



# FARMSTAR

Focus on Farmstar

A comprehensive agricultural decision-support tool based on remote sensing



# A Perennial and innovating Partnership

## AIRBUS

Worldwide leader in the geospatial information market



ARVALIS  
Institut du végétal

Terres Inovia  
l'agronomie en mouvement

Established agronomic institutes



## +40 Distributors

Resellers

Imagery acquisition  
Development and validation of biophysical parameters

Development of agro-meteorological models  
Design and validation of guidelines for crop management

Customer service support.  
Subscription management and technical support.  
Farmers feedback > service evolution

# The French Leader of Precision Farming

- ▶ The service offers a full package of advices all along the crop's cycle on plant protection, crop condition and input management.
- ▶ The service is available for: Winter Wheat, Winter Barley, Rapeseed, Triticale and soon Corn
- ▶ Unique in mixing satellite: drone and airplane imagery to offer the best of monitoring from the sky
- ▶ Unique in allowing to fulfill both objectives
  - Of adjusting the total amount of nitrogen vs actual needs of the plant
  - Of supplying down this amount taking into account variability within the field
- ▶ More than 16 years of working experience between AIRBUS and the technical agronomical institutes (co-development with ARVALIS followed by Terres Inovia)
- ▶ Constantly growing subscribed areas and over 80% renewal rate

**16,000**

Farmers

**100,000**

Field

**720,000**

Hectares

# Advices schedule for cereal crops

		January	February	March	April	May
Crop Input	Starter document	● ● ●				
	Total crop nitrogen requirements		● ● ●			
	2 <sup>nd</sup> Nitrogen application <span style="border: 1px solid gray; border-radius: 10px; padding: 2px;">VAR</span>		● ● ●			
Crop Monitoring	Late nitrogen recommendation <span style="border: 1px solid gray; border-radius: 10px; padding: 2px;">VAR</span>				●	
	Lodging Risk at the end of winter		● ●			
	Lodging Risk at 1-2 nodes <span style="border: 1px solid gray; border-radius: 10px; padding: 2px;">VAR</span>			● ●		
	Growth assessment at the beginning of tillering stage			● ●		
Crop Protection	Growth assessment at the end of tillering stage					●
	Eyespot and fusarium risk		●			
	Yellow rust and Brown rust evaluation			●		
	Update Eyespot risk			●		
	Update fusarium risk					



Wheat



Barley



Triticale

# A service fit to a large range of data field

Each field has its specified advices and variable-rate application maps

- Field data are collected each year



Field boundaries



Crop informations



Weather station (automatised attribution)



- Sowing date
- Cultivar
- Crop
- Soil type
- Sowing density...

# Satellite image processing

A successful combination of Airbus's unique expertise in analysing remote sensing images and the agronomic expertise of Arvalis – Institut du végétal and Terres Inovia



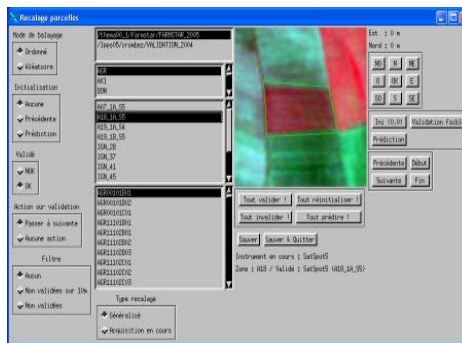
# Available satellite fleet



# Satellite image processing

- Image acquisition and integration into the Farmstar production chain

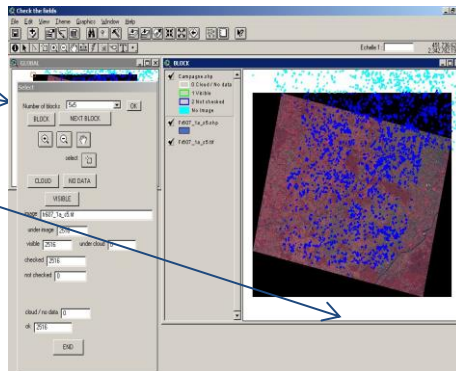
- Control of the orthorectification



- Field/ image allocation

→ Qualification : exploitable/non exploitable  
 → Automatic link with the « best » image

- Biophysical processing

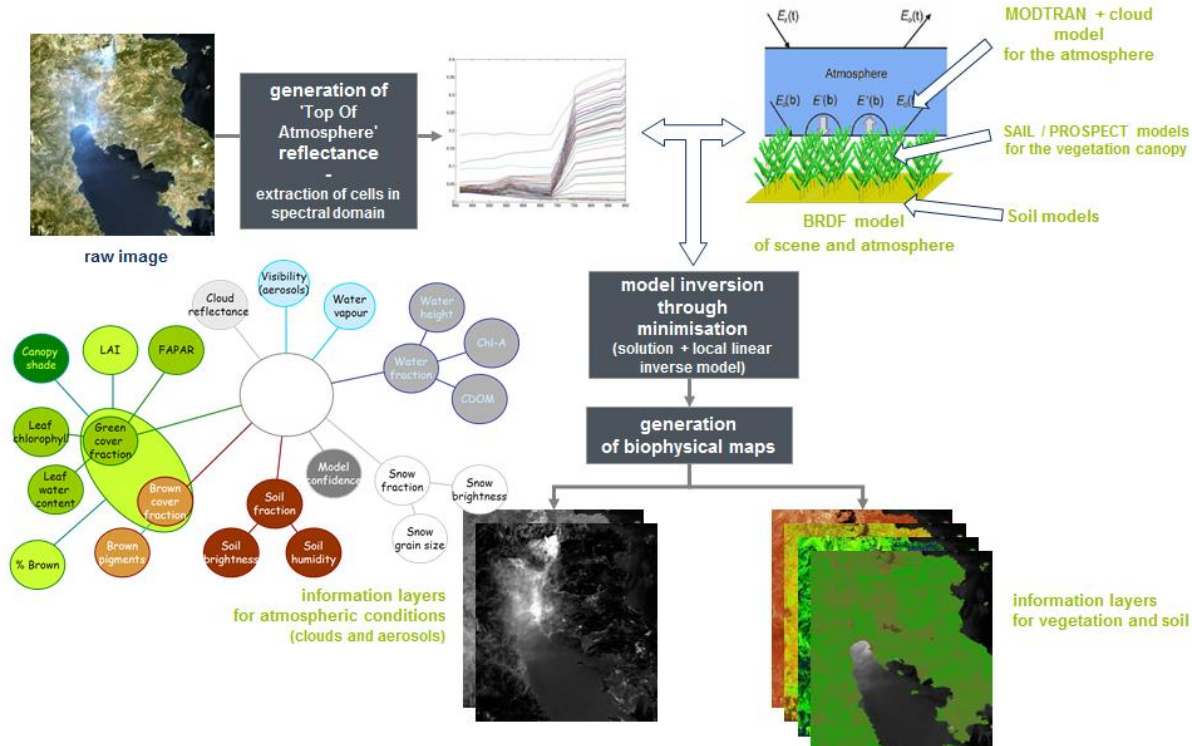


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# Biophysical processing (Overland)

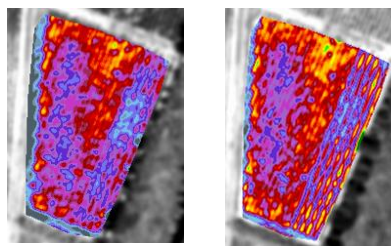
Translating the satellite's signal into biophysical parameters



# Biophysical parameters:

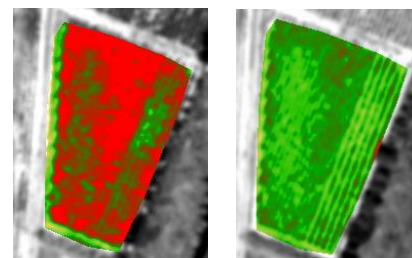
Efficient indicators to an absolute quantification of the biomass and the nitrogen nutrition

Biophysical parameter  
(fcover, LAI..)



Normalised Difference Vegetation Index

*Same field  
Same, day, at two  
different hours with  
different solar and  
viewing angle*



**Independant from the illumination direction**  
**Sensitive to the vegetation amount**

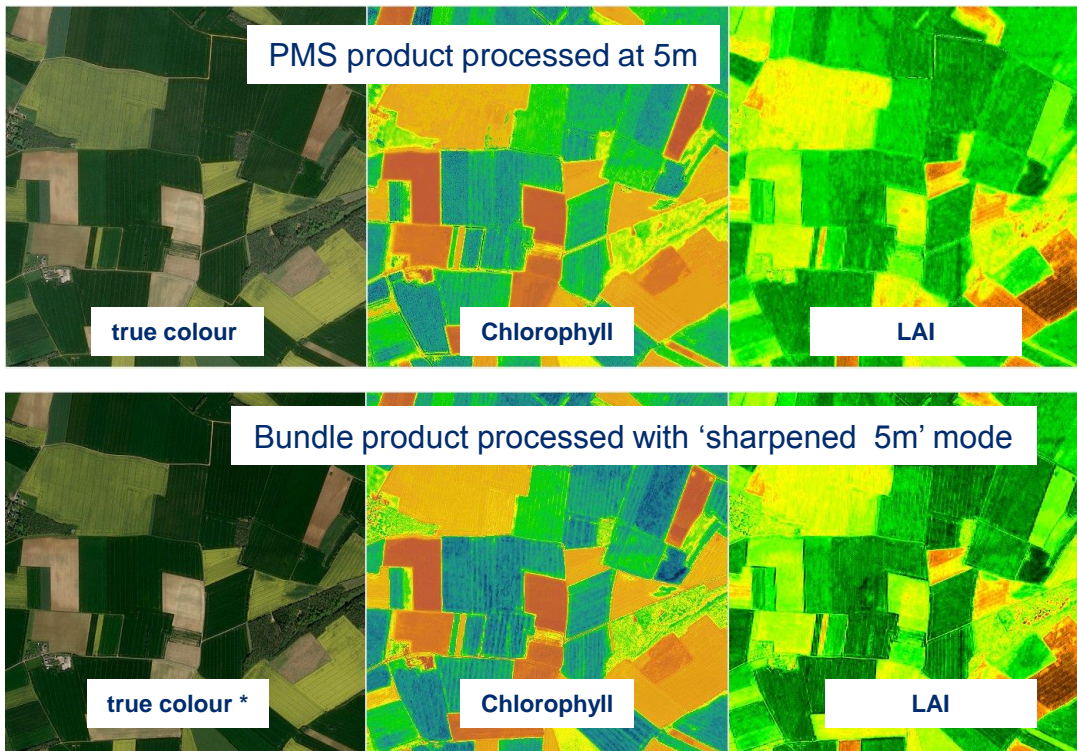
- ▶ To compare and quantify
- ▶ A good indicator for input management

**Not a physical property of vegetation cover**  
**Sensitive to the light conditions, the viewing angle**

- ▶ Only to compare
- ▶ An easy indicator but use limited

# Sharpening process in Overland /

Illustration for SPOT6/7



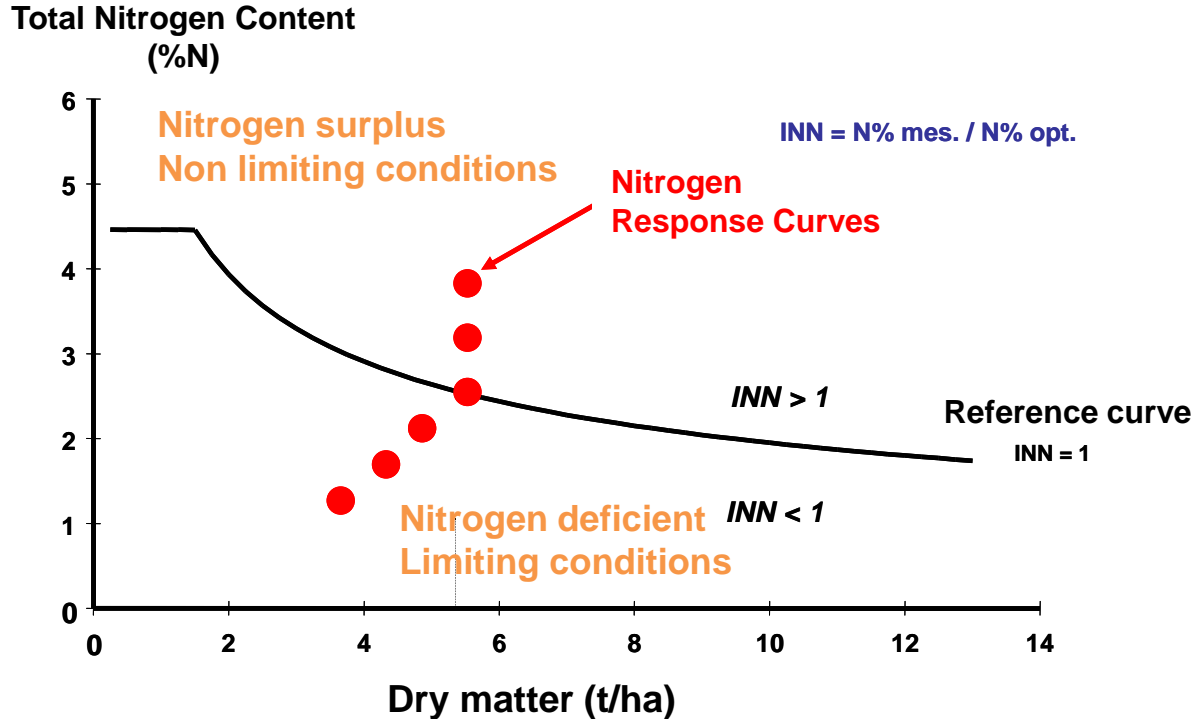
# Farmstar advice production process

## « Late N recommendation on Winter Wheat »

- ▶ In France, sensitive areas have been established where the amount of nitrogen is regulated.
- ▶ A fertilization plan shall be established at the end of winter, field by field, with local calculation methods
  - Farmstar provides this nitrogen balance, turn-key, based on the targeted yield and the desired protein content
- ▶ Nitrogen can be overdosed if justified by the use of a tool supporting decision making
  - Farmstar is one of these authorized tools, providing an indication whether the amount should be increased or decreased at the end of the cycle (last application).
- ▶ As non-profit, technical institutes and Comifer members, Arvalis/Terres Innovia participate in establishing the regulation and the calculation rules of the regulated amount per local area.
- ▶ Farmstar provides the same advice for fields outside sensitive areas

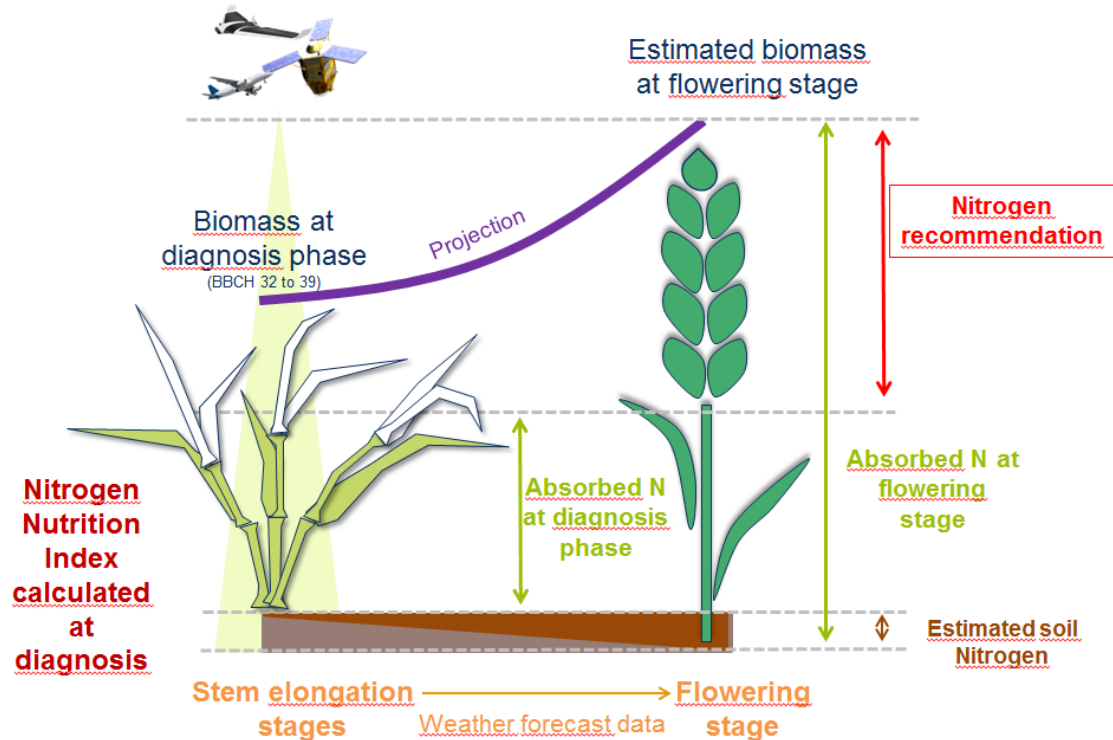
# Nitrogen Nutrition Index (NNI)

A Relevant indicator of crop nitrogen status



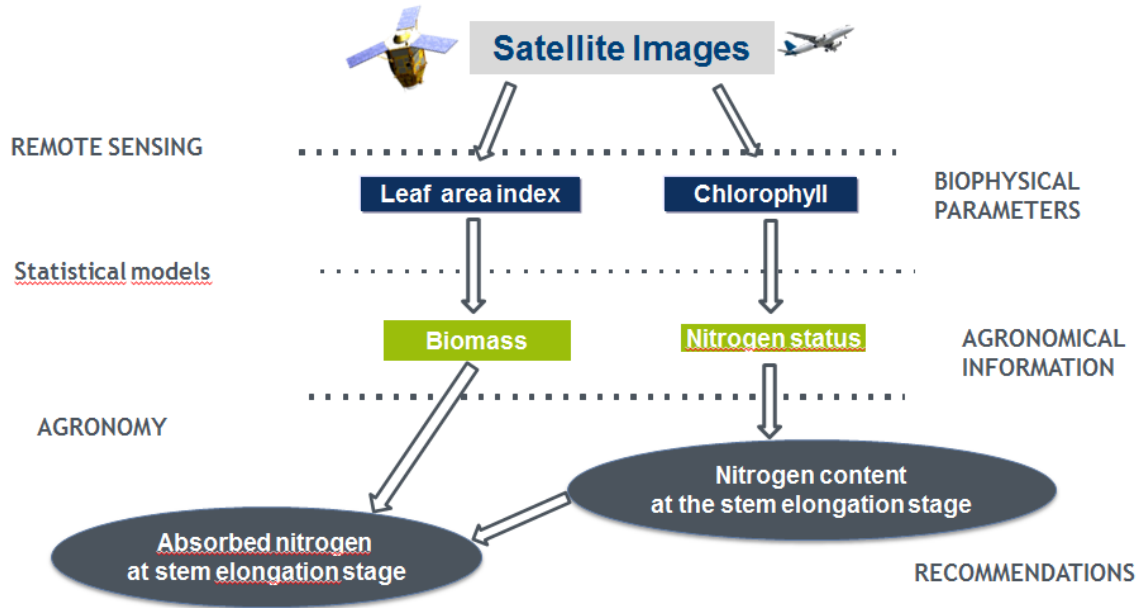
# QN Method :

A nitrogen management tool on winter wheat based on remote sensing diagnostic and agronomic prognosis



# Agronomical processing

- ▶ **The biophysical parameters are translated into different types of products:**  
*Example for late Nitrogen recommendation on winter wheat*



## Customer portal with personal data




pour un objet de rendement de 80 q/ha	
Méthode Epandus	
Date d'ouverture du bilan au 06/02/2013	en unités: 7,28
Rendement de la culture	22
Risqué après récolte	-13
Azote moyen absorbé sortie hiver	-13
Mobilisation	
effet fumure	
effet précédent	
amière effet prairie	
effet CIPAN	
effet N2a d'irrigation	
Données utilisées: Apport: mm / Teneur: mg/L	
Risqué sortie hiver	43
Apport MO effet printemps	15
Dose conseillée (forme solide)	105

## Easy and simple access to:

- Consult and download FARMSTAR recommendations for all the subscribed fields. *A postal mail option is also available*
- Download application maps



# Mapping recommendation

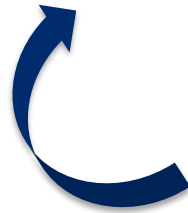
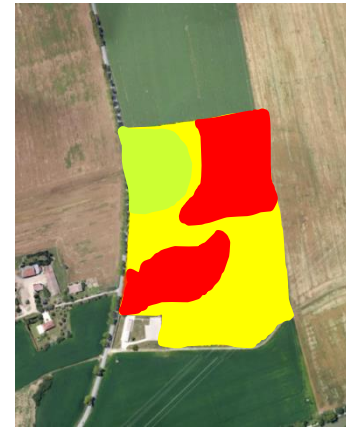
Application map  
in fertiliser amount



Automatic variable  
rate application



Manual variable  
rate application



# Time for demo!



<https://demo.farmstar-conseil.fr>





Thanks for your attention