June 2026

From Whalevis to OilVis

And an early-stage forecasting model

Flavien Rabas

Summary

Part 1 – A global review

- What's WhaleVis
- Evolution of Studied Fields
- Documents Reviewed
- Data Types and Source Importance
- Exploratory Classification

Part 2 – An early-stage forecasting model

- Objectives
- Methodology
- Limitation

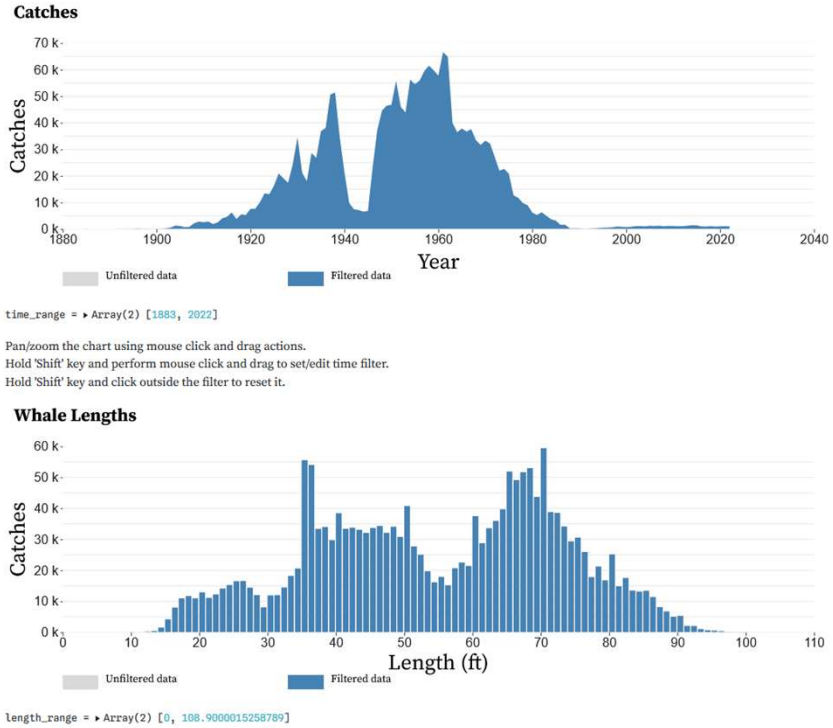
Part 3 – Results

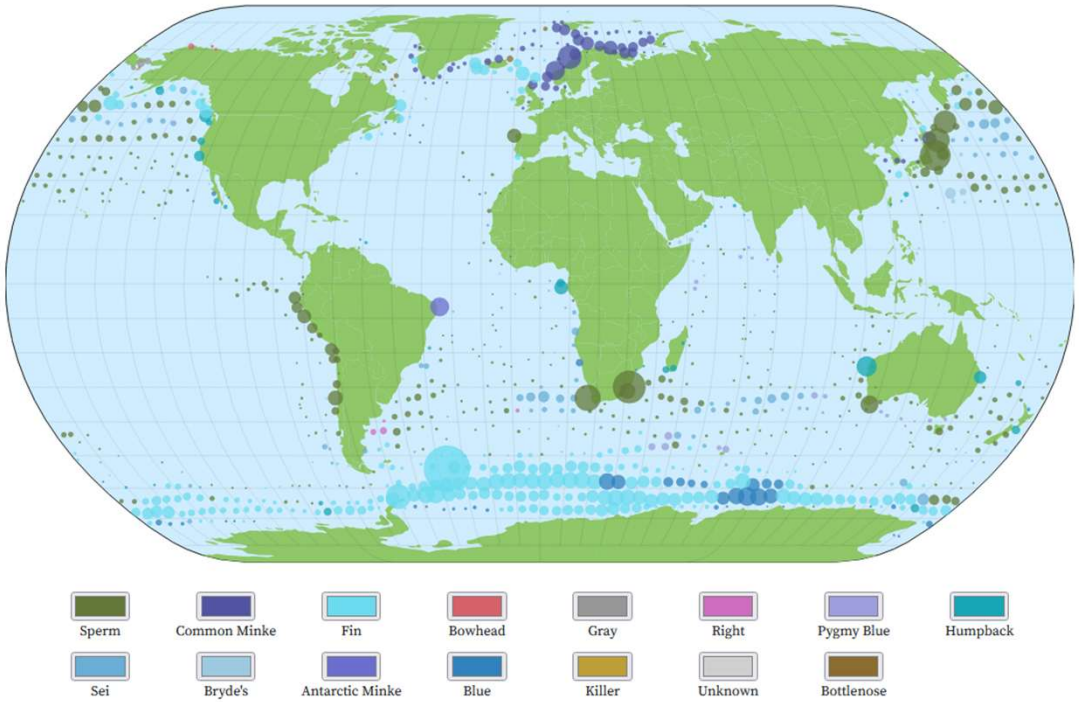
- Overall predictive power
- Period-wise accuracy
- Field-type accuracy
- Chinese fields example
- Early draft of an improved version

Part 4 – Possible uses

- Forecasted volumes and peak date (2025 and beyond)
- A global supply-demand model ?
- New visualisation tool (OilVis)

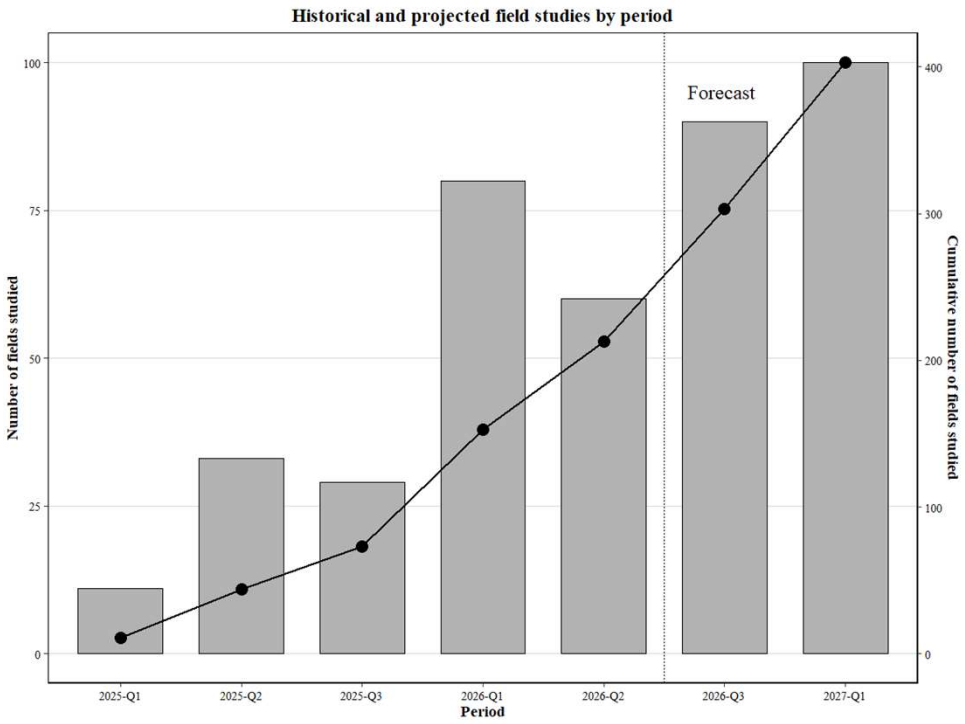
Part 1 – A Global Review / *What's WhaleVis*





WhaleVis: Visualizing the History of Commercial Whaling | IEEE Conference Publication
By *Ameya Patil*, *Leilani Battle*, *Zoe Rand*, *Trevor Branch*

Part 1 – A Global Review / *Evolution of Studied Fields*



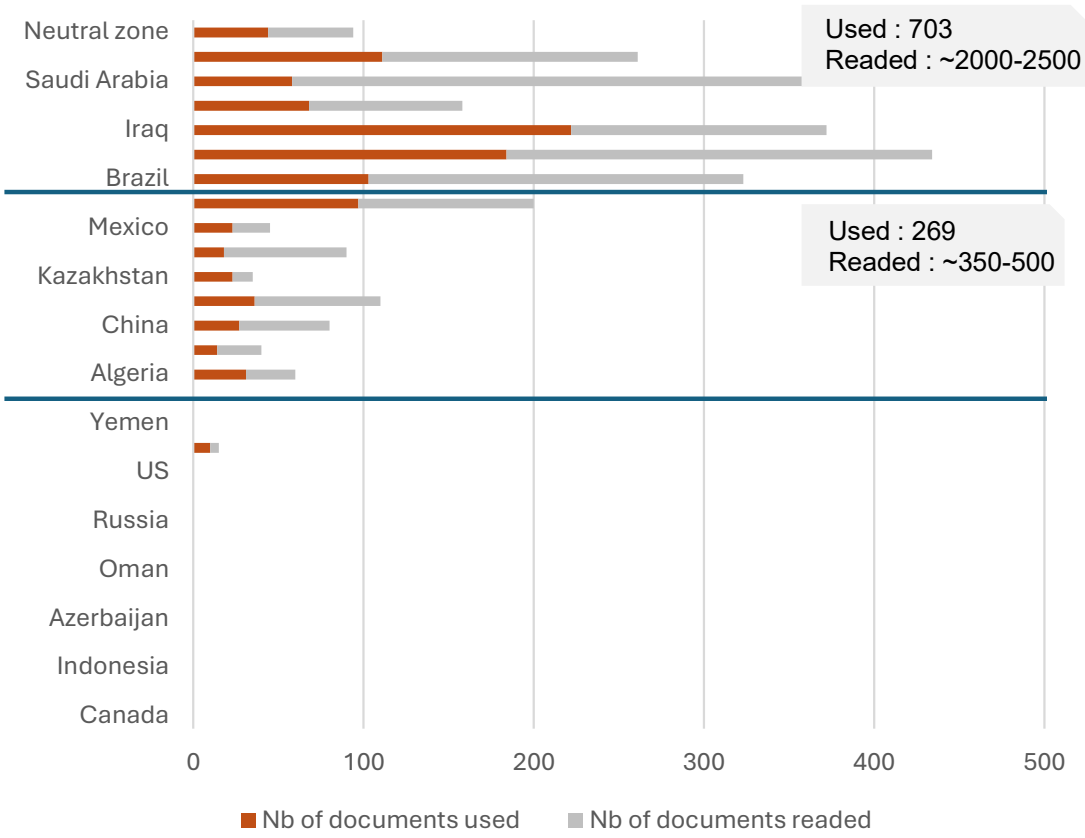
No distinction between fields with available time series and fields added to the database.

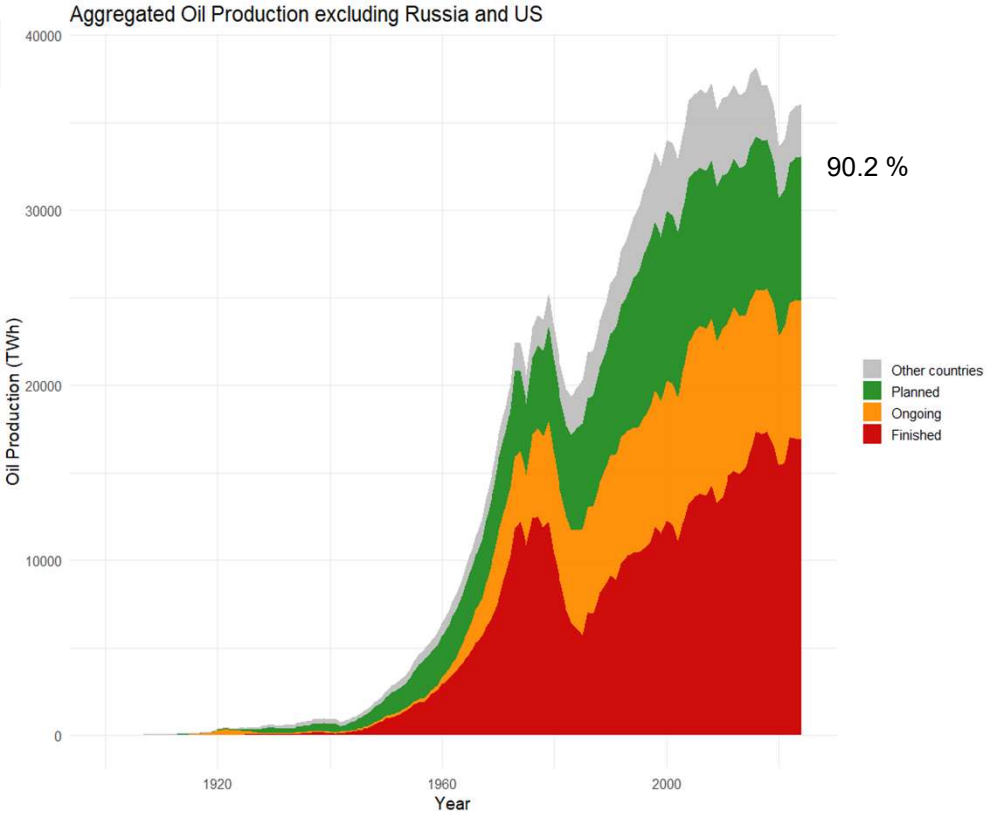
Field Characteristics Overview

Distribution of fields by size, organization, and water depth

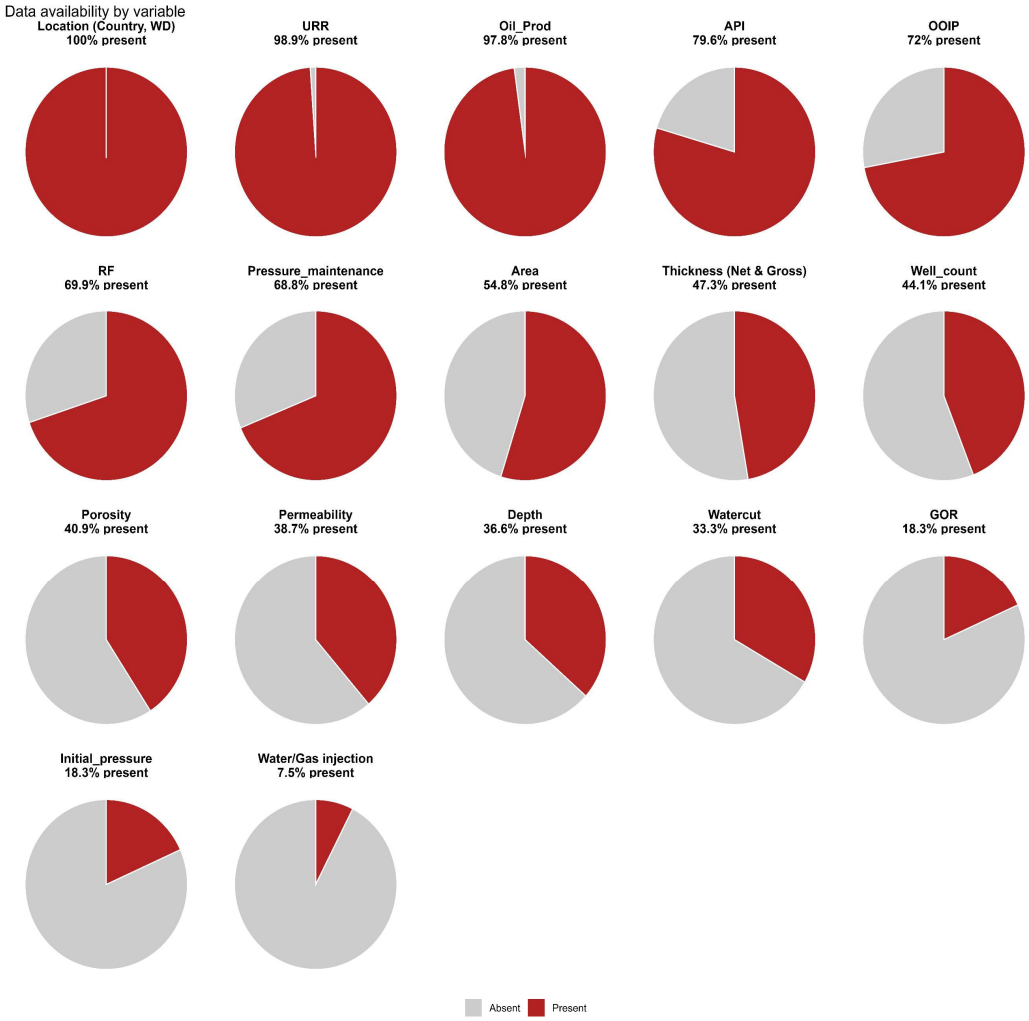
	N fields
Field Size	
Giant	109
Large	23
Minor	1
Supergiant	55
NA	2
Organization	
Non-OPEC	116
OPEC	74
Water Depth	
offshore	87
onshore	102
NA	1

Part 1 – A Global Review / *Documents Reviewed*





Part 1 – A Global Review / *Data Types and Source Importance*

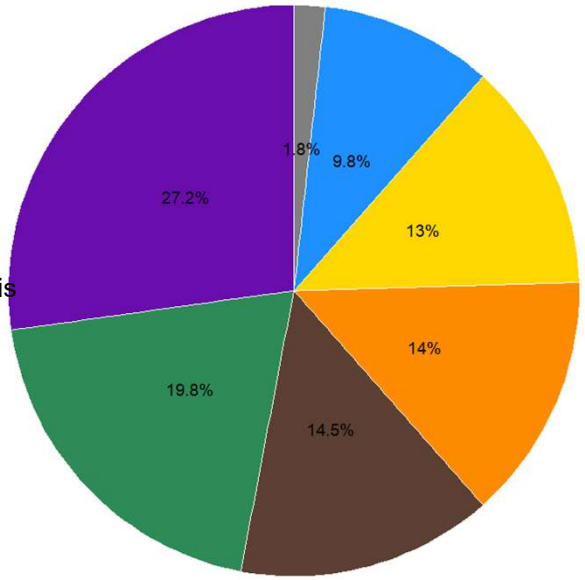


Flaring : essential for opaque countries

OFT : when nothing « better » is available

Others : include *TGS*, *AAPG*, *GeoExPro*, scientific papers, thesis, press articles, *ANP* (Brazil)

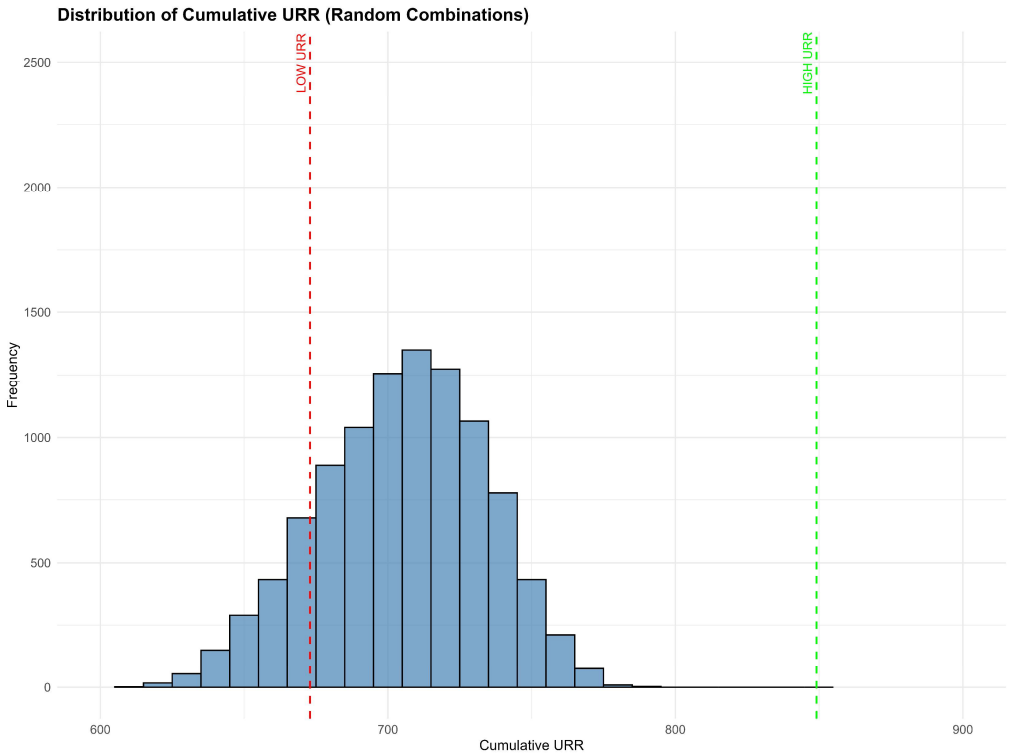
TSP : Minor

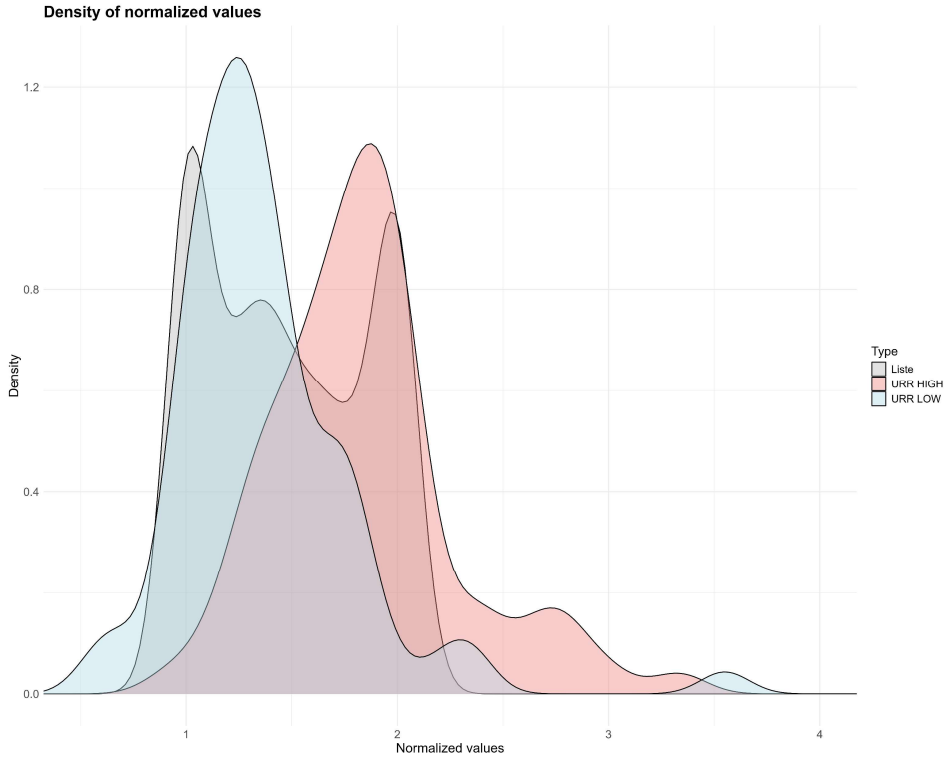


New data source introduced: flaring data (noisy, yet highly informative)
Potential future addition : Ground deformation measurements.

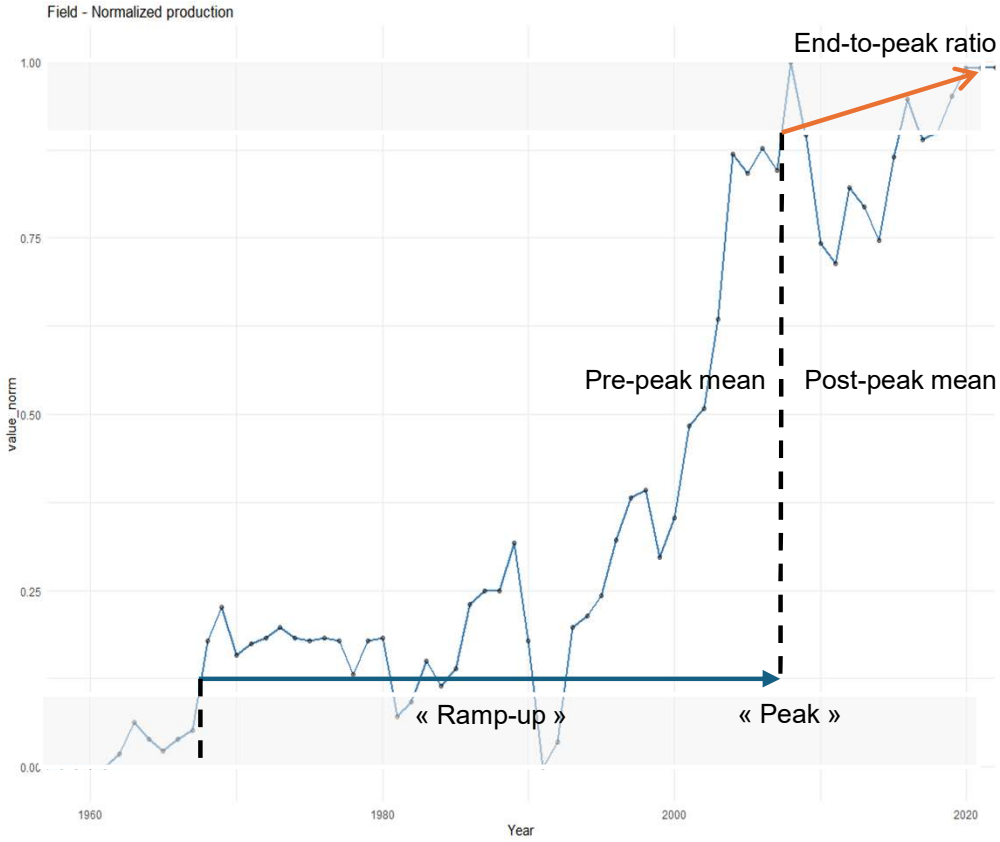
Part 1 – A Global Review / *Data Types and Source Importance*

"URR" ignores probability and timing aspects (backdating, reserve growth).





Part 1 – A Global Review / *Exploratory Classification*



Ramp-up duration: time required for the series to increase from 10% to 90% of its peak level.

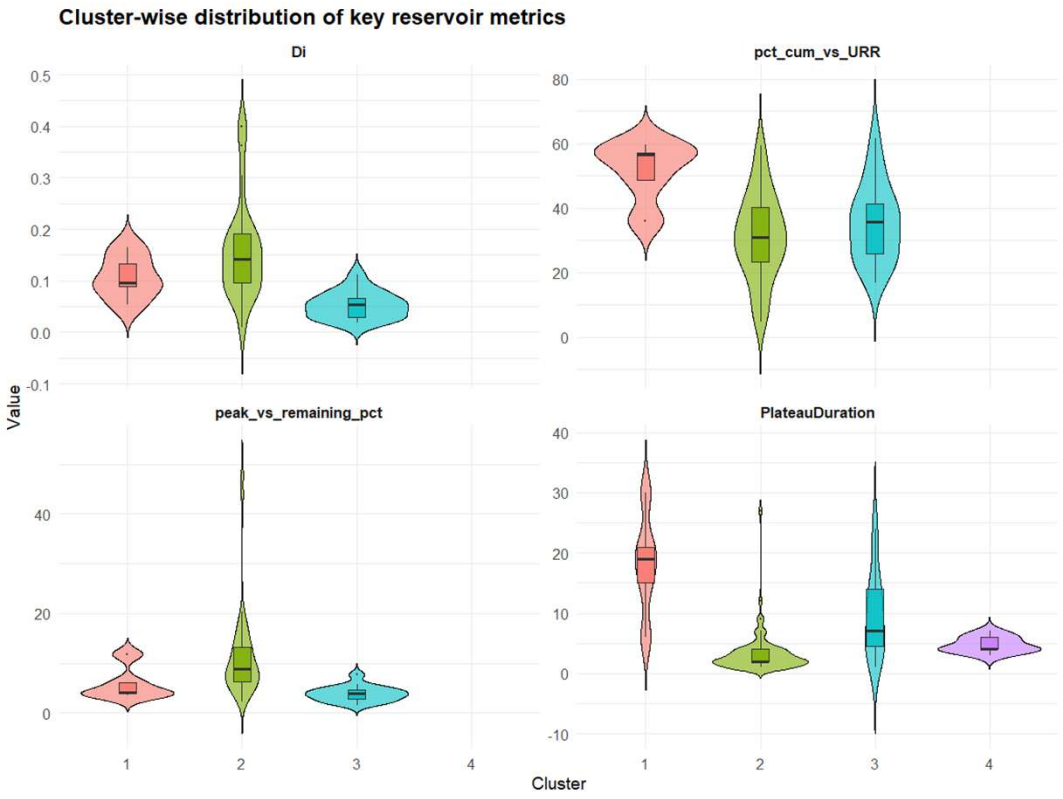
Peak: first occurrence of reaching ≥ 90% of the maximum production (above 0.9 threshold event).

Pre-peak mean: mean value prior to peak attainment.

Post-peak mean: mean value after peak attainment.

End-to-peak ratio: ratio of last value to peak value.

Part 1 – A Global Review / *Exploratory Classification*



Cluster-wise summary statistics

Ramp duration and production dynamics metrics

Cluster	Ramp duration (mean)	SD	Median	Mean pre (mean)	SD	Median	Mean post (mean)	SD	Median	Ratio end (mean)	SD	Median
1	37.818	10.939	40.000	0.166	0.065	0.172	0.055	0.031	0.056	0.730	0.350	0.847
2	3.815	2.766	3.000	0.026	0.020	0.021	0.042	0.019	0.041	0.140	0.135	0.094
3	11.970	6.101	13.000	0.093	0.049	0.093	0.118	0.027	0.113	0.560	0.266	0.593
4	9.217	8.289	7.000	0.039	0.028	0.033	0.030	0.024	0.029	0.867	0.212	0.965

Cluster 1: Long ramp-up, long plateau, most not yet in decline (e.g., Abu Sa'fah, Bab).

Cluster 2: Fast ramp-up, fast decline (e.g., Oseberg, Samotlorskoye).

Cluster 3: Fast ramp-up, long plateau, many fields in decline (e.g., Ghawar, Daqing).

Cluster 4: Mostly greenfields (e.g., Majnoon, Gharraf).

Part 2 – An early-stage forecasting model / *Objectives*

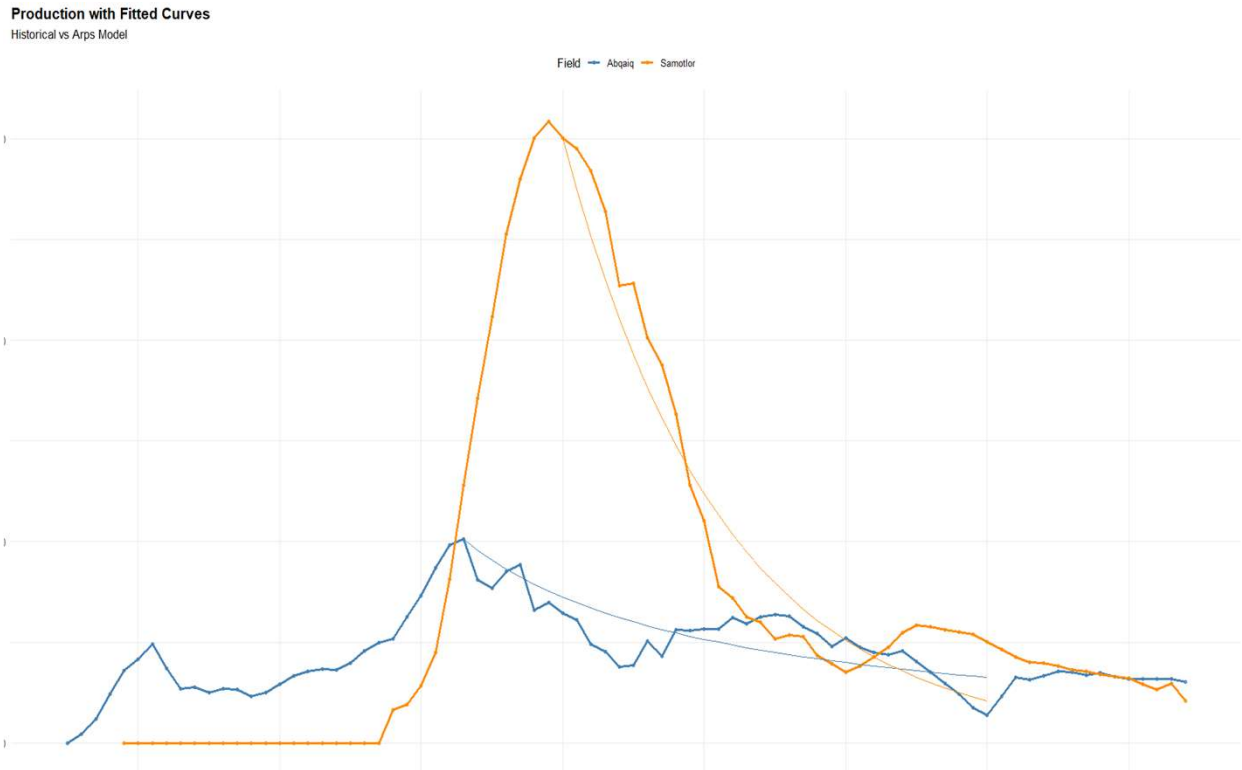
Assess whether the current database can support a preliminary (V1) forecasting model.

Main difficulties:

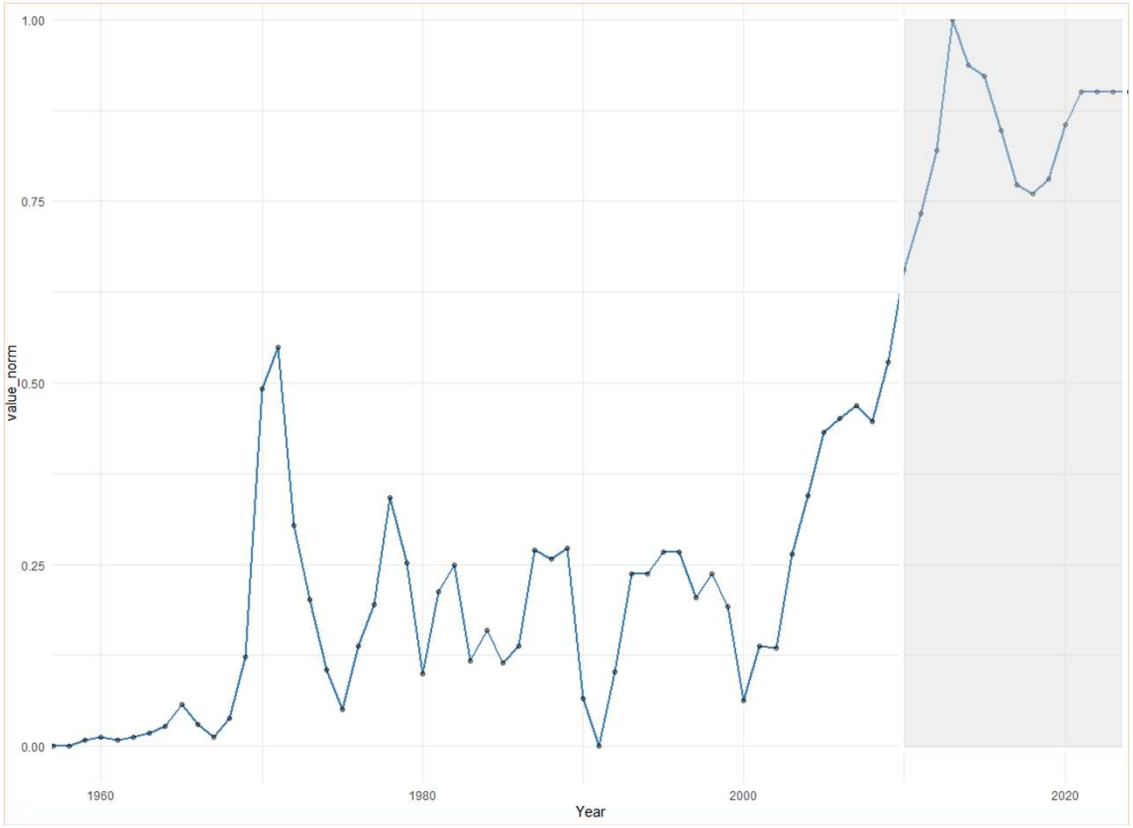
- What parameters should be used ?
- How to treat undeveloped fields ?
- How to model complex production profiles (long ramp-up, noisy trajectories) ?
- How to define plateau levels ?
- How to incorporate recent field dynamics ?
- How to integrate external drivers (e.g. oil price, above-ground factors) ?

In one sentence : designing a global model to solve a highly local problem.

Not yet solved



Part 2 – An early-stage forecasting model / *Methodology*



Backtest period: 2010–2024

Implications:

No computation may rely on information beyond 2010.

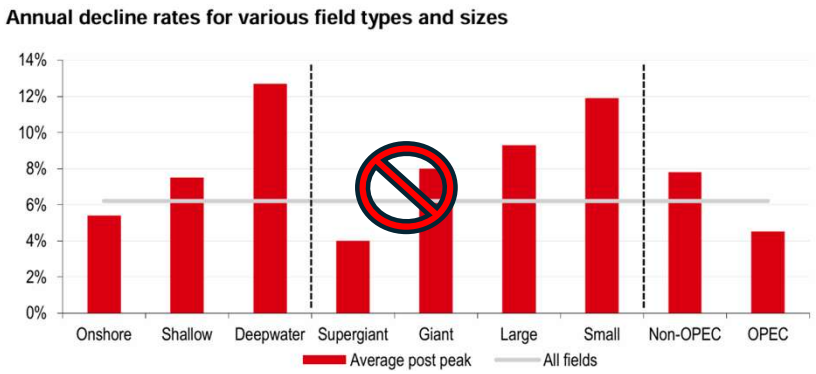
No URR values derived from post-2010 sources are used.

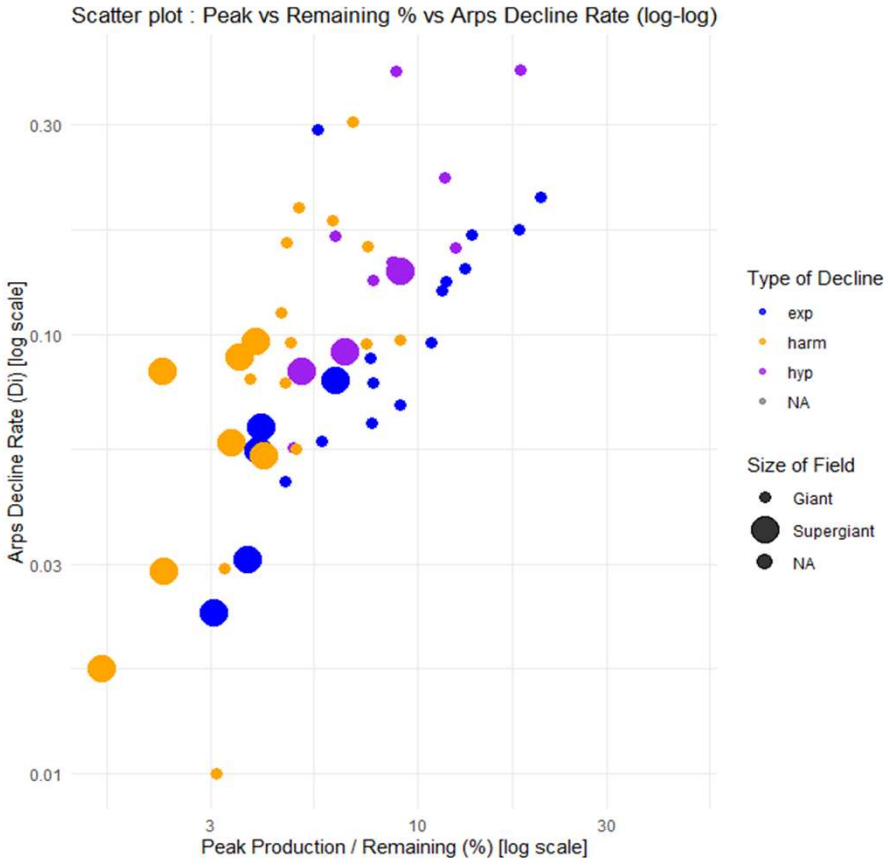
No model training or parameter calibration uses data beyond 2010.

No production increments or adjustments are introduced unless they are observable or defined up to 2010.

No studies dated beyond 2010 (e.g., IEA WEO 2013).

Part 2 – An early-stage forecasting model / *Methodology*

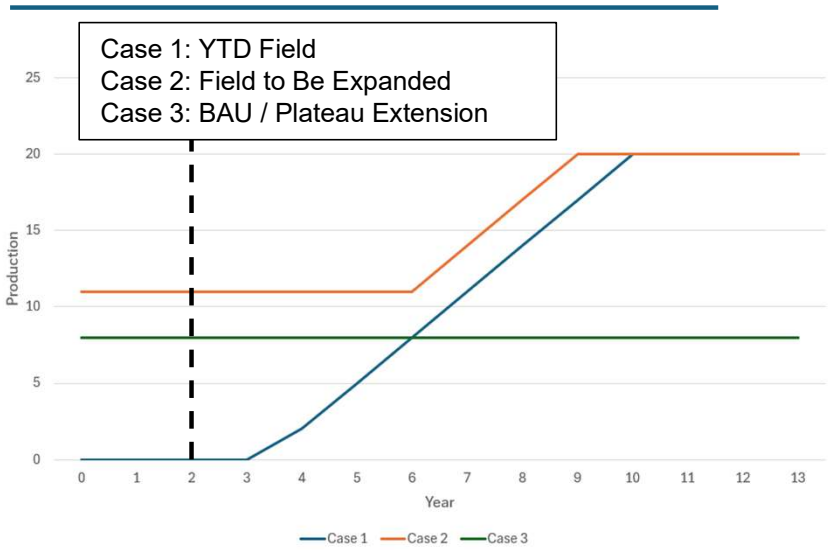


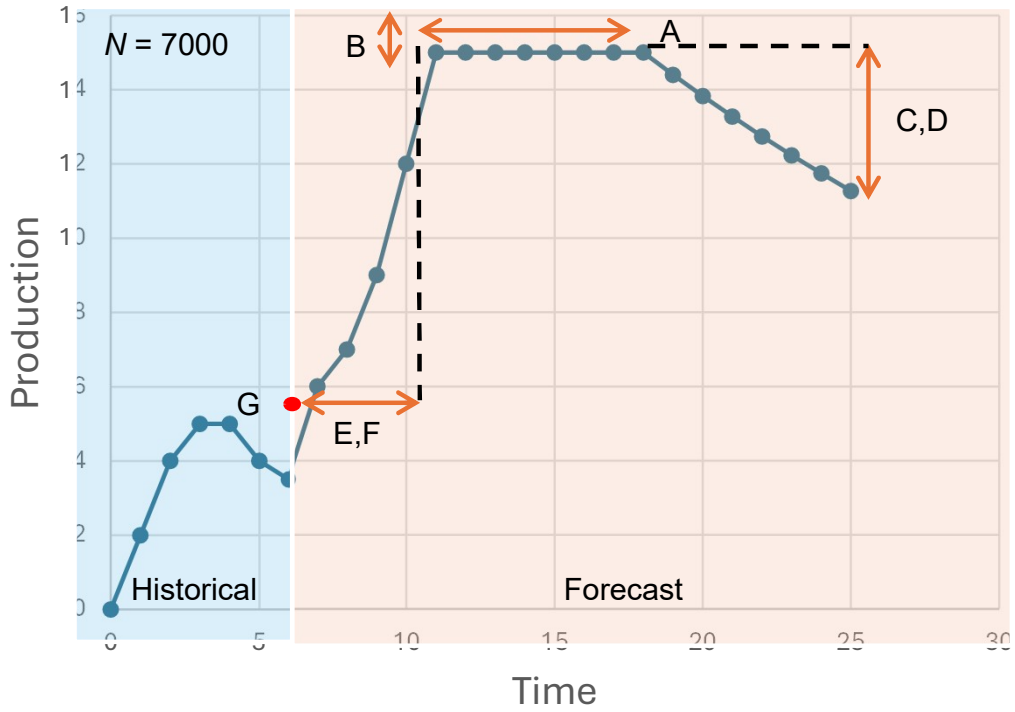


Part 2 – An early-stage forecasting model / *Methodology*

Model definition and parameters used

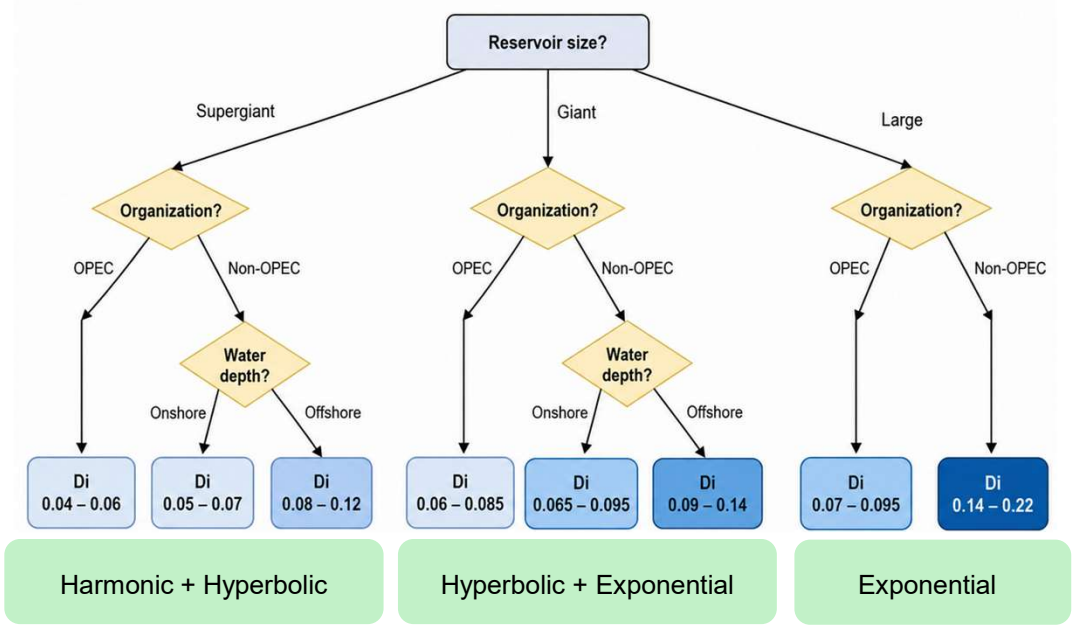
A — Plateau duration (field-dependent)
B — Plateau value (field-dependent)
C — Decline rate
D — Decline curve type
E — Ramp-up duration (constant)
F — Ramp-up growth rate (constant)
G — Initial production value (case-dependant)
N — Number of simulations per field (constant)



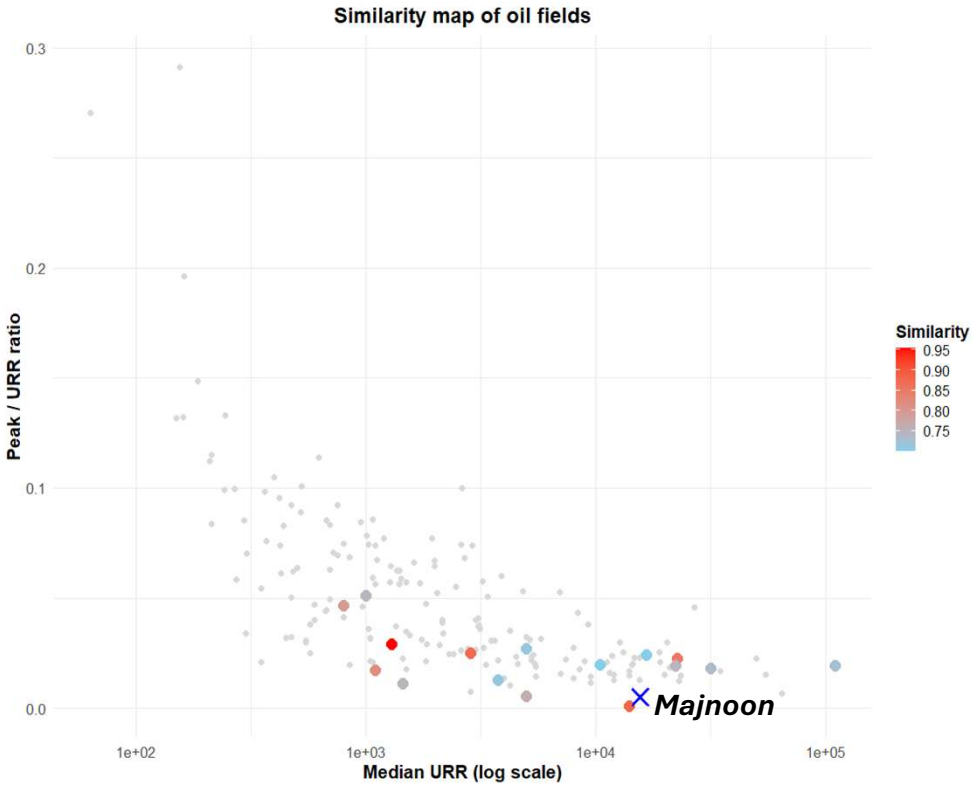


Part 2 – An early-stage forecasting model / *Methodology*

Decline rate and type of decline curve



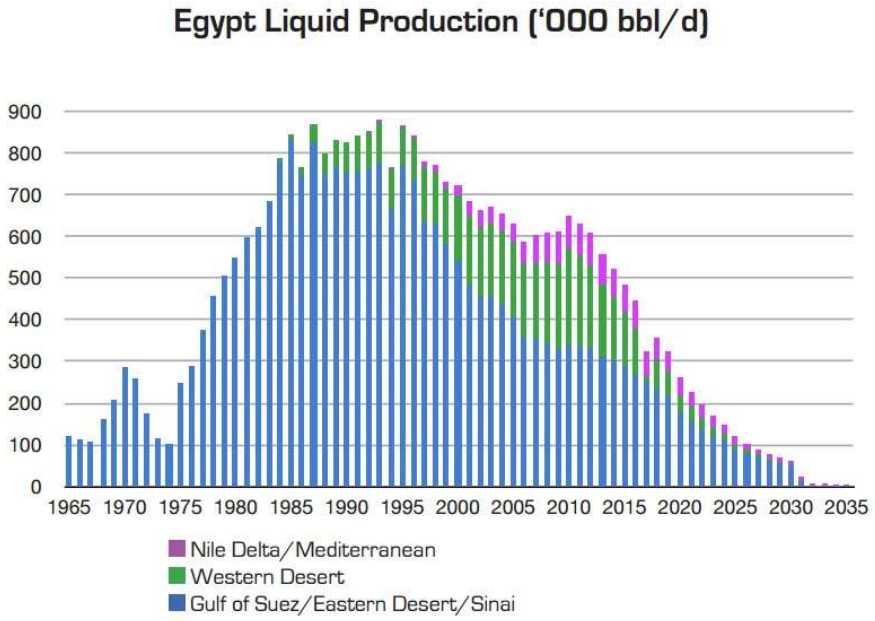
Plateau value

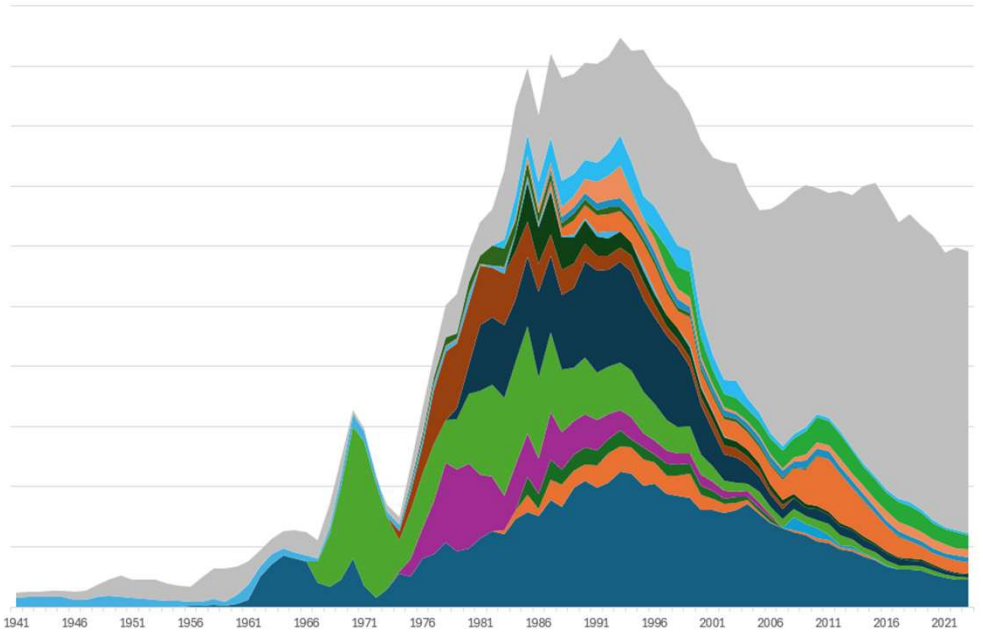


Part 2 – An early-stage forecasting model / *Limitation*

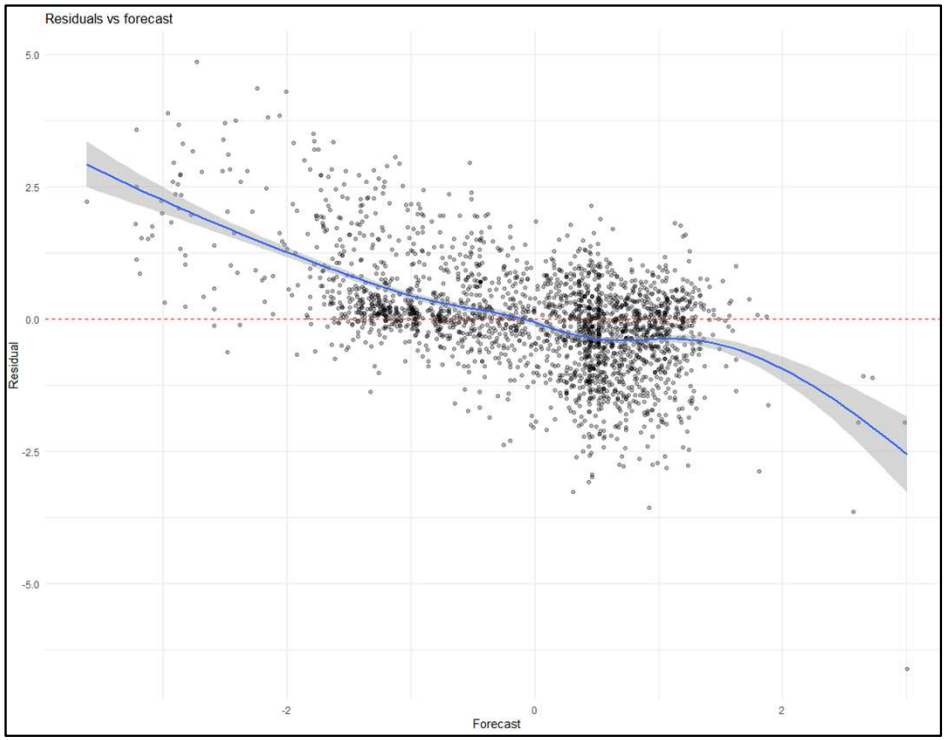
Very strong assumptions :

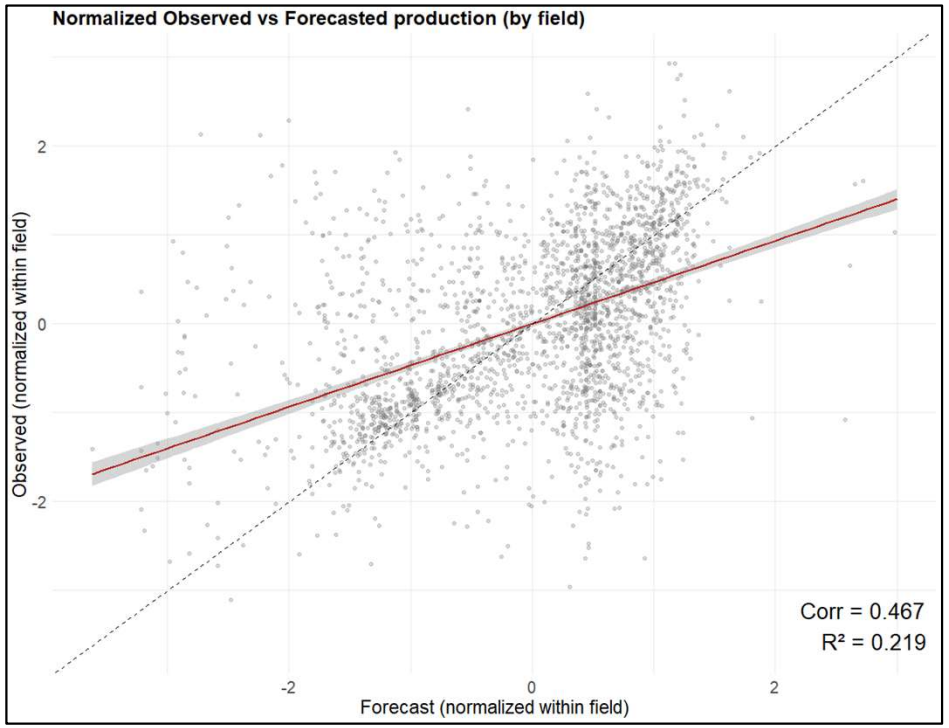
URR values are reliable Plateau values are reliable No above-ground disruptions	No price impact No quotas impact No YTF considered Static model



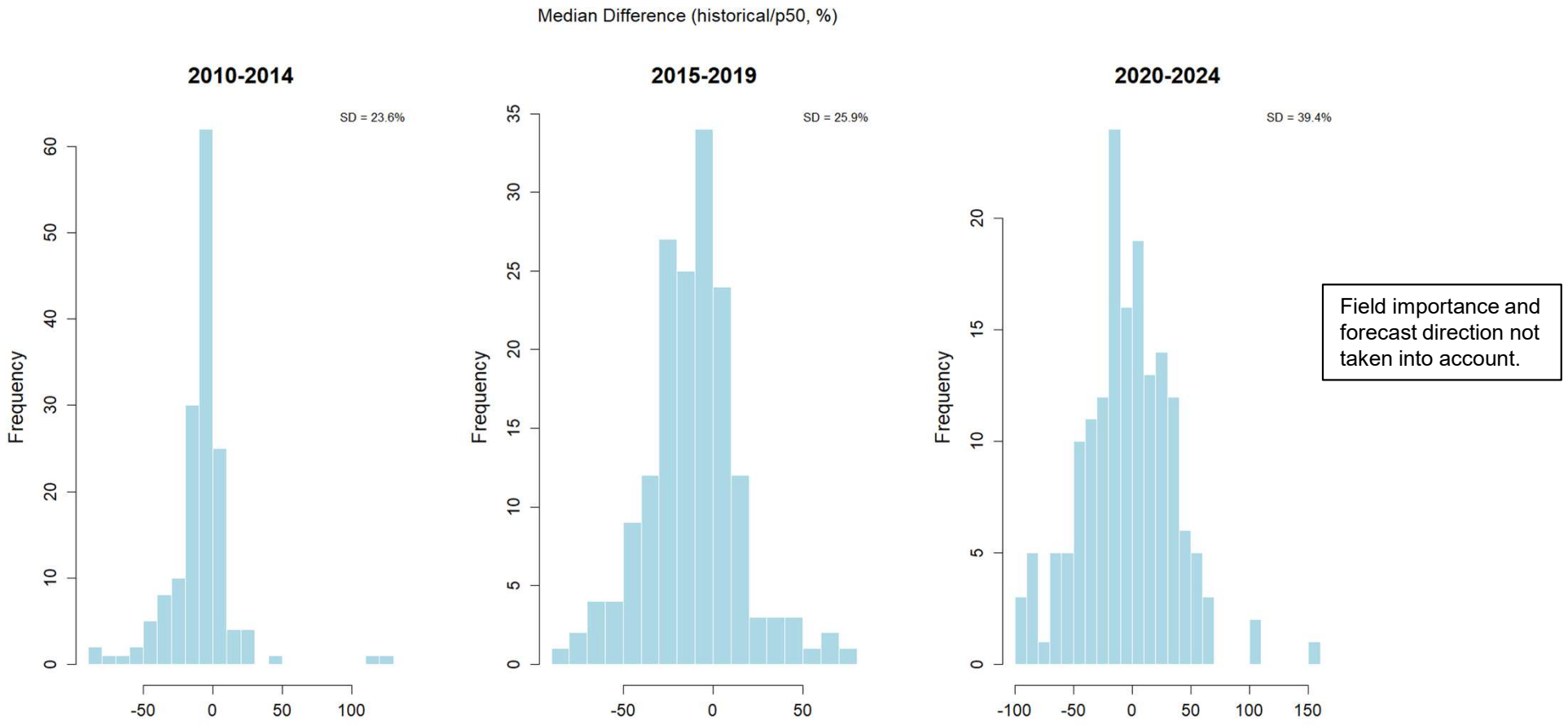


Part 3 – Results / *Overall predictive power*



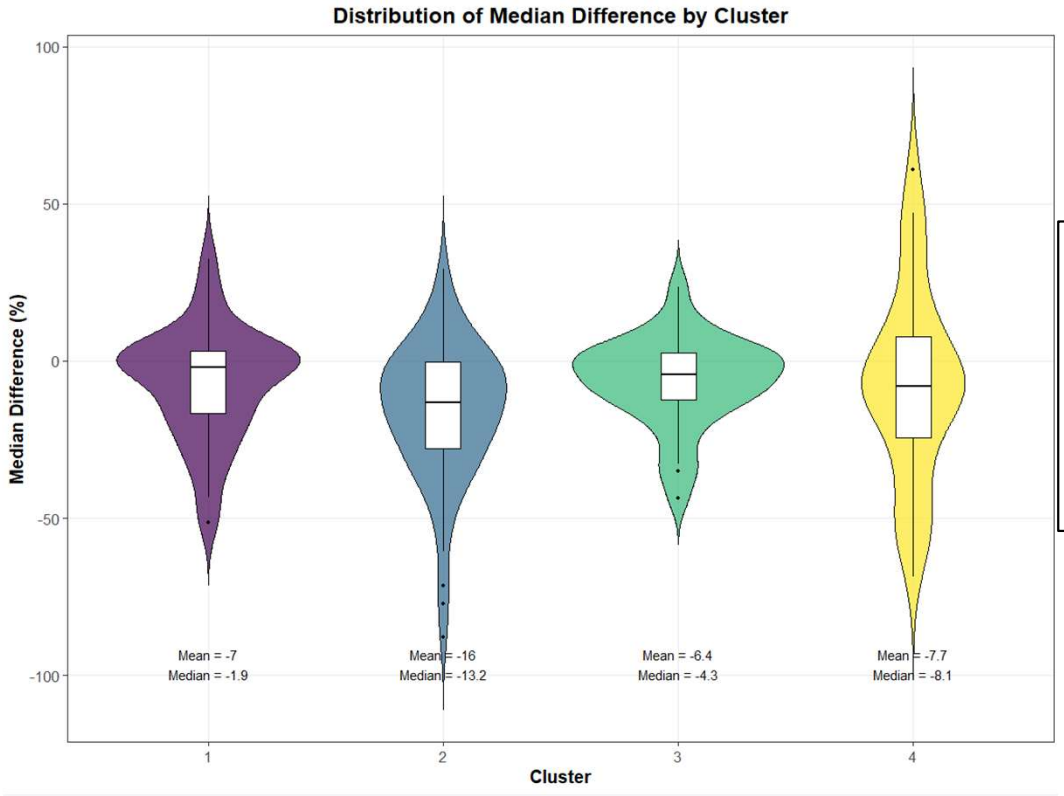


Part 3 – Results / *Period-wise accuracy*



Field importance and forecast direction not taken into account.

Part 3 – Results / *Field-type accuracy*



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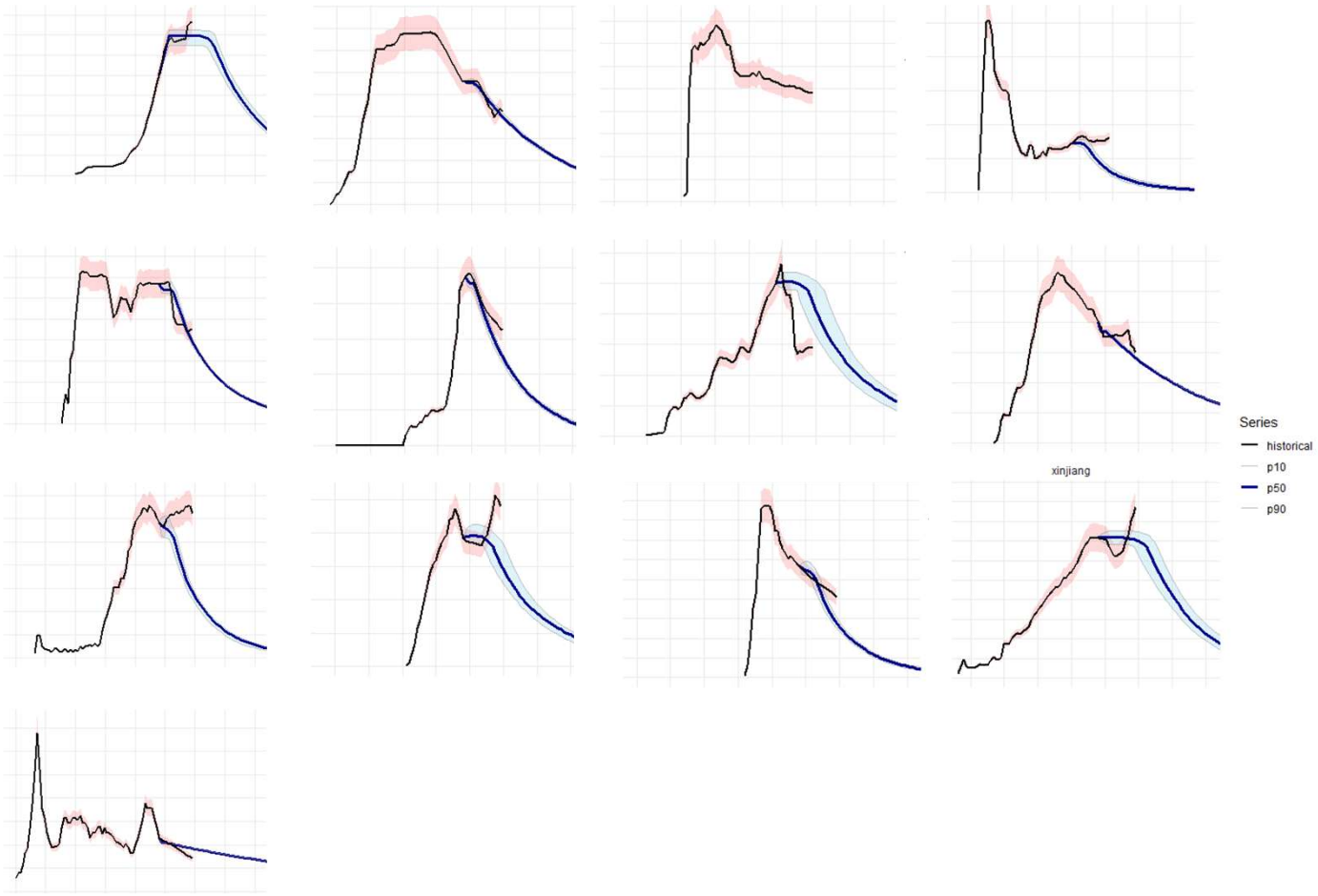
Part 3 – Results / *Chinese fields example*

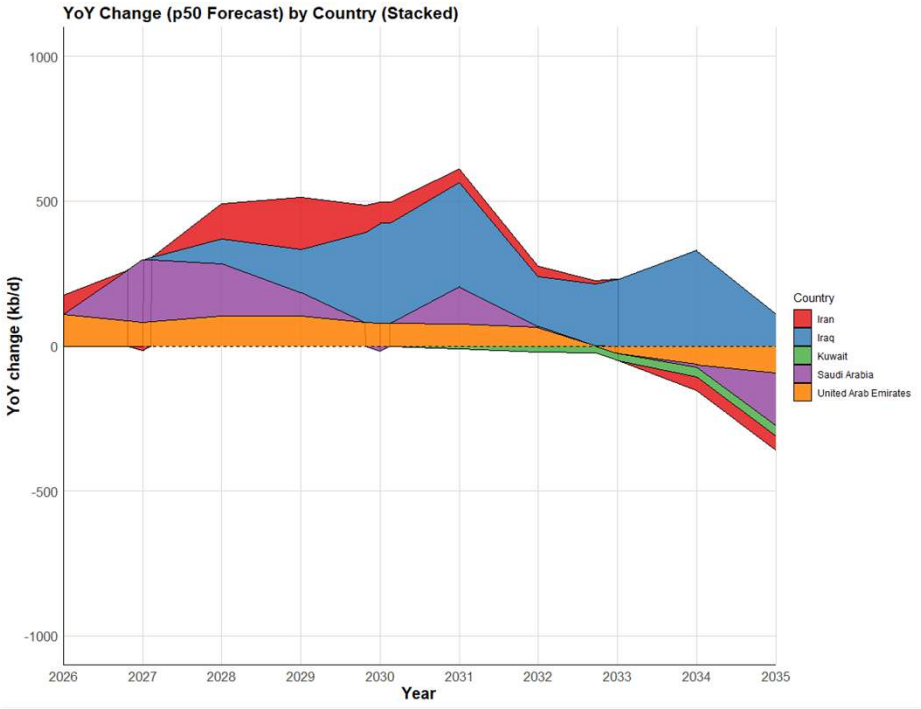


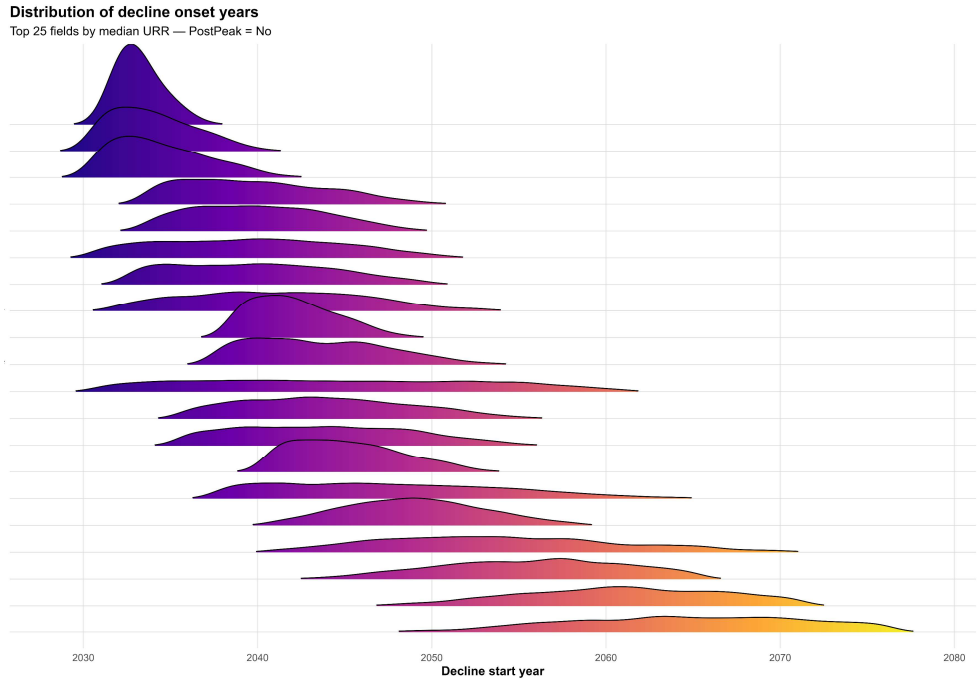
Part 3 – Results / *Early draft of an improved version*

Model limitations and planned structural extensions

1. Structural dynamics	2. Exogenous drivers	3. Learning & diagnostics	4. Integration
Calibration period	Price impact (to formalize)	ML augmentation (optional)	Integration in a global architecture
Multi-phase decline	Quota effects (to formalize)	Error decomposition / attribution	
Revitalization dynamics	Historical development constraints		

Part 4 – Possible uses / *Forecasted volumes and peak date (Middle East)*





Part 4 – Possible uses / *A global supply-demand model ?*

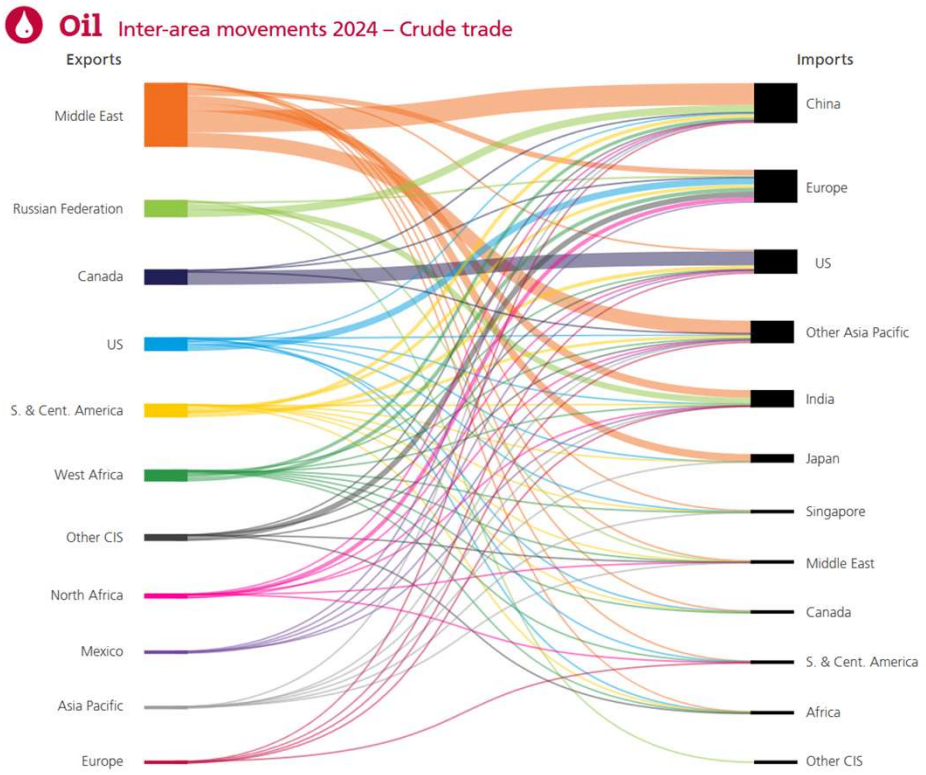
Producing countries

country	HHI	country_score	beta_price	prod_vol	political_stability
Kuwait	0.36181757	1.3659649	NA	NA	0.29
Venezuela	0.34672457	-5.0042266	0.12897367	0.15052663	-1.74
Saudi Arabia	0.23951097	-2.2859612	0.04283552	0.08675603	-0.05
Iraq	0.19763497	2.0149872	0.04961442	0.37553706	-2.06
Kazakhstan	0.16160008	-1.0839482	0.05826454	0.06601294	-0.28
United Arab Emirates	0.14764974	3.0270588	0.07083404	0.07953448	0.79
Iran	0.12326952	-0.7559396	0.10352481	0.10550005	-1.58
China	0.06906504	-2.0557597	0.01490554	0.02342912	-0.15

HHI : concentration index of the production
Country score : forecasted production change (normalized)
Beta price : price impact (lagged) on the production
Prod vol = production volatility

Possible addition : oil exports as national budget share ?

Consuming countries



BP statistical review, 2025

Part 4 – Possible uses / *New visualisation tool (OilVis)*