

Soutenance de stage de fin d'étude

Achille BAUCHER

March 7, 2022



Contexte



Contexte

Institutions



Plan

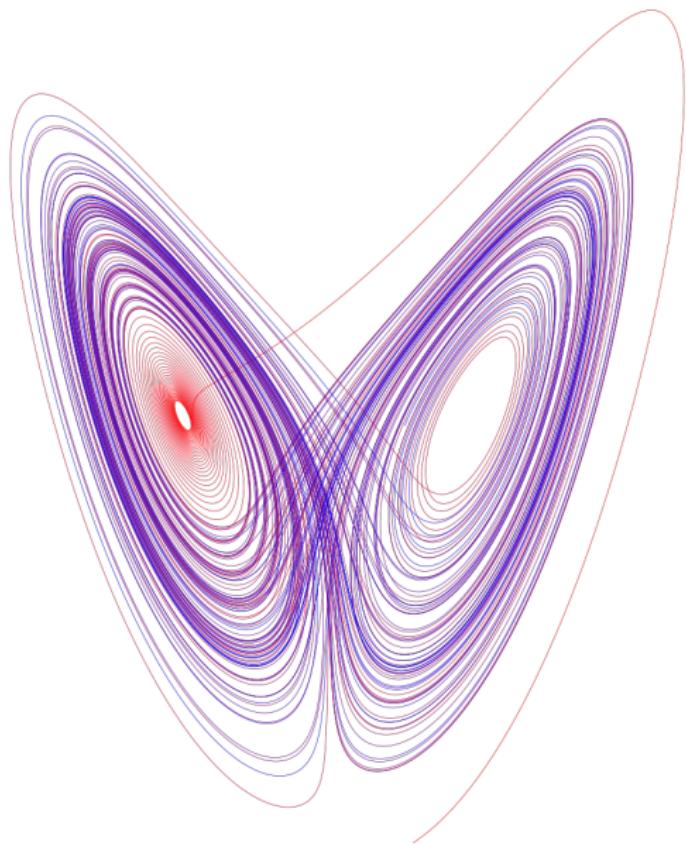
Apprentissage de dynamiques

World3

Pydynamo

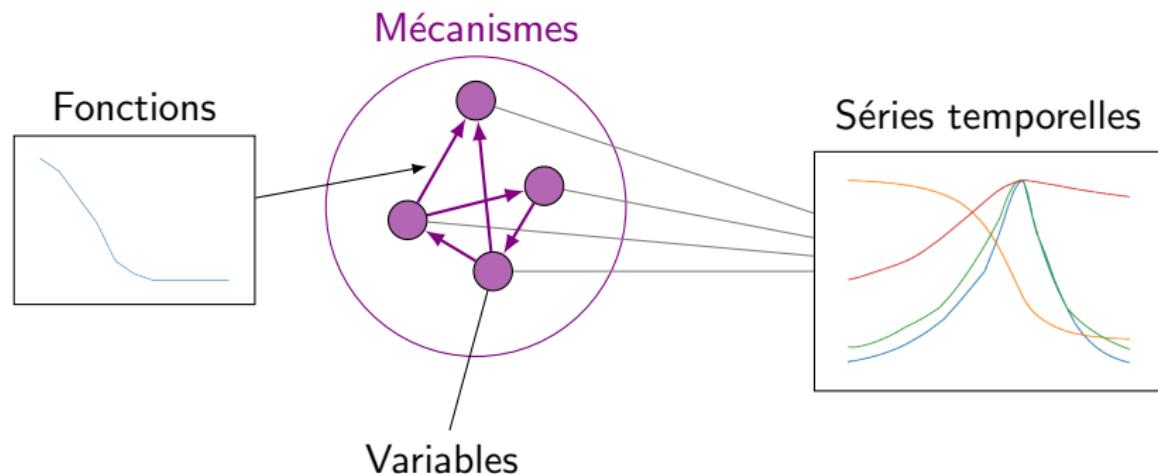
La recherche scientifique

Apprentissage de dynamiques



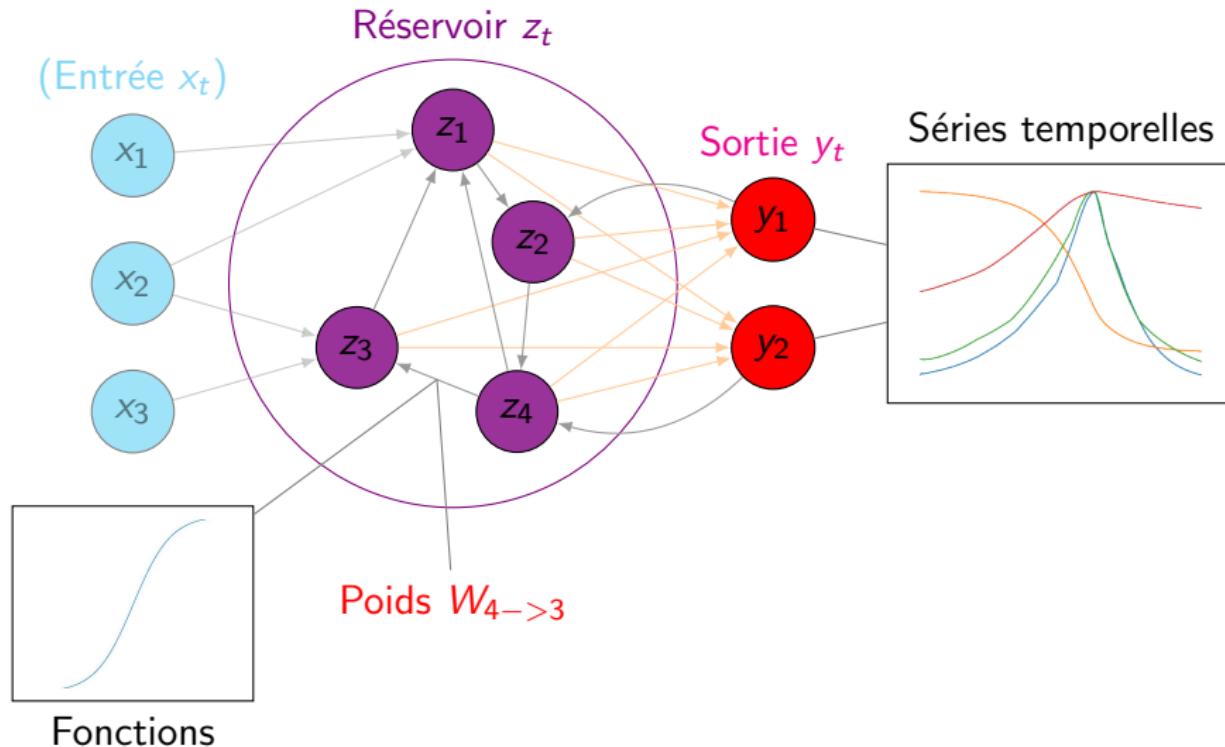
Apprentissage de dynamiques

Système dynamique



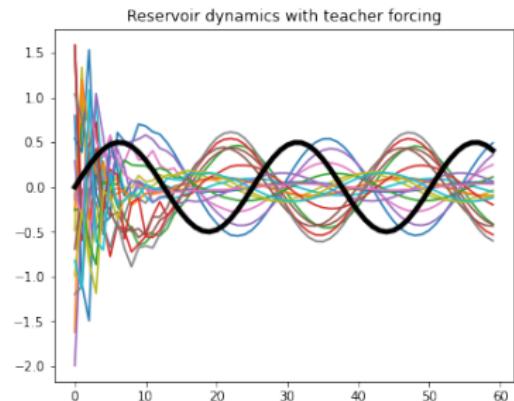
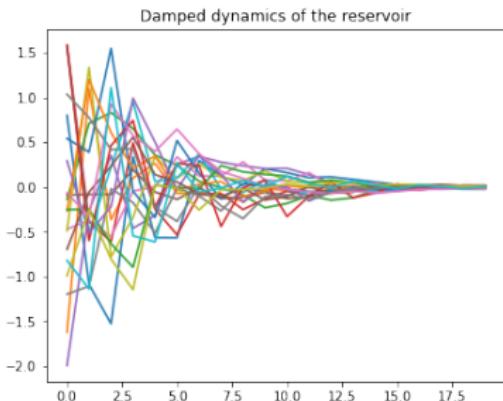
Apprentissage de dynamiques

Echo State Network



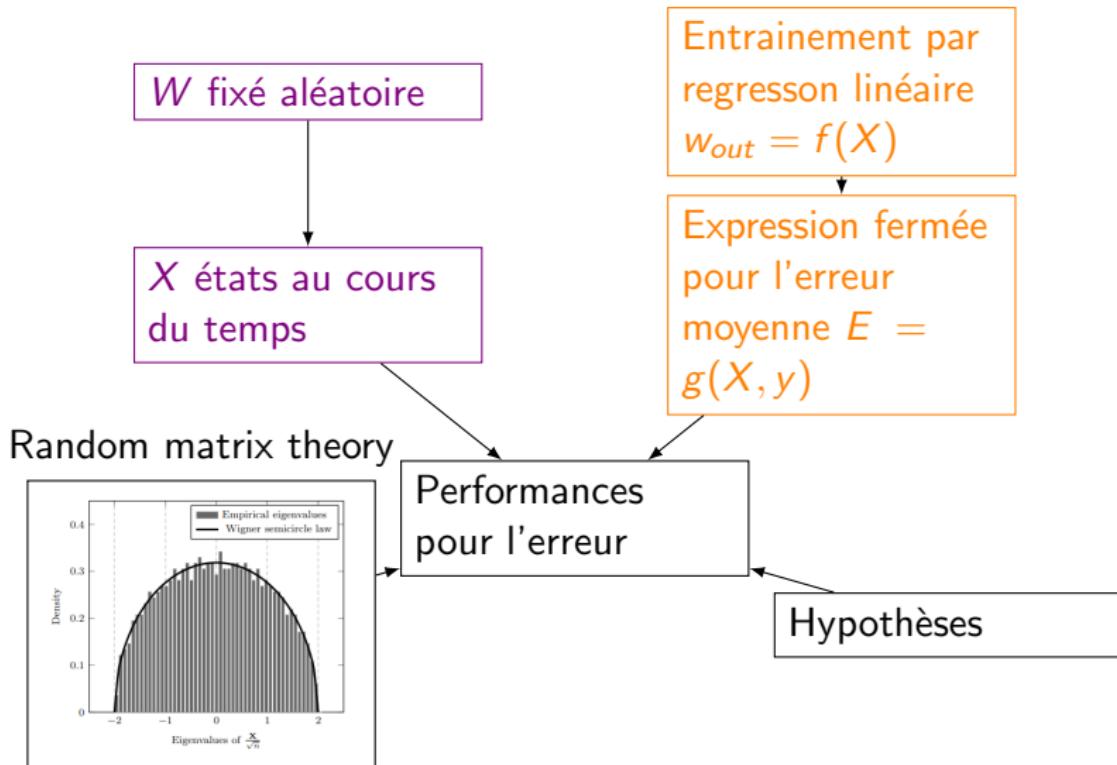
Apprentissage de dynamiques

L'écho et le professeur



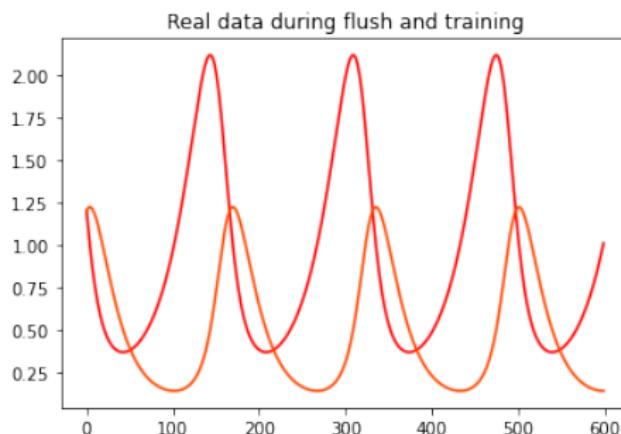
Apprentissage de dynamiques

Les garanties de l'ESN

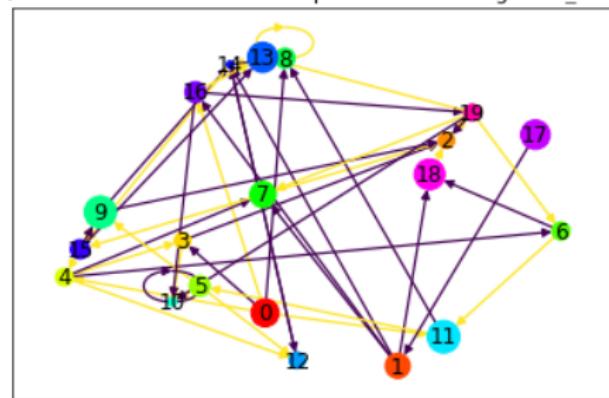


Apprentissage de dynamiques

Dissection du réseau

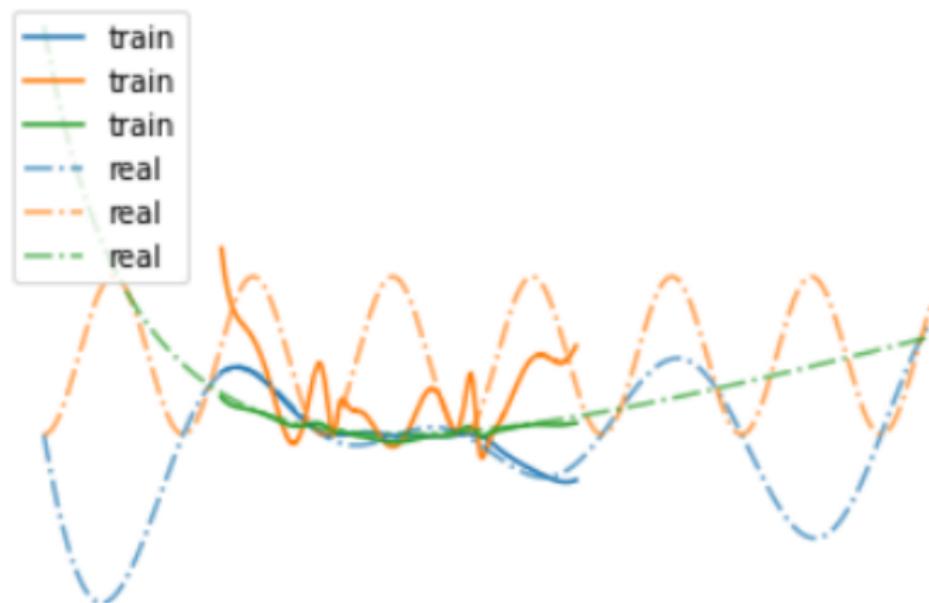


Graph representation of internal states
(node size is their mean importance according to W_{out})



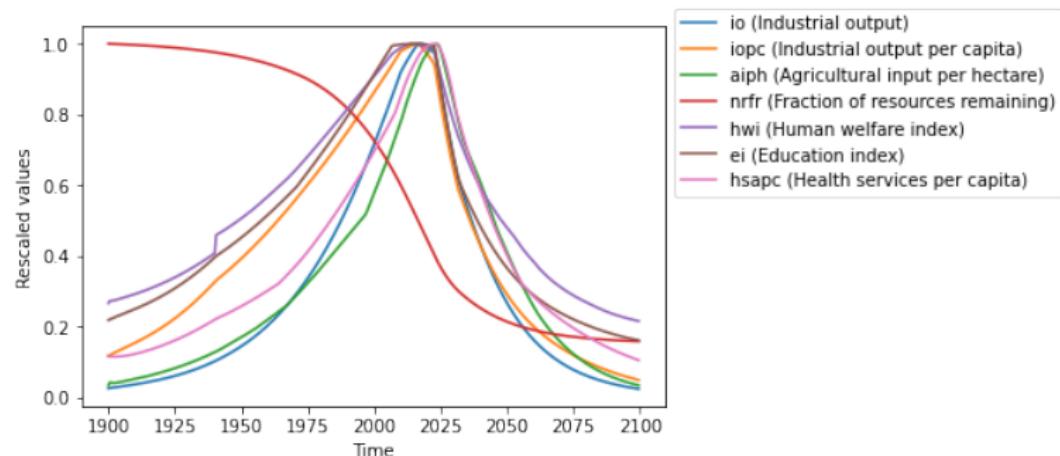
Apprentissage de dynamiques

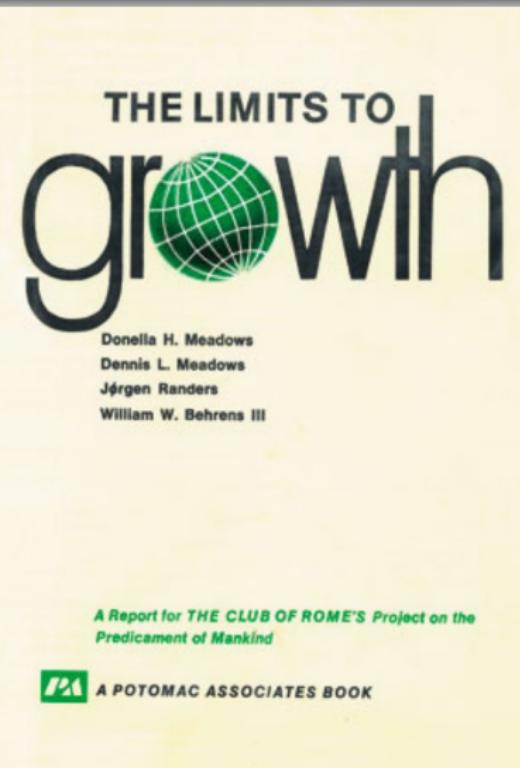
Approximation universelle



Apprentissage de dynamiques

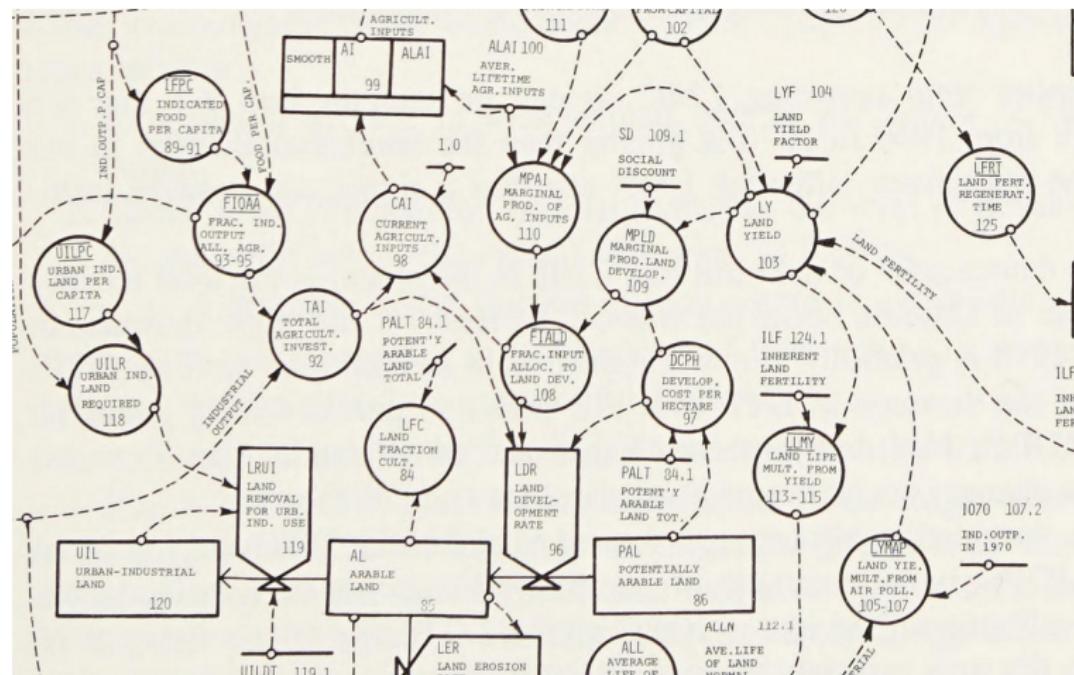
Limites





World3

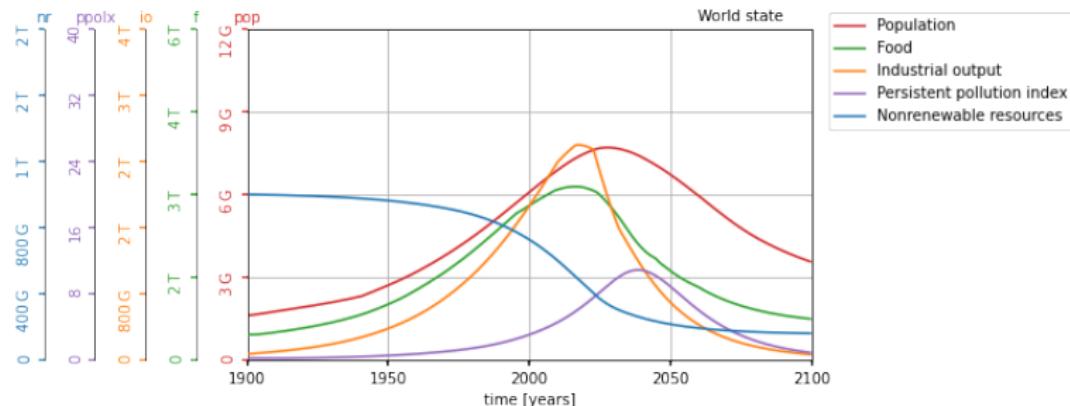
Le modèle



World3

Les simulations

Scénario 1: Business as usual

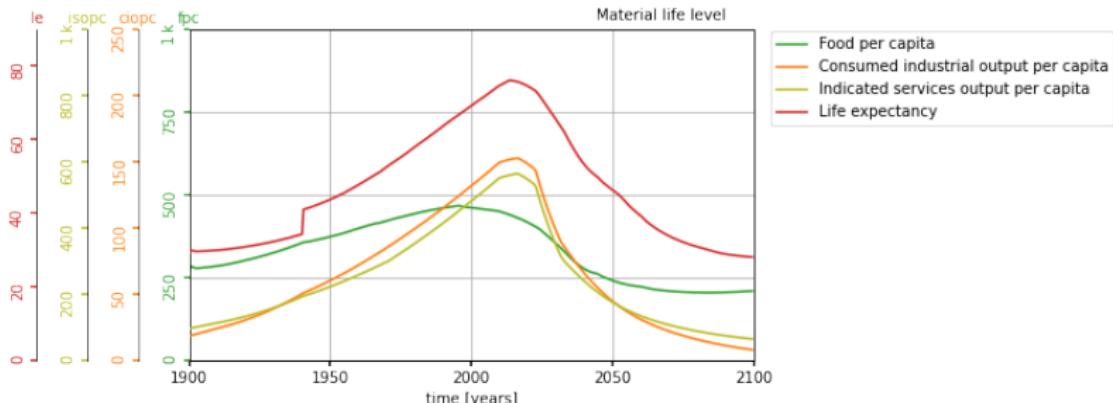


World state

- Population
- Food
- Industrial output
- Persistent pollution index
- Nonrenewable resources

time [years]

Material life level



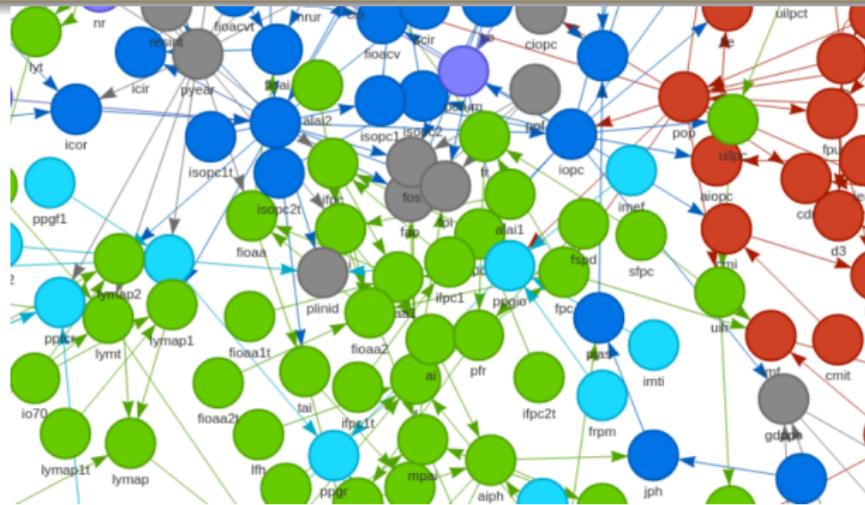
- Food per capita
- Consumed industrial output per capita
- Indicated services output per capita
- Life expectancy

time [years]

Welfare and footprint

Développement Qualitatif
Planification Coûts-Bénéfice Révolution Politique
Technocratisme
Progrès Social Confort
Vision coloniale Prévisionisme Environnement
Rattrapage
Écologie
Catastrophisme Technologie
Décideurs Autonomie Occidental
Élite Gestionnaire Idéalisme

Pydynamo



Pydynamo

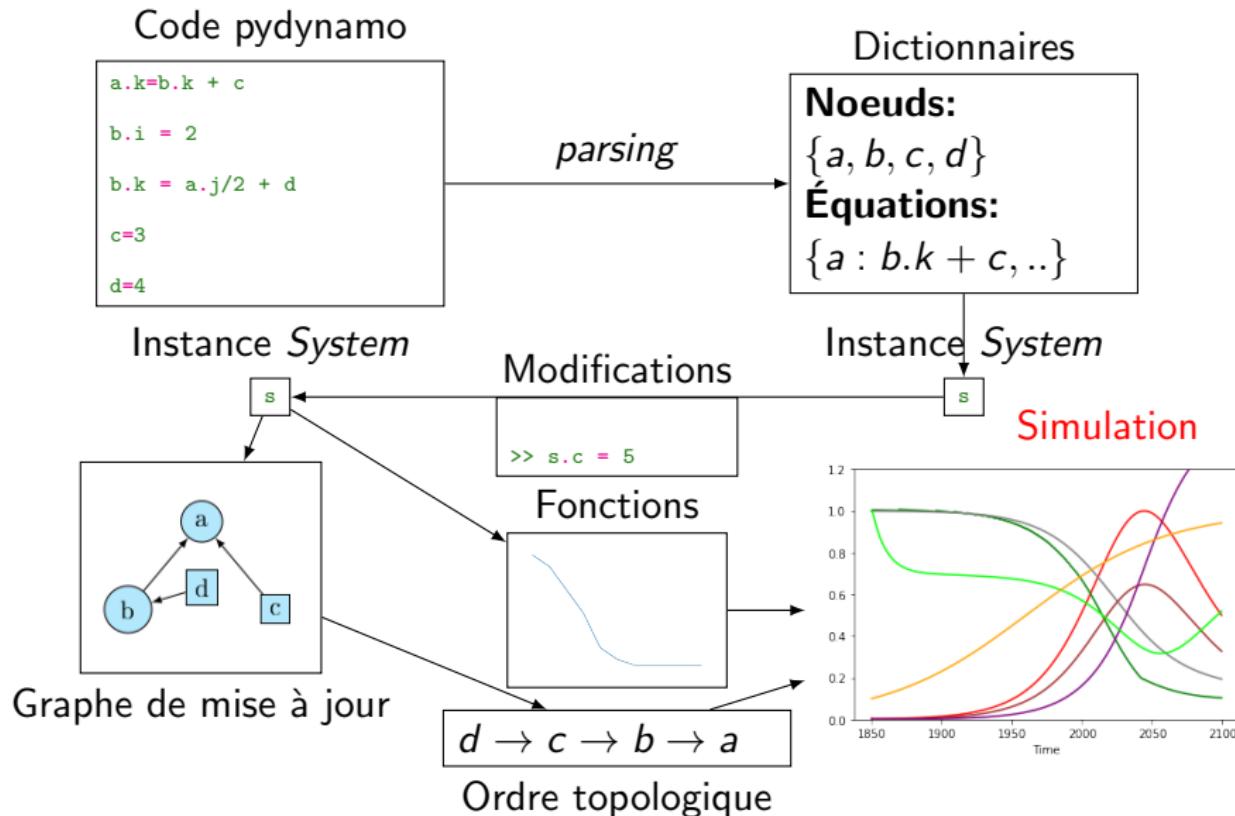
La syntaxe

```
NOTE      AGRICULTURAL SECTOR
NOTE      LOOP 1: FOOD FROM INVESTMENT IN LAND DEVELOPMENT
NOTE
84   A    LFC.K=AL.K/PALT
     C    PALT=3.2E9
85   L    AL.K=AL.J+(DT)*(LDR.JK-LER.JK-LRUI.JK)
     N    AL=ALI
     C    ALI=.9E9
86   L    PAL.K=PAL.J+(DT)*(-LDR.JK)
     N    PAL=PALI
     C    PALI=2.3E9
87   A    F.K=LY.K*AL.K*LFH*(1-PL)
     C    LFH=.7
     C    PL=.1
88   A    FPC.K=F.K/POP.K
89   A    IFPC.K=CLIP(IFPC2.K,IFPC1.K,TIME.K,PYEAR)
90   A    IFPC1.K=TANBL(IFPC1T,IOPC.K,0,1600,200)
     T    IFPC1T=[230,480,690,850,970,1070,1150,1210,1250]
```

```
# Agricultural sector
## Loop1: food from investment in land development
lfc.k = al.k/palt
palt = 3.2e9
al.k = al.j + dt*(ldr.j - ler.j - lrui.j)
al.i = ali
ali = 0.9e9
pal.k = pal.j + dt*(-ldr.j)
pal.i = pali
pali = 2.3e9
f.k = ly.k*al.k*lfh*(1-pl)
lfh = 0.7
pl = 0.1
fpc.k = f.k/pop.k
ifpc.k = clip(ifpc2.k, ifpcl.k, time.k, pyear)
ifpcl.k = tabhl(ifpclt, iopc.k, 0, 1600, 200)
ifpclt = [230, 480, 690, 850, 970, 1070, 1150, 1210, 1250]
```

Pydynamo

Fonctionnement



Pydynamo

La documentation

tpworld3

Search docs

World 2

World 3

World3 tutorial

All sectors

- Population sector
- Capital sector
- Agricultural sector
 - ltc: Land Fr Cult
 - palt: Potentially Arable Land Total
 - al: Arable Land
 - ali: Initial Arable Land
 - pali: Potentially Arable Land
 - pali: Initial Potentially Arable Land
 - f: Food
 - lfh: Land Fraction Harvested
 - pl: Processing Loss
 - fpc: Food Per Capita
 - ifpc: Indicated Food Per Capita
 - itpc1: Indicated Food Per Capita 1
 - itpc1t: Indicated Food Per Capita Table 1
 - ifpc2: Indicated Food Per Capita 2
 - ifpc2t: Indicated Food Per Capita Table 2
 - tai: Total Agricultural Investment
 - fioaa: Fraction Of Industrial Output Allocated To Agriculture
 - fioaa1: Fraction Of Industrial Output Allocated To Agriculture 1
 - fioaa1t: Fraction Industrial Output Allocated To Agriculture Table 1
 - fioaa2: Fraction Of Industrial Output Allocated To Agriculture 2

all: Average Life Of Land

View page source

all: Average Life Of Land

Variable

Agricultural sector

Average Life Of Land [year]

```
all = alin * llmy
```

```
graph LR; alin[alin] --> all((all)); llmy((llmy)) --> all; all --> ler[ler];
```

all in the updating graph: (how to read)

In nodes

alin : average life of land normal

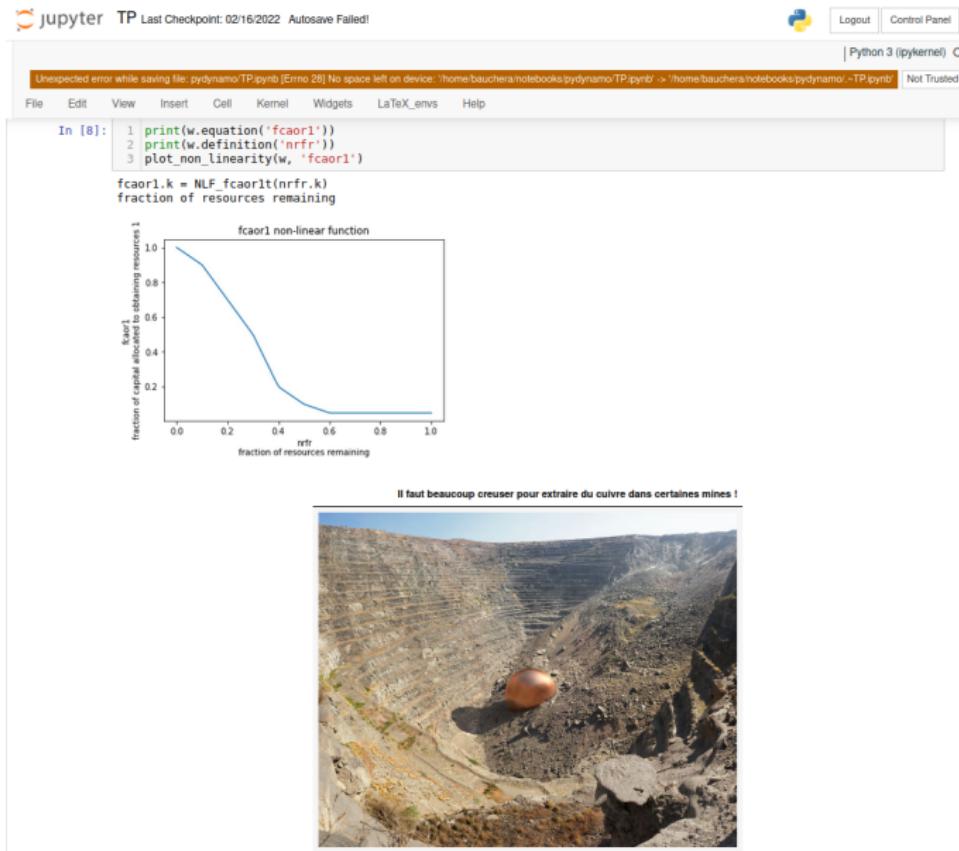
llmy : land life multiplier from land yield

Out nodes

ler : land erosion rate

Pydynamo

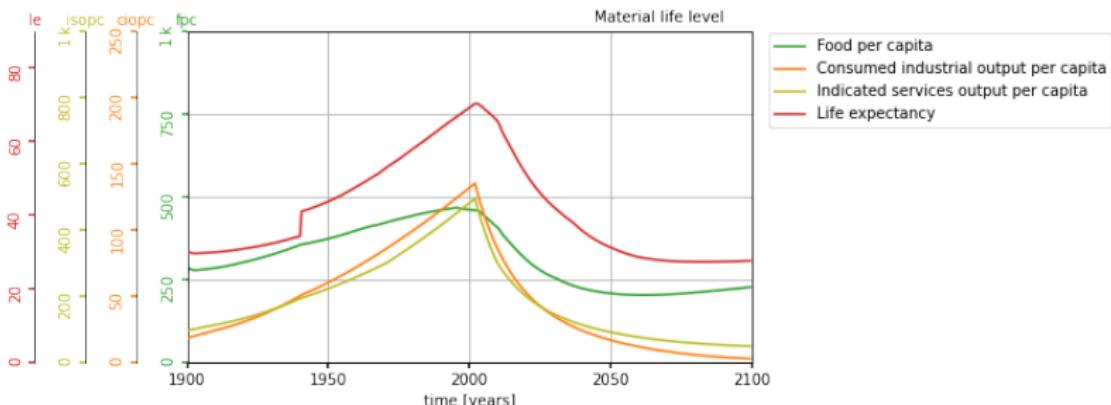
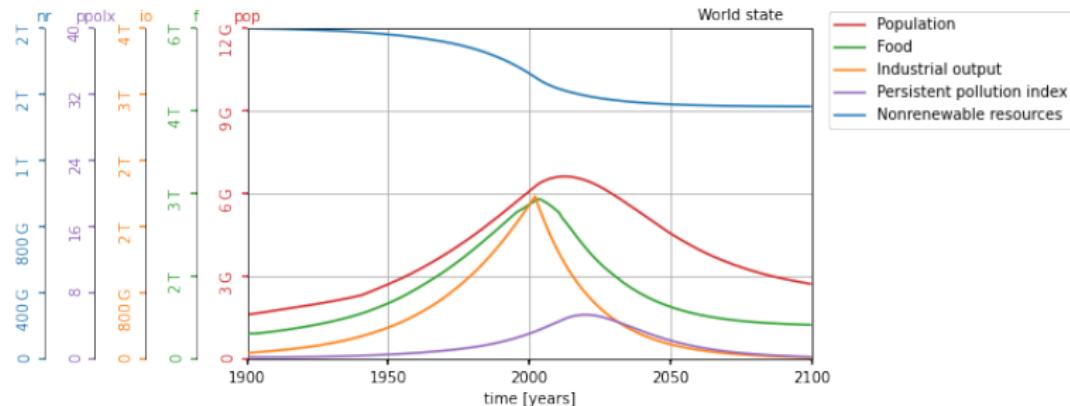
Le TP



Pydynamo

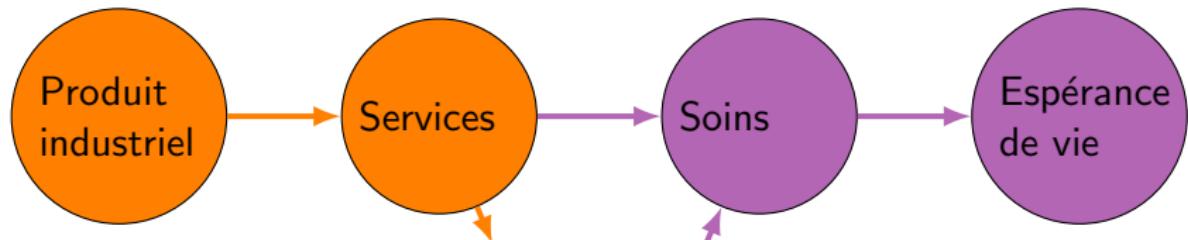
Décroissance

Scénario de décroissance industrielle

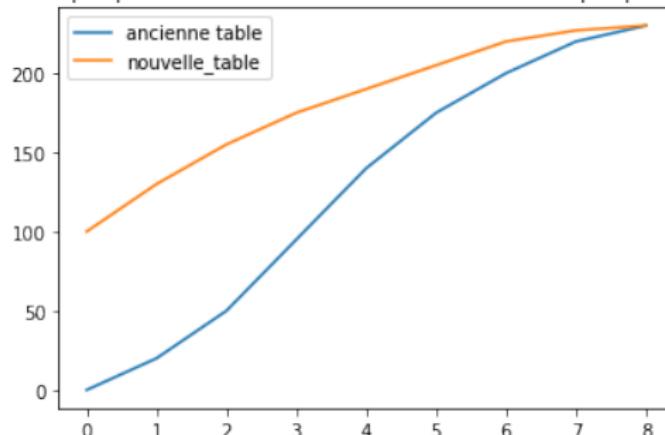


Pydynamo

Décroissance: santé autonome

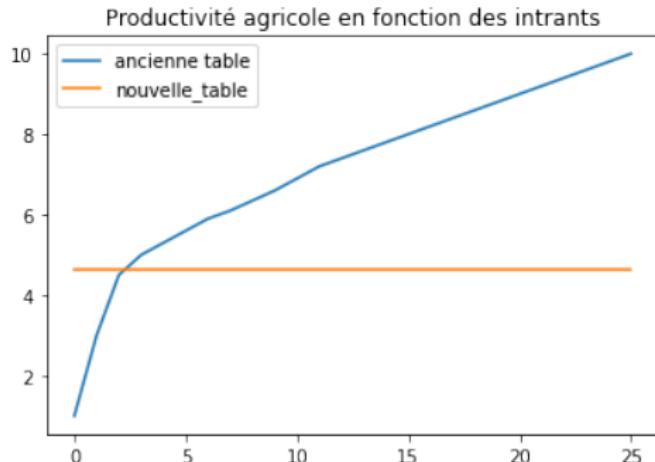
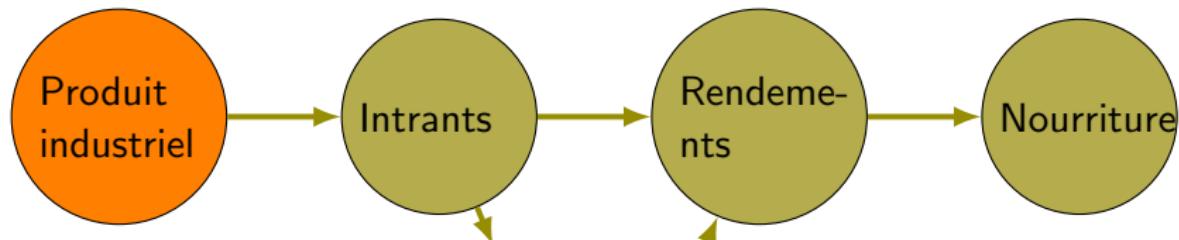


Soins par personne en fonction des services totaux par personne



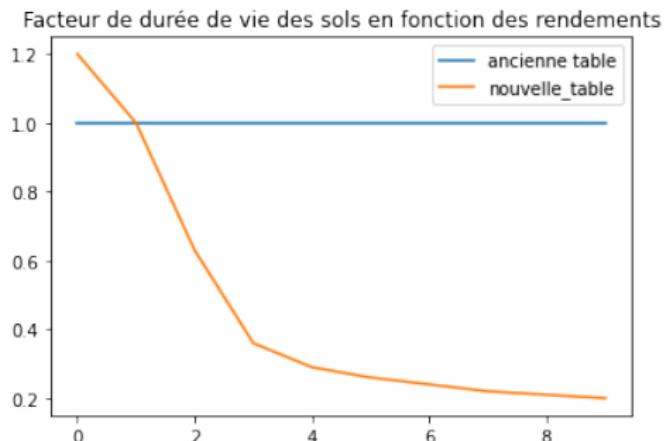
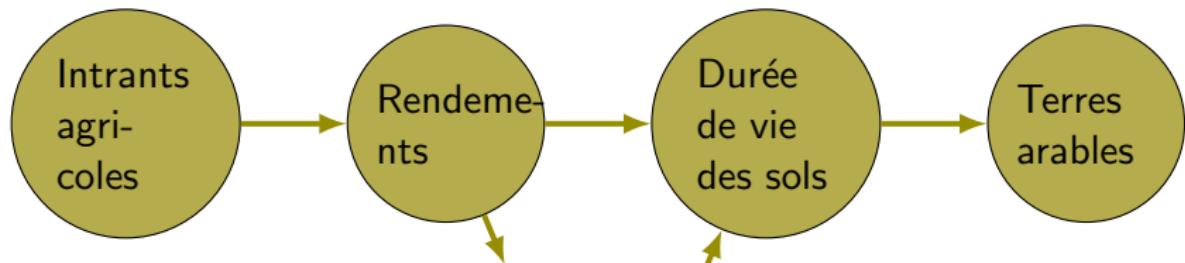
Pydynamo

Décroissance: agroécologie



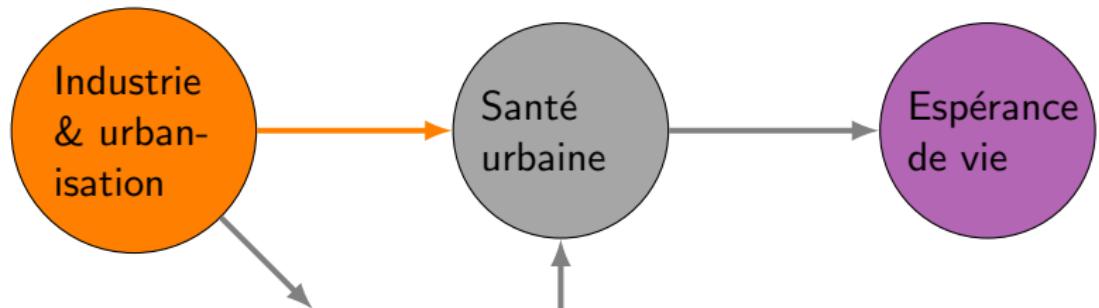
Pydynamo

Décroissance: agroécologie

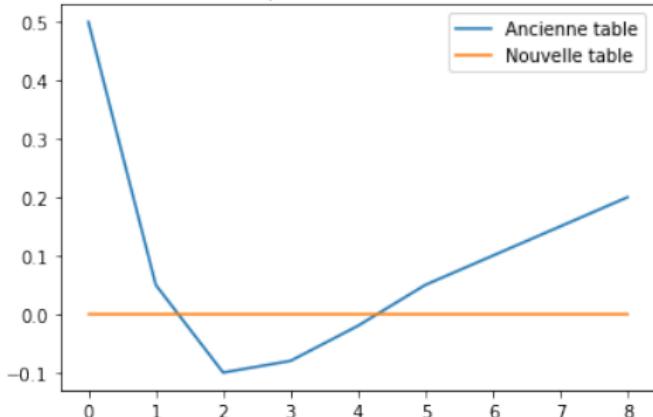


Pydynamo

Décroissance: urbanisme



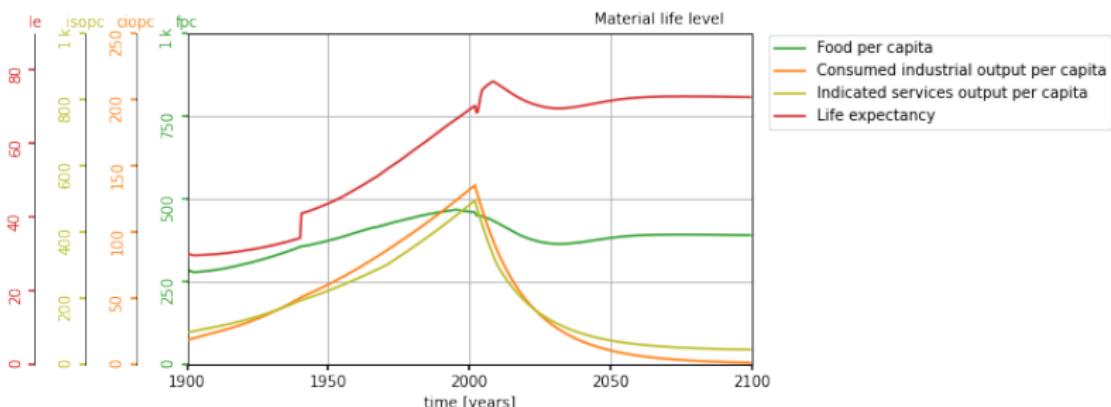
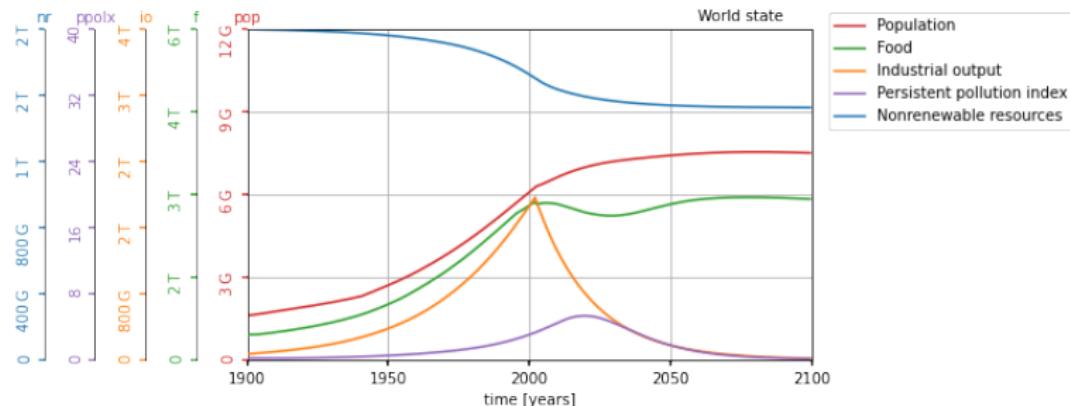
Nouvelle table pour cmi avec la nature urbaine



Pydynamo

Décroissance: réunion des alternatives

Deuxième réunion des alternatives



La recherche scientifique

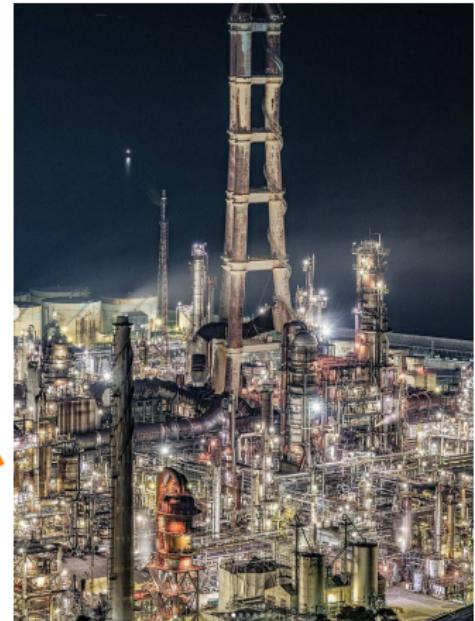
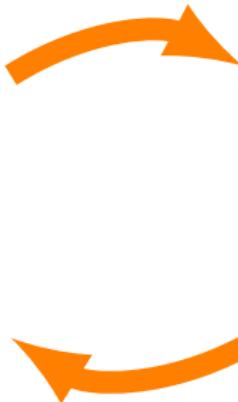


La recherche scientifique

N'est pas neutre

Macrosystème technique

Science



Albert Besnard, La Vérité entraînant les Sciences à sa suite répand sa lumière sur les hommes (1890)
@frederico_italiano, Tetsurou Kobayashi

La recherche scientifique

En question



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La recherche scientifique

Questions



@africanceremonies, Dinka Cattle Camp, South Sudan ,2006