

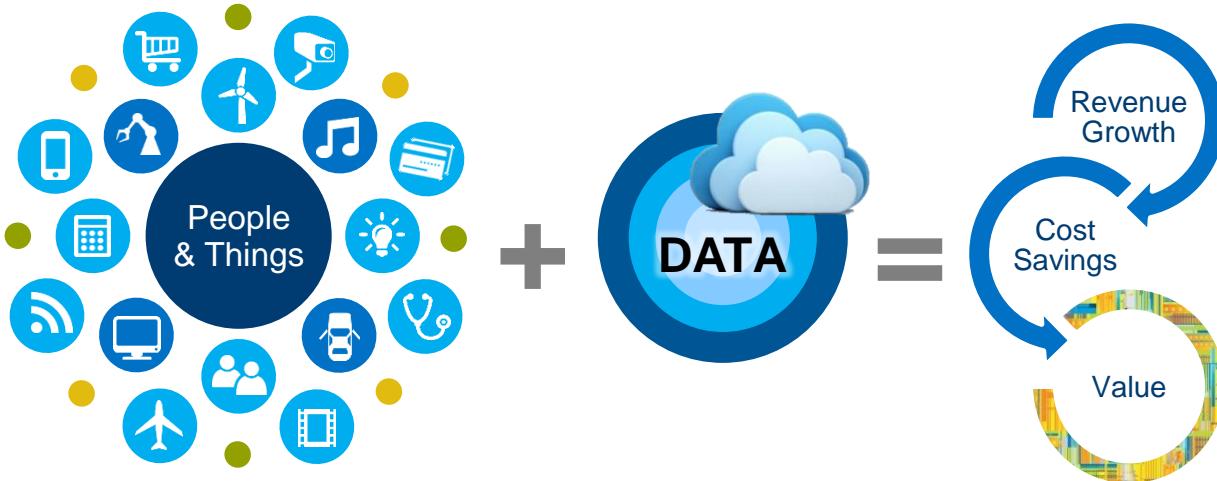


Deep Learning en Agriculture

Jun 29, 2016

Denis Wouters , Adel Chaibi

Big Opportunity: Transform Data into Value

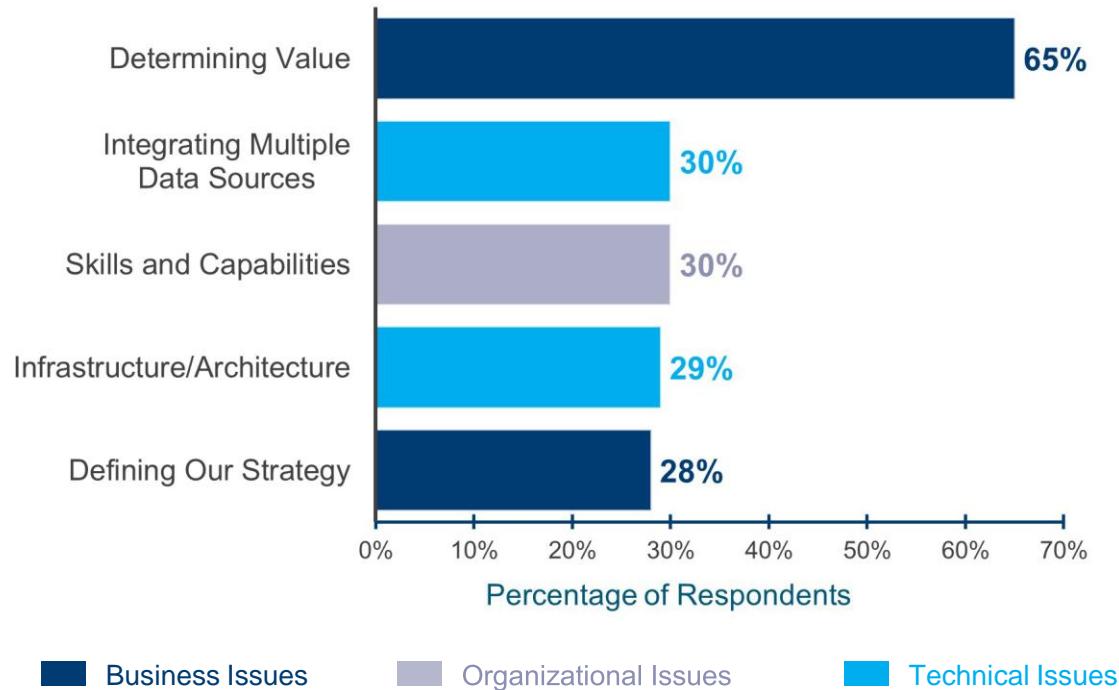


27%
of enterprises have
successfully implemented
big data-driven projects

42%
are still planning
implementations

30%
have no plans to deploy
big data analytics

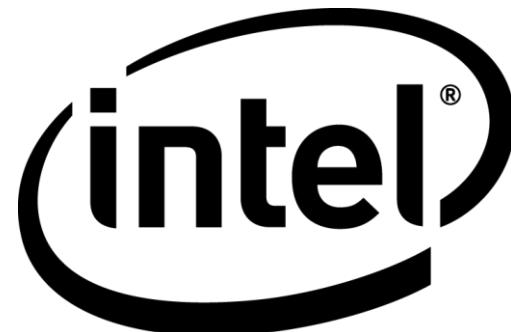
Barriers to Insight



Why Intel?

History of initiatives and open source projects to remove adoption barriers and accelerate time to value

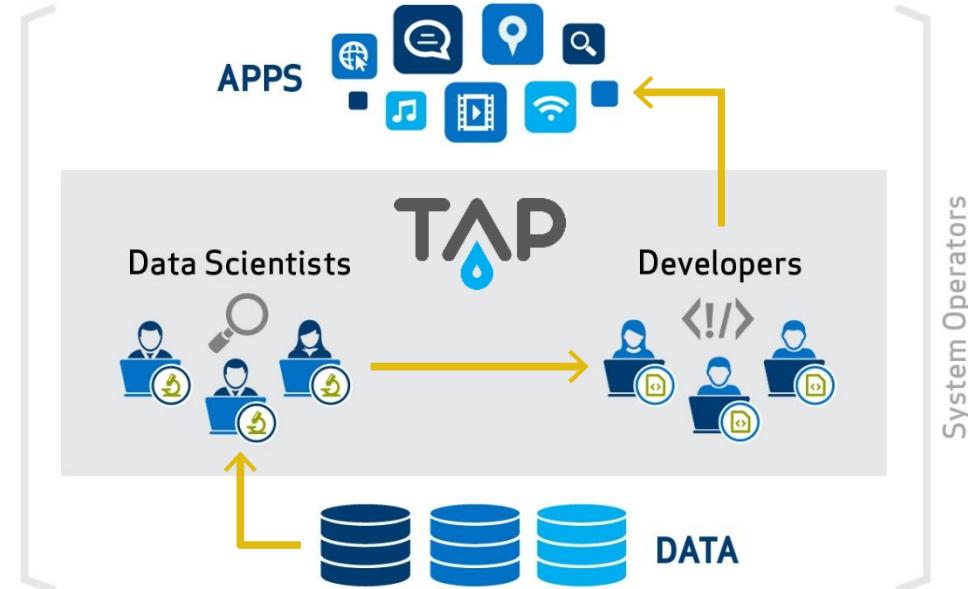
Supported open source projects include:



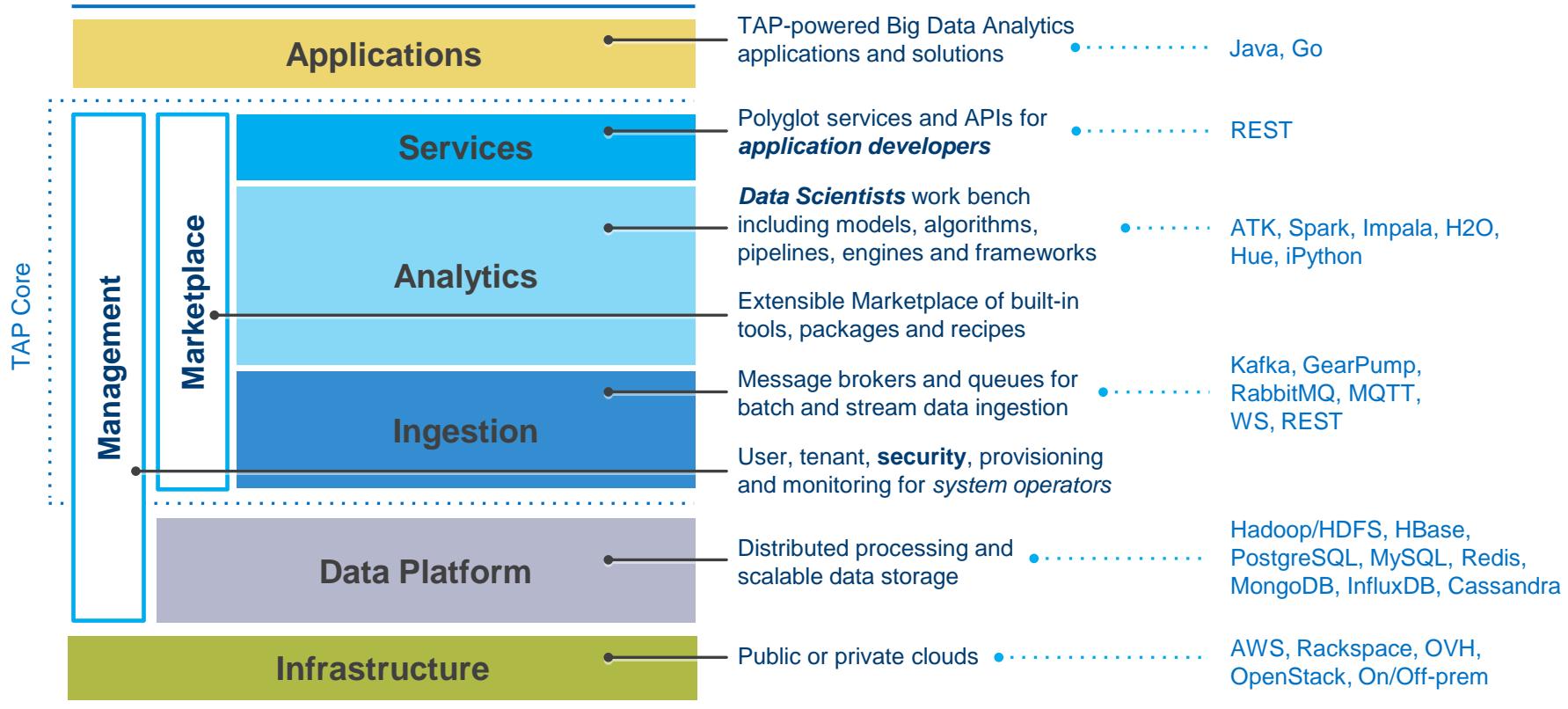
Trusted Analytics Platform (TAP)

Powers the journey from data's potential to value

- Open Source project – ***Lower cost***
- Collaborative, cloud-ready platform to build applications powered by Big Data Analytics – ***Faster time to value***
- Includes everything needed by data scientists, application developers and system operators – ***Simpler***
- Optimized for performance and security – ***Trustworthy***



The Anatomy of Trusted Analytics Platform (TAP)



Trusted Analytics Platform (TAP) Partners

ISVs

DataRobot

cloudera®

deepsense.io
BIG DATA SCIENCE

Conduce

Objectivity®

hkoverse
signal from noise

SKYMIIND

H₂O.ai

Talena

ARCADIA
DATA

Typesafe

CASK

SI

accenture

Infosys

SILICON VALLEY
DATA SCIENCE

SW
STARK & WAYNE

proKarma

CSPs

amazon
web services

OVH.com
Innovation is Freedom

rackspace®
the open cloud company

Trusted Analytics Platform Apps

Reduce Treatment Costs and Improve Patient Care

Penn Medicine

Objective

Predict heart failure patients who are at risk of hospital re-admission within 30 or 90 days of discharge

Challenge

Analyze large amounts of unstructured data in patient records across multiple hospitals in a network

Infrastructure

Hadoop data store in a private cloud



Solution

Used TAP to quickly build and deploy new predictive analytics models driven by Big Data

Results

- **Improved prediction accuracy by 15%** by applying machine learning to patient medication histories
- **Identified high-risk profiles** by modeling the relationship of most relevant medications and medical conditions in health records

Trusted Analytics Platform Apps

Expedite Pharma R&D



Icahn School of Medicine
at Mount Sinai

Objective

Create a faster, more efficient tool
for discovery of new drug therapies

Challenge

Needed to merge data from multiple
datasets in multiple formats, into a
single model with 65 million
compounds and 32 billion
relationships

Infrastructure

Hadoop data store in a private cloud



Solution

Used TAP to
construct a large,
distributed graph
and TAP's graph
analytic
algorithms and
performance
metrics suite to
develop analytics

Results

- **Predicts patterns** and connections among drugs
- **Identifies chemical properties** of clinical significance
- **Makes inferences** about efficacy and interaction of drug compounds

Pilot Deployments and Possibilities



Wearables

Customer behavior analysis using wearable devices



Healthcare

Predict individual health problems to improve care



Retail

Asset management with RFID data



Industrial

Predict equipment failures and optimization based on sensor data



Genomics

Execute privacy-preserving analytics on diverse distributed data sets



IoT Developer Platform

Enable Makers to develop data-generating IoT apps



Security

Detect threats – IT, grid, machines, sites



Forecasting

Financial, inventory, supply chain, etc.

TRUSTED ANALYTICS PLATFORM (TAP)

TAP

ABOUT BLOG PARTNERS ARCHITECTURE DEPLOYMENTS EVENTS RESOURCES



Accelerate Advanced Analytics on Big Data

What is TAP?

Trusted Analytics Platform (TAP) is open source software, optimized for performance and security, that accelerates the creation of Cloud-native applications driven by Big Data Analytics.

TAP makes it easier for developers and data scientists at enterprises, Cloud Service Providers and System Integrators, to collaborate by providing a shared, flexible environment for advanced analytics in public and private Clouds.

The project brings together many proven and familiar open-source components, integrating them in one platform. Its capabilities are exposed as easy-to-consume services while preserving the benefit of the many vibrant communities behind these open source projects.

TAP for Data Scientists
Extensible tools, scalable algorithms and powerful engines to train and deploy predictive models

TAP for Developers
Consistent APIs, services and runtimes to quickly integrate these models into applications

TAP for System Operators
Integrated stack can be easily provisioned in a Cloud infrastructure

Quick Links

Developer Repositories
Access projects, code and documentation
[go to GitHub](#)

Getting Started Guide
Learn about installation & administration as well as working with data in TAP and in the toolkit
[go to GitHub](#)

www.trustedanalytics.org

Learn More About TAP

www.trustedanalytics.org

Engage in Community events meetups, workshops, & webinars

<http://trustedanalytics.org/#resources>

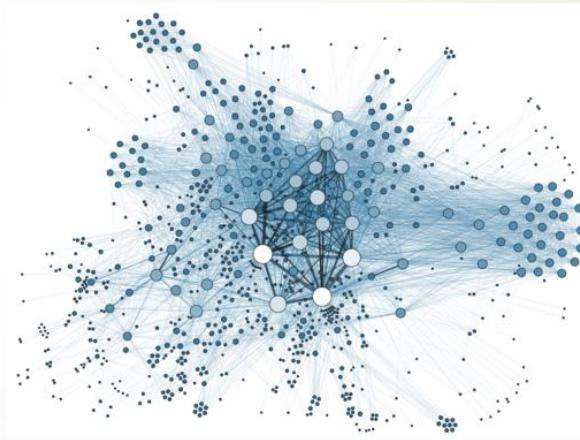


Appréhender ses données : Problèmes rencontrés en agriculture

- Structure complexe des bases de données



- Méconnaissance du contenu des bases



- Ignorance du potentiel de valorisation

- Visualiser
- Analyser
- Interpréter

Différents types de données

Données climatiques



Données agronomiques

Données pédologiques

Données climatiques

- ▶ Suivi en temps réel



Station météo : local

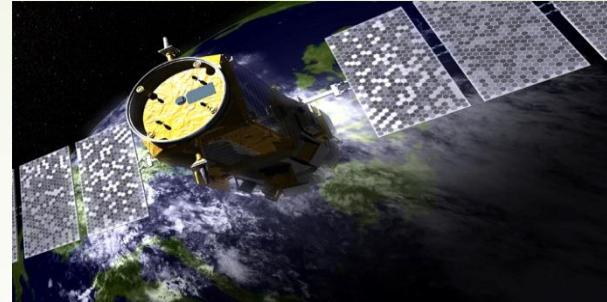


Radar de pluie

Portée ~ 50 km

Résolution ~ 1km

Conduites culturales intra-parcellaires



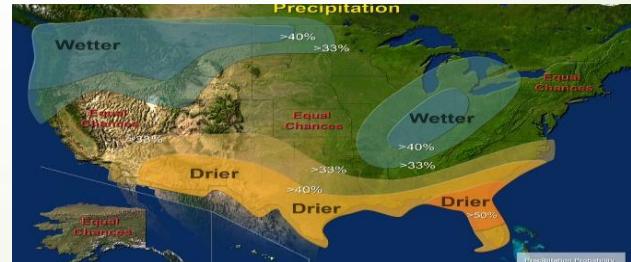
Satellite météorologique

Portée globale

Résolution ~ 1°

Prévisions bassins de production

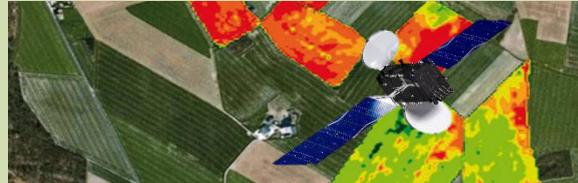
- ▶ Prévisions à l'échelle de 2-3 mois



Données agronomiques

► Télédétection

Satellites



Aérien/ULM



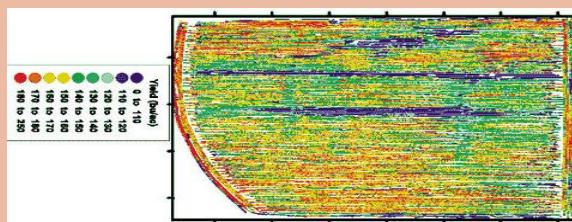
Drones



Images optique
IR
Radar

Mesures biomasse, LAI

Etat de la culture



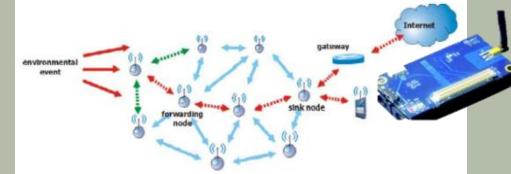
Capteurs de rendement



Capteurs optiques

Déficits locaux (maladies, insectes)
Stress hydriques, azotés

► Au sol



Puces en réseau

Données pédologiques

► Banques de données

Données publiques, échelle mondiale

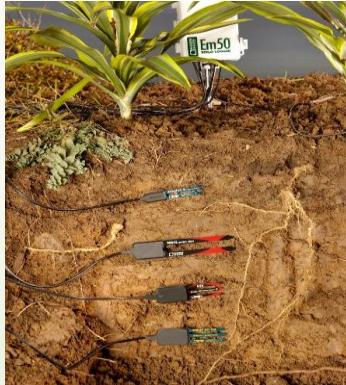
France: données INRA infosol



Carte de la teneur en argile en Europe

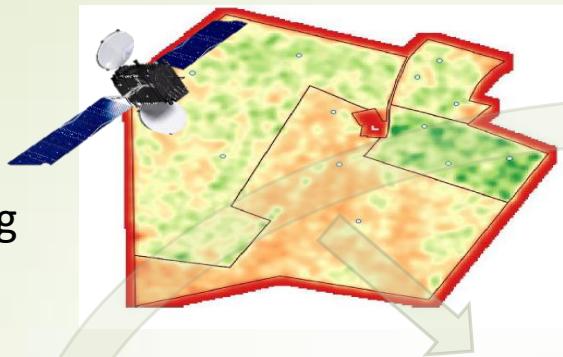
► Etat du sol en temps réel

Humidité du sol
température

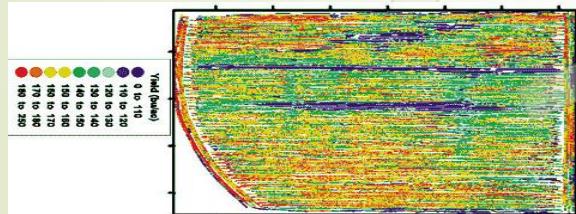


Composition minérale du sol
Résidus d'azote

Satellite imaging



Crop growth modeling
Data analytics & optimization



Yield maps

Weather data



Soil database



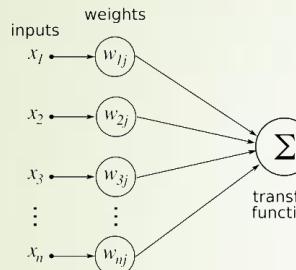
Sowing
Irrigation
Fertilizers
Pesticides

Agronomic data



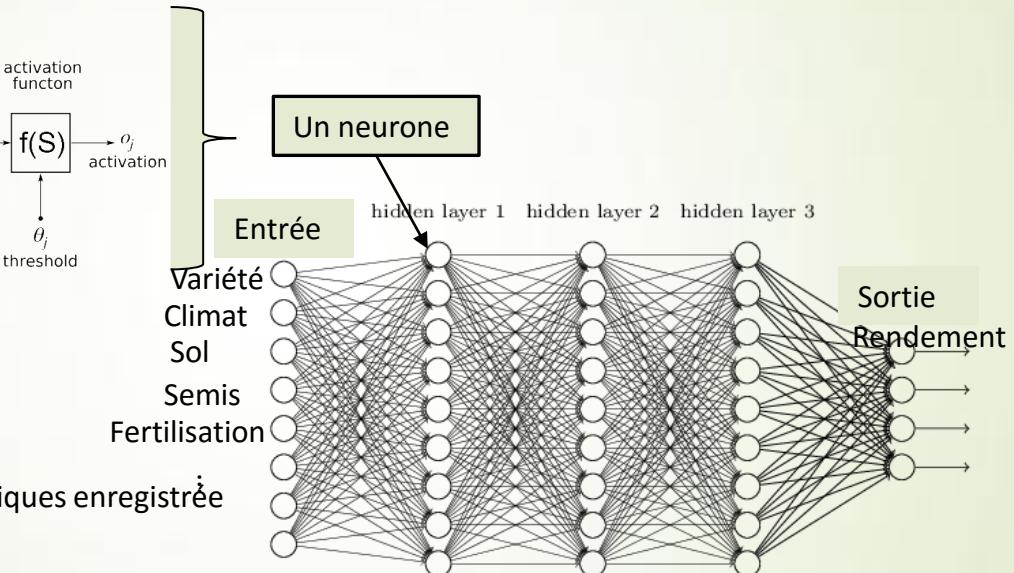
Exemples

Apprentissage par les données: « big data », « machine learning »



Réseau de neurones

Mémoire des données historiques enregistrée dans poids de connexion

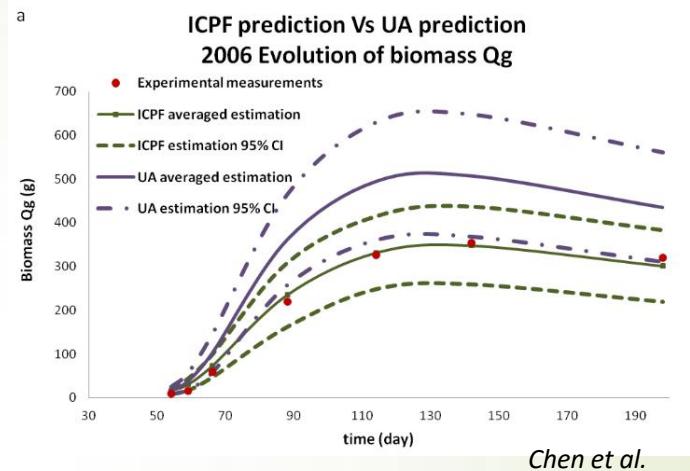
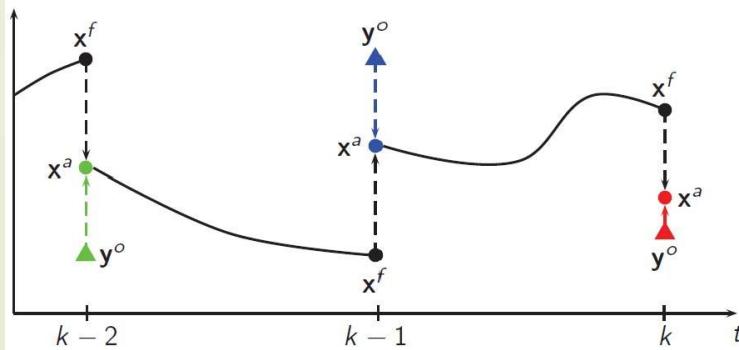


Prise en compte de mesures intermédiaires

Techniques d'assimilation de données

Problème du filtrage

Modèle non linéaire + erreurs non gaussiennes



Recalage simulations avec données intermédiaires (télédétection...)