TEMPO - The French national network of phenology observatories

Iñaki Garcia de Cortazar-Atauri, Isabelle Chuine,

TEMPO members

TEMPO network was created in **2017**…

… from the **association of existing** French research **networks** (GDR, PERPHECLIM,…), **citizen sciences programs** (Observatoire des Saisons and Phenoclim CREA) …

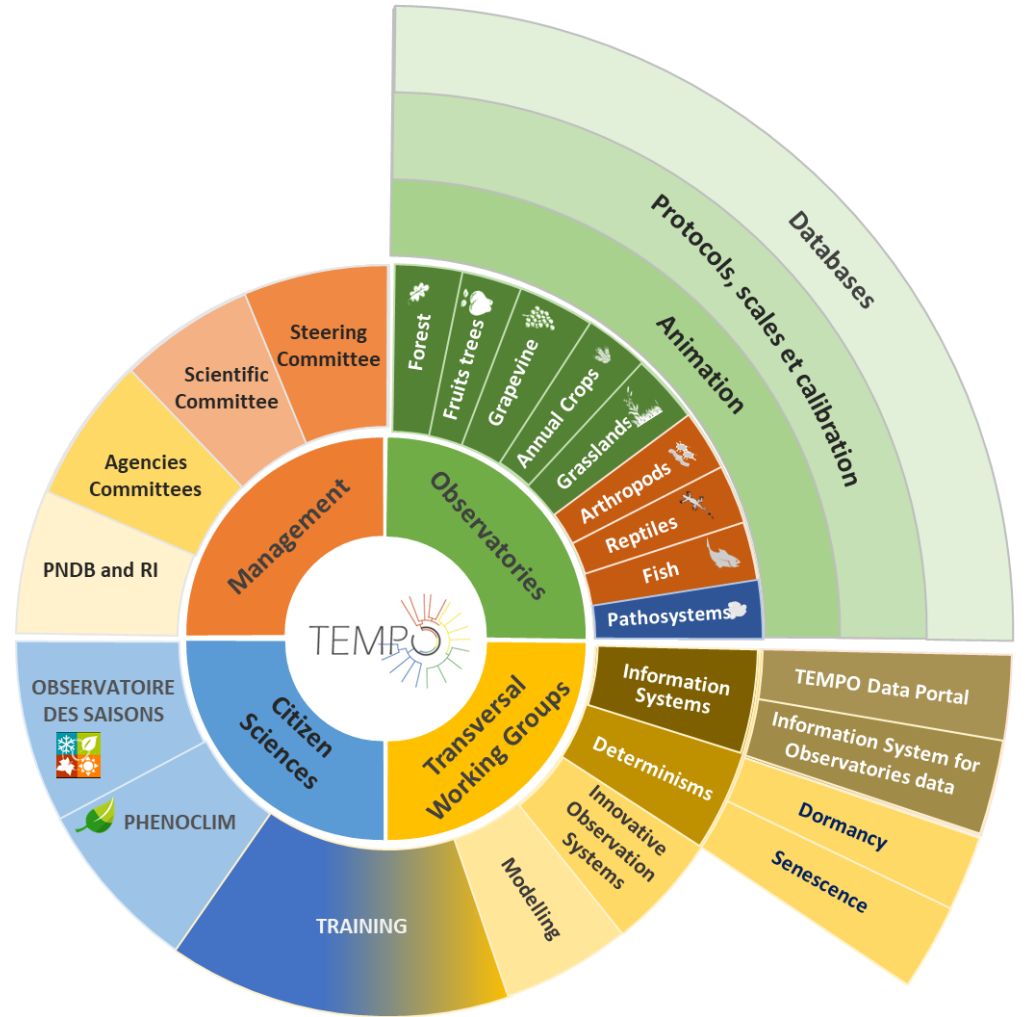**and new scientist and partners** working on phenology

TEMPO mission

Create a **research infrastructure** and **community** for **documenting, understanding and predicting climate change impact** on living organisms **phenology** and the **consequences** on systems **productivity** and **populations survival** and **distribution**
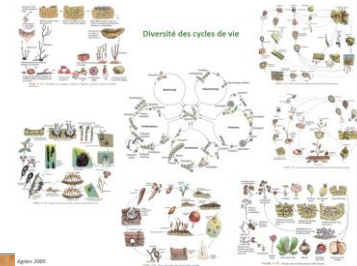
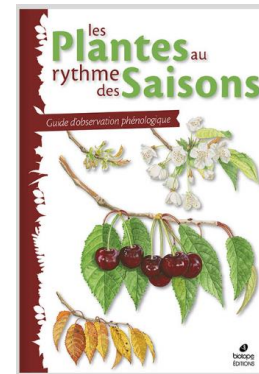# Organization

Main activities

Data management and dissemination
Portal, datahub, Dataverse, DMP, National and International

Animation, training and research
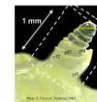Multi-disciplinary, trans-observatory and citizen

Modeling and Pheno-climatic services
Development and use of models (developed from acquired data and knowledge)
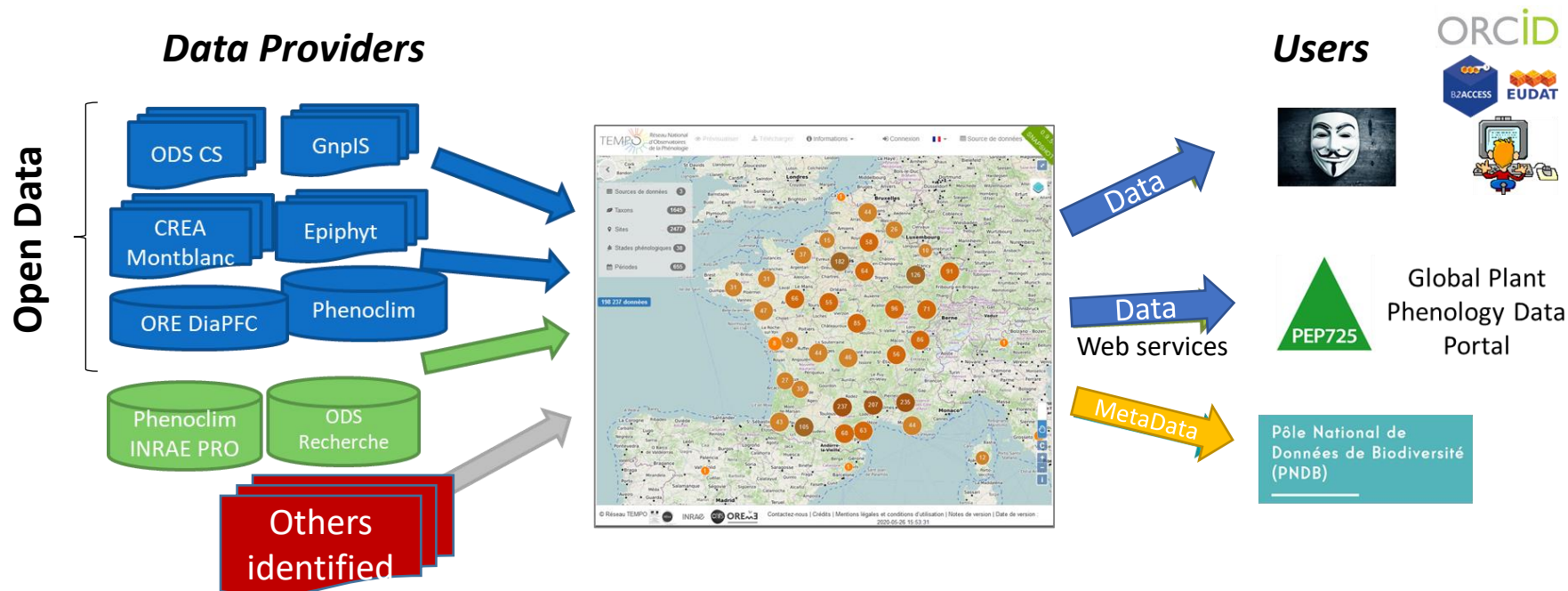
Development of new observation methods
Scales, protocols, inter-calibration, innovative tools

Data management and dissemination

TEMPO Data Portal   **https://data.pheno.fr**

Data Providers

Users

Open Data

ODS CS   GnpIS

CREA Montblanc   Epiphyt

ORE DiaPFC   Phenoclim

Phenoclim INRAE PRO   ODS Recherche

Others identified

Data

Data
Web services

MetaData

Global Plant Phenology Data Portal

Pôle National de Données de Biodiversité (PNDB)

Research data + Citizen Science Data + Professional Data

- > 2.48 M of data (+0.28 M)
- 11775 sites (+800 sites)
- 2660 taxa (+600 taxa)
- 660 years (1349-2022)

Data management and dissemination

Data Hub and Dataverse

TEMPO Dataverse

https://data.inrae.fr/dataverse/TEMPO

Orphan Data Information System (SIDO)

https://sido.pheno.fr

- 13 datasets in TEMPO Dataverse
- Link via national Hubs with GBIF - Global Biodiversity Information Facility
- Several on-going papers

Data rescue

- **Fruit and forest trees,** INRAE Versailles Phenological Observatory 1929 -1970, 4747 observations
- **Forest trees**, Observatory of Saint Maur des Fosses 1875-1947, 180 species, 6187 observations
- **Maize,** INRAE, Variety data since 1937-1991, 100000 data
- **Annual crops**, INRAE, 1990 - 2015
- **Peach** (10 000 data) and **walnut** (10 000), INRAE – Technical PHENOCLIM data
- **Grapevine Grenache,** Institut Rhodanien, 1969 - 2021 Data Paper (Bécart et al., 2022)

And other data: Mont Ventoux dataset, Pine caterpilar, ticks...

https://data.inrae.fr/dataverse/TEMPO

Community building
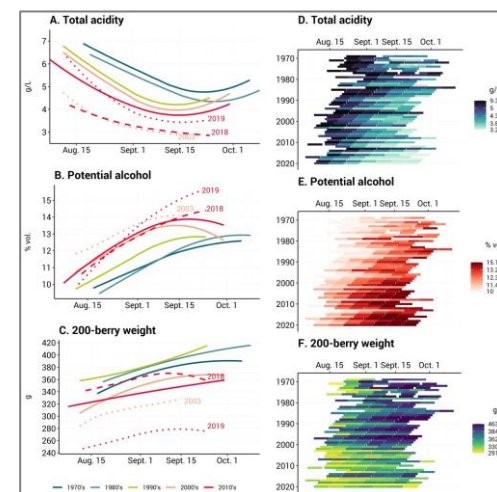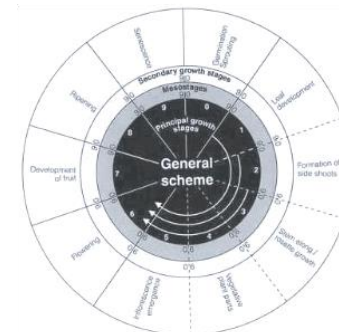
- **Intercalibration & training**
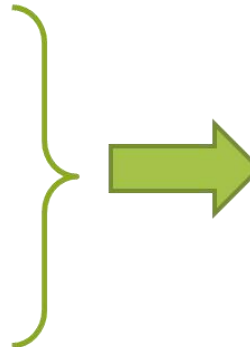

Apple flowering

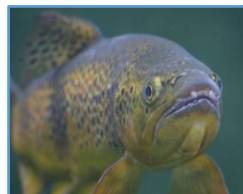*Mapple budbreak*

Grapevine budbreak

- **Harmonising protocoles – Use of common scales**
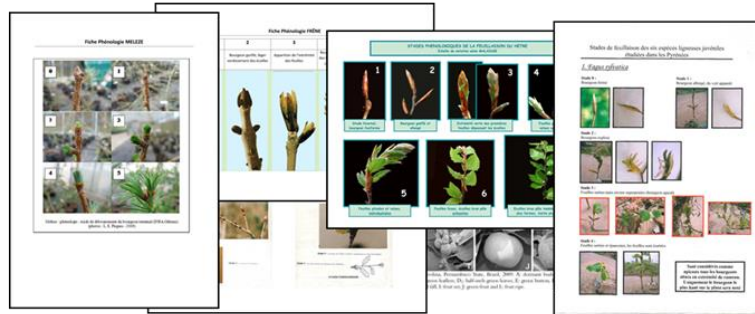
BBCH Scale (Meier, 2001)
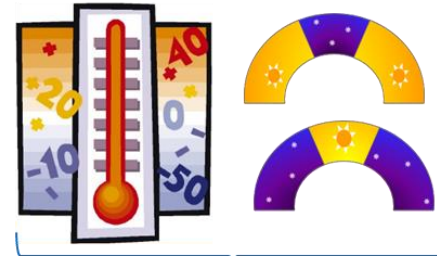
Community building

- **Opening phenology blackboxes**

Dormancy
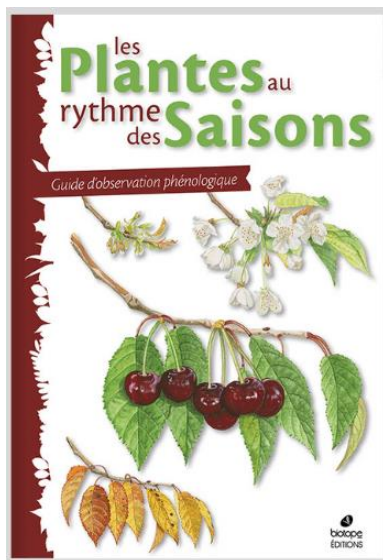

Leaf senescence

Environmental determinisms

Genetic determinisms

- **Sharing knowledge between scientific communities**

… and Citizens

Exhibition: « Climat et Biodiversité: c'est chaud! »
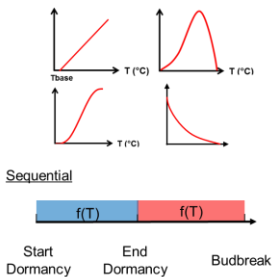

Phenology guide for temperate plants species in French, German and English

Free license exhibition: CC-BY-SA 4.0
Download and free distribution (~ 300)
https://www.obs-saisons.fr/exhibitions

Modeling and Pheno-climatic services

PMP6

Phenoclimate Services

Literature
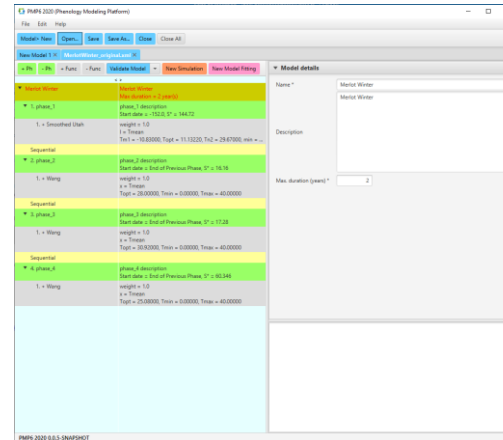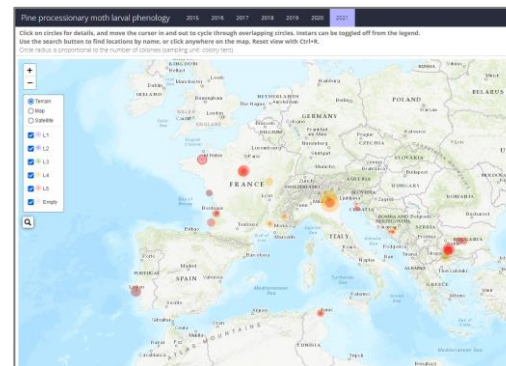
New optimisation algorithms
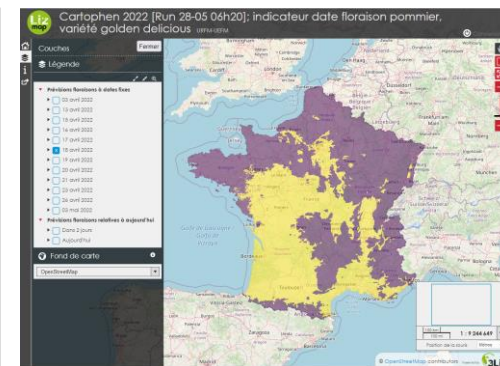
- **Services adapted to different species** (fruits trees, forest, crops, pests…), **different time-space scales → USERS committee**
- **Gitlab TEMPO**
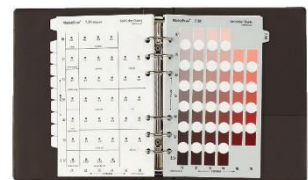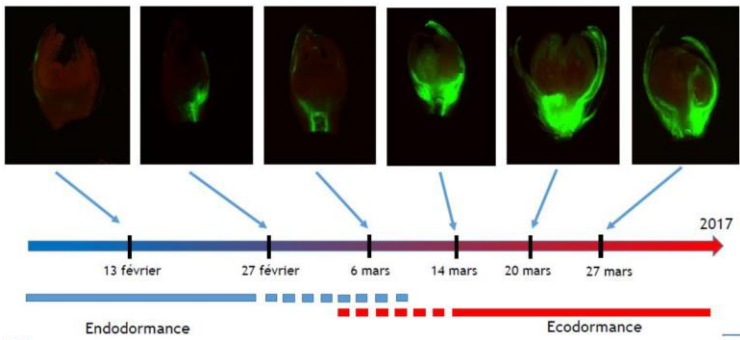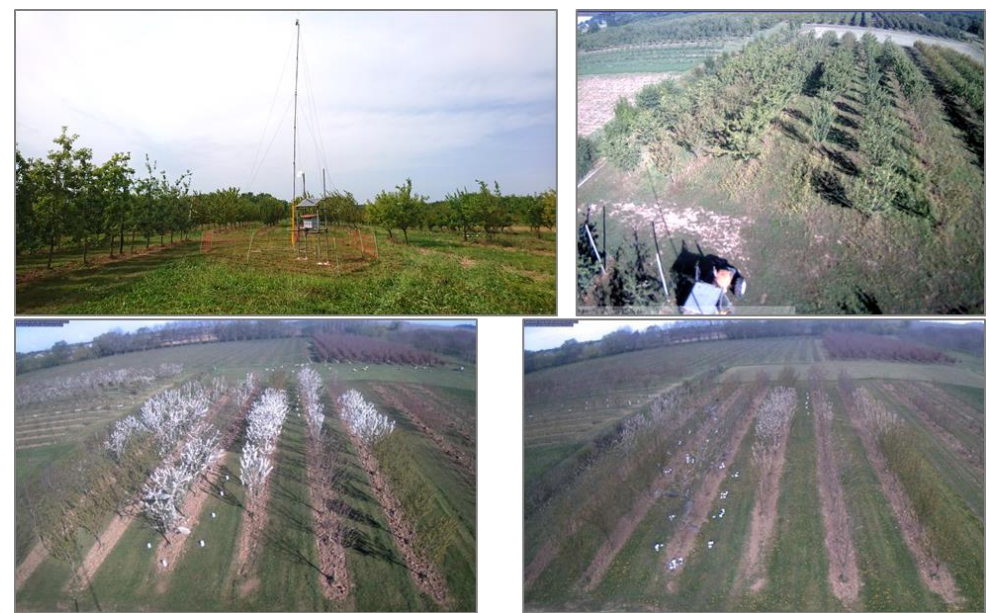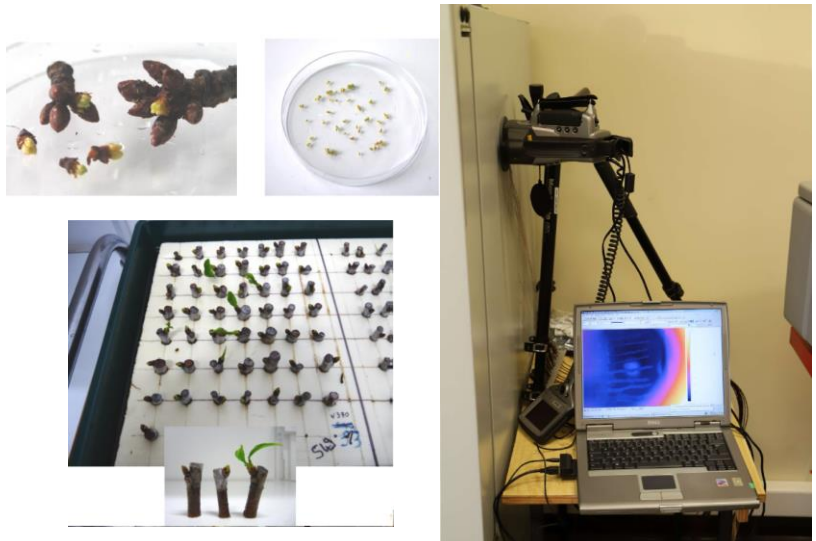- **Other methods to test and optimize models : Deep Learning, Bayesian methods**

PCLIM

CartoPhen

Testing protocoles and new techniques

Cf. Charrier, Wenden, Farrera, Chuine, Volaire...

Conclusion

- **TEMPO is a French network but open to collaborations with other countries**

- **TEMPO is willing to share its data with other information systems (licence constraints)**

- **Interactions between academics and citizen science programs are important for the dynamics of TEMPO**

- **TEMPO future project is to provide bioclimatic services**

Acknowlegments