

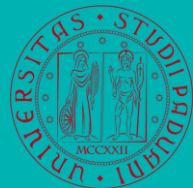
# MPFM Bayesian model for uncertainty-aware predictions

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Enrico Feltresi

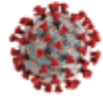


UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA



**NFOGM**  
NORWEGIAN SOCIETY FOR  
OIL AND GAS MEASUREMENT

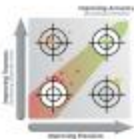
## Background: Oil and Gas market



## Oil and Gas Response



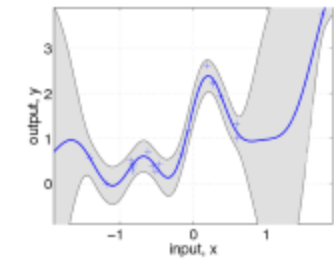
## Action: Measurements system needs



Accurate measurements and Accuracy of that measurement:  
An equipment that returns the uncertainty of its readings in real-time

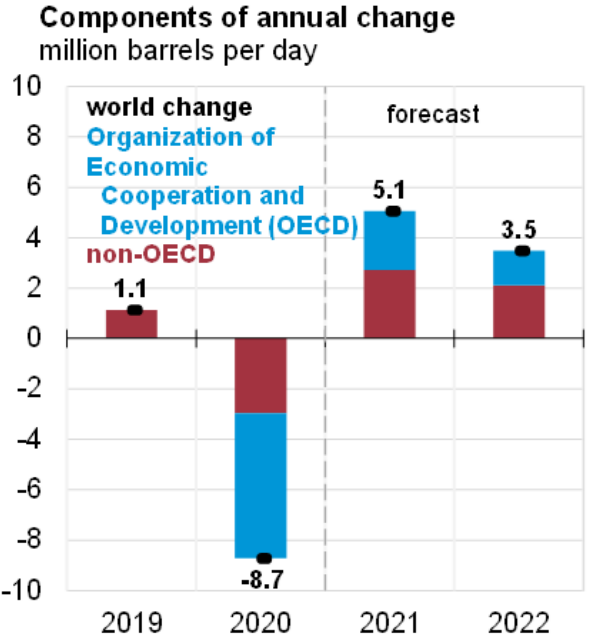
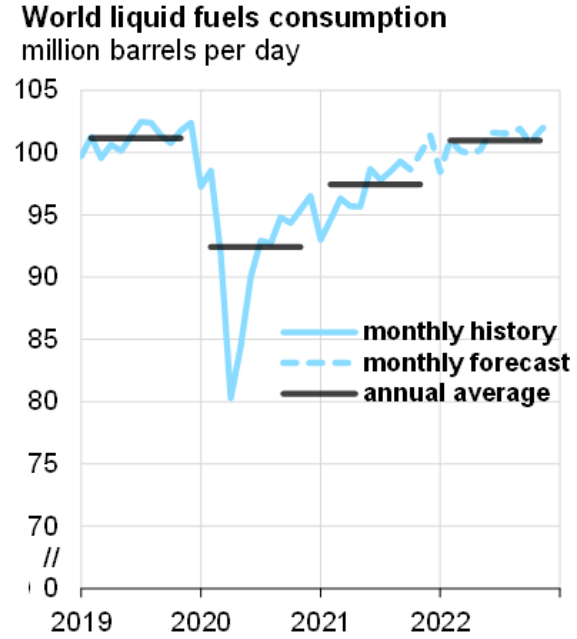


## Action: Uncertainty Quantification Tools



- Tools to determine the accuracy of a machine learning model
- Gaussian Process
- Local Linear Forests

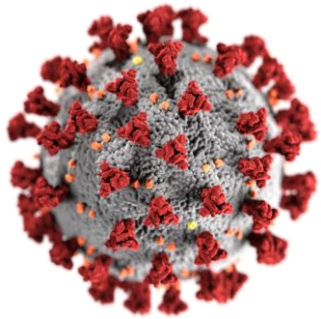
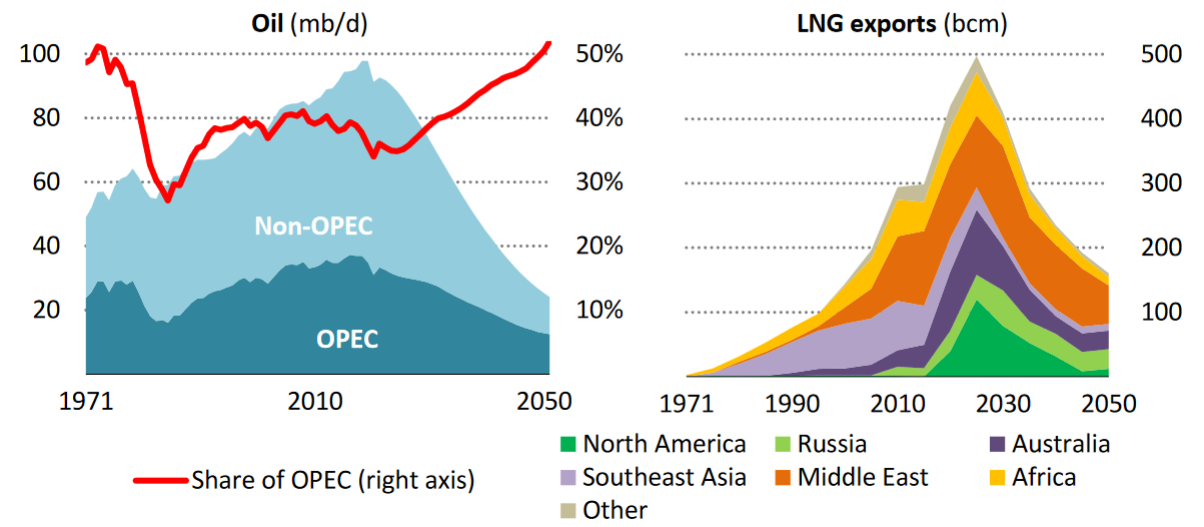
# Background: Oil and Gas market



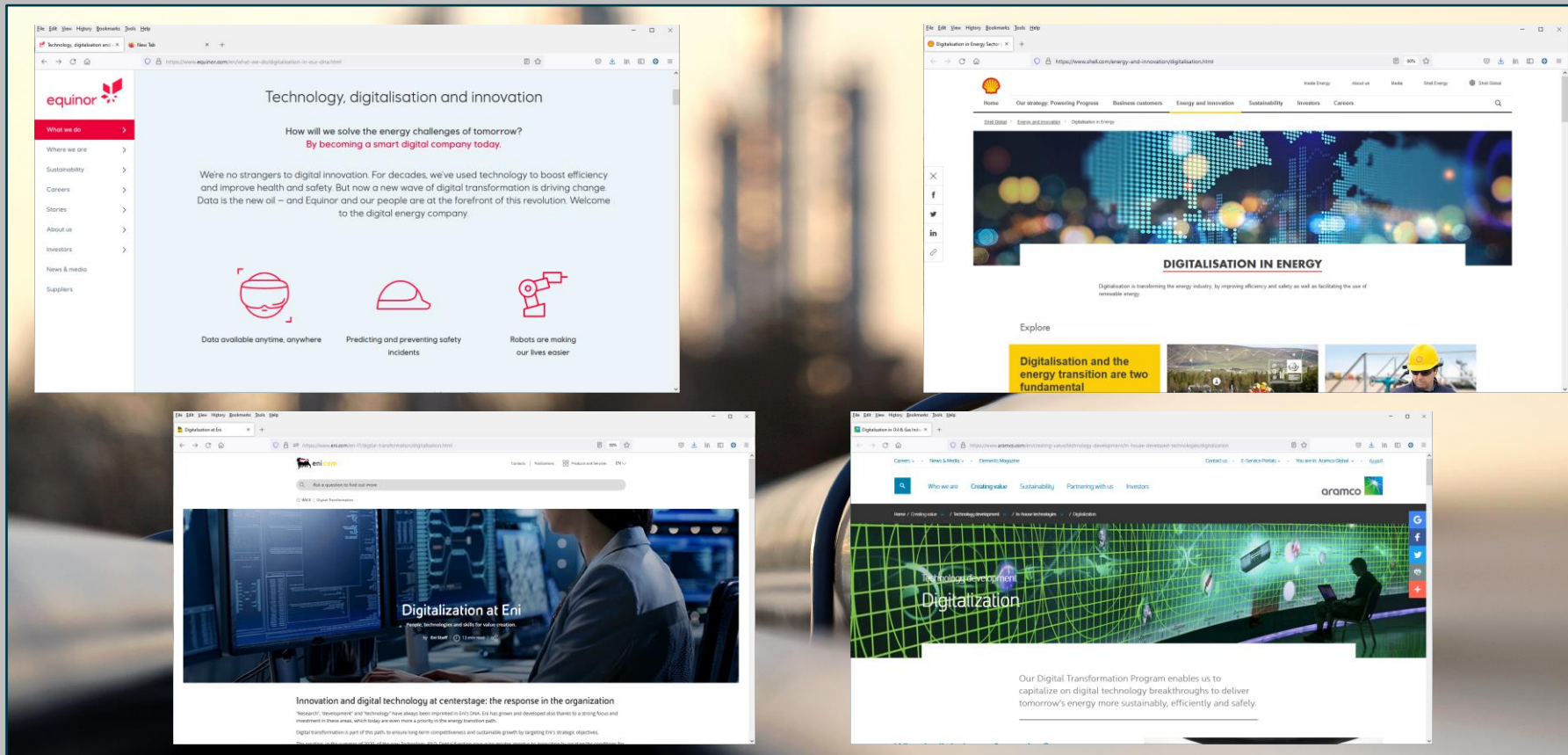
Source: U.S. Energy Information Administration, Short-Term Energy Outlook, October 2021



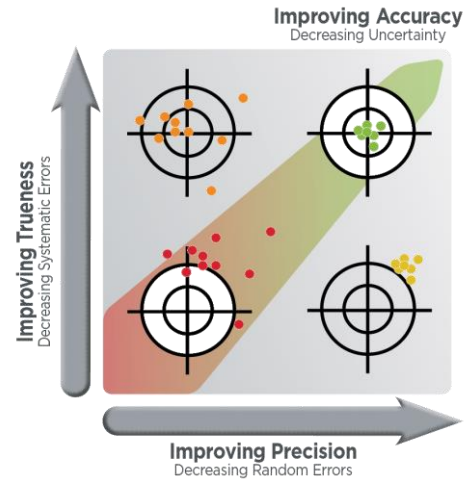
**Global oil supply and LNG exports by region in the NZE**



# Oil and Gas Response



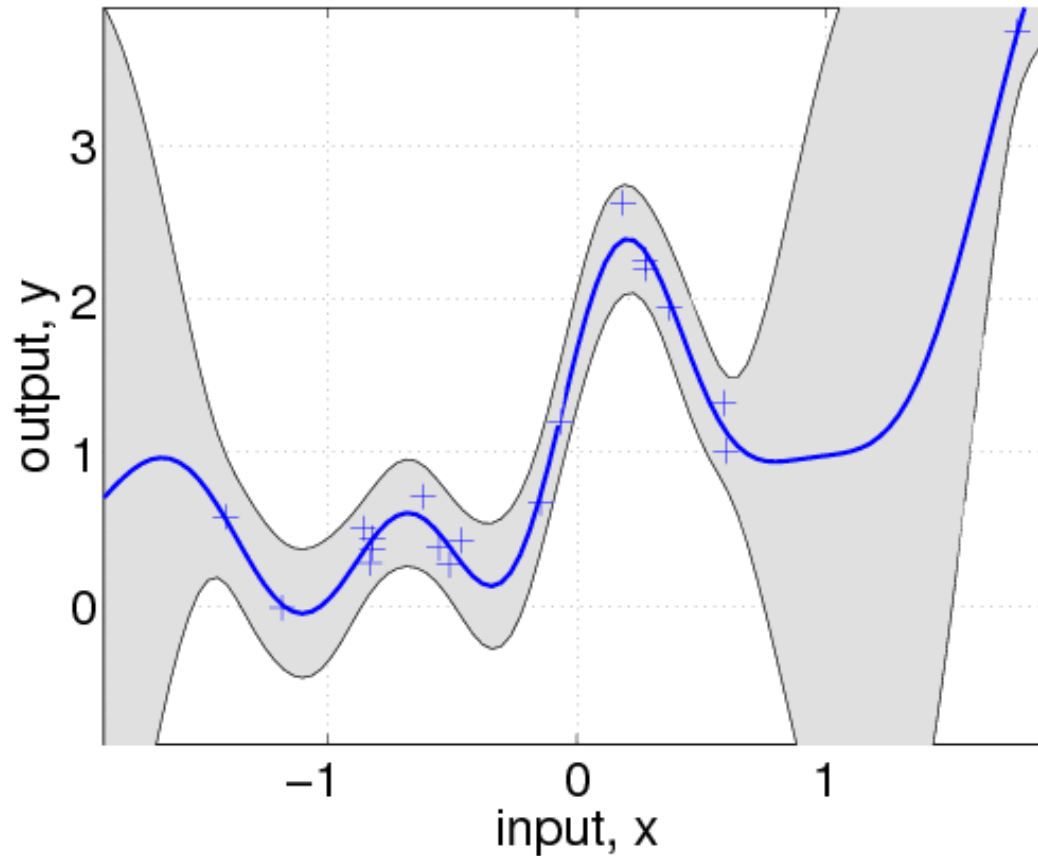
# Action: Measurements system needs



Accurate measurements  
and  
Accuracy of that measurement:

An equipment that returns the  
uncertainty of its readings in real-time

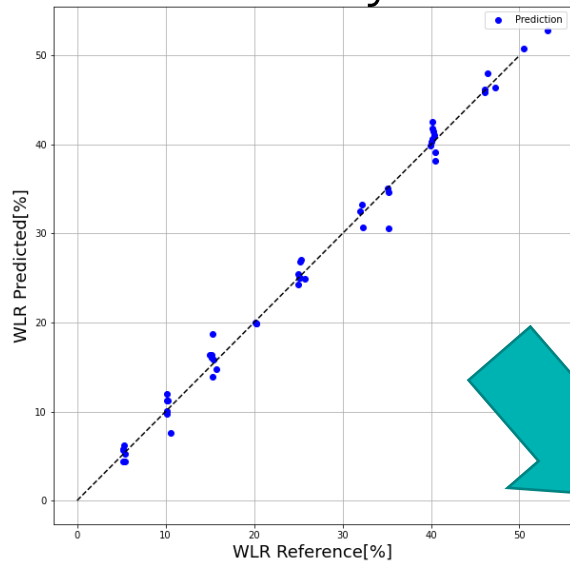
# Action: Uncertainty Quantification Tools



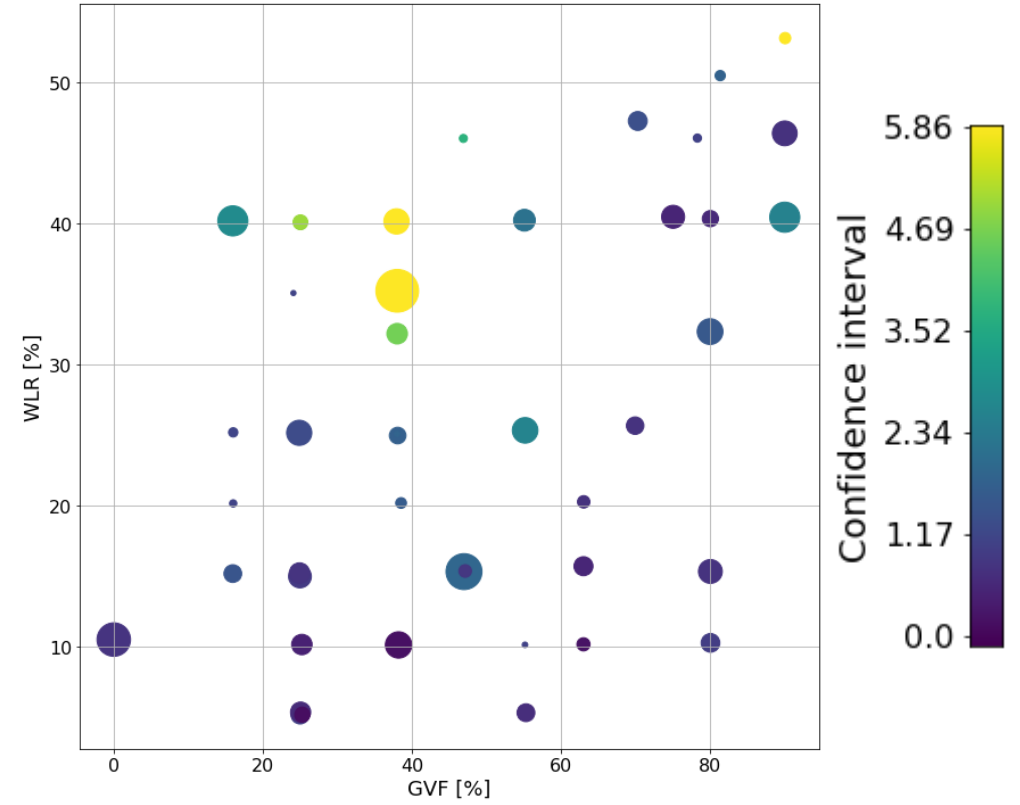
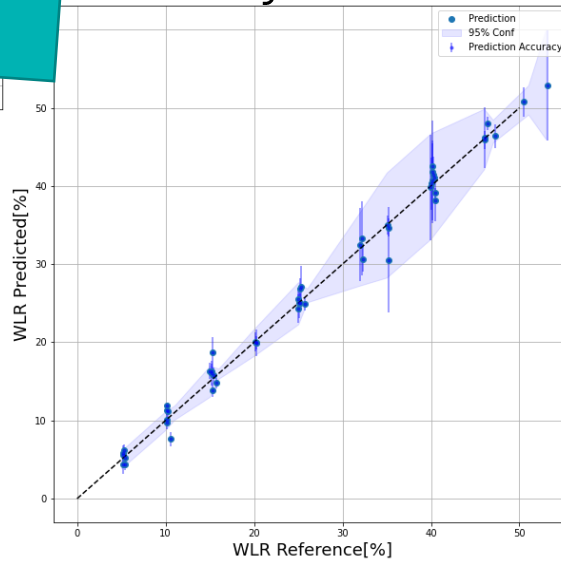
- Tools to determine the accuracy of a machine learning model
  - Gaussian Process
  - Local Linear Forests

# Results

## Prediction Only



## Prediction & Accuracy Prediction



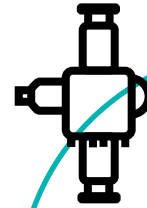
# Summary



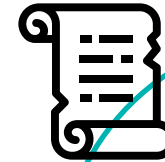
**Uncertainty  
Quantification**  
tool has been  
implemented



It adds **valuable  
insights** on  
MPFM  
measurements



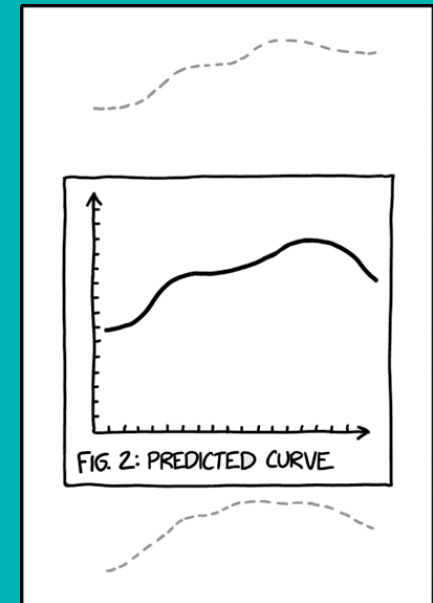
Can be  
generalized on  
**any MPFM**  
measurements



More details are  
in the **Paper**



# Thanks



SCIENCE TIP: IF YOUR MODEL IS BAD ENOUGH, THE CONFIDENCE INTERVALS WILL FALL OUTSIDE THE PRINTABLE AREA.