Model iMM904.cmd: 3.135749253592513E-6
Model iJN1463.cmd: 1.2133086528754138E-5
Cycle 238
Total biomass:
Model iMM904.cmd: 3.149392574499852E-6
Model iJN1463.cmd: 1.2162320531470684E-5
Cycle 239
Total biomass:
Model iMM904.cmd: 3.163174655051845E-6
Model iJN1463.cmd: 1.218943551859435E-5
Cycle 240
Total biomass:
Model iMM904.cmd: 3.17703465910263235E-6
Model iJN1463.cmd: 1.2215851453235821E-5
Cycle 241
Total biomass:
Model iMM904.cmd: 3.18994290064284333E-6
Model iJN1463.cmd: 1.2243296985574785E-5
Cycle 242
Total biomass:
Model iMM904.cmd: 3.203473388784613E-6
Model iJN1463.cmd: 1.2269621756822086E-5
Cycle 243
Total biomass:
Model iMM904.cmd: 3.217036937562989E-6
Model iJN1463.cmd: 1.2296042684392959E-5
Cycle 244
Total biomass:
Model iMM904.cmd: 3.2300388522811462E-6
Model iJN1463.cmd: 1.2322294729605518E-5
Cycle 245
Total biomass:
Model iMM904.cmd: 3.2425219043053153E-6
Model iJN1463.cmd: 1.2349025490567519E-5
Cycle 246
Total biomass:
Model iMM904.cmd: 3.2549071707349717E-6
Model iJN1463.cmd: 1.237554411720461E-5
Cycle 247
Total biomass:
Model iMM904.cmd: 3.2677789959224727E-6
Model iJN1463.cmd: 1.2401099555220056E-5
Cycle 248
Total biomass:
Model iMM904.cmd: 3.2805422242245514E-6
Model iJN1463.cmd: 1.2430629744952621E-5
Cycle 249
Total biomass:
Model iMM904.cmd: 3.2925575568115137E-6
Model iJN1463.cmd: 1.2459106837564187E-5
Cycle 250
Total biomass:
Model iMM904.cmd: 3.305944748613115E-6
Model iJN1463.cmd: 1.2485926223115972E-5
Cycle 251
Total biomass:
Model iMM904.cmd: 3.31940850619821475E-6
Model iJN1463.cmd: 1.2511417415662193E-5
Cycle 252
Total biomass:
Model iMM904.cmd: 3.331427471390143E-6
Model iJN1463.cmd: 1.2538289585007753E-5
Cycle 253
Total biomass:
Model iMM904.cmd: 3.3441291138401736E-6
Model iJN1463.cmd: 1.256357896536849E-5
Cycle 254
Total biomass:
Model iMM904.cmd: 3.3566139972559933E-6
Model iJN1463.cmd: 1.2589407438719159E-5
Cycle 255
Total biomass:
Model iMM904.cmd: 3.3691125577622473E-6
Model iJN1463.cmd: 1.2615222466662058E-5
Cycle 256
Total biomass:
```

```
Model iMM904.cmd: 3.3820611609087447E-6
Model iJN1463.cmd: 1.2639390665852404E-5
Cycle 257
Total biomass:
Model iMM904.cmd: 3.394942388034421E-6
Model iJN1463.cmd: 1.2663441780887008E-5
Cycle 258
Total biomass:
Model iMM904.cmd: 3.40738198111381E-6
Model iJN1463.cmd: 1.2687469712671694E-5
Cycle 259
Total biomass:
Model iMM904.cmd: 3.418056891251656E-6
Model iJN1463.cmd: 1.2716002687100854E-5
Cycle 260
Total biomass:
Model iMM904.cmd: 3.430349970760208E-6
Model iJN1463.cmd: 1.2740969725294528E-5
Cycle 261
Total biomass:
Model iMM904.cmd: 3.4424983858926643E-6
Model iJN1463.cmd: 1.2765431428232529E-5
Cycle 262
Total biomass:
Model iMM904.cmd: 3.4551825781985954E-6
Model iJN1463.cmd: 1.2788863701007257E-5
Cycle 263
Total biomass:
Model iMM904.cmd: 3.4676469450226374E-6
Model iJN1463.cmd: 1.2811984169128927E-5
Cycle 264
Total biomass:
Model iMM904.cmd: 3.480119767441895E-6
Model iJN1463.cmd: 1.2835888518871195E-5
Cycle 265
Total biomass:
Model iMM904.cmd: 3.492183867411074E-6
Model iJN1463.cmd: 1.2859887167947826E-5
Cycle 266
Total biomass:
Model iMM904.cmd: 3.504380440742484E-6
Model iJN1463.cmd: 1.2883280206264284E-5
Cycle 267
Total biomass:
Model iMM904.cmd: 3.5165069746151833E-6
Model iJN1463.cmd: 1.2906581901309744E-5
Cycle 268
Total biomass:
Model iMM904.cmd: 3.528807445428936E-6
Model iJN1463.cmd: 1.2929457932125014E-5
Cycle 269
Total biomass:
Model iMM904.cmd: 3.5411708359107343E-6
Model iJN1463.cmd: 1.2951940505810473E-5
Cycle 270
Total biomass:
Model iMM904.cmd: 3.552943201801583E-6
Model iJN1463.cmd: 1.297485239775319E-5
Cycle 271
Total biomass:
Model iMM904.cmd: 3.565022791817049E-6
Model iJN1463.cmd: 1.2997774229094968E-5
Cycle 272
Total biomass:
Model iMM904.cmd: 3.5773755683957314E-6
Model iJN1463.cmd: 1.3019904589769988E-5
Cycle 273
Total biomass:
Model iMM904.cmd: 3.5897222046056936E-6
Model iJN1463.cmd: 1.3042184406073797E-5
Cycle 274
Total biomass:
Model iMM904.cmd: 3.601641465113772E-6
Model iJN1463.cmd: 1.3065102180710998E-5
Cycle 275
Total biomass:
Model iMM904.cmd: 3.613063192955529E-6
Model iJN1463.cmd: 1.3088384297998315E-5
Cycle 276
Total biomass:
Model iMM904.cmd: 3.624579996306525E-6
Model iJN1463.cmd: 1.311175769032555E-5
Cycle 277
```

```
Total biomass:
Model iMM904.cmd: 3.6361541394323673E-6
Model iJN1463.cmd: 1.3134557039532278E-5
Cycle 278
Total biomass:
Model iMM904.cmd: 3.648575528208217E-6
Model iJN1463.cmd: 1.3156244319500338E-5
Cycle 279
Total biomass:
Model iMM904.cmd: 3.6606508997948526E-6
Model iJN1463.cmd: 1.317743421858003E-5
Cycle 280
Total biomass:
Model iMM904.cmd: 3.6726706513896487E-6
Model iJN1463.cmd: 1.319814010052601E-5
Cycle 281
Total biomass:
Model iMM904.cmd: 3.6833866183445757E-6
Model iJN1463.cmd: 1.3217218853939029E-5
Cycle 282
Total biomass:
Model iMM904.cmd: 3.694375681829686E-6
Model iJN1463.cmd: 1.323885538878418E-5
Cycle 283
Total biomass:
Model iMM904.cmd: 3.70607521550067114E-6
Model iJN1463.cmd: 1.3260322988734713E-5
Cycle 284
Total biomass:
Model iMM904.cmd: 3.717318294740795E-6
Model iJN1463.cmd: 1.3282679084477E-5
Cycle 285
Total biomass:
Model iMM904.cmd: 3.728753337392454E-6
Model iJN1463.cmd: 1.3306381128605886E-5
Cycle 286
Total biomass:
Model iMM904.cmd: 3.739905704683315E-6
Model iJN1463.cmd: 1.3328892818005808E-5
Cycle 287
Total biomass:
Model iMM904.cmd: 3.7522553726966854E-6
Model iJN1463.cmd: 1.3350458268429026E-5
Cycle 288
Total biomass:
Model iMM904.cmd: 3.765629851398121E-6
Model iJN1463.cmd: 1.3370404165304984E-5
Cycle 289
Total biomass:
Model iMM904.cmd: 3.7774510262154063E-6
Model iJN1463.cmd: 1.3391991228869487E-5
Cycle 290
Total biomass:
Model iMM904.cmd: 3.7899155751976977E-6
Model iJN1463.cmd: 1.34139770108876E-5
Cycle 291
Total biomass:
Model iMM904.cmd: 3.8030562941605967E-6
Model iJN1463.cmd: 1.343418513008238E-5
Cycle 292
Total biomass:
Model iMM904.cmd: 3.815897029328629E-6
Model iJN1463.cmd: 1.3454537321897505E-5
Cycle 293
Total biomass:
Model iMM904.cmd: 3.828292235668979E-6
Model iJN1463.cmd: 1.3475295378767104E-5
Cycle 294
Total biomass:
Model iMM904.cmd: 3.84060549133162E-6
Model iJN1463.cmd: 1.3496277860856745E-5
Cycle 295
Total biomass:
Model iMM904.cmd: 3.853075277992369E-6
Model iJN1463.cmd: 1.351685229688898E-5
Cycle 296
Total biomass:
Model iMM904.cmd: 3.865481613795125E-6
Model iJN1463.cmd: 1.3537097882235382E-5
Cycle 297
Total biomass:
Model iMM904.cmd: 3.8778681997485375E-6
Model iJN1463.cmd: 1.3557200103867943E-5
```

```
Cycle 298
Total biomass:
Model iMM904.cmd: 3.88996086435788E-6
Model iJN1463.cmd: 1.35773506637701E-5
Cycle 299
Total biomass:
Model iMM904.cmd: 3.901281874945907E-6
Model iJN1463.cmd: 1.3597863250907754E-5
Cycle 300
Total biomass:
Model iMM904.cmd: 3.912474325484059E-6
Model iJN1463.cmd: 1.3618736971531106E-5
Cycle 301
Total biomass:
Model iMM904.cmd: 3.9235643475897445E-6
Model iJN1463.cmd: 1.3639665222329887E-5
Cycle 302
Total biomass:
Model iMM904.cmd: 3.934992281963452E-6
Model iJN1463.cmd: 1.3660465976276213E-5
Cycle 303
Total biomass:
Model iMM904.cmd: 3.947848082526828E-6
Model iJN1463.cmd: 1.3679738346786337E-5
Cycle 304
Total biomass:
Model iMM904.cmd: 3.960213030159724E-6
Model iJN1463.cmd: 1.3698773356547819E-5
Cycle 305
Total biomass:
Model iMM904.cmd: 3.972332272676015E-6
Model iJN1463.cmd: 1.3718158160664144E-5
Cycle 306
Total biomass:
Model iMM904.cmd: 3.984956578760594E-6
Model iJN1463.cmd: 1.3738610505395295E-5
Cycle 307
Total biomass:
Model iMM904.cmd: 3.996485177170326E-6
Model iJN1463.cmd: 1.375893044542428E-5
Cycle 308
Total biomass:
Model iMM904.cmd: 4.008303390686501E-6
Model iJN1463.cmd: 1.377852700643562E-5
Cycle 309
Total biomass:
Model iMM904.cmd: 4.020711791622361E-6
Model iJN1463.cmd: 1.3799328396635807E-5
Cycle 310
Total biomass:
Model iMM904.cmd: 4.03462775611753E-6
Model iJN1463.cmd: 1.3821436715752029E-5
Cycle 311
Total biomass:
Model iMM904.cmd: 4.04806081069179E-6
Model iJN1463.cmd: 1.3843411121832791E-5
Cycle 312
Total biomass:
Model iMM904.cmd: 4.0604496071325515E-6
Model iJN1463.cmd: 1.3863913240350408E-5
Cycle 313
Total biomass:
Model iMM904.cmd: 4.074745235891962E-6
Model iJN1463.cmd: 1.388460687229433E-5
Cycle 314
Total biomass:
Model iMM904.cmd: 4.08785371307075E-6
Model iJN1463.cmd: 1.3904235641933464E-5
Cycle 315
Total biomass:
Model iMM904.cmd: 4.099968363241771E-6
Model iJN1463.cmd: 1.392339531841991E-5
Cycle 316
Total biomass:
Model iMM904.cmd: 4.1129528051995085E-6
Model iJN1463.cmd: 1.3944020940542698E-5
Cycle 317
Total biomass:
Model iMM904.cmd: 4.126747648975307E-6
Model iJN1463.cmd: 1.3972543521816189E-5
Cycle 318
Total biomass:
Model iMM904.cmd: 4.137559212205016E-6
```

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Model iJN1463.cmd: 1.3993169743598126E-5
Cycle 319
Total biomass:
Model iMM904.cmd: 4.151604717208775E-6
Model iJN1463.cmd: 1.4024551880685804E-5
Cycle 320
Total biomass:
Model iMM904.cmd: 4.164358287465532E-6
Model iJN1463.cmd: 1.4049309132441163E-5
Cycle 321
Total biomass:
Model iMM904.cmd: 4.177496964639355E-6
Model iJN1463.cmd: 1.4070656424262078E-5
Cycle 322
Total biomass:
Model iMM904.cmd: 4.190128781527926E-6
Model iJN1463.cmd: 1.4089350647142829E-5
Cycle 323
Total biomass:
Model iMM904.cmd: 4.201736576590705E-6
Model iJN1463.cmd: 1.4107466711094914E-5
Cycle 324
Total biomass:
Model iMM904.cmd: 4.212737826112635E-6
Model iJN1463.cmd: 1.4125341506419178E-5
Cycle 325
Total biomass:
Model iMM904.cmd: 4.224547418949403E-6
Model iJN1463.cmd: 1.4143063195623222E-5
Cycle 326
Total biomass:
Model iMM904.cmd: 4.23678876817876E-6
Model iJN1463.cmd: 1.4160449716193555E-5
Cycle 327
Total biomass:
Model iMM904.cmd: 4.249109110464475E-6
Model iJN1463.cmd: 1.4177826102883742E-5
Cycle 328
Total biomass:
Model iMM904.cmd: 4.2611614634159716E-6
Model iJN1463.cmd: 1.4195414036662076E-5
Cycle 329
Total biomass:
Model iMM904.cmd: 4.273147657721041E-6
Model iJN1463.cmd: 1.421289688090859E-5
Cycle 330
Total biomass:
Model iMM904.cmd: 4.284797031300804E-6
Model iJN1463.cmd: 1.4230654811853382E-5
Cycle 331
Total biomass:
Model iMM904.cmd: 4.297413615591889E-6
Model iJN1463.cmd: 1.4250211677095437E-5
Cycle 332
Total biomass:
Model iMM904.cmd: 4.310614027338258E-6
Model iJN1463.cmd: 1.4269876056647705E-5
Cycle 333
Total biomass:
Model iMM904.cmd: 4.324024301042501E-6
Model iJN1463.cmd: 1.4290607508543326E-5
Cycle 334
Total biomass:
Model iMM904.cmd: 4.3370171171913925E-6
Model iJN1463.cmd: 1.4308747890369465E-5
Cycle 335
Total biomass:
Model iMM904.cmd: 4.35019657460501E-6
Model iJN1463.cmd: 1.4326876772811803E-5
Cycle 336
Total biomass:
Model iMM904.cmd: 4.36272575628013E-6
Model iJN1463.cmd: 1.4346472512903387E-5
Cycle 337
Total biomass:
Model iMM904.cmd: 4.37593895916812E-6
Model iJN1463.cmd: 1.436529201661871E-5
Cycle 338
Total biomass:
Model iMM904.cmd: 4.38987625183686E-6
Model iJN1463.cmd: 1.4383870288058852E-5
Cycle 339
Total biomass:
```

```
Model iMM904.cmd: 4.401673976288396E-6
Model iJN1463.cmd: 1.4400944572213328E-5
Cycle 340
Total biomass:
Model iMM904.cmd: 4.4133715778980045E-6
Model iJN1463.cmd: 1.4417964222232641E-5
Cycle 341
Total biomass:
Model iMM904.cmd: 4.425049373637257E-6
Model iJN1463.cmd: 1.4434233893781753E-5
Cycle 342
Total biomass:
Model iMM904.cmd: 4.435807635723683E-6
Model iJN1463.cmd: 1.444930502669796E-5
Cycle 343
Total biomass:
Model iMM904.cmd: 4.446649520166323E-6
Model iJN1463.cmd: 1.4464686430395347E-5
Cycle 344
Total biomass:
Model iMM904.cmd: 4.457584914247027E-6
Model iJN1463.cmd: 1.4480212685431397E-5
Cycle 345
Total biomass:
Model iMM904.cmd: 4.468451942911362E-6
Model iJN1463.cmd: 1.4495667245215646E-5
Cycle 346
Total biomass:
Model iMM904.cmd: 4.48100475506442E-6
Model iJN1463.cmd: 1.4512353625369981E-5
Cycle 347
Total biomass:
Model iMM904.cmd: 4.493860661028518E-6
Model iJN1463.cmd: 1.4529541649844823E-5
Cycle 348
Total biomass:
Model iMM904.cmd: 4.505911430819425E-6
Model iJN1463.cmd: 1.4546667359080179E-5
Cycle 349
Total biomass:
Model iMM904.cmd: 4.517482300321416E-6
Model iJN1463.cmd: 1.4562771386633862E-5
Cycle 350
Total biomass:
Model iMM904.cmd: 4.529637295195364E-6
Model iJN1463.cmd: 1.4578064757872088E-5
Cycle 351
Total biomass:
Model iMM904.cmd: 4.541576983415751E-6
Model iJN1463.cmd: 1.4594331577151911E-5
Cycle 352
Total biomass:
Model iMM904.cmd: 4.5500560057532065E-6
Model iJN1463.cmd: 1.460794930689881E-5
Cycle 353
Total biomass:
Model iMM904.cmd: 4.558706218499878E-6
Model iJN1463.cmd: 1.461894481779201E-5
Cycle 354
Total biomass:
Model iMM904.cmd: 4.5669494379877E-6
Model iJN1463.cmd: 1.4629248780427133E-5
Cycle 355
Total biomass:
Model iMM904.cmd: 4.577613335296952E-6
Model iJN1463.cmd: 1.4641990856888793E-5
Cycle 356
Total biomass:
Model iMM904.cmd: 4.588986223192775E-6
Model iJN1463.cmd: 1.4655582106515267E-5
Cycle 357
Total biomass:
Model iMM904.cmd: 4.600438078193103E-6
Model iJN1463.cmd: 1.466990527440468E-5
Cycle 358
Total biomass:
Model iMM904.cmd: 4.6120993969960915E-6
Model iJN1463.cmd: 1.4685088191256136E-5
Cycle 359
Total biomass:
Model iMM904.cmd: 4.623745298214188E-6
Model iJN1463.cmd: 1.4700063399982114E-5
Cycle 360
```

```
Total biomass:
Model iMM904.cmd: 4.635309108278789E-6
Model iJN1463.cmd: 1.4714678728518135E-5
Cycle 361
Total biomass:
Model iMM904.cmd: 4.646384260762672E-6
Model iJN1463.cmd: 1.4729678353849485E-5
Cycle 362
Total biomass:
Model iMM904.cmd: 4.657500622383023E-6
Model iJN1463.cmd: 1.47445930002606163E-5
Cycle 363
Total biomass:
Model iMM904.cmd: 4.668039059814196E-6
Model iJN1463.cmd: 1.4760115532358387E-5
Cycle 364
Total biomass:
Model iMM904.cmd: 4.678211126221333E-6
Model iJN1463.cmd: 1.4776023144879419E-5
Cycle 365
Total biomass:
Model iMM904.cmd: 4.68814085153158E-6
Model iJN1463.cmd: 1.479199789414732E-5
Cycle 366
Total biomass:
Model iMM904.cmd: 4.698014411408203E-6
Model iJN1463.cmd: 1.4807930536386329E-5
Cycle 367
Total biomass:
Model iMM904.cmd: 4.707867308021792E-6
Model iJN1463.cmd: 1.4823801041087374E-5
Cycle 368
Total biomass:
Model iMM904.cmd: 4.717712137421734E-6
Model iJN1463.cmd: 1.4839601676482422E-5
Cycle 369
Total biomass:
Model iMM904.cmd: 4.728012568765512E-6
Model iJN1463.cmd: 1.485509729538211E-5
Cycle 370
Total biomass:
Model iMM904.cmd: 4.7383803543691835E-6
Model iJN1463.cmd: 1.4870559444640704E-5
Cycle 371
Total biomass:
Model iMM904.cmd: 4.74840842847115E-6
Model iJN1463.cmd: 1.4886175097402524E-5
Cycle 372
Total biomass:
Model iMM904.cmd: 4.760383674783295E-6
Model iJN1463.cmd: 1.4903151337448938E-5
Cycle 373
Total biomass:
Model iMM904.cmd: 4.772558522986797E-6
Model iJN1463.cmd: 1.4919505228596466E-5
Cycle 374
Total biomass:
Model iMM904.cmd: 4.784133001092103E-6
Model iJN1463.cmd: 1.4935064641958375E-5
Cycle 375
Total biomass:
Model iMM904.cmd: 4.795034618023171E-6
Model iJN1463.cmd: 1.4950045563940859E-5
Cycle 376
Total biomass:
Model iMM904.cmd: 4.805747808161631E-6
Model iJN1463.cmd: 1.4965523208197833E-5
Cycle 377
Total biomass:
Model iMM904.cmd: 4.8167157328294366E-6
Model iJN1463.cmd: 1.4980940018488058E-5
Cycle 378
Total biomass:
Model iMM904.cmd: 4.8295781941807515E-6
Model iJN1463.cmd: 1.4996474637816074E-5
Cycle 379
Total biomass:
Model iMM904.cmd: 4.842241023695083E-6
Model iJN1463.cmd: 1.5011873346019637E-5
Cycle 380
Total biomass:
Model iMM904.cmd: 4.853473118932231E-6
Model iJN1463.cmd: 1.5027968012508845E-5
```

```
Cycle 381
Total biomass:
Model iMM904.cmd: 4.864615782061369E-6
Model iJN1463.cmd: 1.504220074056121E-5
Cycle 382
Total biomass:
Model iMM904.cmd: 4.873626343896314E-6
Model iJN1463.cmd: 1.5053078744255802E-5
Cycle 383
Total biomass:
Model iMM904.cmd: 4.881297079746551E-6
Model iJN1463.cmd: 1.5062783834868718E-5
Cycle 384
Total biomass:
Model iMM904.cmd: 4.889592746166051E-6
Model iJN1463.cmd: 1.50733810834784461E-5
Cycle 385
Total biomass:
Model iMM904.cmd: 4.898040409707487E-6
Model iJN1463.cmd: 1.5084306387291372E-5
Cycle 386
Total biomass:
Model iMM904.cmd: 4.907122028589378E-6
Model iJN1463.cmd: 1.5094944323127286E-5
Cycle 387
Total biomass:
Model iMM904.cmd: 4.916575518380294E-6
Model iJN1463.cmd: 1.5106946517911702E-5
Cycle 388
Total biomass:
Model iMM904.cmd: 4.926334856829178E-6
Model iJN1463.cmd: 1.5118218152643146E-5
Cycle 389
Total biomass:
Model iMM904.cmd: 4.9370627816745E-6
Model iJN1463.cmd: 1.5131033843319531E-5
Cycle 390
Total biomass:
Model iMM904.cmd: 4.948250871049507E-6
Model iJN1463.cmd: 1.5144041893021491E-5
Cycle 391
Total biomass:
Model iMM904.cmd: 4.959551846046536E-6
Model iJN1463.cmd: 1.5157362442845943E-5
Cycle 392
Total biomass:
Model iMM904.cmd: 4.9702193264397756E-6
Model iJN1463.cmd: 1.5171335046282433E-5
Cycle 393
Total biomass:
Model iMM904.cmd: 4.980333581995061E-6
Model iJN1463.cmd: 1.5185827179244947E-5
Cycle 394
Total biomass:
Model iMM904.cmd: 4.9900482059614035E-6
Model iJN1463.cmd: 1.520035967931803E-5
Cycle 395
Total biomass:
Model iMM904.cmd: 5.0007797875824E-6
Model iJN1463.cmd: 1.5213387169640435E-5
Cycle 396
Total biomass:
Model iMM904.cmd: 5.011311828991608E-6
Model iJN1463.cmd: 1.5226619149871095E-5
Cycle 397
Total biomass:
Model iMM904.cmd: 5.02180845570913E-6
Model iJN1463.cmd: 1.5239837587302097E-5
Cycle 398
Total biomass:
Model iMM904.cmd: 5.03263727892767E-6
Model iJN1463.cmd: 1.525253127338816E-5
Cycle 399
Total biomass:
Model iMM904.cmd: 5.043507699943631E-6
Model iJN1463.cmd: 1.5265115259126828E-5
Cycle 400
Total biomass:
Model iMM904.cmd: 5.054380832888316E-6
Model iJN1463.cmd: 1.5277644371834854E-5
Cycle 401
Total biomass:
Model iMM904.cmd: 5.06524520385299E-6
```

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Model iJN1463.cmd: 1.5290134805018454E-5
Cycle 402
Total biomass:
Model iMM904.cmd: 5.076272346614865E-6
Model iJN1463.cmd: 1.530254493754754E-5
Cycle 403
Total biomass:
Model iMM904.cmd: 5.086978037778345E-6
Model iJN1463.cmd: 1.531531946953845E-5
Cycle 404
Total biomass:
Model iMM904.cmd: 5.09761134712859E-6
Model iJN1463.cmd: 1.532812463342901E-5
Cycle 405
Total biomass:
Model iMM904.cmd: 5.108233315271971E-6
Model iJN1463.cmd: 1.5341231212688553E-5
Cycle 406
Total biomass:
Model iMM904.cmd: 5.118717490141541E-6
Model iJN1463.cmd: 1.5354178316102968E-5
Cycle 407
Total biomass:
Model iMM904.cmd: 5.12915572085047E-6
Model iJN1463.cmd: 1.53670257499411E-5
Cycle 408
Total biomass:
Model iMM904.cmd: 5.139571991961577E-6
Model iJN1463.cmd: 1.5379813388716213E-5
Cycle 409
Total biomass:
Model iMM904.cmd: 5.149975400997013E-6
Model iJN1463.cmd: 1.5392554708758125E-5
Cycle 410
Total biomass:
Model iMM904.cmd: 5.160369199696848E-6
Model iJN1463.cmd: 1.540525425146801E-5
Cycle 411
Total biomass:
Model iMM904.cmd: 5.170754515459555E-6
Model iJN1463.cmd: 1.541791369617017E-5
Cycle 412
Total biomass:
Model iMM904.cmd: 5.181131699113106E-6
Model iJN1463.cmd: 1.543053373868412E-5
Cycle 413
Total biomass:
Model iMM904.cmd: 5.191230175936269E-6
Model iJN1463.cmd: 1.5442895448355265E-5
Cycle 414
Total biomass:
Model iMM904.cmd: 5.201687699452228E-6
Model iJN1463.cmd: 1.545534798589458E-5
Cycle 415
Total biomass:
Model iMM904.cmd: 5.212268289343279E-6
Model iJN1463.cmd: 1.5467688428386044E-5
Cycle 416
Total biomass:
Model iMM904.cmd: 5.222810629172118E-6
Model iJN1463.cmd: 1.548020411855716E-5
Cycle 417
Total biomass:
Model iMM904.cmd: 5.2332437461577804E-6
Model iJN1463.cmd: 1.549263170139253E-5
Cycle 418
Total biomass:
Model iMM904.cmd: 5.243645798771213E-6
Model iJN1463.cmd: 1.5504962432781727E-5
Cycle 419
Total biomass:
Model iMM904.cmd: 5.254032003788049E-6
Model iJN1463.cmd: 1.5517231342243543E-5
Cycle 420
Total biomass:
Model iMM904.cmd: 5.264398111679311E-6
Model iJN1463.cmd: 1.5529465310560763E-5
Cycle 421
Total biomass:
Model iMM904.cmd: 5.274747642424269E-6
Model iJN1463.cmd: 1.554166687628653E-5
Cycle 422
Total biomass:
```

```
Model iMM904.cmd: 5.2850818839026526E-6
Model iJN1463.cmd: 1.5553836965467217E-5
Cycle 423
Total biomass:
Model iMM904.cmd: 5.295401320261924E-6
Model iJN1463.cmd: 1.556597595113179E-5
Cycle 424
Total biomass:
Model iMM904.cmd: 5.30570615118347E-6
Model iJN1463.cmd: 1.557808400962101E-5
Cycle 425
Total biomass:
Model iMM904.cmd: 5.316172568644395E-6
Model iJN1463.cmd: 1.5590136219398413E-5
Cycle 426
Total biomass:
Model iMM904.cmd: 5.326615914131799E-6
Model iJN1463.cmd: 1.560213295011837E-5
Cycle 427
Total biomass:
Model iMM904.cmd: 5.337044335479461E-6
Model iJN1463.cmd: 1.5614080122312248E-5
Cycle 428
Total biomass:
Model iMM904.cmd: 5.347491315155324E-6
Model iJN1463.cmd: 1.562628867171786E-5
Cycle 429
Total biomass:
Model iMM904.cmd: 5.357793399087688E-6
Model iJN1463.cmd: 1.563833215206694E-5
Cycle 430
Total biomass:
Model iMM904.cmd: 5.368037275015937E-6
Model iJN1463.cmd: 1.565028641007433E-5
Cycle 431
Total biomass:
Model iMM904.cmd: 5.378250461462201E-6
Model iJN1463.cmd: 1.5662190228227715E-5
Cycle 432
Total biomass:
Model iMM904.cmd: 5.388443410835729E-6
Model iJN1463.cmd: 1.567405693028418E-5
Cycle 433
Total biomass:
Model iMM904.cmd: 5.398619977187771E-6
Model iJN1463.cmd: 1.568589095323001E-5
Cycle 434
Total biomass:
Model iMM904.cmd: 5.408781599206215E-6
Model iJN1463.cmd: 1.569769387296805E-5
Cycle 435
Total biomass:
Model iMM904.cmd: 5.418928820091062E-6
Model iJN1463.cmd: 1.5709466272351995E-5
Cycle 436
Total biomass:
Model iMM904.cmd: 5.429061862973336E-6
Model iJN1463.cmd: 1.572120839807867E-5
Cycle 437
Total biomass:
Model iMM904.cmd: 5.439360382800949E-6
Model iJN1463.cmd: 1.5732894861726943E-5
Cycle 438
Total biomass:
Model iMM904.cmd: 5.449636769337666E-6
Model iJN1463.cmd: 1.574452641848594E-5
Cycle 439
Total biomass:
Model iMM904.cmd: 5.459898469270355E-6
Model iJN1463.cmd: 1.575610863005969E-5
Cycle 440
Total biomass:
Model iMM904.cmd: 5.470180052240649E-6
Model iJN1463.cmd: 1.576795860029445E-5
Cycle 441
Total biomass:
Model iMM904.cmd: 5.48031474922974666E-6
Model iJN1463.cmd: 1.5779641747497983E-5
Cycle 442
Total biomass:
Model iMM904.cmd: 5.490390365841374E-6
Model iJN1463.cmd: 1.57912350826714E-5
Cycle 443
```

```
Total biomass:
Model iMM904.cmd: 5.500435172815402E-6
Model iJN1463.cmd: 1.580277813168817E-5
Cycle 444
Total biomass:
Model iMM904.cmd: 5.51045995020321E-6
Model iJN1463.cmd: 1.5814284527066758E-5
Cycle 445
Total biomass:
Model iMM904.cmd: 5.520468690414854E-6
Model iJN1463.cmd: 1.5825758848591253E-5
Cycle 446
Total biomass:
Model iMM904.cmd: 5.530462883774215E-6
Model iJN1463.cmd: 1.5837202723676246E-5
Cycle 447
Total biomass:
Model iMM904.cmd: 5.54044309246607E-6
Model iJN1463.cmd: 1.5848616758023083E-5
Cycle 448
Total biomass:
Model iMM904.cmd: 5.550409546394546E-6
Model iJN1463.cmd: 1.5860001207542303E-5
Cycle 449
Total biomass:
Model iMM904.cmd: 5.560545287554531E-6
Model iJN1463.cmd: 1.587133020645867E-5
Cycle 450
Total biomass:
Model iMM904.cmd: 5.570659829633804E-6
Model iJN1463.cmd: 1.588260485931398E-5
Cycle 451
Total biomass:
Model iMM904.cmd: 5.580764301767712E-6
Model iJN1463.cmd: 1.58938326664457887E-5
Cycle 452
Total biomass:
Model iMM904.cmd: 5.5908867472200155E-6
Model iJN1463.cmd: 1.5905332634742356E-5
Cycle 453
Total biomass:
Model iMM904.cmd: 5.600866658289551E-6
Model iJN1463.cmd: 1.5916672006049092E-5
Cycle 454
Total biomass:
Model iMM904.cmd: 5.61078365001971E-6
Model iJN1463.cmd: 1.5927921243229937E-5
Cycle 455
Total biomass:
Model iMM904.cmd: 5.62066741433028E-6
Model iJN1463.cmd: 1.5939116842005456E-5
Cycle 456
Total biomass:
Model iMM904.cmd: 5.630530093101198E-6
Model iJN1463.cmd: 1.5950273595662694E-5
Cycle 457
Total biomass:
Model iMM904.cmd: 5.640376481921132E-6
Model iJN1463.cmd: 1.5961397536913163E-5
Cycle 458
Total biomass:
Model iMM904.cmd: 5.650208453641456E-6
Model iJN1463.cmd: 1.5972491094507988E-5
Cycle 459
Total biomass:
Model iMM904.cmd: 5.660176850163521E-6
Model iJN1463.cmd: 1.598353390542223E-5
Cycle 460
Total biomass:
Model iMM904.cmd: 5.6701579981754026E-6
Model iJN1463.cmd: 1.5994516302531737E-5
Cycle 461
Total biomass:
Model iMM904.cmd: 5.680124395166577E-6
Model iJN1463.cmd: 1.6005450812782964E-5
Cycle 462
Total biomass:
Model iMM904.cmd: 5.690082526642828E-6
Model iJN1463.cmd: 1.6016348763417713E-5
Cycle 463
Total biomass:
Model iMM904.cmd: 5.700055883271352E-6
Model iJN1463.cmd: 1.602753917797588E-5
```

```
Cycle 464
Total biomass:
Model iMM904.cmd: 5.709875081820467E-6
Model iJN1463.cmd: 1.6038580488538325E-5
Cycle 465
Total biomass:
Model iMM904.cmd: 5.7196173951911575E-6
Model iJN1463.cmd: 1.6049547103387294E-5
Cycle 466
Total biomass:
Model iMM904.cmd: 5.729316700355736E-6
Model iJN1463.cmd: 1.6060471590155184E-5
Cycle 467
Total biomass:
Model iMM904.cmd: 5.738986541084067E-6
Model iJN1463.cmd: 1.6071367591066668E-5
Cycle 468
Total biomass:
Model iMM904.cmd: 5.748632272147498E-6
Model iJN1463.cmd: 1.6082240670410812E-5
Cycle 469
Total biomass:
Model iMM904.cmd: 5.758256016678398E-6
Model iJN1463.cmd: 1.6093093073218298E-5
Cycle 470
Total biomass:
Model iMM904.cmd: 5.7680473035237855E-6
Model iJN1463.cmd: 1.6103898855322996E-5
Cycle 471
Total biomass:
Model iMM904.cmd: 5.7778248606915295E-6
Model iJN1463.cmd: 1.611464418965681E-5
Cycle 472
Total biomass:
Model iMM904.cmd: 5.787580427891413E-6
Model iJN1463.cmd: 1.6125349642728316E-5
Cycle 473
Total biomass:
Model iMM904.cmd: 5.797349895346807E-6
Model iJN1463.cmd: 1.6136350300269924E-5
Cycle 474
Total biomass:
Model iMM904.cmd: 5.8069633044442336E-6
Model iJN1463.cmd: 1.61472002733929E-5
Cycle 475
Total biomass:
Model iMM904.cmd: 5.816499288311634E-6
Model iJN1463.cmd: 1.6157975003957326E-5
Cycle 476
Total biomass:
Model iMM904.cmd: 5.825992336768753E-6
Model iJN1463.cmd: 1.6168707593995297E-5
Cycle 477
Total biomass:
Model iMM904.cmd: 5.835456217983508E-6
Model iJN1463.cmd: 1.617941189301235E-5
Cycle 478
Total biomass:
Model iMM904.cmd: 5.84489641655583E-6
Model iJN1463.cmd: 1.619009360229246E-5
Cycle 479
Total biomass:
Model iMM904.cmd: 5.8545061451249545E-6
Model iJN1463.cmd: 1.6200727760031848E-5
Cycle 480
Total biomass:
Model iMM904.cmd: 5.864102872611486E-6
Model iJN1463.cmd: 1.6211301190722734E-5
Cycle 481
Total biomass:
Model iMM904.cmd: 5.873681352148E-6
Model iJN1463.cmd: 1.6221835427717174E-5
Cycle 482
Total biomass:
Model iMM904.cmd: 5.8831871812904635E-6
Model iJN1463.cmd: 1.6232572339612013E-5
Cycle 483
Total biomass:
Model iMM904.cmd: 5.892594212450035E-6
Model iJN1463.cmd: 1.6243225078530904E-5
Cycle 484
Total biomass:
Model iMM904.cmd: 5.901939630589108E-6
```

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Model iJN1463.cmd: 1.6253820438013017E-5
Cycle 485
Total biomass:
Model iMM904.cmd: 5.911247899579389E-6
Model iJN1463.cmd: 1.6264380070181157E-5
Cycle 486
Total biomass:
Model iMM904.cmd: 5.920529380872849E-6
Model iJN1463.cmd: 1.6274913955289553E-5
Cycle 487
Total biomass:
Model iMM904.cmd: 5.930001262262891E-6
Model iJN1463.cmd: 1.6285381196203693E-5
Cycle 488
Total biomass:
Model iMM904.cmd: 5.939617637634046E-6
Model iJN1463.cmd: 1.6295730748006884E-5
Cycle 489
Total biomass:
Model iMM904.cmd: 5.9490994526862115E-6
Model iJN1463.cmd: 1.6306154490444993E-5
Cycle 490
Total biomass:
Model iMM904.cmd: 5.95851860359979405E-6
Model iJN1463.cmd: 1.6316534764417956E-5
Cycle 491
Total biomass:
Model iMM904.cmd: 5.9679053789178854E-6
Model iJN1463.cmd: 1.6326879752276697E-5
Cycle 492
Total biomass:
Model iMM904.cmd: 5.977658812279007E-6
Model iJN1463.cmd: 1.6337347277957062E-5
Cycle 493
Total biomass:
Model iMM904.cmd: 5.987265704514204E-6
Model iJN1463.cmd: 1.6347634646173594E-5
Cycle 494
Total biomass:
Model iMM904.cmd: 5.996790231888302E-6
Model iJN1463.cmd: 1.6357828106082414E-5
Cycle 495
Total biomass:
Model iMM904.cmd: 6.006267751655856E-6
Model iJN1463.cmd: 1.6367971291043343E-5
Cycle 496
Total biomass:
Model iMM904.cmd: 6.0157146338684E-6
Model iJN1463.cmd: 1.6378083250291167E-5
Cycle 497
Total biomass:
Model iMM904.cmd: 6.0251378425914255E-6
Model iJN1463.cmd: 1.6388171817628582E-5
Cycle 498
Total biomass:
Model iMM904.cmd: 6.0345402024175774E-6
Model iJN1463.cmd: 1.639824009828571E-5
Cycle 499
Total biomass:
Model iMM904.cmd: 6.043818174300068E-6
Model iJN1463.cmd: 1.6408449357382846E-5
Cycle 500
Total biomass:
Model iMM904.cmd: 6.053039562410983E-6
Model iJN1463.cmd: 1.641863617570403E-5
Cycle 501
Total biomass:
Model iMM904.cmd: 6.062231548780749E-6
Model iJN1463.cmd: 1.6428793499650595E-5
Cycle 502
Total biomass:
Model iMM904.cmd: 6.0708836996253145E-6
Model iJN1463.cmd: 1.6440149631830427E-5
Cycle 503
Total biomass:
Model iMM904.cmd: 6.080148372117758E-6
Model iJN1463.cmd: 1.645043494226541E-5
Cycle 504
Total biomass:
Model iMM904.cmd: 6.089438397937251E-6
Model iJN1463.cmd: 1.6460497678263582E-5
Cycle 505
Total biomass:
```

```
Model iMM904.cmd: 6.098713157617023E-6
Model iJN1463.cmd: 1.6470472678531905E-5
Cycle 506
Total biomass:
Model iMM904.cmd: 6.10796700425282E-6
Model iJN1463.cmd: 1.648040554060217E-5
Cycle 507
Total biomass:
Model iMM904.cmd: 6.1172003881661334E-6
Model iJN1463.cmd: 1.649031202565525E-5
Cycle 508
Total biomass:
Model iMM904.cmd: 6.126326150680387E-6
Model iJN1463.cmd: 1.650032045434101E-5
Cycle 509
Total biomass:
Model iMM904.cmd: 6.135391261556154E-6
Model iJN1463.cmd: 1.651035577981096E-5
Cycle 510
Total biomass:
Model iMM904.cmd: 6.144420391563984E-6
Model iJN1463.cmd: 1.652035919040394E-5
Cycle 511
Total biomass:
Model iMM904.cmd: 6.152962860691074E-6
Model iJN1463.cmd: 1.65308594087575E-5
Cycle 512
Total biomass:
Model iMM904.cmd: 6.161156267945893E-6
Model iJN1463.cmd: 1.6540534372029818E-5
Cycle 513
Total biomass:
Model iMM904.cmd: 6.169149802096663E-6
Model iJN1463.cmd: 1.6549946984977628E-5
Cycle 514
Total biomass:
Model iMM904.cmd: 6.17830472988895E-6
Model iJN1463.cmd: 1.6560124952034092E-5
Cycle 515
Total biomass:
Model iMM904.cmd: 6.1868100197763004E-6
Model iJN1463.cmd: 1.6571429595210118E-5
Cycle 516
Total biomass:
Model iMM904.cmd: 6.192957132725492E-6
Model iJN1463.cmd: 1.6581205046711275E-5
Cycle 517
Total biomass:
Model iMM904.cmd: 6.201545618616096E-6
Model iJN1463.cmd: 1.659107293663361E-5
Cycle 518
Total biomass:
Model iMM904.cmd: 6.210164817121957E-6
Model iJN1463.cmd: 1.660159342120319E-5
Cycle 519
Total biomass:
Model iMM904.cmd: 6.218335512359405E-6
Model iJN1463.cmd: 1.6612826454274082E-5
Cycle 520
Total biomass:
Model iMM904.cmd: 6.2258586075146185E-6
Model iJN1463.cmd: 1.662449985804935E-5
Cycle 521
Total biomass:
Model iMM904.cmd: 6.23308445073238E-6
Model iJN1463.cmd: 1.663620767328121E-5
Cycle 522
Total biomass:
Model iMM904.cmd: 6.240699991418446E-6
Model iJN1463.cmd: 1.6647487316661025E-5
Cycle 523
Total biomass:
Model iMM904.cmd: 6.248811385666938E-6
Model iJN1463.cmd: 1.6658107662862673E-5
Cycle 524
Total biomass:
Model iMM904.cmd: 6.256991312128823E-6
Model iJN1463.cmd: 1.6668583331525496E-5
Cycle 525
Total biomass:
Model iMM904.cmd: 6.265181645322564E-6
Model iJN1463.cmd: 1.6678996495617548E-5
Cycle 526
```

```
Total biomass:
Model iMM904.cmd: 6.2733336078015585E-6
Model iJN1463.cmd: 1.668945430686621E-5
Cycle 527
Total biomass:
Model iMM904.cmd: 6.281957233181621E-6
Model iJN1463.cmd: 1.6699317436443695E-5
Cycle 528
Total biomass:
Model iMM904.cmd: 6.290628647642125E-6
Model iJN1463.cmd: 1.670904456951733E-5
Cycle 529
Total biomass:
Model iMM904.cmd: 6.298609512052208E-6
Model iJN1463.cmd: 1.6718359363099254E-5
Cycle 530
Total biomass:
Model iMM904.cmd: 6.306795076418892E-6
Model iJN1463.cmd: 1.6727649234356496E-5
Cycle 531
Total biomass:
Model iMM904.cmd: 6.315466168162802E-6
Model iJN1463.cmd: 1.673734675211284E-5
Cycle 532
Total biomass:
Model iMM904.cmd: 6.325699272307276E-6
Model iJN1463.cmd: 1.6748863210119964E-5
Cycle 533
Total biomass:
Model iMM904.cmd: 6.335083367512232E-6
Model iJN1463.cmd: 1.675913154434348E-5
Cycle 534
Total biomass:
Model iMM904.cmd: 6.344113179723582E-6
Model iJN1463.cmd: 1.6768898025337316E-5
Cycle 535
Total biomass:
Model iMM904.cmd: 6.35295870608193E-6
Model iJN1463.cmd: 1.677843696195866E-5
Cycle 536
Total biomass:
Model iMM904.cmd: 6.36171810477285E-6
Model iJN1463.cmd: 1.6787874885071975E-5
Cycle 537
Total biomass:
Model iMM904.cmd: 6.370433137347706E-6
Model iJN1463.cmd: 1.6797263541240607E-5
Cycle 538
Total biomass:
Model iMM904.cmd: 6.379120412404304E-6
Model iJN1463.cmd: 1.6806623037973563E-5
Cycle 539
Total biomass:
Model iMM904.cmd: 6.387786388944241E-6
Model iJN1463.cmd: 1.6815961058653938E-5
Cycle 540
Total biomass:
Model iMM904.cmd: 6.396433552983617E-6
Model iJN1463.cmd: 1.68252805160113E-5
Cycle 541
Total biomass:
Model iMM904.cmd: 6.405062866622066E-6
Model iJN1463.cmd: 1.6834582518716638E-5
Cycle 542
Total biomass:
Model iMM904.cmd: 6.41367471137635E-6
Model iJN1463.cmd: 1.6843867496765423E-5
Cycle 543
Total biomass:
Model iMM904.cmd: 6.42216106462518E-6
Model iJN1463.cmd: 1.6853305889455532E-5
Cycle 544
Total biomass:
Model iMM904.cmd: 6.4306190322343E-6
Model iJN1463.cmd: 1.686275720176873E-5
Cycle 545
Total biomass:
Model iMM904.cmd: 6.439032786316607E-6
Model iJN1463.cmd: 1.6872163757330254E-5
Cycle 546
Total biomass:
Model iMM904.cmd: 6.447868532443519E-6
Model iJN1463.cmd: 1.6881861453228694E-5
```

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Cycle 547
Total biomass:
Model iMM904.cmd: 6.456781307346409E-6
Model iJN1463.cmd: 1.6891606555031233E-5
Cycle 548
Total biomass:
Model iMM904.cmd: 6.465641933502554E-6
Model iJN1463.cmd: 1.6901521488961E-5
Cycle 549
Total biomass:
Model iMM904.cmd: 6.474350279519203E-6
Model iJN1463.cmd: 1.6911027316924386E-5
Cycle 550
Total biomass:
Model iMM904.cmd: 6.482956423781937E-6
Model iJN1463.cmd: 1.6920346259939782E-5
Cycle 551
Total biomass:
Model iMM904.cmd: 6.491472061089339E-6
Model iJN1463.cmd: 1.6929551490249965E-5
Cycle 552
Total biomass:
Model iMM904.cmd: 6.4999367017009116E-6
Model iJN1463.cmd: 1.6938697704552457E-5
Cycle 553
Total biomass:
Model iMM904.cmd: 6.508370029853295E-6
Model iJN1463.cmd: 1.6947810043897196E-5
Cycle 554
Total biomass:
Model iMM904.cmd: 6.51678073834003E-6
Model iJN1463.cmd: 1.695689912497496E-5
Cycle 555
Total biomass:
Model iMM904.cmd: 6.525172418712921E-6
Model iJN1463.cmd: 1.6965969215569016E-5
Cycle 556
Total biomass:
Model iMM904.cmd: 6.533546518418811E-6
Model iJN1463.cmd: 1.6975021998720986E-5
Cycle 557
Total biomass:
Model iMM904.cmd: 6.5419036259357765E-6
Model iJN1463.cmd: 1.69840581429641E-5
Cycle 558
Total biomass:
Model iMM904.cmd: 6.550243988322587E-6
Model iJN1463.cmd: 1.699307792076363E-5
Cycle 559
Total biomass:
Model iMM904.cmd: 6.558458325729202E-6
Model iJN1463.cmd: 1.7002255305018287E-5
Cycle 560
Total biomass:
Model iMM904.cmd: 6.566643853100394E-6
Model iJN1463.cmd: 1.701144687562118E-5
Cycle 561
Total biomass:
Model iMM904.cmd: 6.5748105617423725E-6
Model iJN1463.cmd: 1.702063088575655E-5
Cycle 562
Total biomass:
Model iMM904.cmd: 6.582960753808933E-6
Model iJN1463.cmd: 1.7029801304919576E-5
Cycle 563
Total biomass:
Model iMM904.cmd: 6.591082148637872E-6
Model iJN1463.cmd: 1.7038936837120994E-5
Cycle 564
Total biomass:
Model iMM904.cmd: 6.599190862258688E-6
Model iJN1463.cmd: 1.7048064016263017E-5
Cycle 565
Total biomass:
Model iMM904.cmd: 6.6072875517507605E-6
Model iJN1463.cmd: 1.705718187251825E-5
Cycle 566
Total biomass:
Model iMM904.cmd: 6.615370445917221E-6
Model iJN1463.cmd: 1.7066287362380025E-5
Cycle 567
Total biomass:
Model iMM904.cmd: 6.623438249057192E-6
```

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Model iJN1463.cmd: 1.7075378639055316E-5
Cycle 568
Total biomass:
Model iMM904.cmd: 6.631490323992746E-6
Model iJN1463.cmd: 1.7084454850786855E-5
Cycle 569
Total biomass:
Model iMM904.cmd: 6.639526409210326E-6
Model iJN1463.cmd: 1.7093515654445888E-5
Cycle 570
Total biomass:
Model iMM904.cmd: 6.647546418484591E-6
Model iJN1463.cmd: 1.7102560931349844E-5
Cycle 571
Total biomass:
Model iMM904.cmd: 6.6555503404264E-6
Model iJN1463.cmd: 1.7111590655981793E-5
Cycle 572
Total biomass:
Model iMM904.cmd: 6.663538193998028E-6
Model iJN1463.cmd: 1.7120604838976218E-5
Cycle 573
Total biomass:
Model iMM904.cmd: 6.671510010040433E-6
Model iJN1463.cmd: 1.7129603505728103E-5
Cycle 574
Total biomass:
Model iMM904.cmd: 6.67946582390759E-6
Model iJN1463.cmd: 1.7138586686414254E-5
Cycle 575
Total biomass:
Model iMM904.cmd: 6.687405672598259E-6
Model iJN1463.cmd: 1.7147554413559668E-5
Cycle 576
Total biomass:
Model iMM904.cmd: 6.695329593660653E-6
Model iJN1463.cmd: 1.7156506720047107E-5
Cycle 577
Total biomass:
Model iMM904.cmd: 6.703237624793954E-6
Model iJN1463.cmd: 1.7165443638977953E-5
Cycle 578
Total biomass:
Model iMM904.cmd: 6.711129803685039E-6
Model iJN1463.cmd: 1.7174365203633467E-5
Cycle 579
Total biomass:
Model iMM904.cmd: 6.719006167955531E-6
Model iJN1463.cmd: 1.7183271447209723E-5
Cycle 580
Total biomass:
Model iMM904.cmd: 6.726866755143491E-6
Model iJN1463.cmd: 1.719216240280534E-5
Cycle 581
Total biomass:
Model iMM904.cmd: 6.7347116026940355E-6
Model iJN1463.cmd: 1.7201038103436205E-5
Cycle 582
Total biomass:
Model iMM904.cmd: 6.742540747958895E-6
Model iJN1463.cmd: 1.720989858214485E-5
Cycle 583
Total biomass:
Model iMM904.cmd: 6.750354228195235E-6
Model iJN1463.cmd: 1.721874387187733E-5
Cycle 584
Total biomass:
Model iMM904.cmd: 6.758152080562858E-6
Model iJN1463.cmd: 1.7227574005417985E-5
Cycle 585
Total biomass:
Model iMM904.cmd: 6.765934342125617E-6
Model iJN1463.cmd: 1.7236389015575252E-5
Cycle 586
Total biomass:
Model iMM904.cmd: 6.773701049852348E-6
Model iJN1463.cmd: 1.7245188935089648E-5
Cycle 587
Total biomass:
Model iMM904.cmd: 6.781452240616761E-6
Model iJN1463.cmd: 1.7253973796510133E-5
Cycle 588
Total biomass:
```

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Model iMM904.cmd: 6.789187951196835E-6
Model iJN1463.cmd: 1.726274363480556E-5
Cycle 589
Total biomass:
Model iMM904.cmd: 6.796908218278443E-6
Model iJN1463.cmd: 1.7271498655254724E-5
Cycle 590
Total biomass:
Model iMM904.cmd: 6.8046130784494E-6
Model iJN1463.cmd: 1.7280238986033458E-5
Cycle 591
Total biomass:
Model iMM904.cmd: 6.812302568204911E-6
Model iJN1463.cmd: 1.72889643858669E-5
Cycle 592
Total biomass:
Model iMM904.cmd: 6.819976723949372E-6
Model iJN1463.cmd: 1.72976749971074E-5
Cycle 593
Total biomass:
Model iMM904.cmd: 6.827635581986713E-6
Model iJN1463.cmd: 1.730637065830347E-5
Cycle 594
Total biomass:
Model iMM904.cmd: 6.8352791785318165E-6
Model iJN1463.cmd: 1.7315051486862282E-5
Cycle 595
Total biomass:
Model iMM904.cmd: 6.842907549705634E-6
Model iJN1463.cmd: 1.732371751522042E-5
Cycle 596
Total biomass:
Model iMM904.cmd: 6.8505207315352094E-6
Model iJN1463.cmd: 1.7332368775160968E-5
Cycle 597
Total biomass:
Model iMM904.cmd: 6.858118759953207E-6
Model iJN1463.cmd: 1.734100529887193E-5
Cycle 598
Total biomass:
Model iMM904.cmd: 6.865701670802008E-6
Model iJN1463.cmd: 1.7349627117785506E-5
Cycle 599
Total biomass:
Model iMM904.cmd: 6.8732694998309574E-6
Model iJN1463.cmd: 1.735823426406234E-5
Cycle 600
Total biomass:
Model iMM904.cmd: 6.880822282696417E-6
Model iJN1463.cmd: 1.7366826769365747E-5
Cycle 601
Total biomass:
Model iMM904.cmd: 6.888360054961882E-6
Model iJN1463.cmd: 1.7375404665123014E-5
Cycle 602
Total biomass:
Model iMM904.cmd: 6.895882852100159E-6
Model iJN1463.cmd: 1.7383967983326892E-5
Cycle 603
Total biomass:
Model iMM904.cmd: 6.9033907094952245E-6
Model iJN1463.cmd: 1.7392516755562253E-5
Cycle 604
Total biomass:
Model iMM904.cmd: 6.910883662434967E-6
Model iJN1463.cmd: 1.74001051012650692E-5
Cycle 605
Total biomass:
Model iMM904.cmd: 6.9183617461187265E-6
Model iJN1463.cmd: 1.7409570786296224E-5
Cycle 606
Total biomass:
Model iMM904.cmd: 6.925824995653165E-6
Model iJN1463.cmd: 1.7418076107921718E-5
Cycle 607
Total biomass:
Model iMM904.cmd: 6.933273446055997E-6
Model iJN1463.cmd: 1.742656700890339E-5
Cycle 608
Total biomass:
Model iMM904.cmd: 6.940707132252357E-6
Model iJN1463.cmd: 1.7435043520150833E-5
Cycle 609
```

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Total biomass:
Model iMM904.cmd: 6.9481260890797055E-6
Model iJN1463.cmd: 1.7443505672657995E-5
Cycle 610
Total biomass:
Model iMM904.cmd: 6.955530351282182E-6
Model iJN1463.cmd: 1.745195349790109E-5
Cycle 611
Total biomass:
Model iMM904.cmd: 6.962919953517372E-6
Model iJN1463.cmd: 1.7460387026682552E-5
Cycle 612
Total biomass:
Model iMM904.cmd: 6.970294930352067E-6
Model iJN1463.cmd: 1.746880628965747E-5
Cycle 613
Total biomass:
Model iMM904.cmd: 6.977655316263055E-6
Model iJN1463.cmd: 1.747721131792458E-5
Cycle 614
Total biomass:
Model iMM904.cmd: 6.9850011456395135E-6
Model iJN1463.cmd: 1.74856021426627E-5
Cycle 615
Total biomass:
Model iMM904.cmd: 6.9923324527796645E-6
Model iJN1463.cmd: 1.7493978794001348E-5
Cycle 616
Total biomass:
Model iMM904.cmd: 6.999649271893559E-6
Model iJN1463.cmd: 1.750234130253024E-5
Cycle 617
Total biomass:
Model iMM904.cmd: 7.006951637104222E-6
Model iJN1463.cmd: 1.7510689699111313E-5
Cycle 618
Total biomass:
Model iMM904.cmd: 7.014239582444288E-6
Model iJN1463.cmd: 1.751902401422173E-5
Cycle 619
Total biomass:
Model iMM904.cmd: 7.021513141861281E-6
Model iJN1463.cmd: 1.7527344278244026E-5
Cycle 620
Total biomass:
Model iMM904.cmd: 7.0287723492110975E-6
Model iJN1463.cmd: 1.753565052159994E-5
Cycle 621
Total biomass:
Model iMM904.cmd: 7.0360172382659575E-6
Model iJN1463.cmd: 1.754394277431992E-5
Cycle 622
Total biomass:
Model iMM904.cmd: 7.043247842707493E-6
Model iJN1463.cmd: 1.7552221067272297E-5
Cycle 623
Total biomass:
Model iMM904.cmd: 7.050464196132274E-6
Model iJN1463.cmd: 1.7560485429920556E-5
Cycle 624
Total biomass:
Model iMM904.cmd: 7.057666332048752E-6
Model iJN1463.cmd: 1.7568735892495617E-5
Cycle 625
Total biomass:
Model iMM904.cmd: 7.064854283879993E-6
Model iJN1463.cmd: 1.7576972485218732E-5
Cycle 626
Total biomass:
Model iMM904.cmd: 7.072028084958591E-6
Model iJN1463.cmd: 1.7585195238215774E-5
Cycle 627
Total biomass:
Model iMM904.cmd: 7.079187768536905E-6
Model iJN1463.cmd: 1.759340418109945E-5
Cycle 628
Total biomass:
Model iMM904.cmd: 7.086333367776401E-6
Model iJN1463.cmd: 1.7601599343727235E-5
Cycle 629
Total biomass:
Model iMM904.cmd: 7.093464915756188E-6
Model iJN1463.cmd: 1.760978075580261E-5
```

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Cycle 630
Total biomass:
Model iMM904.cmd: 7.100582445467639E-6
Model iJN1463.cmd: 1.761794844718332E-5
Cycle 631
Total biomass:
Model iMM904.cmd: 7.107685989818222E-6
Model iJN1463.cmd: 1.762610244744629E-5
Cycle 632
Total biomass:
Model iMM904.cmd: 7.11477558162792E-6
Model iJN1463.cmd: 1.7634242786150583E-5
Cycle 633
Total biomass:
Model iMM904.cmd: 7.121851253633058E-6
Model iJN1463.cmd: 1.764236949291515E-5
Cycle 634
Total biomass:
Model iMM904.cmd: 7.128913038486204E-6
Model iJN1463.cmd: 1.7650482596902374E-5
Cycle 635
Total biomass:
Model iMM904.cmd: 7.135960968755606E-6
Model iJN1463.cmd: 1.7658582127655E-5
Cycle 636
Total biomass:
Model iMM904.cmd: 7.1429950769225565E-6
Model iJN1463.cmd: 1.7666668114246056E-5
Cycle 637
Total biomass:
Model iMM904.cmd: 7.1500153953869376E-6
Model iJN1463.cmd: 1.7674740586378905E-5
Cycle 638
Total biomass:
Model iMM904.cmd: 7.157021956464475E-6
Model iJN1463.cmd: 1.7682799572684912E-5
Cycle 639
Total biomass:
Model iMM904.cmd: 7.164014792386443E-6
Model iJN1463.cmd: 1.769084510264092E-5
Cycle 640
Total biomass:
Model iMM904.cmd: 7.170993935301313E-6
Model iJN1463.cmd: 1.769887720504449E-5
Cycle 641
Total biomass:
Model iMM904.cmd: 7.177959417274558E-6
Model iJN1463.cmd: 1.7706895909041042E-5
Cycle 642
Total biomass:
Model iMM904.cmd: 7.18491127028662E-6
Model iJN1463.cmd: 1.7714901243571285E-5
Cycle 643
Total biomass:
Model iMM904.cmd: 7.1918495262371775E-6
Model iJN1463.cmd: 1.7722893237202067E-5
Cycle 644
Total biomass:
Model iMM904.cmd: 7.198774216944597E-6
Model iJN1463.cmd: 1.7730871918948637E-5
Cycle 645
Total biomass:
Model iMM904.cmd: 7.205685374143162E-6
Model iJN1463.cmd: 1.7738837317575408E-5
Cycle 646
Total biomass:
Model iMM904.cmd: 7.212583029484292E-6
Model iJN1463.cmd: 1.7746789461458865E-5
Cycle 647
Total biomass:
Model iMM904.cmd: 7.219467214539309E-6
Model iJN1463.cmd: 1.77547283793749E-5
Cycle 648
Total biomass:
Model iMM904.cmd: 7.226337960797236E-6
Model iJN1463.cmd: 1.776265409978387E-5
Cycle 649
Total biomass:
Model iMM904.cmd: 7.233195299665254E-6
Model iJN1463.cmd: 1.7770566650831124E-5
Cycle 650
Total biomass:
Model iMM904.cmd: 7.240039262470572E-6
```

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Model iJN1463.cmd: 1.7778466061596347E-5
Cycle 651
Total biomass:
Model iMM904.cmd: 7.246869880459979E-6
Model iJN1463.cmd: 1.7786352359768244E-5
Cycle 652
Total biomass:
Model iMM904.cmd: 7.253687184794984E-6
Model iJN1463.cmd: 1.7794225573886633E-5
Cycle 653
Total biomass:
Model iMM904.cmd: 7.260491206561861E-6
Model iJN1463.cmd: 1.780208573208001E-5
Cycle 654
Total biomass:
Model iMM904.cmd: 7.267281976762459E-6
Model iJN1463.cmd: 1.780993286249428E-5
Cycle 655
Total biomass:
Model iMM904.cmd: 7.274059526321073E-6
Model iJN1463.cmd: 1.7817766993016824E-5
Cycle 656
Total biomass:
Model iMM904.cmd: 7.280823886082147E-6
Model iJN1463.cmd: 1.7825588151866788E-5
Cycle 657
Total biomass:
Model iMM904.cmd: 7.287575086809112E-6
Model iJN1463.cmd: 1.7833396366871498E-5
Cycle 658
Total biomass:
Model iMM904.cmd: 7.2943131591887255E-6
Model iJN1463.cmd: 1.7841191665951696E-5
Cycle 659
Total biomass:
Model iMM904.cmd: 7.301038133822615E-6
Model iJN1463.cmd: 1.7848974077189798E-5
Cycle 660
Total biomass:
Model iMM904.cmd: 7.307750041239046E-6
Model iJN1463.cmd: 1.7856743627861006E-5
Cycle 661
Total biomass:
Model iMM904.cmd: 7.314448911885991E-6
Model iJN1463.cmd: 1.7864500345693168E-5
Cycle 662
Total biomass:
Model iMM904.cmd: 7.321134776130877E-6
Model iJN1463.cmd: 1.7872244258601448E-5
Cycle 663
Total biomass:
Model iMM904.cmd: 7.327807664264372E-6
Model iJN1463.cmd: 1.7879975394063708E-5
Cycle 664
Total biomass:
Model iMM904.cmd: 7.334467606499074E-6
Model iJN1463.cmd: 1.7887693779155216E-5
Cycle 665
Total biomass:
Model iMM904.cmd: 7.341114632969438E-6
Model iJN1463.cmd: 1.7895399441977813E-5
Cycle 666
Total biomass:
Model iMM904.cmd: 7.3477487737309985E-6
Model iJN1463.cmd: 1.7903092409519474E-5
Cycle 667
Total biomass:
Model iMM904.cmd: 7.3543700587621025E-6
Model iJN1463.cmd: 1.7910772709063127E-5
Cycle 668
Total biomass:
Model iMM904.cmd: 7.360978517966176E-6
Model iJN1463.cmd: 1.7918440367898224E-5
Cycle 669
Total biomass:
Model iMM904.cmd: 7.367574181166528E-6
Model iJN1463.cmd: 1.7926095413218028E-5
Cycle 670
Total biomass:
Model iMM904.cmd: 7.374157078109583E-6
Model iJN1463.cmd: 1.7933737872022166E-5
Cycle 671
Total biomass:
```

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Model iMM904.cmd: 7.380727238467455E-6
Model iJN1463.cmd: 1.7941367771503918E-5
Cycle 672
Total biomass:
Model iMM904.cmd: 7.387284691832658E-6
Model iJN1463.cmd: 1.7948985138530994E-5
Cycle 673
Total biomass:
Model iMM904.cmd: 7.393829467724877E-6
Model iJN1463.cmd: 1.7956589999974233E-5
Cycle 674
Total biomass:
Model iMM904.cmd: 7.400361595585201E-6
Model iJN1463.cmd: 1.796418238304257E-5
Cycle 675
Total biomass:
Model iMM904.cmd: 7.406881104779811E-6
Model iJN1463.cmd: 1.797176231418874E-5
Cycle 676
Total biomass:
Model iMM904.cmd: 7.41338802459776E-6
Model iJN1463.cmd: 1.797932982043835E-5
Cycle 677
Total biomass:
Model iMM904.cmd: 7.419882384253824E-6
Model iJN1463.cmd: 1.798688492825527E-5
Cycle 678
Total biomass:
Model iMM904.cmd: 7.426366427414752E-6
Model iJN1463.cmd: 1.799443000755737E-5
Cycle 679
Total biomass:
Model iMM904.cmd: 7.432841745883553E-6
Model iJN1463.cmd: 1.8001966738551417E-5
Cycle 680
Total biomass:
Model iMM904.cmd: 7.4393087568628226E-6
Model iJN1463.cmd: 1.8009495559174764E-5
Cycle 681
Total biomass:
Model iMM904.cmd: 7.4457676012155034E-6
Model iJN1463.cmd: 1.8017016615175057E-5
Cycle 682
Total biomass:
Model iMM904.cmd: 7.4522183342260665E-6
Model iJN1463.cmd: 1.8024529961470455E-5
Cycle 683
Total biomass:
Model iMM904.cmd: 7.458660983698989E-6
Model iJN1463.cmd: 1.803203562406963E-5
Cycle 684
Total biomass:
Model iMM904.cmd: 7.465095568556916E-6
Model iJN1463.cmd: 1.803953361947894E-5
Cycle 685
Total biomass:
Model iMM904.cmd: 7.4715221048411775E-6
Model iJN1463.cmd: 1.804702396118158E-5
Cycle 686
Total biomass:
Model iMM904.cmd: 7.477940607641443E-6
Model iJN1463.cmd: 1.805450666198081E-5
Cycle 687
Total biomass:
Model iMM904.cmd: 7.4843510917213074E-6
Model iJN1463.cmd: 1.8061981733967397E-5
Cycle 688
Total biomass:
Model iMM904.cmd: 7.490753571721835E-6
Model iJN1463.cmd: 1.8069449189106256E-5
Cycle 689
Total biomass:
Model iMM904.cmd: 7.497148062221808E-6
Model iJN1463.cmd: 1.8076909039801893E-5
Cycle 690
Total biomass:
Model iMM904.cmd: 7.503534577764465E-6
Model iJN1463.cmd: 1.8084361297924943E-5
Cycle 691
Total biomass:
Model iMM904.cmd: 7.5099131328606695E-6
Model iJN1463.cmd: 1.8091805975501647E-5
Cycle 692
```

```
Total biomass:
Model iMM904.cmd: 7.516283741993255E-6
Model iJN1463.cmd: 1.80992430846405E-5
Cycle 693
Total biomass:
Model iMM904.cmd: 7.522646419615071E-6
Model iJN1463.cmd: 1.810667263711994E-5
Cycle 694
Total biomass:
Model iMM904.cmd: 7.529001180150812E-6
Model iJN1463.cmd: 1.811409464529552E-5
Cycle 695
Total biomass:
Model iMM904.cmd: 7.535348037998362E-6
Model iJN1463.cmd: 1.812150912121371E-5
Cycle 696
Total biomass:
Model iMM904.cmd: 7.541687007526269E-6
Model iJN1463.cmd: 1.812891607641894E-5
Cycle 697
Total biomass:
Model iMM904.cmd: 7.548018103076698E-6
Model iJN1463.cmd: 1.8136315523089786E-5
Cycle 698
Total biomass:
Model iMM904.cmd: 7.554341338962066E-6
Model iJN1463.cmd: 1.814370747257541E-5
Cycle 699
Total biomass:
Model iMM904.cmd: 7.56065672946693E-6
Model iJN1463.cmd: 1.8151091937474685E-5
Cycle 700
Total biomass:
Model iMM904.cmd: 7.5669642888510095E-6
Model iJN1463.cmd: 1.815846892965018E-5
Cycle 701
Total biomass:
Model iMM904.cmd: 7.573264031341955E-6
Model iJN1463.cmd: 1.81658384606684E-5
Cycle 702
Total biomass:
Model iMM904.cmd: 7.579555971141848E-6
Model iJN1463.cmd: 1.8173200542640498E-5
Cycle 703
Total biomass:
Model iMM904.cmd: 7.585840122423531E-6
Model iJN1463.cmd: 1.8180555187124557E-5
Cycle 704
Total biomass:
Model iMM904.cmd: 7.592116499334498E-6
Model iJN1463.cmd: 1.8187902406212073E-5
Cycle 705
Total biomass:
Model iMM904.cmd: 7.598385115991466E-6
Model iJN1463.cmd: 1.8195242211384095E-5
Cycle 706
Total biomass:
Model iMM904.cmd: 7.6046459864846195E-6
Model iJN1463.cmd: 1.82025746146108E-5
Cycle 707
Total biomass:
Model iMM904.cmd: 7.610899124877162E-6
Model iJN1463.cmd: 1.8209899627640793E-5
Cycle 708
Total biomass:
Model iMM904.cmd: 7.617144545202718E-6
Model iJN1463.cmd: 1.8217217262184404E-5
Cycle 709
Total biomass:
Model iMM904.cmd: 7.623382261470574E-6
Model iJN1463.cmd: 1.8224527530255136E-5
Cycle 710
Total biomass:
Model iMM904.cmd: 7.629612287659499E-6
Model iJN1463.cmd: 1.8231830443171493E-5
Cycle 711
Total biomass:
Model iMM904.cmd: 7.63583463772057E-6
Model iJN1463.cmd: 1.8239126012814488E-5
Cycle 712
Total biomass:
Model iMM904.cmd: 7.642049325579178E-6
Model iJN1463.cmd: 1.824641425133931E-5
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Cycle 713
Total biomass:
Model iMM904.cmd: 7.648256365131706E-6
Model iJN1463.cmd: 1.825369516966135E-5
Cycle 714
Total biomass:
Model iMM904.cmd: 7.654455770245947E-6
Model iJN1463.cmd: 1.8260968780039488E-5
Cycle 715
Total biomass:
Model iMM904.cmd: 7.660647554764603E-6
Model iJN1463.cmd: 1.826823509347941E-5
Cycle 716
Total biomass:
Model iMM904.cmd: 7.666831732501117E-6
Model iJN1463.cmd: 1.8275494122235455E-5
Cycle 717
Total biomass:
Model iMM904.cmd: 7.673008317244103E-6
Model iJN1463.cmd: 1.828274587766233E-5
Cycle 718
Total biomass:
Model iMM904.cmd: 7.679177322751098E-6
Model iJN1463.cmd: 1.8289990371156643E-5
Cycle 719
Total biomass:
Model iMM904.cmd: 7.685338762754251E-6
Model iJN1463.cmd: 1.8297227614621823E-5
Cycle 720
Total biomass:
Model iMM904.cmd: 7.691492650959215E-6
Model iJN1463.cmd: 1.830445761920425E-5
Cycle 721
Total biomass:
Model iMM904.cmd: 7.697639001041343E-6
Model iJN1463.cmd: 1.8311680396574177E-5
Cycle 722
Total biomass:
Model iMM904.cmd: 7.703777826652988E-6
Model iJN1463.cmd: 1.831889595872258E-5
Cycle 723
Total biomass:
Model iMM904.cmd: 7.709909141415293E-6
Model iJN1463.cmd: 1.8326104316959036E-5
Cycle 724
Total biomass:
Model iMM904.cmd: 7.71603295892248E-6
Model iJN1463.cmd: 1.8333305482590462E-5
Cycle 725
Total biomass:
Model iMM904.cmd: 7.722149292744467E-6
Model iJN1463.cmd: 1.834049946717481E-5
Cycle 726
Total biomass:
Model iMM904.cmd: 7.728258156422281E-6
Model iJN1463.cmd: 1.8347686281997504E-5
Cycle 727
Total biomass:
Model iMM904.cmd: 7.73435956346805E-6
Model iJN1463.cmd: 1.8354865938429378E-5
Cycle 728
Total biomass:
Model iMM904.cmd: 7.74045352737122E-6
Model iJN1463.cmd: 1.8362038448268845E-5
Cycle 729
Total biomass:
Model iMM904.cmd: 7.746540061589196E-6
Model iJN1463.cmd: 1.8369203822587226E-5
Cycle 730
Total biomass:
Model iMM904.cmd: 7.752619179556268E-6
Model iJN1463.cmd: 1.8376362072888054E-5
Cycle 731
Total biomass:
Model iMM904.cmd: 7.758690894676711E-6
Model iJN1463.cmd: 1.838351321081023E-5
Cycle 732
Total biomass:
Model iMM904.cmd: 7.764755220329742E-6
Model iJN1463.cmd: 1.8390657247488623E-5
Cycle 733
Total biomass:
Model iMM904.cmd: 7.77081216986812E-6
```

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Model iJN1463.cmd: 1.8397794194302205E-5
Cycle 734
Total biomass:
Model iMM904.cmd: 7.7768617566161E-6
Model iJN1463.cmd: 1.8404924062445237E-5
Cycle 735
Total biomass:
Model iMM904.cmd: 7.782903993870103E-6
Model iJN1463.cmd: 1.841204686314762E-5
Cycle 736
Total biomass:
Model iMM904.cmd: 7.788938894901943E-6
Model iJN1463.cmd: 1.8419162607797054E-5
Cycle 737
Total biomass:
Model iMM904.cmd: 7.794966472956236E-6
Model iJN1463.cmd: 1.8426271307995444E-5
Cycle 738
Total biomass:
Model iMM904.cmd: 7.800986741251895E-6
Model iJN1463.cmd: 1.843337297447596E-5
Cycle 739
Total biomass:
Model iMM904.cmd: 7.80699971297736E-6
Model iJN1463.cmd: 1.8440467618362868E-5
Cycle 740
Total biomass:
Model iMM904.cmd: 7.81300540129802E-6
Model iJN1463.cmd: 1.8447555251268546E-5
Cycle 741
Total biomass:
Model iMM904.cmd: 7.819003819350998E-6
Model iJN1463.cmd: 1.8454635884303617E-5
Cycle 742
Total biomass:
Model iMM904.cmd: 7.824994980245875E-6
Model iJN1463.cmd: 1.8461709528609672E-5
Cycle 743
Total biomass:
Model iMM904.cmd: 7.830978897068669E-6
Model iJN1463.cmd: 1.846877619551188E-5
Cycle 744
Total biomass:
Model iMM904.cmd: 7.836955582877393E-6
Model iJN1463.cmd: 1.8475835895768576E-5
Cycle 745
Total biomass:
Model iMM904.cmd: 7.842925050699614E-6
Model iJN1463.cmd: 1.8482888640902752E-5
Cycle 746
Total biomass:
Model iMM904.cmd: 7.848887313543523E-6
Model iJN1463.cmd: 1.8489934441859108E-5
Cycle 747
Total biomass:
Model iMM904.cmd: 7.854842384385665E-6
Model iJN1463.cmd: 1.8496973309723098E-5
Cycle 748
Total biomass:
Model iMM904.cmd: 7.860790276177327E-6
Model iJN1463.cmd: 1.8504005255847353E-5
Cycle 749
Total biomass:
Model iMM904.cmd: 7.866731001844513E-6
Model iJN1463.cmd: 1.8511030290632164E-5
Cycle 750
Total biomass:
Model iMM904.cmd: 7.872664574285922E-6
Model iJN1463.cmd: 1.851804842576708E-5
Cycle 751
Total biomass:
Model iMM904.cmd: 7.878591006374797E-6
Model iJN1463.cmd: 1.8525059672021013E-5
Cycle 752
Total biomass:
Model iMM904.cmd: 7.88451031095477E-6
Model iJN1463.cmd: 1.8532064040156927E-5
Cycle 753
Total biomass:
Model iMM904.cmd: 7.89042250084888E-6
Model iJN1463.cmd: 1.853906154171877E-5
Cycle 754
Total biomass:
```

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Model iMM904.cmd: 7.89632758885057E-6
Model iJN1463.cmd: 1.8546052187044865E-5
Cycle 755
Total biomass:
Model iMM904.cmd: 7.902225587727108E-6
Model iJN1463.cmd: 1.8553035987554157E-5
Cycle 756
Total biomass:
Model iMM904.cmd: 7.908116510219805E-6
Model iJN1463.cmd: 1.8560012953856983E-5
Cycle 757
Total biomass:
Model iMM904.cmd: 7.914000369043428E-6
Model iJN1463.cmd: 1.8566983097123895E-5
Cycle 758
Total biomass:
Model iMM904.cmd: 7.91987717688958E-6
Model iJN1463.cmd: 1.857394642799211E-5
Cycle 759
Total biomass:
Model iMM904.cmd: 7.925746946418621E-6
Model iJN1463.cmd: 1.858090295740573E-5
Cycle 760
Total biomass:
Model iMM904.cmd: 7.931609690271301E-6
Model iJN1463.cmd: 1.8587852696406092E-5
Cycle 761
Total biomass:
Model iMM904.cmd: 7.937465421057358E-6
Model iJN1463.cmd: 1.859479565593828E-5
Cycle 762
Total biomass:
Model iMM904.cmd: 7.943314151361353E-6
Model iJN1463.cmd: 1.8601731846578565E-5
Cycle 763
Total biomass:
Model iMM904.cmd: 7.949155893744038E-6
Model iJN1463.cmd: 1.8608661279150543E-5
Cycle 764
Total biomass:
Model iMM904.cmd: 7.954990660740394E-6
Model iJN1463.cmd: 1.8615583964621106E-5
Cycle 765
Total biomass:
Model iMM904.cmd: 7.960818464856033E-6
Model iJN1463.cmd: 1.8622499913294363E-5
Cycle 766
Total biomass:
Model iMM904.cmd: 7.966639318576309E-6
Model iJN1463.cmd: 1.8629409136688667E-5
Cycle 767
Total biomass:
Model iMM904.cmd: 7.972453234356076E-6
Model iJN1463.cmd: 1.863631164483907E-5
Cycle 768
Total biomass:
Model iMM904.cmd: 7.978260224627003E-6
Model iJN1463.cmd: 1.864320744891439E-5
Cycle 769
Total biomass:
Model iMM904.cmd: 7.984060301791032E-6
Model iJN1463.cmd: 1.8650096559231147E-5
Cycle 770
Total biomass:
Model iMM904.cmd: 7.989853478231103E-6
Model iJN1463.cmd: 1.8656978986875313E-5
Cycle 771
Total biomass:
Model iMM904.cmd: 7.995639766300445E-6
Model iJN1463.cmd: 1.8663854742602533E-5
Cycle 772
Total biomass:
Model iMM904.cmd: 8.001419178328004E-6
Model iJN1463.cmd: 1.8670723836655574E-5
Cycle 773
Total biomass:
Model iMM904.cmd: 8.007191726616764E-6
Model iJN1463.cmd: 1.8677586279837772E-5
Cycle 774
Total biomass:
Model iMM904.cmd: 8.012957423443712E-6
Model iJN1463.cmd: 1.86844420827377E-5
Cycle 775
```

```
Total biomass:
Model iMM904.cmd: 8.01871628106166E-6
Model iJN1463.cmd: 1.869129125600055E-5
Cycle 776
Total biomass:
Model iMM904.cmd: 8.024468311697064E-6
Model iJN1463.cmd: 1.869813381003636E-5
Cycle 777
Total biomass:
Model iMM904.cmd: 8.030213527550751E-6
Model iJN1463.cmd: 1.8704969755646308E-5
Cycle 778
Total biomass:
Model iMM904.cmd: 8.035951940800411E-6
Model iJN1463.cmd: 1.871179910298333E-5
Cycle 779
Total biomass:
Model iMM904.cmd: 8.041683563596333E-6
Model iJN1463.cmd: 1.8718621862793352E-5
Cycle 780
Total biomass:
Model iMM904.cmd: 8.047408408063942E-6
Model iJN1463.cmd: 1.8725438045555335E-5
Cycle 781
Total biomass:
Model iMM904.cmd: 8.053126486304362E-6
Model iJN1463.cmd: 1.873224766205253E-5
Cycle 782
Total biomass:
Model iMM904.cmd: 8.058837810393905E-6
Model iJN1463.cmd: 1.8739050722465607E-5
Cycle 783
Total biomass:
Model iMM904.cmd: 8.064542392382243E-6
Model iJN1463.cmd: 1.874584723744635E-5
Cycle 784
Total biomass:
Model iMM904.cmd: 8.070240244294555E-6
Model iJN1463.cmd: 1.8752637217086872E-5
Cycle 785
Total biomass:
Model iMM904.cmd: 8.07593137813026E-6
Model iJN1463.cmd: 1.8759420672258266E-5
Cycle 786
Total biomass:
Model iMM904.cmd: 8.081615805864883E-6
Model iJN1463.cmd: 1.8766197613139963E-5
Cycle 787
Total biomass:
Model iMM904.cmd: 8.087293539449172E-6
Model iJN1463.cmd: 1.8772968050104717E-5
Cycle 788
Total biomass:
Model iMM904.cmd: 8.092964590810058E-6
Model iJN1463.cmd: 1.877973199355282E-5
Cycle 789
Total biomass:
Model iMM904.cmd: 8.098628971845653E-6
Model iJN1463.cmd: 1.8786489453765105E-5
Cycle 790
Total biomass:
Model iMM904.cmd: 8.104286694435233E-6
Model iJN1463.cmd: 1.8793240440980332E-5
Cycle 791
Total biomass:
Model iMM904.cmd: 8.109937770425376E-6
Model iJN1463.cmd: 1.8799984965668947E-5
Cycle 792
Total biomass:
Model iMM904.cmd: 8.115582211645493E-6
Model iJN1463.cmd: 1.8806723038054175E-5
Cycle 793
Total biomass:
Model iMM904.cmd: 8.121220029895973E-6
Model iJN1463.cmd: 1.8813454668577948E-5
Cycle 794
Total biomass:
Model iMM904.cmd: 8.12685123695259E-6
Model iJN1463.cmd: 1.8820179867289597E-5
Cycle 795
Total biomass:
Model iMM904.cmd: 8.132475844572959E-6
Model iJN1463.cmd: 1.8826898644634715E-5
```

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Cycle 796
Total biomass:
Model iMM904.cmd: 8.138093864480552E-6
Model iJN1463.cmd: 1.883361101055904E-5
Cycle 797
Total biomass:
Model iMM904.cmd: 8.143705308379487E-6
Model iJN1463.cmd: 1.884031697542027E-5
Cycle 798
Total biomass:
Model iMM904.cmd: 8.149310187947943E-6
Model iJN1463.cmd: 1.8847016549469617E-5
Cycle 799
Total biomass:
Model iMM904.cmd: 8.15490851484217E-6
Model iJN1463.cmd: 1.885370974281246E-5
Cycle 800
Total biomass:
Model iMM904.cmd: 8.160500300689765E-6
Model iJN1463.cmd: 1.88603965657488E-5
Cycle 801
Total biomass:
Model iMM904.cmd: 8.166085557097671E-6
Model iJN1463.cmd: 1.886707732673654E-5
Cycle 802
Total biomass:
Model iMM904.cmd: 8.171664295649782E-6
Model iJN1463.cmd: 1.8873751736829307E-5
Cycle 803
Total biomass:
Model iMM904.cmd: 8.17723652789801E-6
Model iJN1463.cmd: 1.8880419806128596E-5
Cycle 804
Total biomass:
Model iMM904.cmd: 8.182802265378666E-6
Model iJN1463.cmd: 1.8887081545035848E-5
Cycle 805
Total biomass:
Model iMM904.cmd: 8.18836151959844E-6
Model iJN1463.cmd: 1.889373705112222E-5
Cycle 806
Total biomass:
Model iMM904.cmd: 8.193914302042367E-6
Model iJN1463.cmd: 1.8900386246409014E-5
Cycle 807
Total biomass:
Model iMM904.cmd: 8.199460624169516E-6
Model iJN1463.cmd: 1.8907029141431266E-5
Cycle 808
Total biomass:
Model iMM904.cmd: 8.205000497420761E-6
Model iJN1463.cmd: 1.8913665745390524E-5
Cycle 809
Total biomass:
Model iMM904.cmd: 8.21053393320289E-6
Model iJN1463.cmd: 1.8920296069187987E-5
Cycle 810
Total biomass:
Model iMM904.cmd: 8.216060942907475E-6
Model iJN1463.cmd: 1.8926920122378288E-5
Cycle 811
Total biomass:
Model iMM904.cmd: 8.221581537896177E-6
Model iJN1463.cmd: 1.893353791508848E-5
Cycle 812
Total biomass:
Model iMM904.cmd: 8.22709572951182E-6
Model iJN1463.cmd: 1.8940149456915626E-5
Cycle 813
Total biomass:
Model iMM904.cmd: 8.232603529069172E-6
Model iJN1463.cmd: 1.89467547582024E-5
Cycle 814
Total biomass:
Model iMM904.cmd: 8.238104947861489E-6
Model iJN1463.cmd: 1.895335382884547E-5
Cycle 815
Total biomass:
Model iMM904.cmd: 8.243599997157668E-6
Model iJN1463.cmd: 1.8959946678654778E-5
Cycle 816
Total biomass:
Model iMM904.cmd: 8.249088688204147E-6
```

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Model iJN1463.cmd: 1.8966533317275004E-5
Cycle 817
Total biomass:
Model iMM904.cmd: 8.254571032220154E-6
Model iJN1463.cmd: 1.8973113754725352E-5
Cycle 818
Total biomass:
Model iMM904.cmd: 8.260047040405046E-6
Model iJN1463.cmd: 1.8979688000755558E-5
Cycle 819
Total biomass:
Model iMM904.cmd: 8.26551672393165E-6
Model iJN1463.cmd: 1.8986256065277605E-5
Cycle 820
Total biomass:
Model iMM904.cmd: 8.270980093951273E-6
Model iJN1463.cmd: 1.8992817958077542E-5
Cycle 821
Total biomass:
Model iMM904.cmd: 8.276437161590312E-6
Model iJN1463.cmd: 1.8999373689022907E-5
Cycle 822
Total biomass:
Model iMM904.cmd: 8.281887937953288E-6
Model iJN1463.cmd: 1.9005923268012734E-5
Cycle 823
Total biomass:
Model iMM904.cmd: 8.287332434120725E-6
Model iJN1463.cmd: 1.901246670426893E-5
Cycle 824
Total biomass:
Model iMM904.cmd: 8.292770661149748E-6
Model iJN1463.cmd: 1.9019004007783246E-5
Cycle 825
Total biomass:
Model iMM904.cmd: 8.298202630071946E-6
Model iJN1463.cmd: 1.902553518852509E-5
Cycle 826
Total biomass:
Model iMM904.cmd: 8.303628351897208E-6
Model iJN1463.cmd: 1.9032060255914763E-5
Cycle 827
Total biomass:
Model iMM904.cmd: 8.309047837615503E-6
Model iJN1463.cmd: 1.9038579219591554E-5
Cycle 828
Total biomass:
Model iMM904.cmd: 8.314461098186517E-6
Model iJN1463.cmd: 1.9045092089311235E-5
Cycle 829
Total biomass:
Model iMM904.cmd: 8.3198681445532E-6
Model iJN1463.cmd: 1.905159887472082E-5
Cycle 830
Total biomass:
Model iMM904.cmd: 8.325268987631106E-6
Model iJN1463.cmd: 1.9058099585361387E-5
Cycle 831
Total biomass:
Model iMM904.cmd: 8.330663638314173E-6
Model iJN1463.cmd: 1.906459423105249E-5
Cycle 832
Total biomass:
Model iMM904.cmd: 8.336052107475049E-6
Model iJN1463.cmd: 1.907108282130447E-5
Cycle 833
Total biomass:
Model iMM904.cmd: 8.341434405961534E-6
Model iJN1463.cmd: 1.9077565365553236E-5
Cycle 834
Total biomass:
Model iMM904.cmd: 8.346810544597472E-6
Model iJN1463.cmd: 1.9084041873184836E-5
Cycle 835
Total biomass:
Model iMM904.cmd: 8.35218053418584E-6
Model iJN1463.cmd: 1.9090512354027096E-5
Cycle 836
Total biomass:
Model iMM904.cmd: 8.357544385506002E-6
Model iJN1463.cmd: 1.9096976817787618E-5
Cycle 837
Total biomass:
```

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Model iMM904.cmd: 8.362902109312566E-6
Model iJN1463.cmd: 1.9103435273497452E-5
Cycle 838
Total biomass:
Model iMM904.cmd: 8.368253716340658E-6
Model iJN1463.cmd: 1.9109887730845847E-5
Cycle 839
Total biomass:
Model iMM904.cmd: 8.373599217300344E-6
Model iJN1463.cmd: 1.9116334199447902E-5
Cycle 840
Total biomass:
Model iMM904.cmd: 8.378938622880261E-6
Model iJN1463.cmd: 1.9122774688460392E-5
Cycle 841
Total biomass:
Model iMM904.cmd: 8.384271943744688E-6
Model iJN1463.cmd: 1.9129209207874256E-5
Cycle 842
Total biomass:
Model iMM904.cmd: 8.38959919053674E-6
Model iJN1463.cmd: 1.913563776653637E-5
Cycle 843
Total biomass:
Model iMM904.cmd: 8.394920373877718E-6
Model iJN1463.cmd: 1.9142060373939755E-5
Cycle 844
Total biomass:
Model iMM904.cmd: 8.400235504363609E-6
Model iJN1463.cmd: 1.914847703957255E-5
Cycle 845
Total biomass:
Model iMM904.cmd: 8.405544592571051E-6
Model iJN1463.cmd: 1.9154888105086166E-5
Cycle 846
Total biomass:
Model iMM904.cmd: 8.410847649051704E-6
Model iJN1463.cmd: 1.9161293246818367E-5
Cycle 847
Total biomass:
Model iMM904.cmd: 8.416144684335304E-6
Model iJN1463.cmd: 1.9167692474741842E-5
Cycle 848
Total biomass:
Model iMM904.cmd: 8.421436631113275E-6
Model iJN1463.cmd: 1.9174086773690833E-5
Cycle 849
Total biomass:
Model iMM904.cmd: 8.42672586954539E-6
Model iJN1463.cmd: 1.9180478660980656E-5
Cycle 850
Total biomass:
Model iMM904.cmd: 8.432012805454086E-6
Model iJN1463.cmd: 1.918686856437852E-5
Cycle 851
Total biomass:
Model iMM904.cmd: 8.437297558693125E-6
Model iJN1463.cmd: 1.9193256609829872E-5
Cycle 852
Total biomass:
Model iMM904.cmd: 8.442580165414987E-6
Model iJN1463.cmd: 1.919964283425205E-5
Cycle 853
Total biomass:
Model iMM904.cmd: 8.447860636871496E-6
Model iJN1463.cmd: 1.9206027248372577E-5
Cycle 854
Total biomass:
Model iMM904.cmd: 8.453138976896282E-6
Model iJN1463.cmd: 1.9212409855135926E-5
Cycle 855
Total biomass:
Model iMM904.cmd: 8.458415187113526E-6
Model iJN1463.cmd: 1.921879042706507E-5
Cycle 856
Total biomass:
Model iMM904.cmd: 8.463689268494685E-6
Model iJN1463.cmd: 1.9225169192213553E-5
Cycle 857
Total biomass:
Model iMM904.cmd: 8.46896122181382E-6
Model iJN1463.cmd: 1.9231546046658206E-5
Cycle 858
```

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Total biomass:
Model iMM904.cmd: 8.474231047791361E-6
Model iJN1463.cmd: 1.923792109766882E-5
Cycle 859
Total biomass:
Model iMM904.cmd: 8.47949874713225E-6
Model iJN1463.cmd: 1.924429433664611E-5
Cycle 860
Total biomass:
Model iMM904.cmd: 8.484764320539995E-6
Model iJN1463.cmd: 1.9250665767627006E-5
Cycle 861
Total biomass:
Model iMM904.cmd: 8.490027768717493E-6
Model iJN1463.cmd: 1.9257035389378147E-5
Cycle 862
Total biomass:
Model iMM904.cmd: 8.495289092369027E-6
Model iJN1463.cmd: 1.9263403202597966E-5
Cycle 863
Total biomass:
Model iMM904.cmd: 8.500548292203906E-6
Model iJN1463.cmd: 1.9269769206289323E-5
Cycle 864
Total biomass:
Model iMM904.cmd: 8.505805368930976E-6
Model iJN1463.cmd: 1.9276133400020464E-5
Cycle 865
Total biomass:
Model iMM904.cmd: 8.51106032326402E-6
Model iJN1463.cmd: 1.9282495783943728E-5
Cycle 866
Total biomass:
Model iMM904.cmd: 8.51631315591698E-6
Model iJN1463.cmd: 1.92888563571717E-5
Cycle 867
Total biomass:
Model iMM904.cmd: 8.521563867608493E-6
Model iJN1463.cmd: 1.929521511944152E-5
Cycle 868
Total biomass:
Model iMM904.cmd: 8.526812459056682E-6
Model iJN1463.cmd: 1.9301572070512615E-5
Cycle 869
Total biomass:
Model iMM904.cmd: 8.532058930986119E-6
Model iJN1463.cmd: 1.930792721001809E-5
Cycle 870
Total biomass:
Model iMM904.cmd: 8.53730328412077E-6
Model iJN1463.cmd: 1.9314280537739555E-5
Cycle 871
Total biomass:
Model iMM904.cmd: 8.54254551918864E-6
Model iJN1463.cmd: 1.9320632053371533E-5
Cycle 872
Total biomass:
Model iMM904.cmd: 8.547785636918451E-6
Model iJN1463.cmd: 1.9326981756342943E-5
Cycle 873
Total biomass:
Model iMM904.cmd: 8.553023638041512E-6
Model iJN1463.cmd: 1.9333329466529636E-5
Cycle 874
Total biomass:
Model iMM904.cmd: 8.558259523291405E-6
Model iJN1463.cmd: 1.9339675723157234E-5
Cycle 875
Total biomass:
Model iMM904.cmd: 8.563493293405973E-6
Model iJN1463.cmd: 1.9346019986605084E-5
Cycle 876
Total biomass:
Model iMM904.cmd: 8.56872494912304E-6
Model iJN1463.cmd: 1.9352362436116625E-5
Cycle 877
Total biomass:
Model iMM904.cmd: 8.573954491183295E-6
Model iJN1463.cmd: 1.935870307183714E-5
Cycle 878
Total biomass:
Model iMM904.cmd: 8.579181920327156E-6
Model iJN1463.cmd: 1.9365041893003818E-5
```

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Cycle 879
Total biomass:
Model iMM904.cmd: 8.5844072373025E-6
Model iJN1463.cmd: 1.937137889958976E-5
Cycle 880
Total biomass:
Model iMM904.cmd: 8.589630442856482E-6
Model iJN1463.cmd: 1.9377714091495605E-5
Cycle 881
Total biomass:
Model iMM904.cmd: 8.594851537736133E-6
Model iJN1463.cmd: 1.9384047468317874E-5
Cycle 882
Total biomass:
Model iMM904.cmd: 8.60007052269445E-6
Model iJN1463.cmd: 1.939037902959827E-5
Cycle 883
Total biomass:
Model iMM904.cmd: 8.605287398485801E-6
Model iJN1463.cmd: 1.9396708774974217E-5
Cycle 884
Total biomass:
Model iMM904.cmd: 8.610502165863148E-6
Model iJN1463.cmd: 1.940303670457358E-5
Cycle 885
Total biomass:
Model iMM904.cmd: 8.615714825585224E-6
Model iJN1463.cmd: 1.9409362818076798E-5
Cycle 886
Total biomass:
Model iMM904.cmd: 8.620925378409895E-6
Model iJN1463.cmd: 1.941568711492447E-5
Cycle 887
Total biomass:
Model iMM904.cmd: 8.626133825101532E-6
Model iJN1463.cmd: 1.9422009595249194E-5
Cycle 888
Total biomass:
Model iMM904.cmd: 8.631340166422299E-6
Model iJN1463.cmd: 1.9428330258809203E-5
Cycle 889
Total biomass:
Model iMM904.cmd: 8.63654440313856E-6
Model iJN1463.cmd: 1.9434649105218066E-5
Cycle 890
Total biomass:
Model iMM904.cmd: 8.641746536016786E-6
Model iJN1463.cmd: 1.9440966134101175E-5
Cycle 891
Total biomass:
Model iMM904.cmd: 8.64694656582677E-6
Model iJN1463.cmd: 1.9447281345784623E-5
Cycle 892
Total biomass:
Model iMM904.cmd: 8.652144493337813E-6
Model iJN1463.cmd: 1.9453594739529985E-5
Cycle 893
Total biomass:
Model iMM904.cmd: 8.657340319324632E-6
Model iJN1463.cmd: 1.9459906315582873E-5
Cycle 894
Total biomass:
Model iMM904.cmd: 8.662534044563254E-6
Model iJN1463.cmd: 1.9466216073507295E-5
Cycle 895
Total biomass:
Model iMM904.cmd: 8.667725669831703E-6
Model iJN1463.cmd: 1.9472524012883387E-5
Cycle 896
Total biomass:
Model iMM904.cmd: 8.672915195905148E-6
Model iJN1463.cmd: 1.9478830133934282E-5
Cycle 897
Total biomass:
Model iMM904.cmd: 8.678102623566253E-6
Model iJN1463.cmd: 1.9485134436271347E-5
Cycle 898
Total biomass:
Model iMM904.cmd: 8.683287953598269E-6
Model iJN1463.cmd: 1.949143691964355E-5
Cycle 899
Total biomass:
Model iMM904.cmd: 8.688471186784984E-6
```

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Model iJN1463.cmd: 1.9497737584231776E-5
Cycle 900
Total biomass:
Model iMM904.cmd: 8.69365232391115E-6
Model iJN1463.cmd: 1.950403642983057E-5
Cycle 901
Total biomass:
Model iMM904.cmd: 8.69883136576498E-6
Model iJN1463.cmd: 1.9510333455743095E-5
Cycle 902
Total biomass:
Model iMM904.cmd: 8.704008313135899E-6
Model iJN1463.cmd: 1.951662866200855E-5
Cycle 903
Total biomass:
Model iMM904.cmd: 8.709183166814052E-6
Model iJN1463.cmd: 1.9522922048709808E-5
Cycle 904
Total biomass:
Model iMM904.cmd: 8.714355927594259E-6
Model iJN1463.cmd: 1.9529213615890468E-5
Cycle 905
Total biomass:
Model iMM904.cmd: 8.719526596268563E-6
Model iJN1463.cmd: 1.9535503363277812E-5
Cycle 906
Total biomass:
Model iMM904.cmd: 8.724695173636414E-6
Model iJN1463.cmd: 1.954179129040646E-5
Cycle 907
Total biomass:
Model iMM904.cmd: 8.729861660493176E-6
Model iJN1463.cmd: 1.9548077397470546E-5
Cycle 908
Total biomass:
Model iMM904.cmd: 8.735026057639853E-6
Model iJN1463.cmd: 1.955436168405192E-5
Cycle 909
Total biomass:
Model iMM904.cmd: 8.74018836587613E-6
Model iJN1463.cmd: 1.9560644150488445E-5
Cycle 910
Total biomass:
Model iMM904.cmd: 8.74534858600589E-6
Model iJN1463.cmd: 1.956692479601847E-5
Cycle 911
Total biomass:
Model iMM904.cmd: 8.750506718833337E-6
Model iJN1463.cmd: 1.9573203709189993E-5
Cycle 912
Total biomass:
Model iMM904.cmd: 8.755662765163218E-6
Model iJN1463.cmd: 1.9579480996780403E-5
Cycle 913
Total biomass:
Model iMM904.cmd: 8.76081672580371E-6
Model iJN1463.cmd: 1.958575646330423E-5
Cycle 914
Total biomass:
Model iMM904.cmd: 8.765968601563981E-6
Model iJN1463.cmd: 1.9592030108478293E-5
Cycle 915
Total biomass:
Model iMM904.cmd: 8.771118393254443E-6
Model iJN1463.cmd: 1.9598301932548256E-5
Cycle 916
Total biomass:
Model iMM904.cmd: 8.77626610168783E-6
Model iJN1463.cmd: 1.960457193547292E-5
Cycle 917
Total biomass:
Model iMM904.cmd: 8.781411727676698E-6
Model iJN1463.cmd: 1.961084011671566E-5
Cycle 918
Total biomass:
Model iMM904.cmd: 8.78655527203551E-6
Model iJN1463.cmd: 1.96171065599075E-5
Cycle 919
Total biomass:
Model iMM904.cmd: 8.791696735581341E-6
Model iJN1463.cmd: 1.9623371181009867E-5
Cycle 920
Total biomass:
```

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Model iMM904.cmd: 8.796836119133395E-6
Model iJN1463.cmd: 1.9629633980557594E-5
Cycle 921
Total biomass:
Model iMM904.cmd: 8.80197342350873E-6
Model iJN1463.cmd: 1.9635894958424254E-5
Cycle 922
Total biomass:
Model iMM904.cmd: 8.807108649531069E-6
Model iJN1463.cmd: 1.9642154114590748E-5
Cycle 923
Total biomass:
Model iMM904.cmd: 8.812241798018854E-6
Model iJN1463.cmd: 1.964841144857835E-5
Cycle 924
Total biomass:
Model iMM904.cmd: 8.817372869799385E-6
Model iJN1463.cmd: 1.965466696063152E-5
Cycle 925
Total biomass:
Model iMM904.cmd: 8.822501865695253E-6
Model iJN1463.cmd: 1.966092065098482E-5
Cycle 926
Total biomass:
Model iMM904.cmd: 8.827628786531664E-6
Model iJN1463.cmd: 1.966717251922761E-5
Cycle 927
Total biomass:
Model iMM904.cmd: 8.832753633137881E-6
Model iJN1463.cmd: 1.967342256570736E-5
Cycle 928
Total biomass:
Model iMM904.cmd: 8.83787640634239E-6
Model iJN1463.cmd: 1.967967078981506E-5
Cycle 929
Total biomass:
Model iMM904.cmd: 8.842997106977456E-6
Model iJN1463.cmd: 1.9685917191529203E-5
Cycle 930
Total biomass:
Model iMM904.cmd: 8.848115735872741E-6
Model iJN1463.cmd: 1.969216177120278E-5
Cycle 931
Total biomass:
Model iMM904.cmd: 8.853232293860808E-6
Model iJN1463.cmd: 1.9698404528751676E-5
Cycle 932
Total biomass:
Model iMM904.cmd: 8.858346781777924E-6
Model iJN1463.cmd: 1.970464546420308E-5
Cycle 933
Total biomass:
Model iMM904.cmd: 8.863459200457456E-6
Model iJN1463.cmd: 1.971088457715843E-5
Cycle 934
Total biomass:
Model iMM904.cmd: 8.868569550736969E-6
Model iJN1463.cmd: 1.9717122134742557E-5
Cycle 935
Total biomass:
Model iMM904.cmd: 8.873677833454848E-6
Model iJN1463.cmd: 1.972335787010119E-5
Cycle 936
Total biomass:
Model iMM904.cmd: 8.87878404944899E-6
Model iJN1463.cmd: 1.972959178296078E-5
Cycle 937
Total biomass:
Model iMM904.cmd: 8.883888199560448E-6
Model iJN1463.cmd: 1.9735823873401636E-5
Cycle 938
Total biomass:
Model iMM904.cmd: 8.88899028463144E-6
Model iJN1463.cmd: 1.974205414156304E-5
Cycle 939
Total biomass:
Model iMM904.cmd: 8.894090305503098E-6
Model iJN1463.cmd: 1.974828266536019E-5
Cycle 940
Total biomass:
Model iMM904.cmd: 8.899188263021707E-6
Model iJN1463.cmd: 1.9754509366569842E-5
Cycle 941
```

```
Total biomass:
Model iMM904.cmd: 8.904284158032499E-6
Model iJN1463.cmd: 1.976073424556678E-5
Cycle 942
Total biomass:
Model iMM904.cmd: 8.909377991378277E-6
Model iJN1463.cmd: 1.9766957302076772E-5
Cycle 943
Total biomass:
Model iMM904.cmd: 8.914469763909277E-6
Model iJN1463.cmd: 1.9773178536326333E-5
Cycle 944
Total biomass:
Model iMM904.cmd: 8.919559476474518E-6
Model iJN1463.cmd: 1.9779398029943984E-5
Cycle 945
Total biomass:
Model iMM904.cmd: 8.924647129921389E-6
Model iJN1463.cmd: 1.9785615882838074E-5
Cycle 946
Total biomass:
Model iMM904.cmd: 8.929732725101824E-6
Model iJN1463.cmd: 1.9791831913316522E-5
Cycle 947
Total biomass:
Model iMM904.cmd: 8.934816262867151E-6
Model iJN1463.cmd: 1.9798046121490002E-5
Cycle 948
Total biomass:
Model iMM904.cmd: 8.939897744070642E-6
Model iJN1463.cmd: 1.98042585072931E-5
Cycle 949
Total biomass:
Model iMM904.cmd: 8.944977169567346E-6
Model iJN1463.cmd: 1.9810469147896338E-5
Cycle 950
Total biomass:
Model iMM904.cmd: 8.950054540213175E-6
Model iJN1463.cmd: 1.9816677966308827E-5
Cycle 951
Total biomass:
Model iMM904.cmd: 8.955129856862703E-6
Model iJN1463.cmd: 1.9822884962362516E-5
Cycle 952
Total biomass:
Model iMM904.cmd: 8.960203120371665E-6
Model iJN1463.cmd: 1.9829090135956387E-5
Cycle 953
Total biomass:
Model iMM904.cmd: 8.965274331600928E-6
Model iJN1463.cmd: 1.9835293487348254E-5
Cycle 954
Total biomass:
Model iMM904.cmd: 8.97034349140675E-6
Model iJN1463.cmd: 1.984149501652095E-5
Cycle 955
Total biomass:
Model iMM904.cmd: 8.975410600651815E-6
Model iJN1463.cmd: 1.9847694723795213E-5
Cycle 956
Total biomass:
Model iMM904.cmd: 8.98047566019536E-6
Model iJN1463.cmd: 1.9853892608822123E-5
Cycle 957
Total biomass:
Model iMM904.cmd: 8.985538670901255E-6
Model iJN1463.cmd: 1.9860088672346595E-5
Cycle 958
Total biomass:
Model iMM904.cmd: 8.990599633632204E-6
Model iJN1463.cmd: 1.986628291402035E-5
Cycle 959
Total biomass:
Model iMM904.cmd: 8.995658549251169E-6
Model iJN1463.cmd: 1.9872475333619225E-5
Cycle 960
Total biomass:
Model iMM904.cmd: 9.000715418624283E-6
Model iJN1463.cmd: 1.9878665932057448E-5
Cycle 961
Total biomass:
Model iMM904.cmd: 9.005770242616732E-6
Model iJN1463.cmd: 1.9884854708731238E-5
```

```
Cycle 962
Total biomass:
Model iMM904.cmd: 9.010823022095252E-6
Model iJN1463.cmd: 1.9891041663967506E-5
Cycle 963
Total biomass:
Model iMM904.cmd: 9.015873757926812E-6
Model iJN1463.cmd: 1.98972267977059E-5
Cycle 964
Total biomass:
Model iMM904.cmd: 9.020922450981599E-6
Model iJN1463.cmd: 1.9903410110003119E-5
Cycle 965
Total biomass:
Model iMM904.cmd: 9.025969102128732E-6
Model iJN1463.cmd: 1.9909591601425717E-5
Cycle 966
Total biomass:
Model iMM904.cmd: 9.031013712238898E-6
Model iJN1463.cmd: 1.991577127196513E-5
Cycle 967
Total biomass:
Model iMM904.cmd: 9.036056282184425E-6
Model iJN1463.cmd: 1.9921949121658865E-5
Cycle 968
Total biomass:
Model iMM904.cmd: 9.04109681283722E-6
Model iJN1463.cmd: 1.9928125150362837E-5
Cycle 969
Total biomass:
Model iMM904.cmd: 9.046135305068898E-6
Model iJN1463.cmd: 1.9934299358342906E-5
Cycle 970
Total biomass:
Model iMM904.cmd: 9.051171759755473E-6
Model iJN1463.cmd: 1.99404717460003E-5
Cycle 971
Total biomass:
Model iMM904.cmd: 9.05620617776797E-6
Model iJN1463.cmd: 1.9946642312924106E-5
Cycle 972
Total biomass:
Model iMM904.cmd: 9.061238559982785E-6
Model iJN1463.cmd: 1.995281105989966E-5
Cycle 973
Total biomass:
Model iMM904.cmd: 9.066268907279332E-6
Model iJN1463.cmd: 1.9958977986689897E-5
Cycle 974
Total biomass:
Model iMM904.cmd: 9.071297220531188E-6
Model iJN1463.cmd: 1.996514309334324E-5
Cycle 975
Total biomass:
Model iMM904.cmd: 9.076323500618877E-6
Model iJN1463.cmd: 1.9971306380179784E-5
Cycle 976
Total biomass:
Model iMM904.cmd: 9.081347748420395E-6
Model iJN1463.cmd: 1.9977467846990446E-5
Cycle 977
Total biomass:
Model iMM904.cmd: 9.08636996481325E-6
Model iJN1463.cmd: 1.9983627494491712E-5
Cycle 978
Total biomass:
Model iMM904.cmd: 9.09139015068211E-6
Model iJN1463.cmd: 1.9989785322741388E-5
Cycle 979
Total biomass:
Model iMM904.cmd: 9.096408306903842E-6
Model iJN1463.cmd: 1.999594133146008E-5
Cycle 980
Total biomass:
Model iMM904.cmd: 9.101424434362573E-6
Model iJN1463.cmd: 2.000209552136684E-5
Cycle 981
Total biomass:
Model iMM904.cmd: 9.10643853393953E-6
Model iJN1463.cmd: 2.0008247891800842E-5
Cycle 982
Total biomass:
Model iMM904.cmd: 9.11145060651721E-6
```
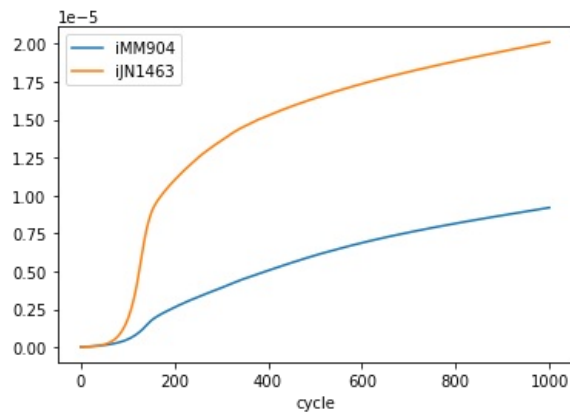
```
Model iJN1463.cmd: 2.0014398443828135E-5
Cycle 983
Total biomass:
Model iMM904.cmd: 9.116460652981447E-6
Model iJN1463.cmd: 2.002054717733666E-5
Cycle 984
Total biomass:
Model iMM904.cmd: 9.121468674215168E-6
Model iJN1463.cmd: 2.0026694092032203E-5
Cycle 985
Total biomass:
Model iMM904.cmd: 9.126474671102294E-6
Model iJN1463.cmd: 2.0032839188392944E-5
Cycle 986
Total biomass:
Model iMM904.cmd: 9.131478644532518E-6
Model iJN1463.cmd: 2.0038982467049417E-5
Cycle 987
Total biomass:
Model iMM904.cmd: 9.136480595390499E-6
Model iJN1463.cmd: 2.004512392739604E-5
Cycle 988
Total biomass:
Model iMM904.cmd: 9.14148052456485E-6
Model iJN1463.cmd: 2.005126357029029E-5
Cycle 989
Total biomass:
Model iMM904.cmd: 9.146478432940995E-6
Model iJN1463.cmd: 2.005740139539159E-5
Cycle 990
Total biomass:
Model iMM904.cmd: 9.151474321410217E-6
Model iJN1463.cmd: 2.0063537403071805E-5
Cycle 991
Total biomass:
Model iMM904.cmd: 9.15646819085948E-6
Model iJN1463.cmd: 2.0069671593672693E-5
Cycle 992
Total biomass:
Model iMM904.cmd: 9.161460042180876E-6
Model iJN1463.cmd: 2.0075803967401994E-5
Cycle 993
Total biomass:
Model iMM904.cmd: 9.166449876262274E-6
Model iJN1463.cmd: 2.0081934524277993E-5
Cycle 994
Total biomass:
Model iMM904.cmd: 9.171437693996672E-6
Model iJN1463.cmd: 2.0088063264523267E-5
Cycle 995
Total biomass:
Model iMM904.cmd: 9.176423496274324E-6
Model iJN1463.cmd: 2.0094190188342225E-5
Cycle 996
Total biomass:
Model iMM904.cmd: 9.1814072839908E-6
Model iJN1463.cmd: 2.010031529603359E-5
Cycle 997
Total biomass:
Model iMM904.cmd: 9.186389058036926E-6
Model iJN1463.cmd: 2.010643858793281E-5
Cycle 998
Total biomass:
Model iMM904.cmd: 9.191368819307078E-6
Model iJN1463.cmd: 2.0112560063828268E-5
Cycle 999
Total biomass:
Model iMM904.cmd: 9.196346568695893E-6
Model iJN1463.cmd: 2.0118679724163852E-5
Cycle 1000
Total biomass:
Model iMM904.cmd: 9.201322307094974E-6
Model iJN1463.cmd: 2.0124797568946477E-5
Cycle 1001
End of simulation
Total time = 749.583s

STDERR empty.
```

Para revisar la biomasa total

```
In [16]:  sim.total_biomass.plot(x = "cycle")
```

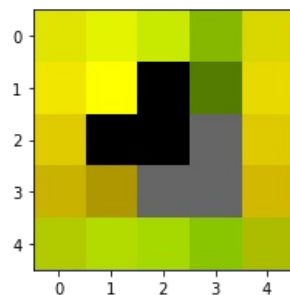Out[16]: <AxesSubplot:xlabel='cycle'>

Graficamos los resultados de biomasa y demás metabolitos interesantes en el grid:

```
In [17]:  im = sim.get_biomass_image('iMM904', params.all_params['maxCycles'])
          im2 = sim.get_biomass_image('iJN1463',params.all_params['maxCycles'])

          final = np.zeros((grid_size,grid_size,3))
          final[:,:,0] = im / np.max(im)
          final[:,:,1] = im2 / np.max(im2)
          for rock in rock_locs:
              final[rock[0],rock[1],0:3] = 0.4
          from matplotlib import pyplot as plt
          fig, ax = plt.subplots(figsize = (3.1, 3.1))
          ax.imshow(final)
          plt.imshow(final)
```
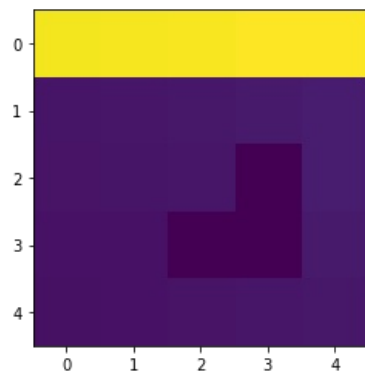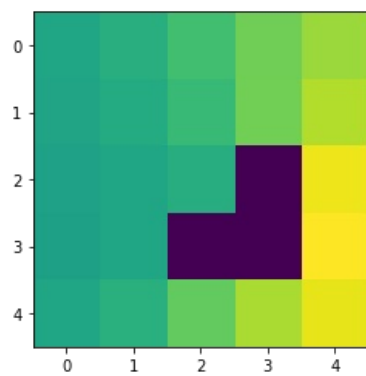
Out[17]: <matplotlib.image.AxesImage at 0x22ff9cefc10>


```
In [18]:  plt.imshow(sim.get_metabolite_image("succ_e",params.all_params['maxCycles']))
```
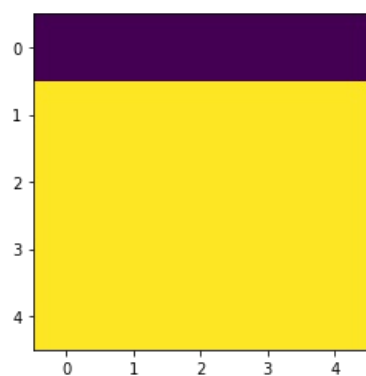
Out[18]: <matplotlib.image.AxesImage at 0x22ff9bcaca0>


```
In [19]:  plt.imshow(sim.get_metabolite_image("ac_e",params.all_params['maxCycles']))
```
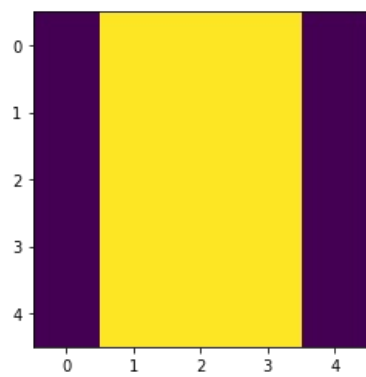
Out[19]: <matplotlib.image.AxesImage at 0x22ff3f50a90>

```
plt.imshow(sim.get_metabolite_image("nh4_e",params.all_params['maxCycles']))
```

Out[20]: <matplotlib.image.AxesImage at 0x22ff8d10e80>

In [21]:

```
plt.imshow(sim.get_metabolite_image("o2_e",params.all_params['maxCycles']))
```

Out[21]: <matplotlib.image.AxesImage at 0x22ff9cdc4f0>

In [ ]: