# Spre o abordare probabilistă a dimensionării rezervelor de putere în Sistemul Energetic National

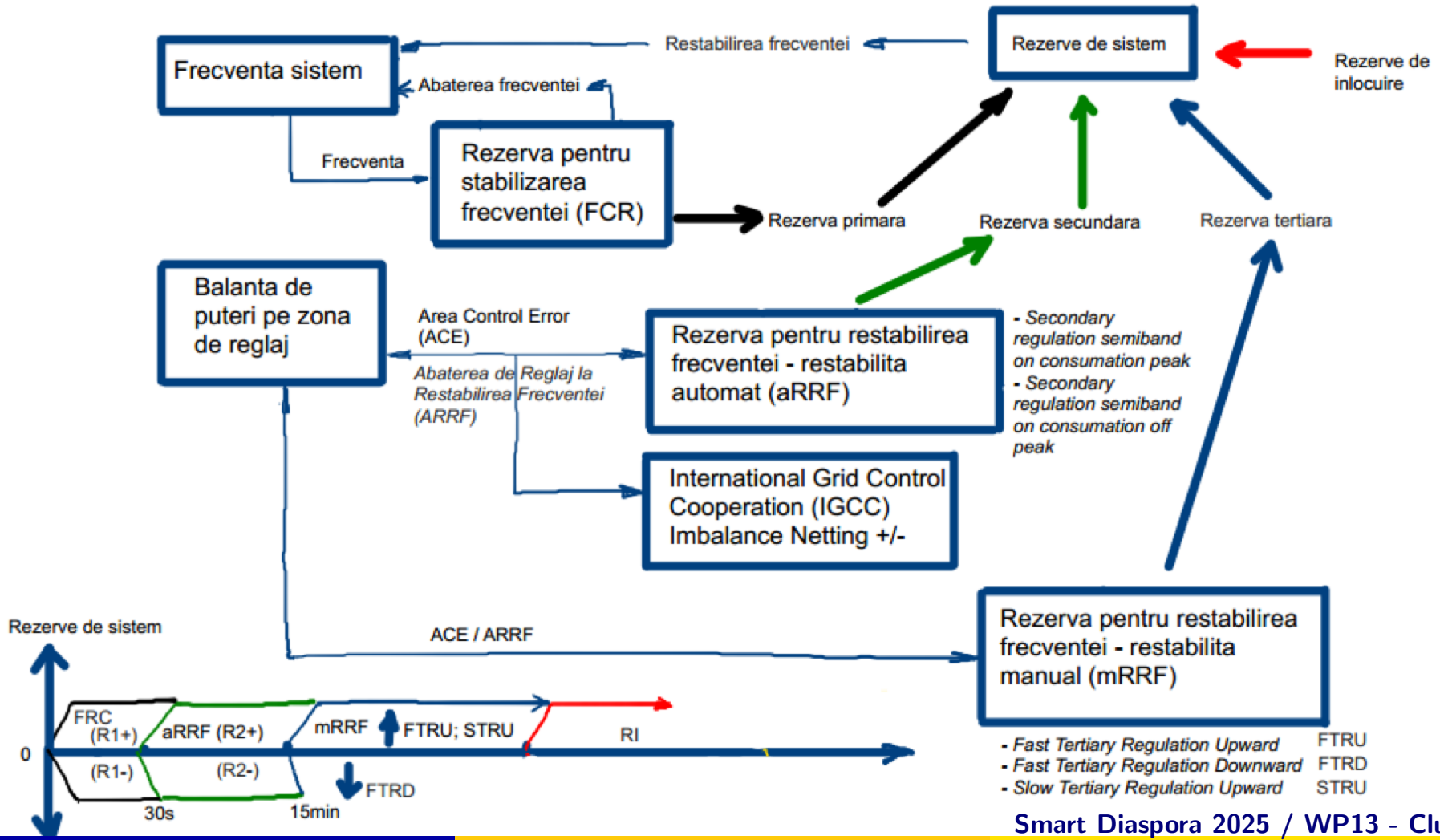
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Smart Diaspora 2025 / WP13 - Cluj-Napoca 5-7 noiembrie

1. ENSTO-E: Dimensiunea probabilista si estimari variabilitate ; incertitudine
2. ENTSO-E: Estimări Variabilitate, Incertitudine
3. SEN: Majoranți și minoranți
4. **Variabilitate și Incertitudine**
5. Mecanisme ascunse
6. Antrenare și Decodare
7. Experimente numerice

# ENSTO-E: Variabilitate si incertitudine: Tipuri de rezerve în SEN

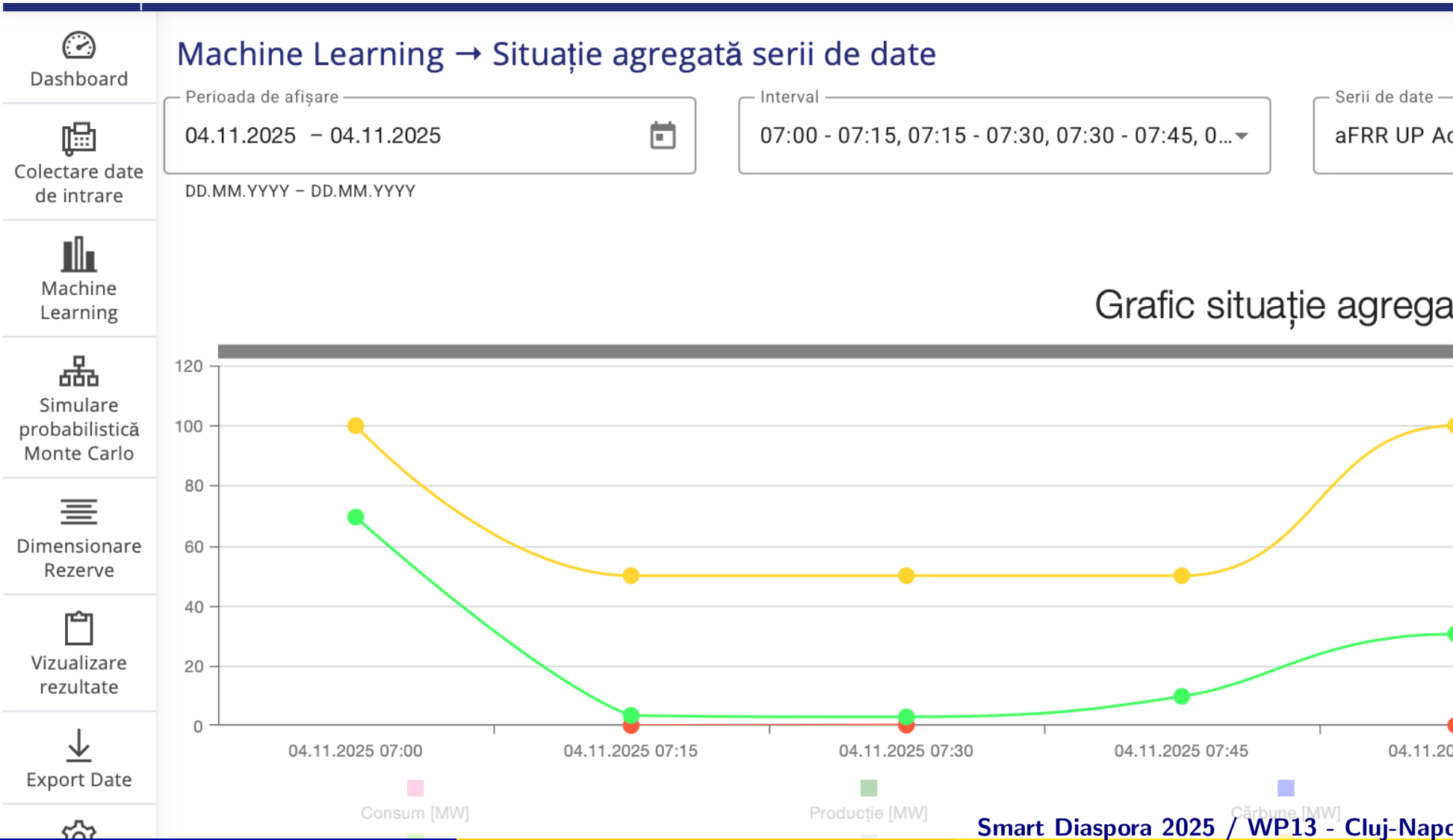


# ENSTO-E: Dimensionare rezerve: dimensiunea probabilista

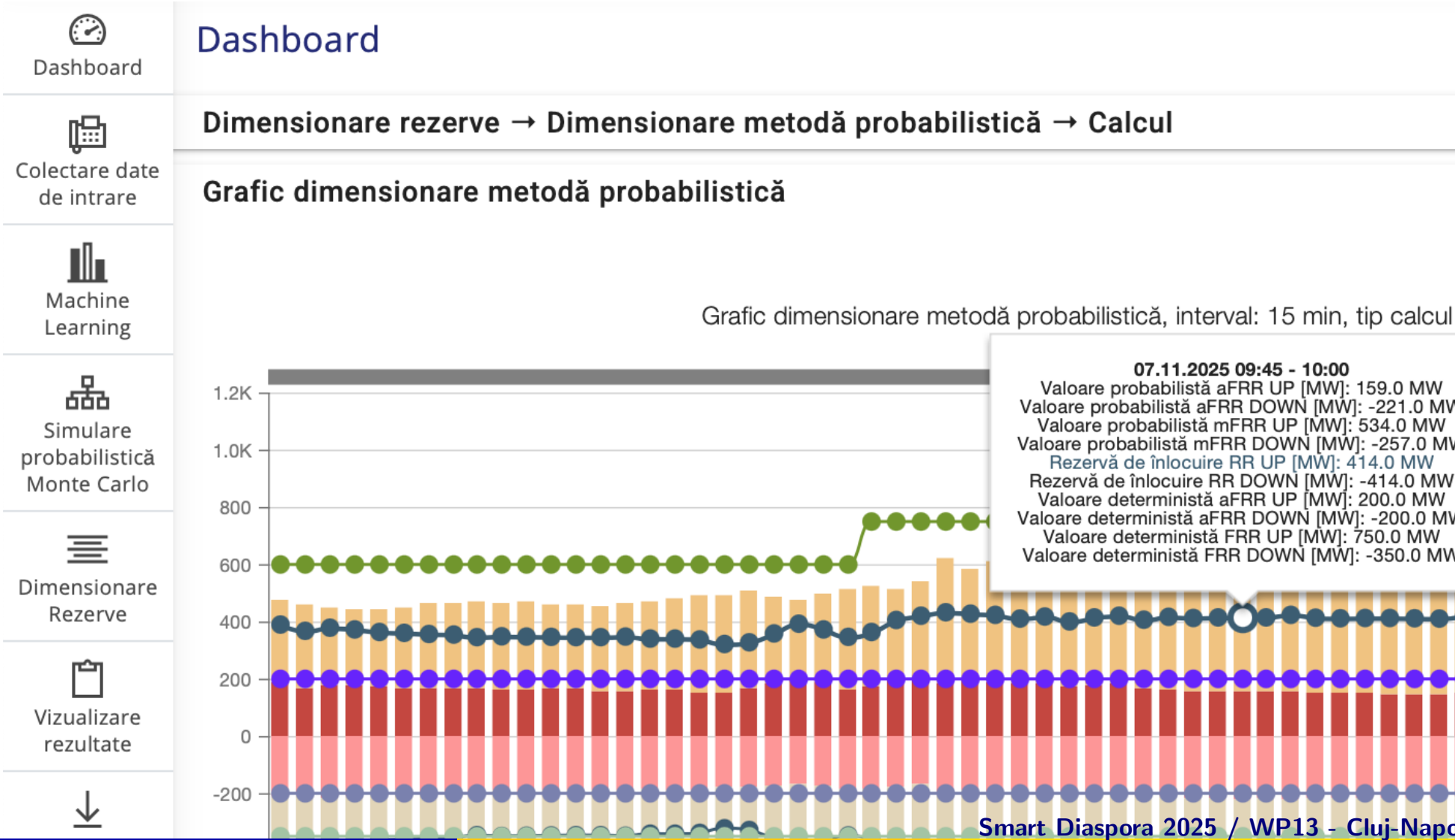
- Rezervă primară ⇒ dimensionare statică
- Rezervă secundară ⇒ dimensionare dinamică (data mining)
- Rezervă terțiară ⇒ dimensionare dinamică (data mining)

**Putere de echilibrare** ⇒ Variabilitate ; Incertitudine

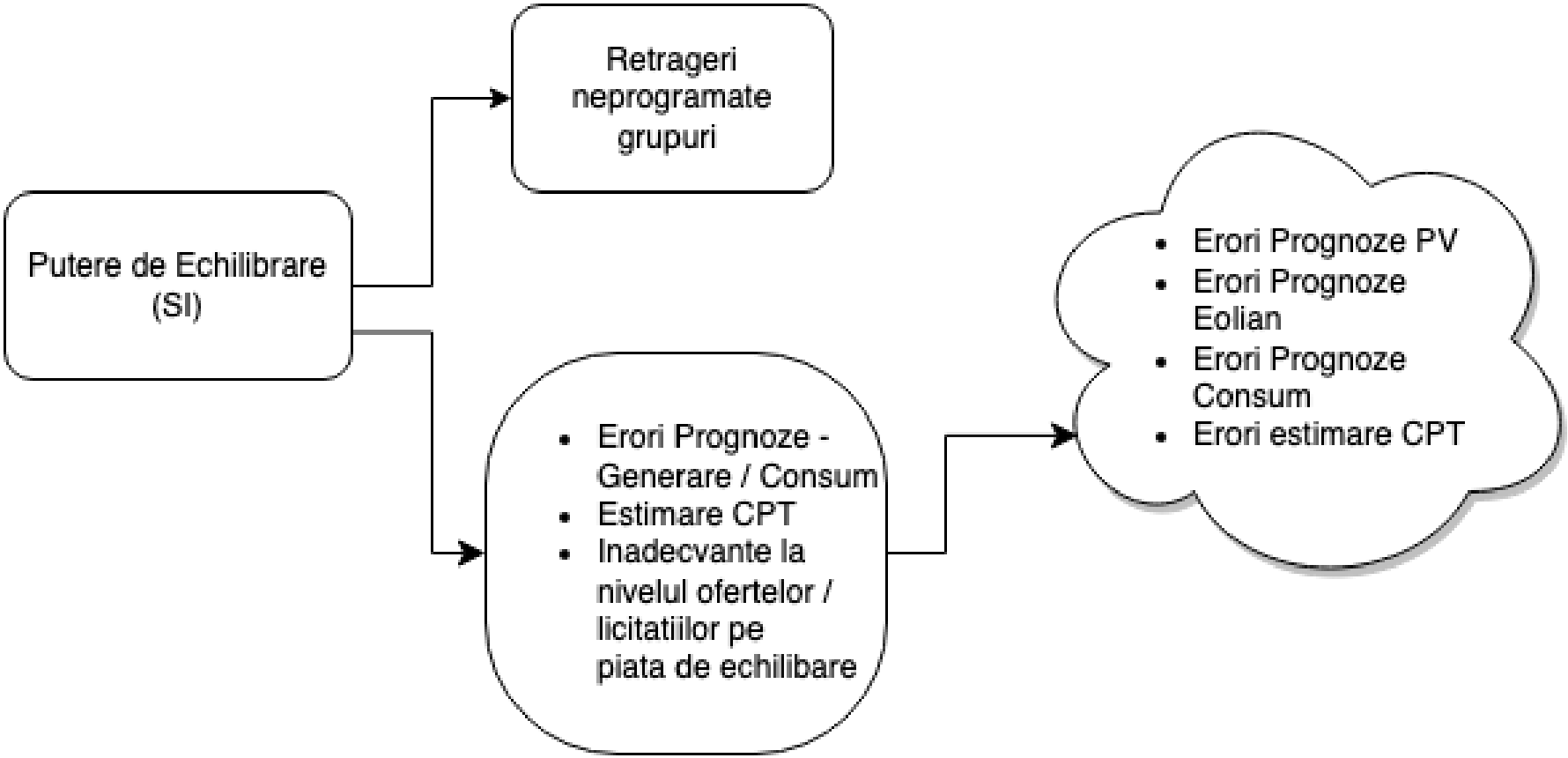
# SEN: aFRR / mFRR



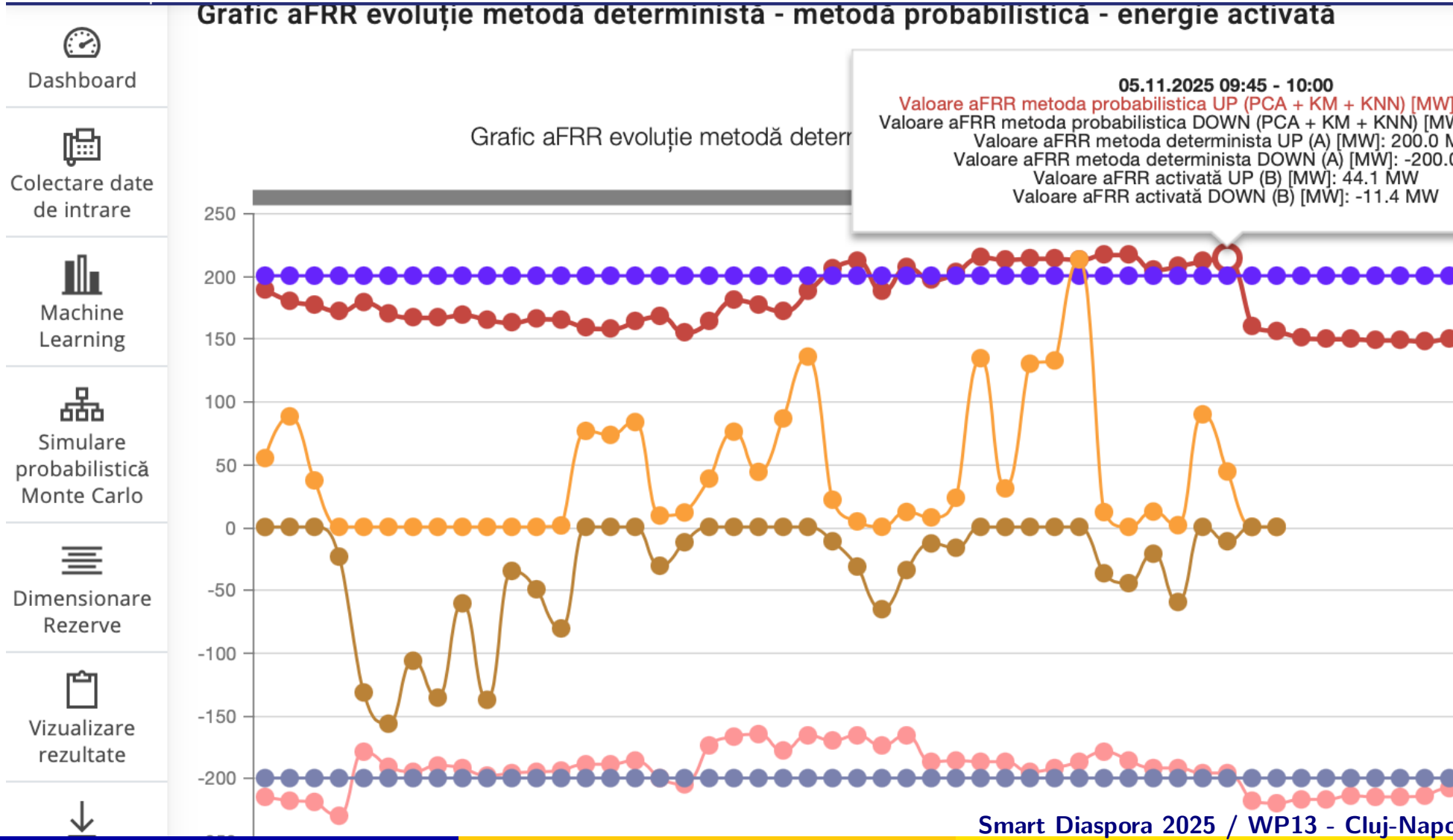
# SEN: Determinist vs. probabilist



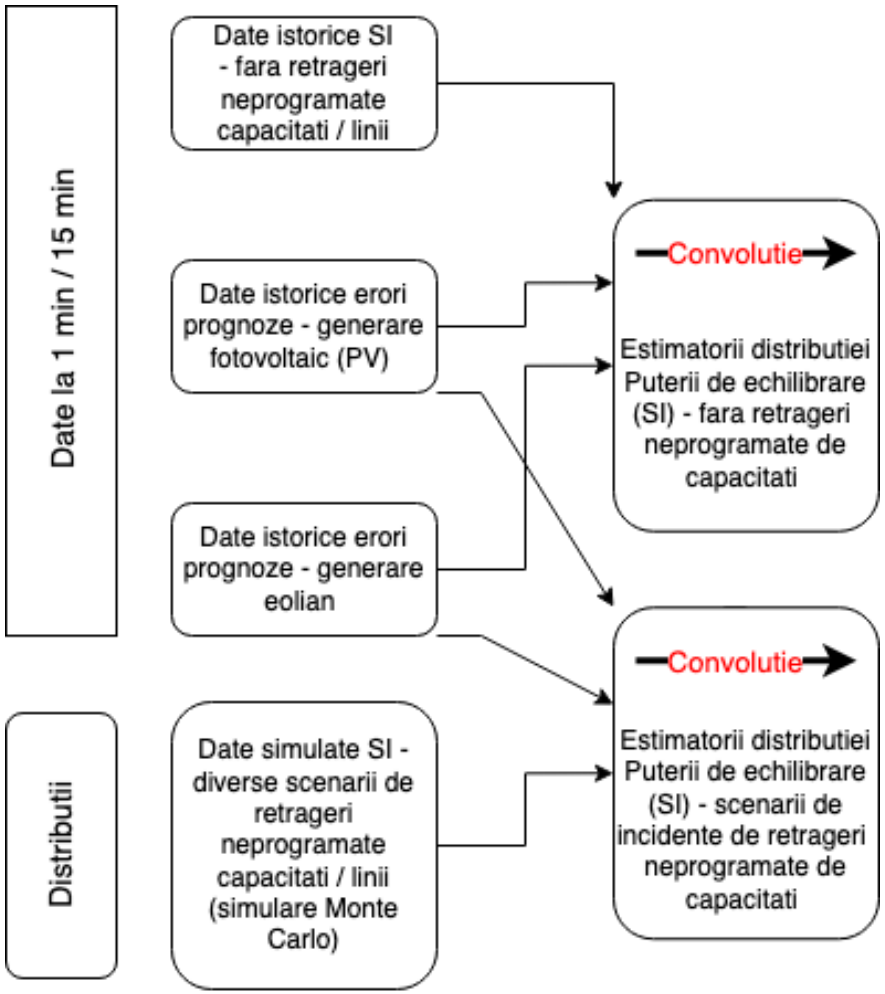
# SEN: Puterea de Echilibrare / System Imbalance (SI)



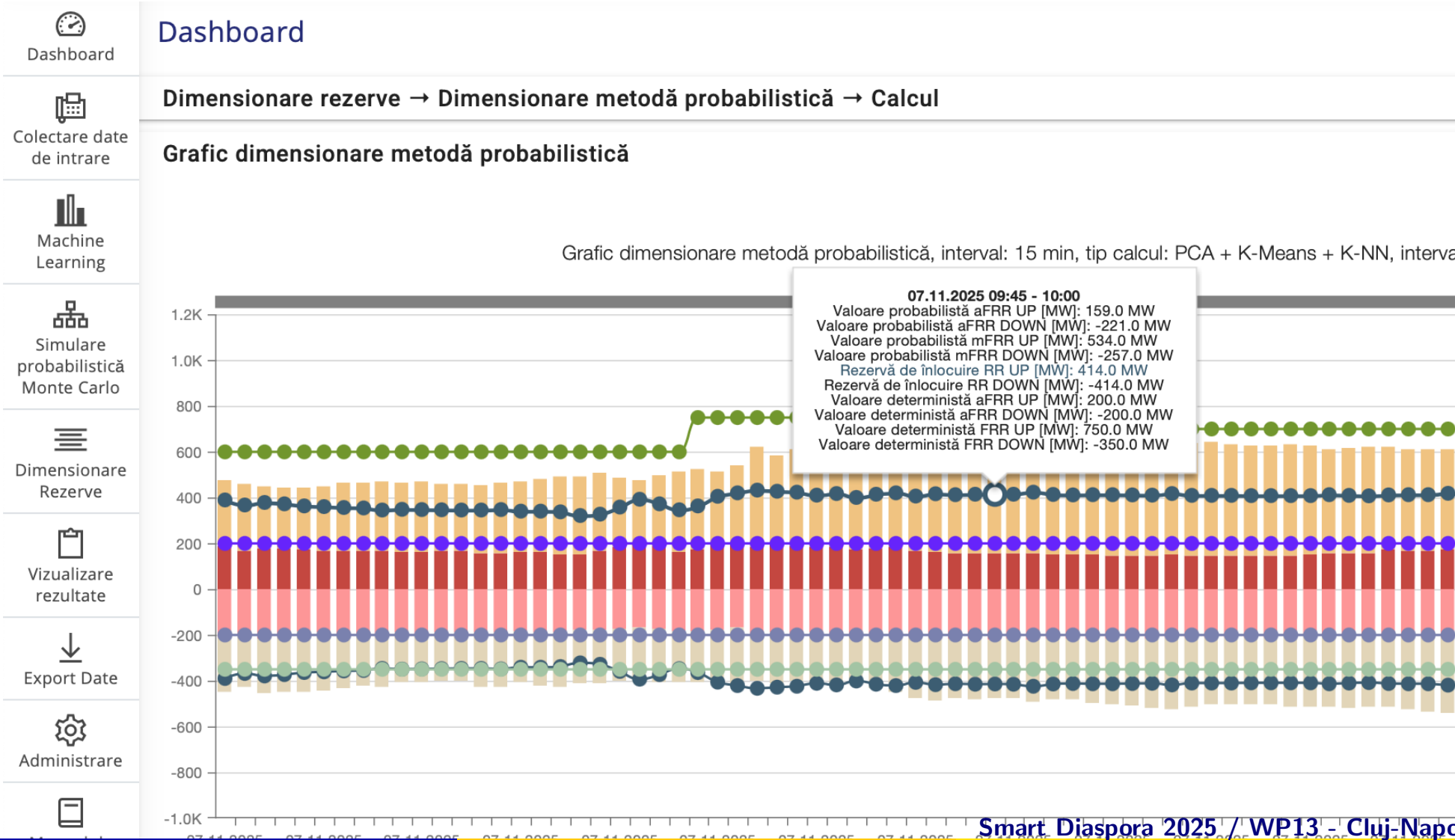
# SEN: Determinist vs. probabilist



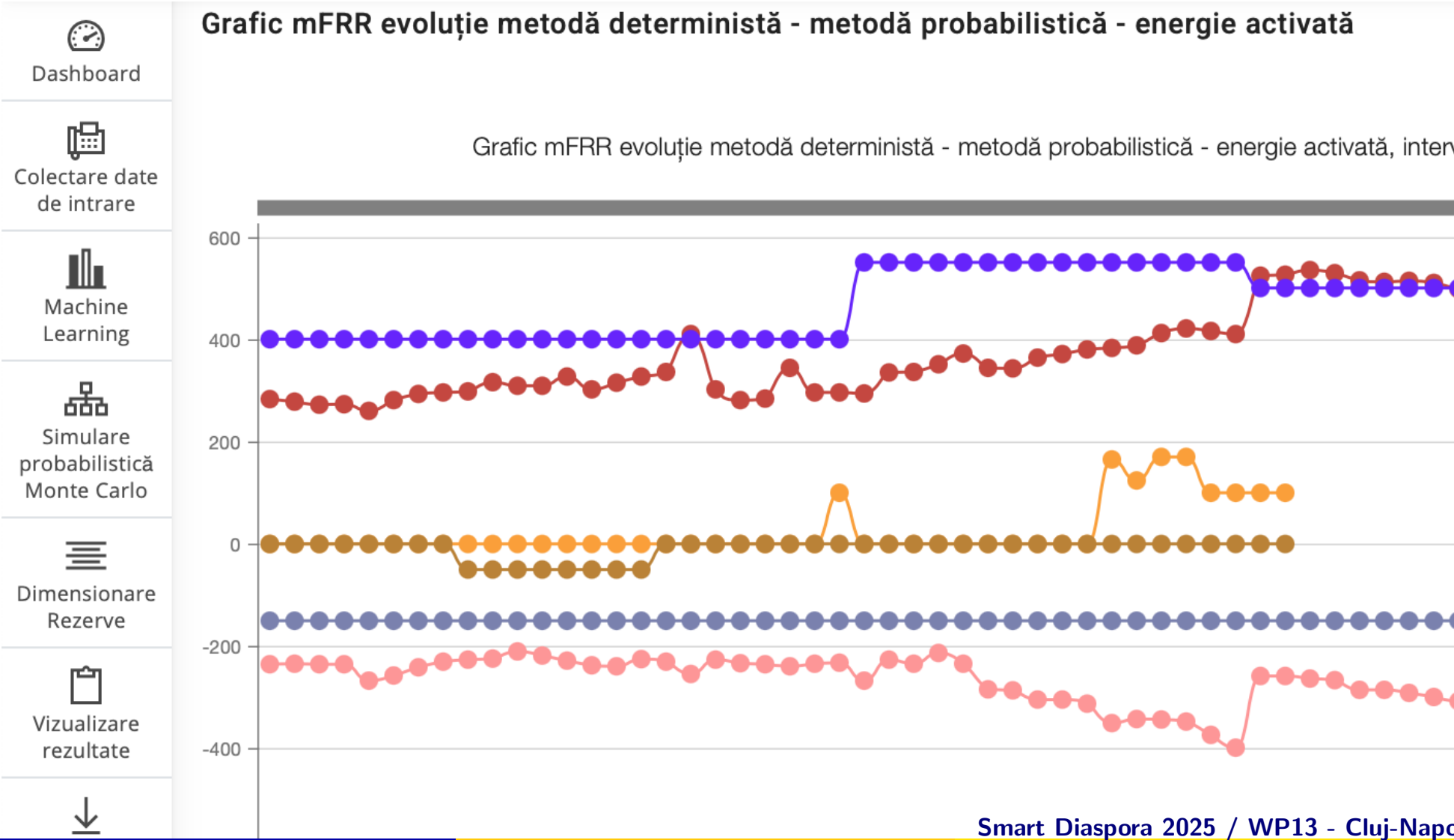
# Puterea de Echilibrare / System Imbalance (SI)



# aFRR / mFRR


Dashboard
Dashboard
Colectare date de intrare
Machine Learning
Simulare probabilistică Monte Carlo
Dimensionare Rezerve
Vizualizare rezultate
Export Date
Administrare
Dimensionare rezerve → Dimensionare metodă probabilistică → Calcul
Grafic dimensionare metodă probabilistică
Grafic dimensionare metodă probabilistică, interval: 15 min, tip calcul: PCA + K-Means + K-NN, interva
07.11.2025 09:45 - 10:00
Valoare probabilistă aFRR UP [MW]: 159.0 MW
Valoare probabilistă aFRR DOWN [MW]: -221.0 MW
Valoare probabilistă mFRR UP [MW]: 534.0 MW
Valoare probabilistă mFRR DOWN [MW]: -257.0 MW
Rezervă de înlocuire RR UP [MW]: 414.0 MW
Rezervă de înlocuire RR DOWN [MW]: -414.0 MW
Valoare deterministă aFRR UP [MW]: 200.0 MW
Valoare deterministă aFRR DOWN [MW]: -200.0 MW
Valoare deterministă FRR UP [MW]: 750.0 MW
Valoare deterministă FRR DOWN [MW]: -350.0 MW
1.2K
1.0K
800
600
400
200
0
-200
-400
-600
-800
-1.0K

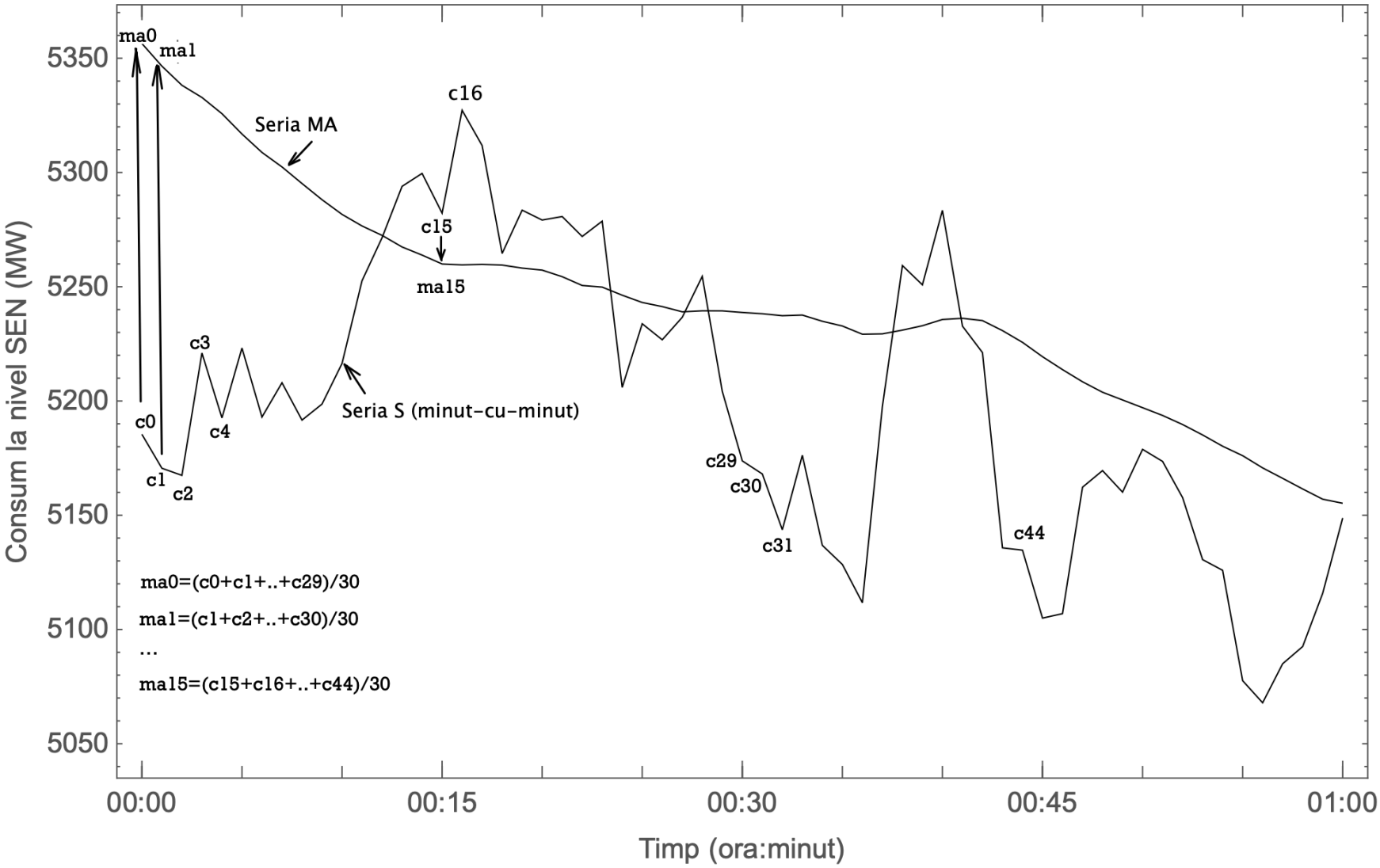
# Determinist vs. probabilist



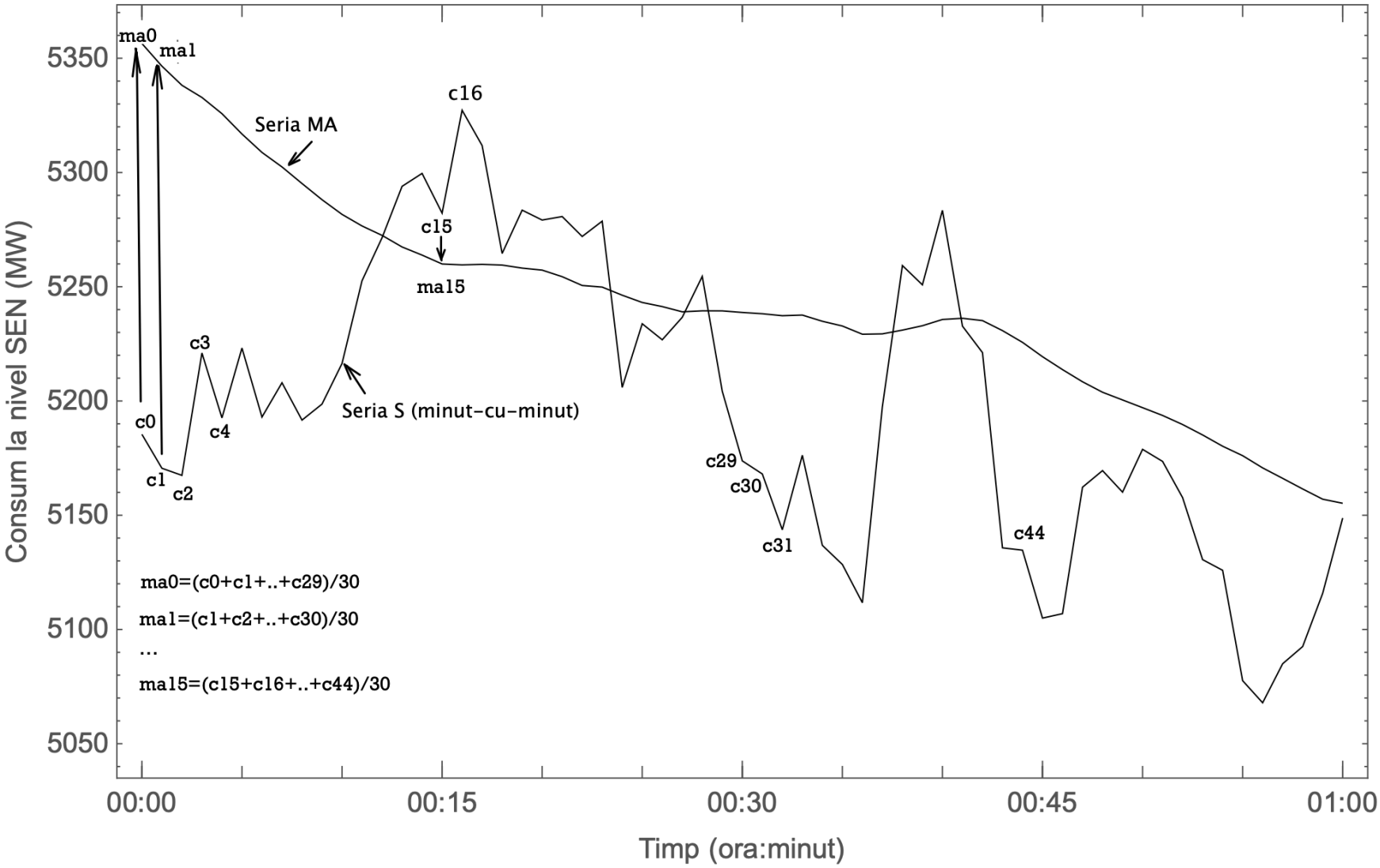
# Estimări Variabilitate, Incertitudine

- Variabilitatea este expresia schimbărilor așteptate la nivelul variabilelor Transmission System Operator (TSO) (Grid Data).
- Incertitudinea este expresia schimbărilor neașteptate la nivelul variabilelor TSO (Grid Data).

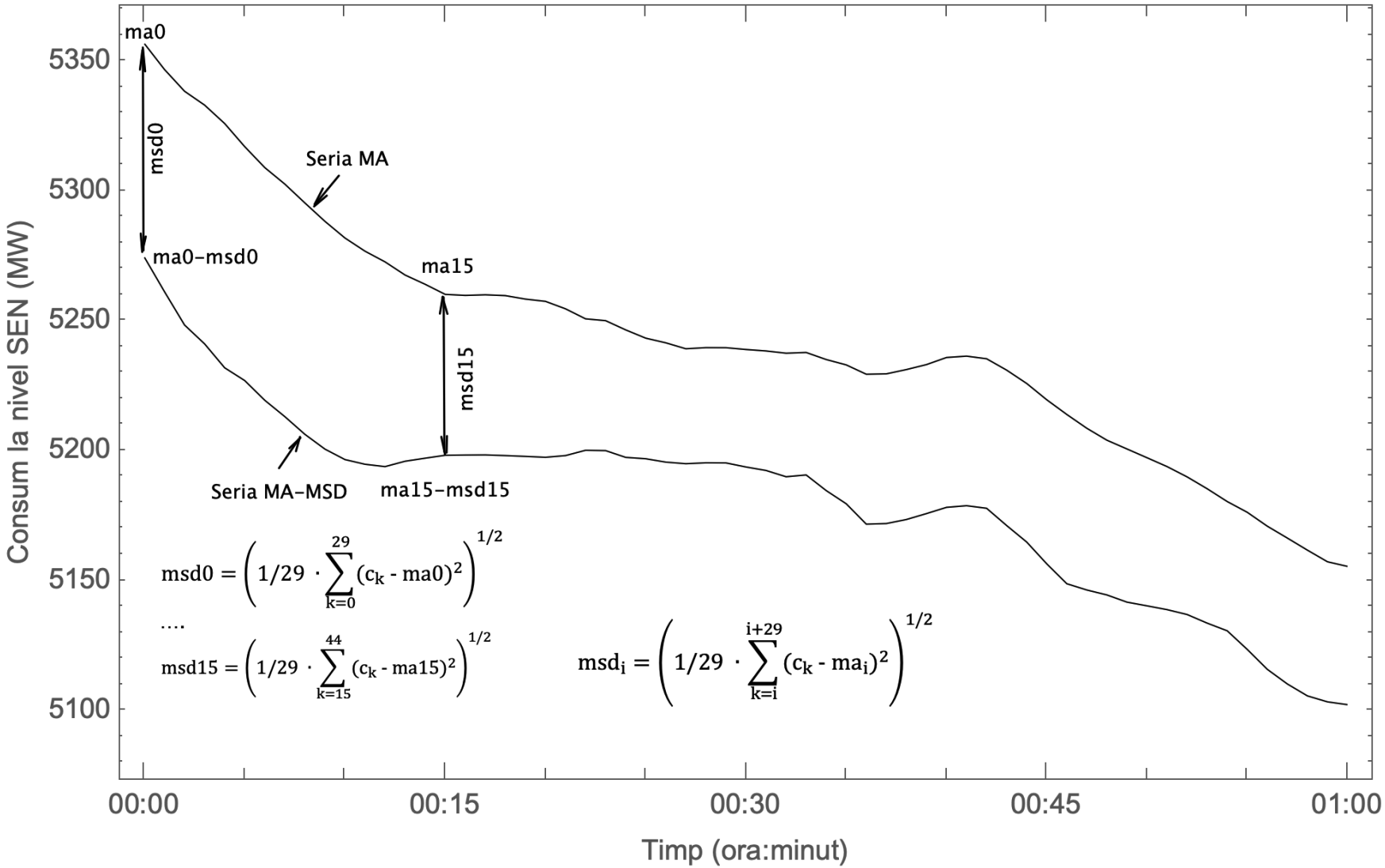
# Filtrarea datelor prin Moving Average (MA)



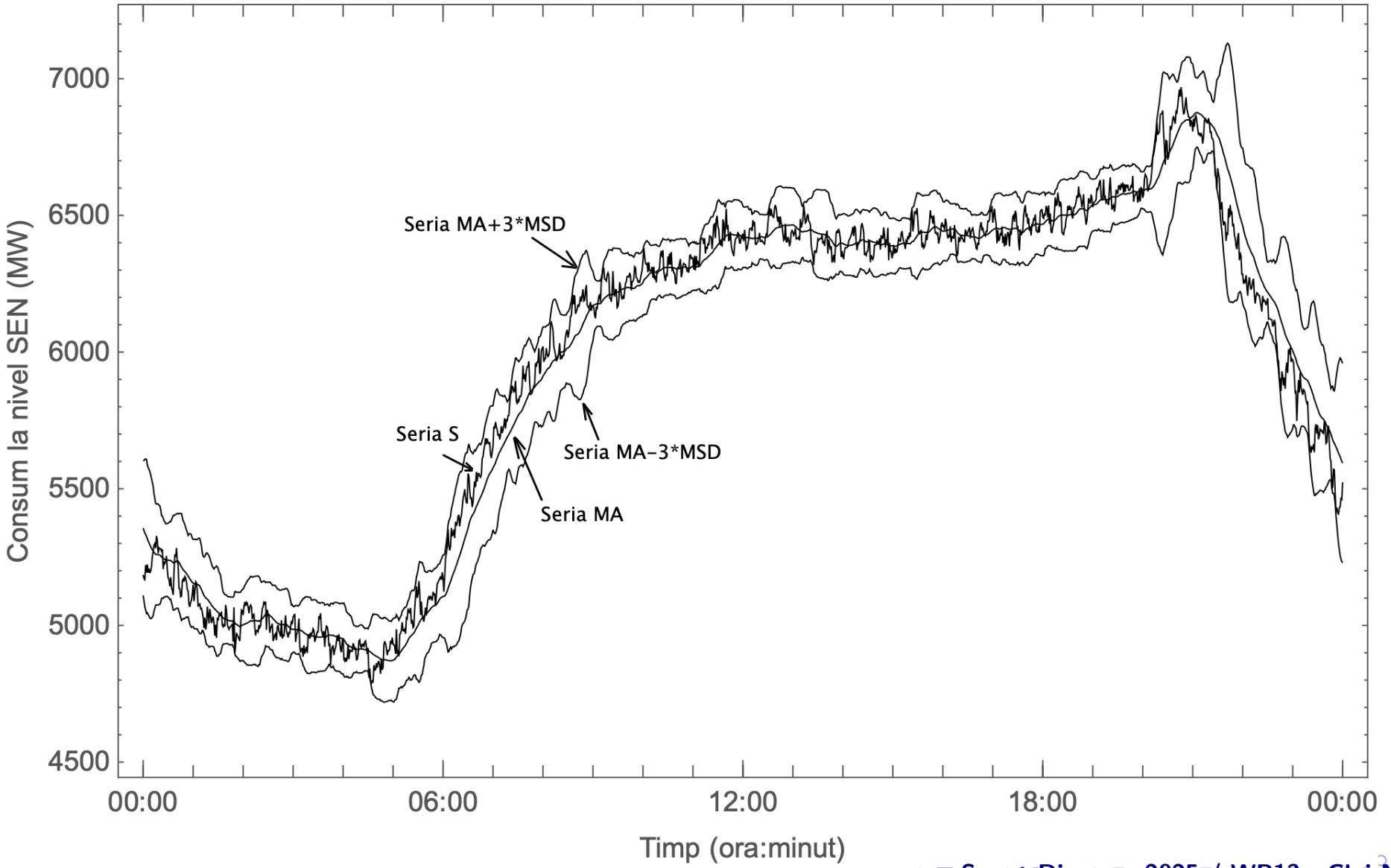
# Filtrarea datelor prin Moving Average (MA)



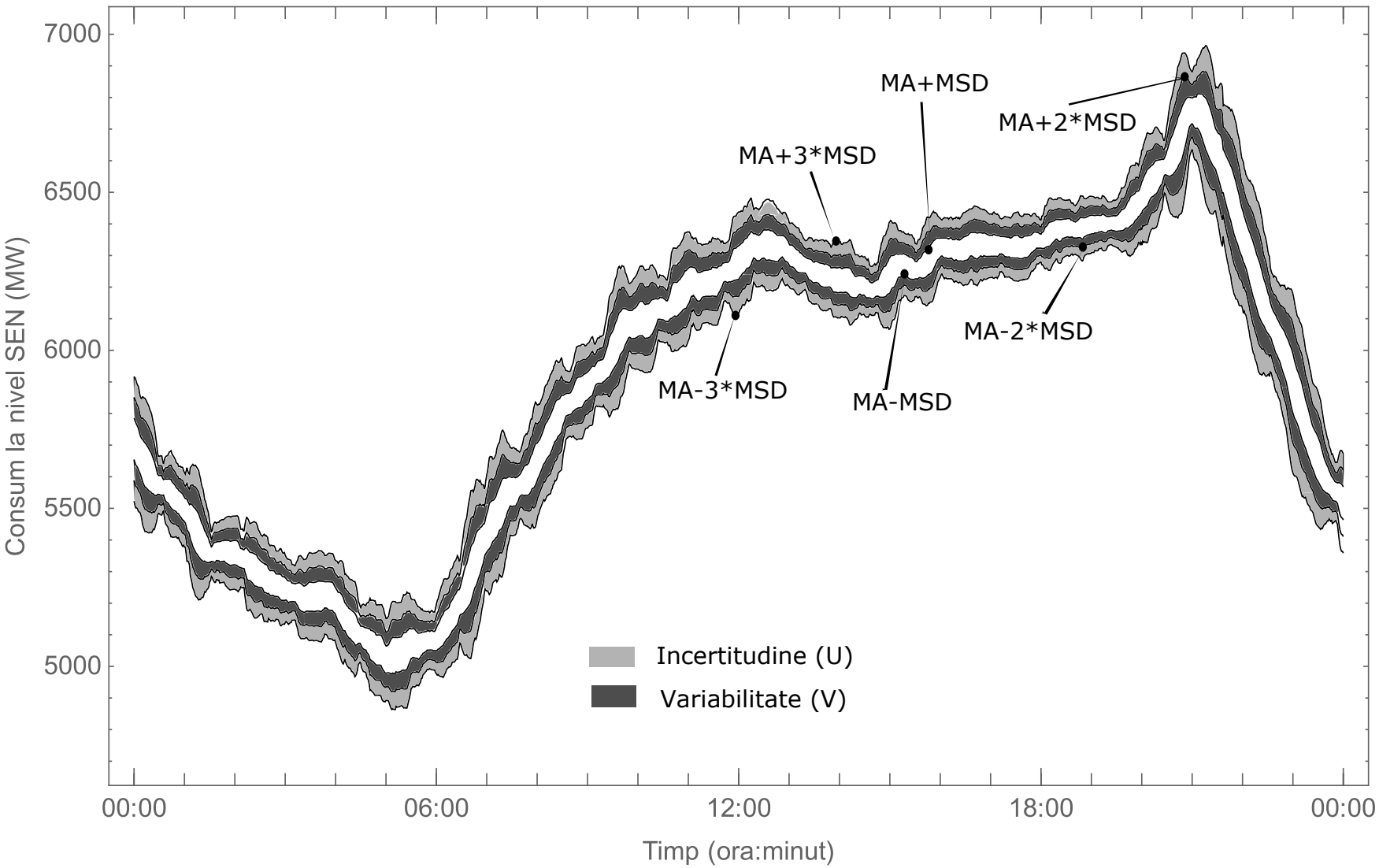
# Majoranți și minoranți



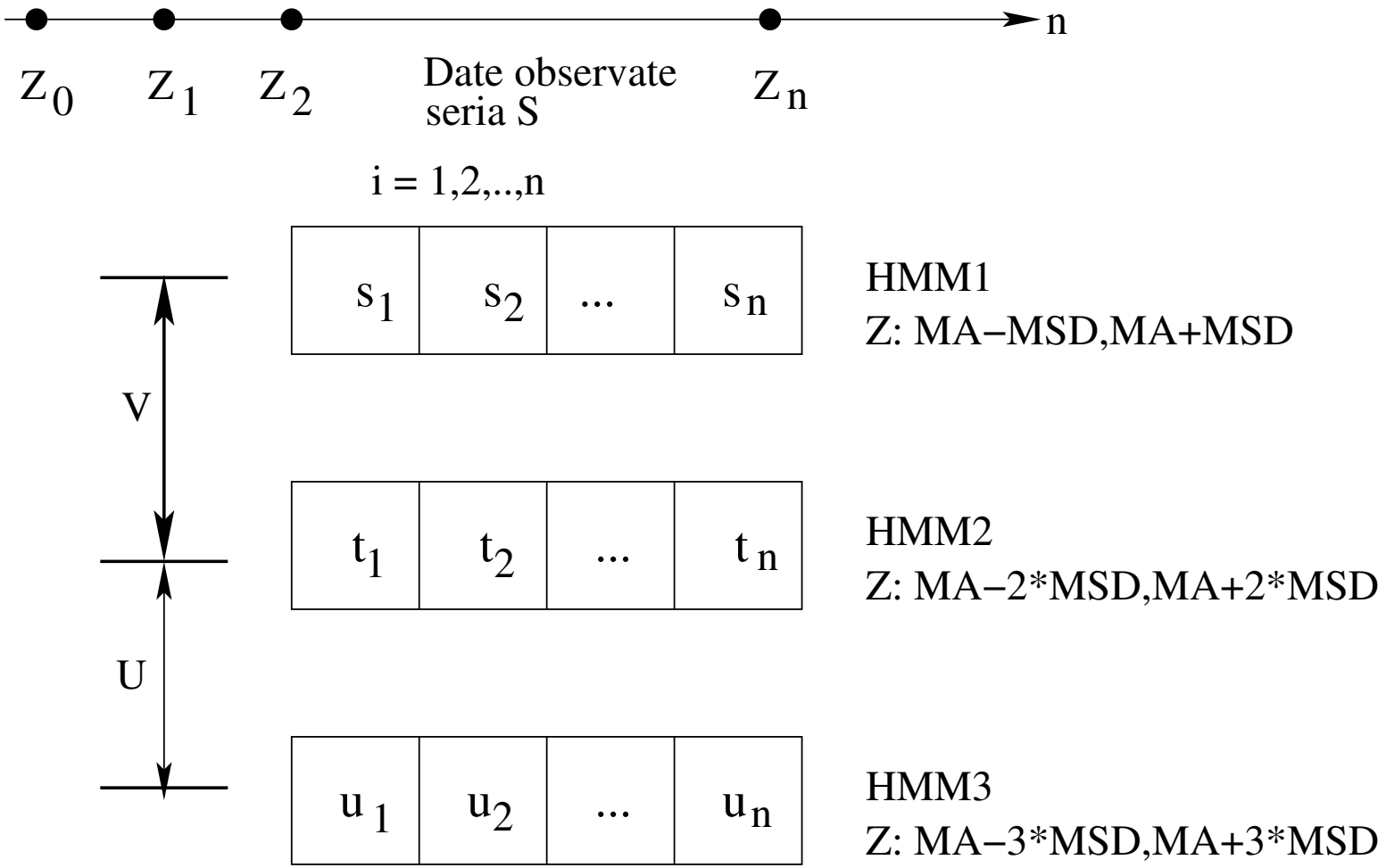
# Patru serii temporale: S, MA, MA-3*MSD, MA+3*MSD



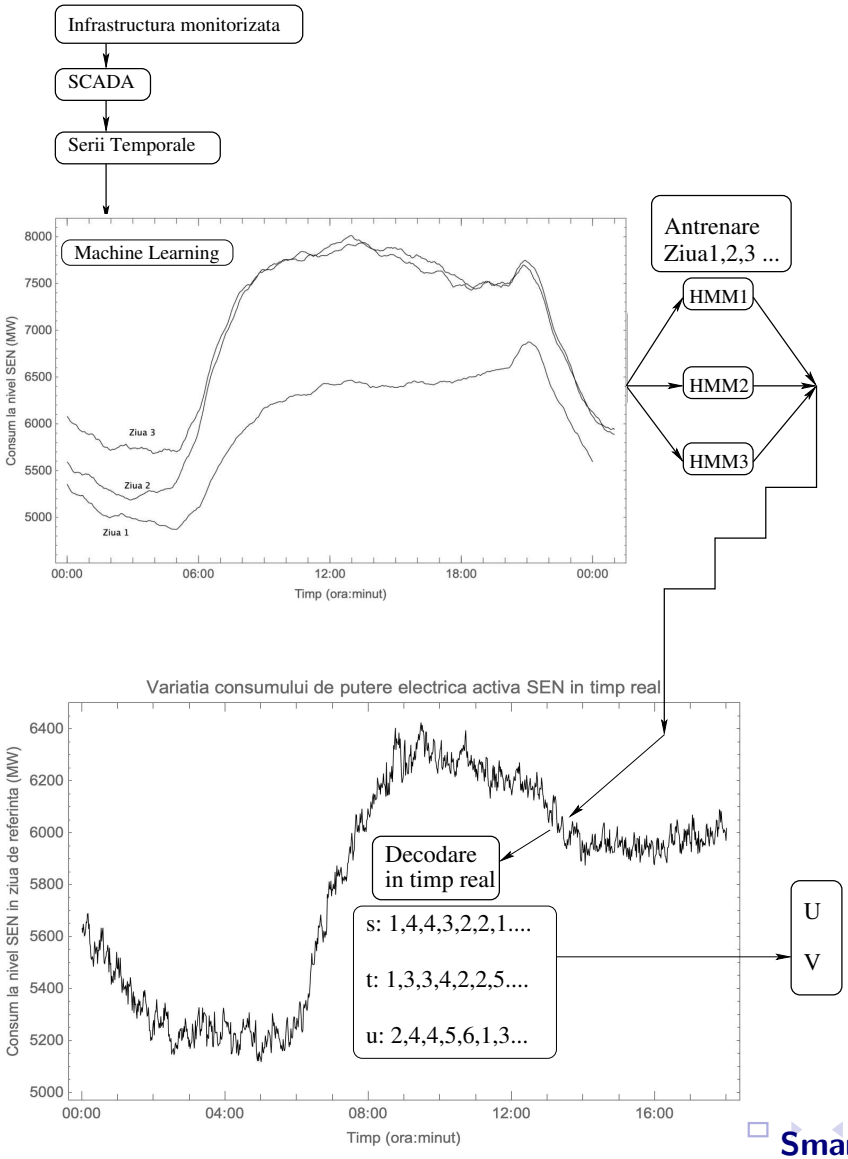
# Variabilitate și Incertitudine



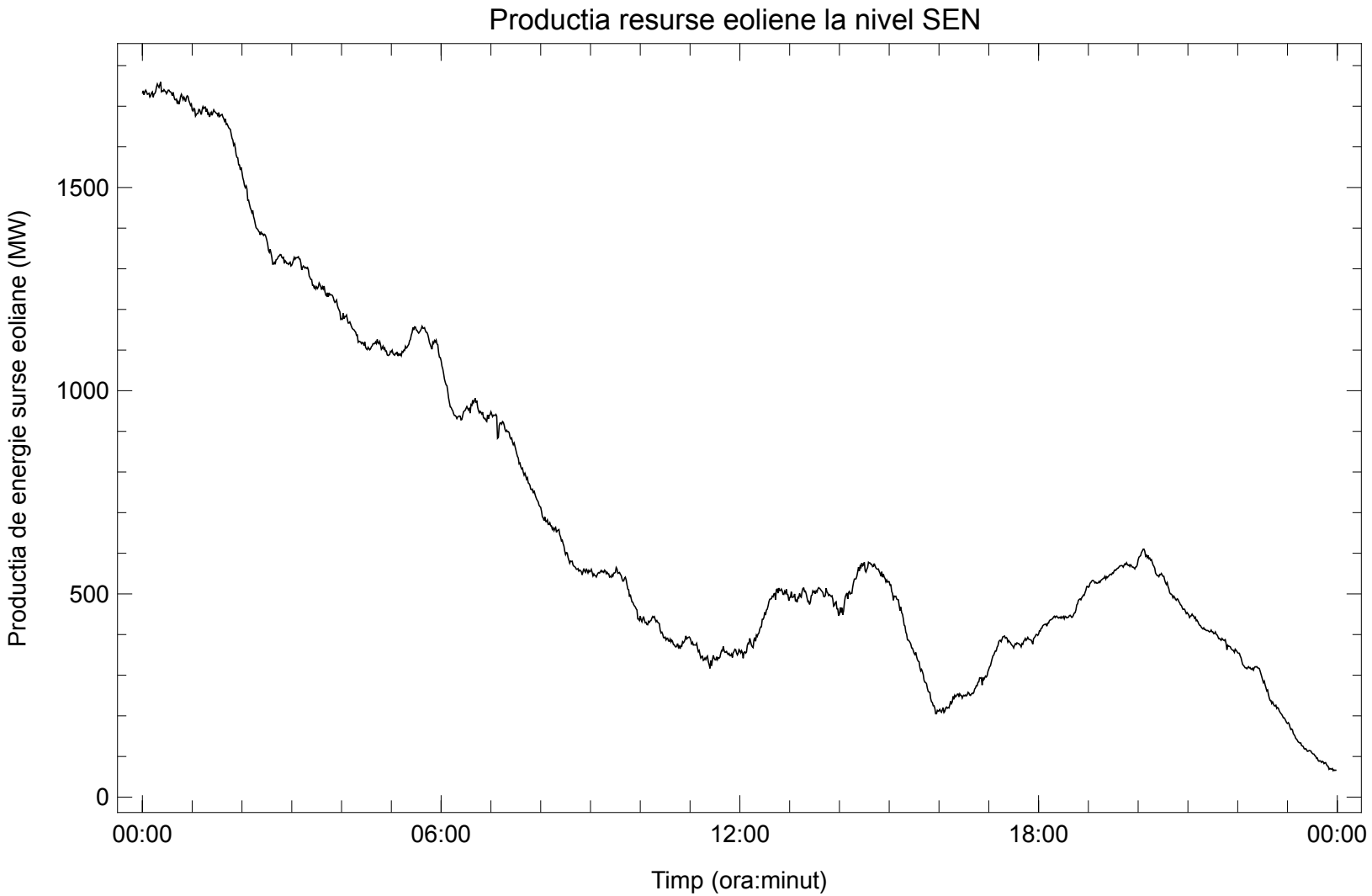
# Mecanisme ascunse



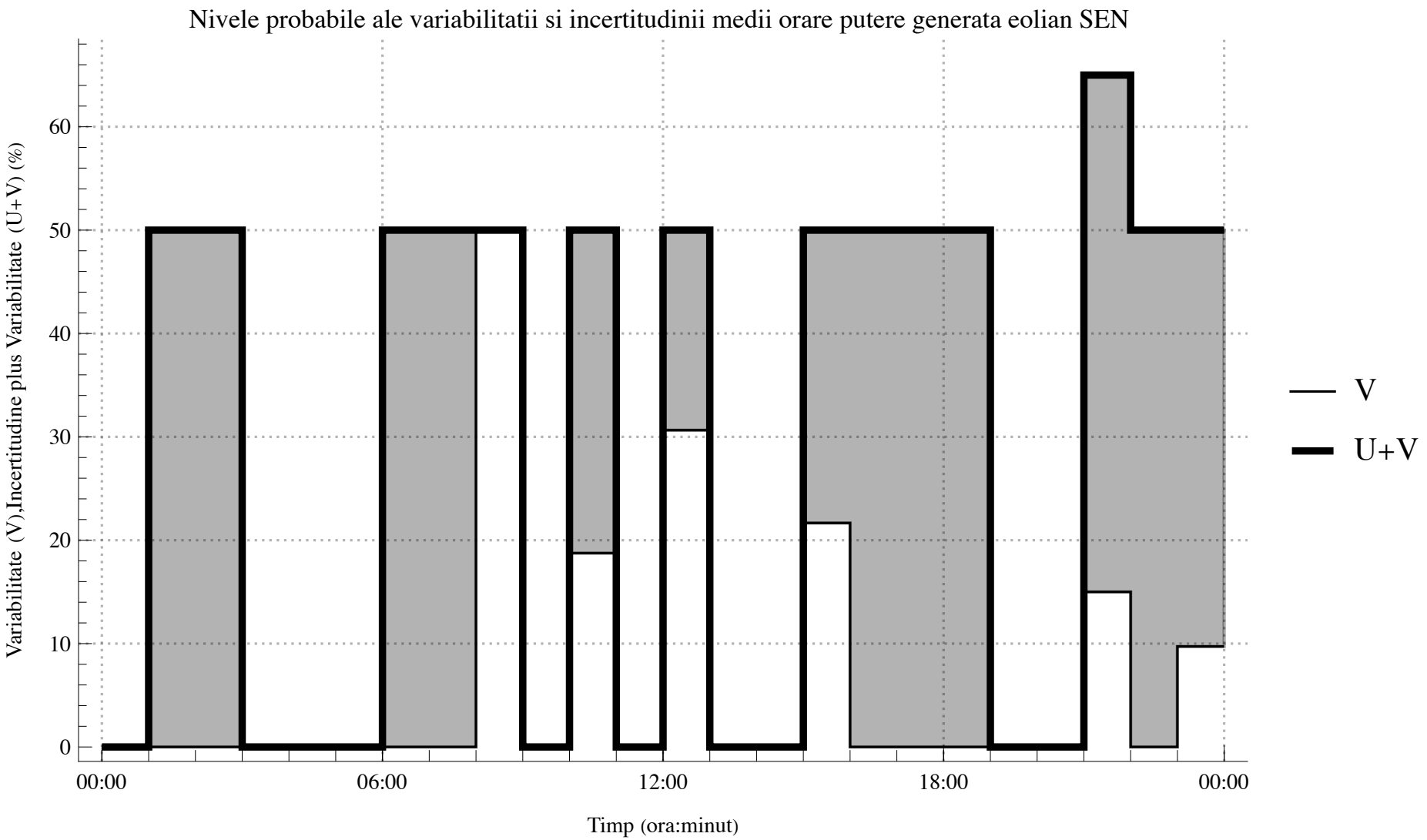
# Antrenare si Decodare



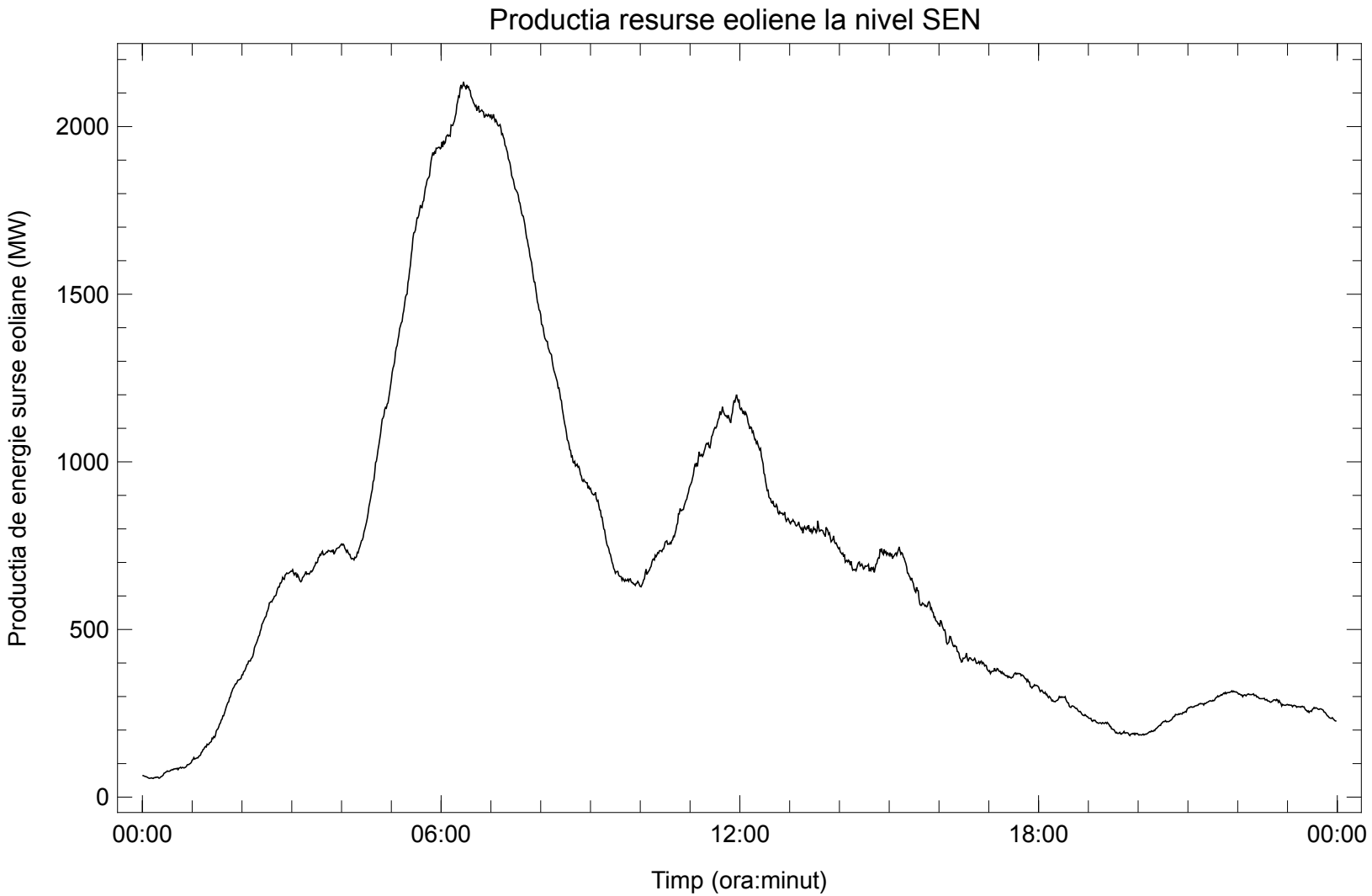
# Experiment numeric 1



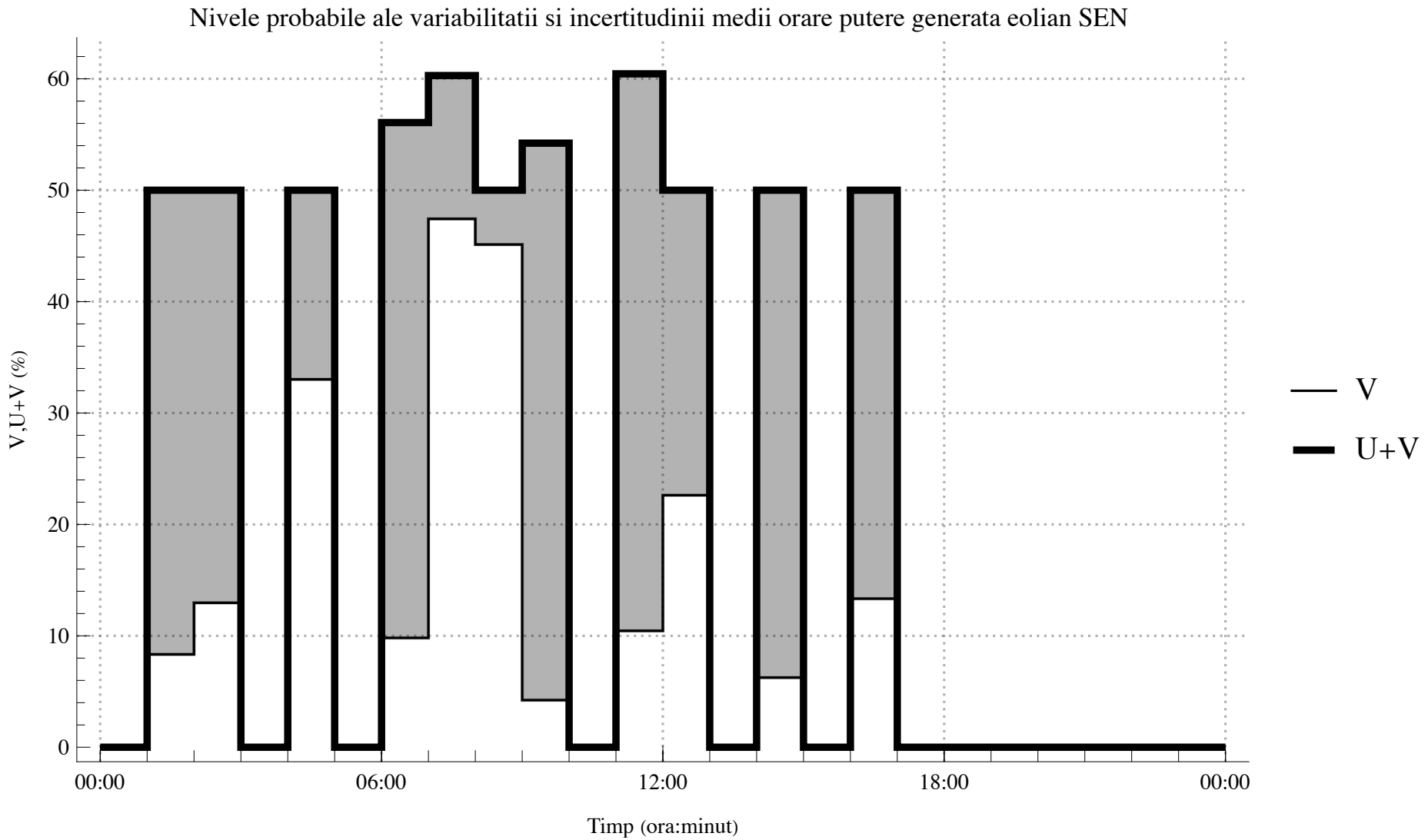
# Experiment numeric 1



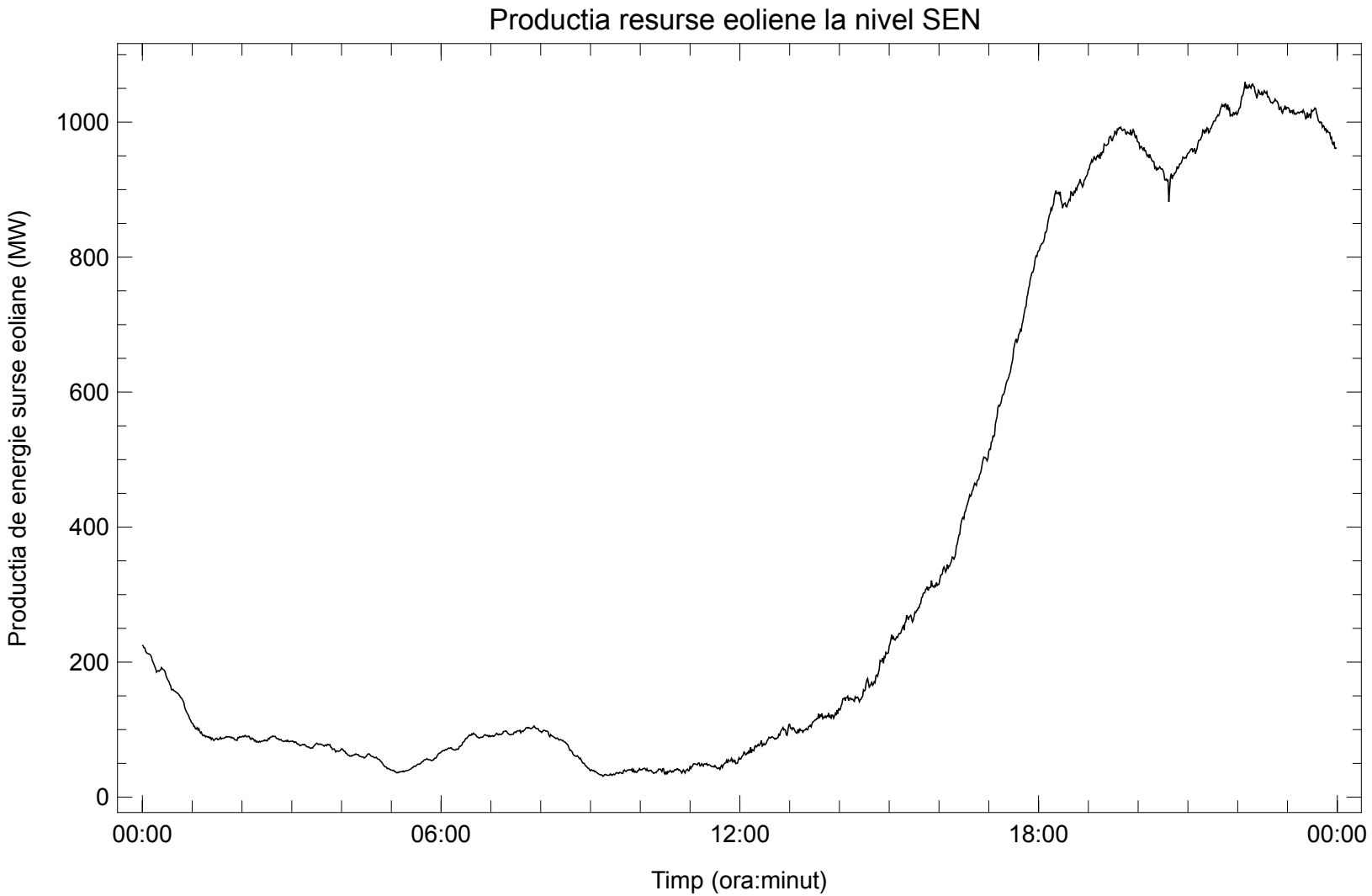
# Experiment numeric 2



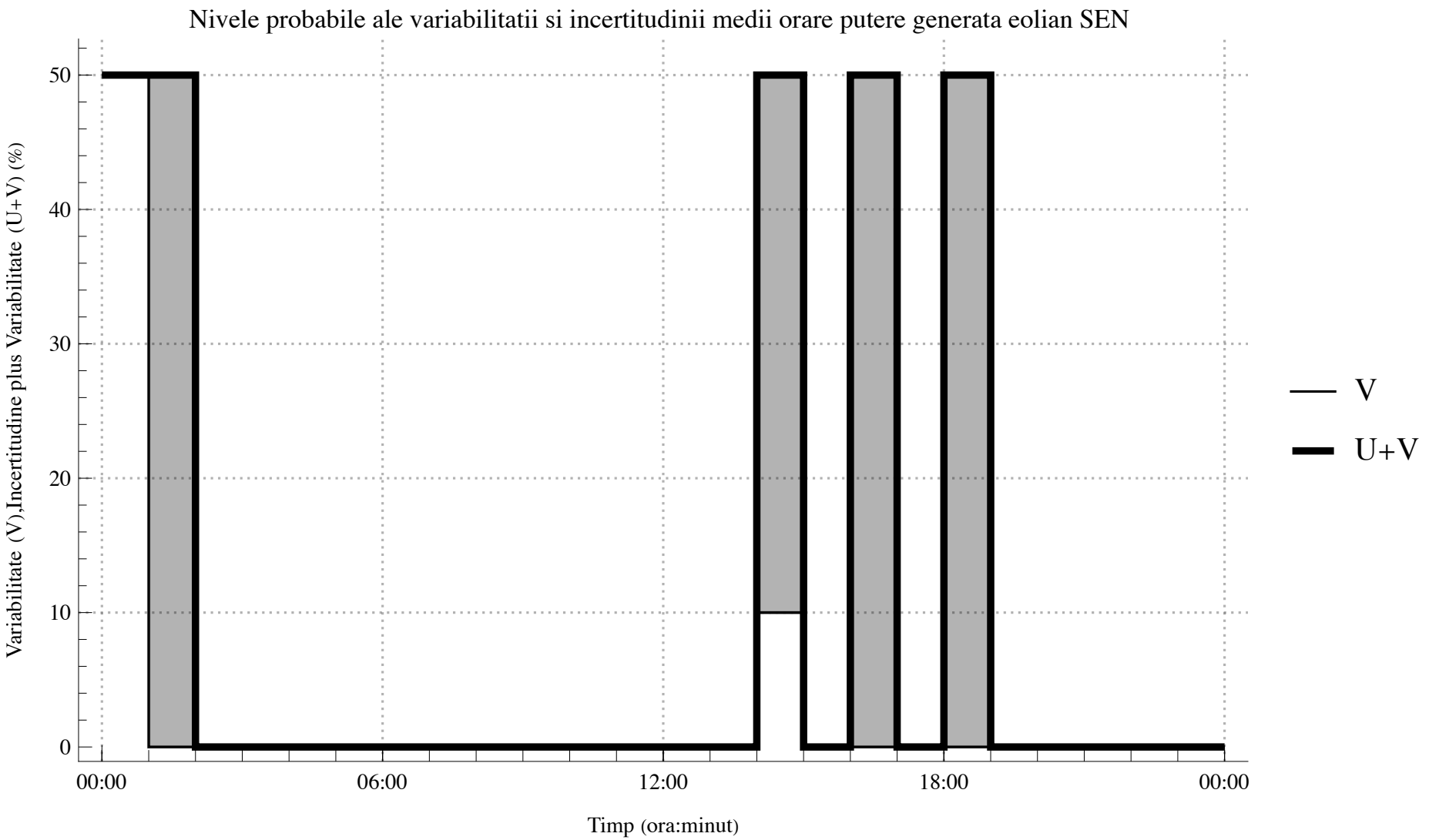
# Experiment numeric 2



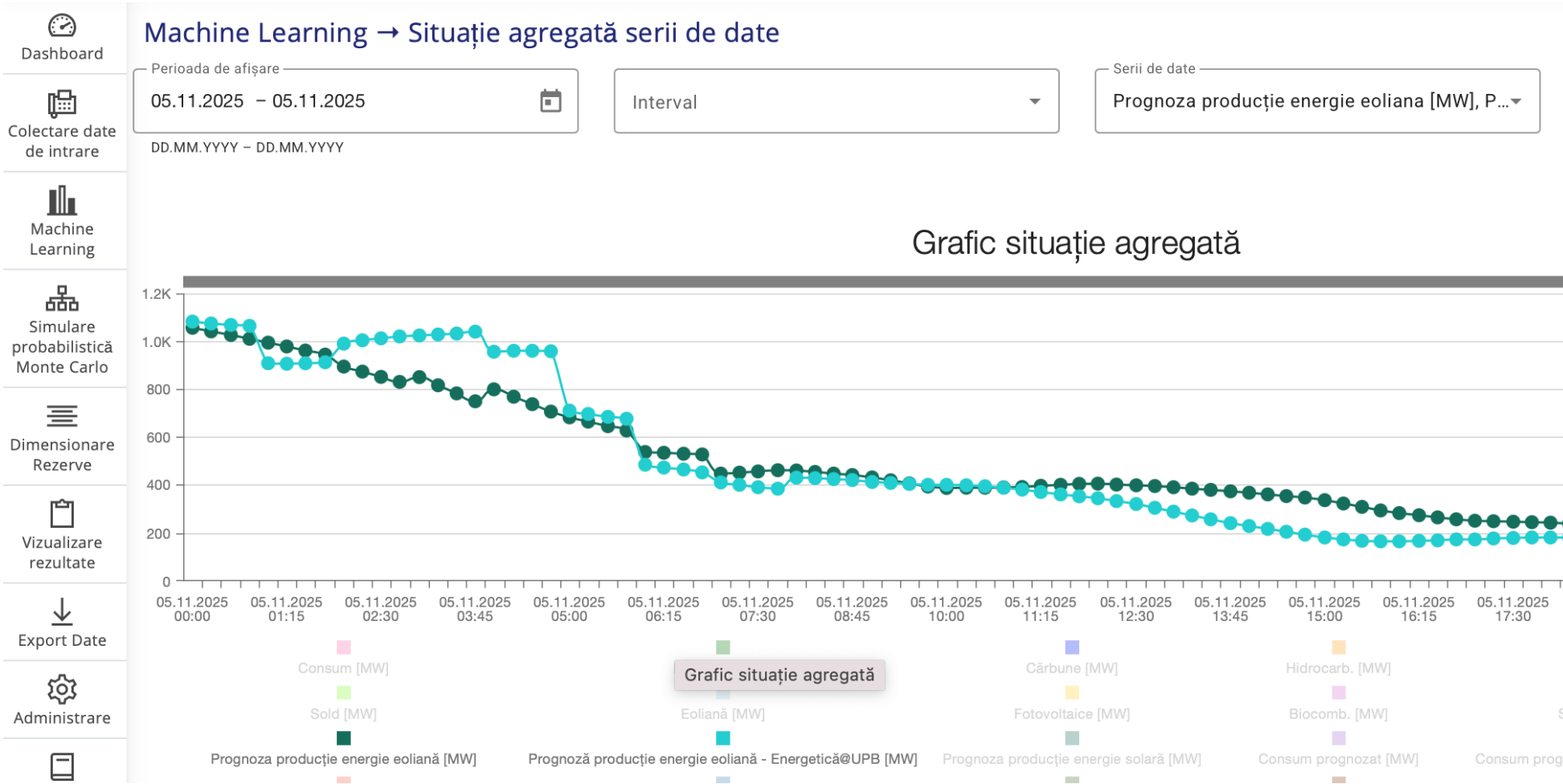
# Experiment numeric 3



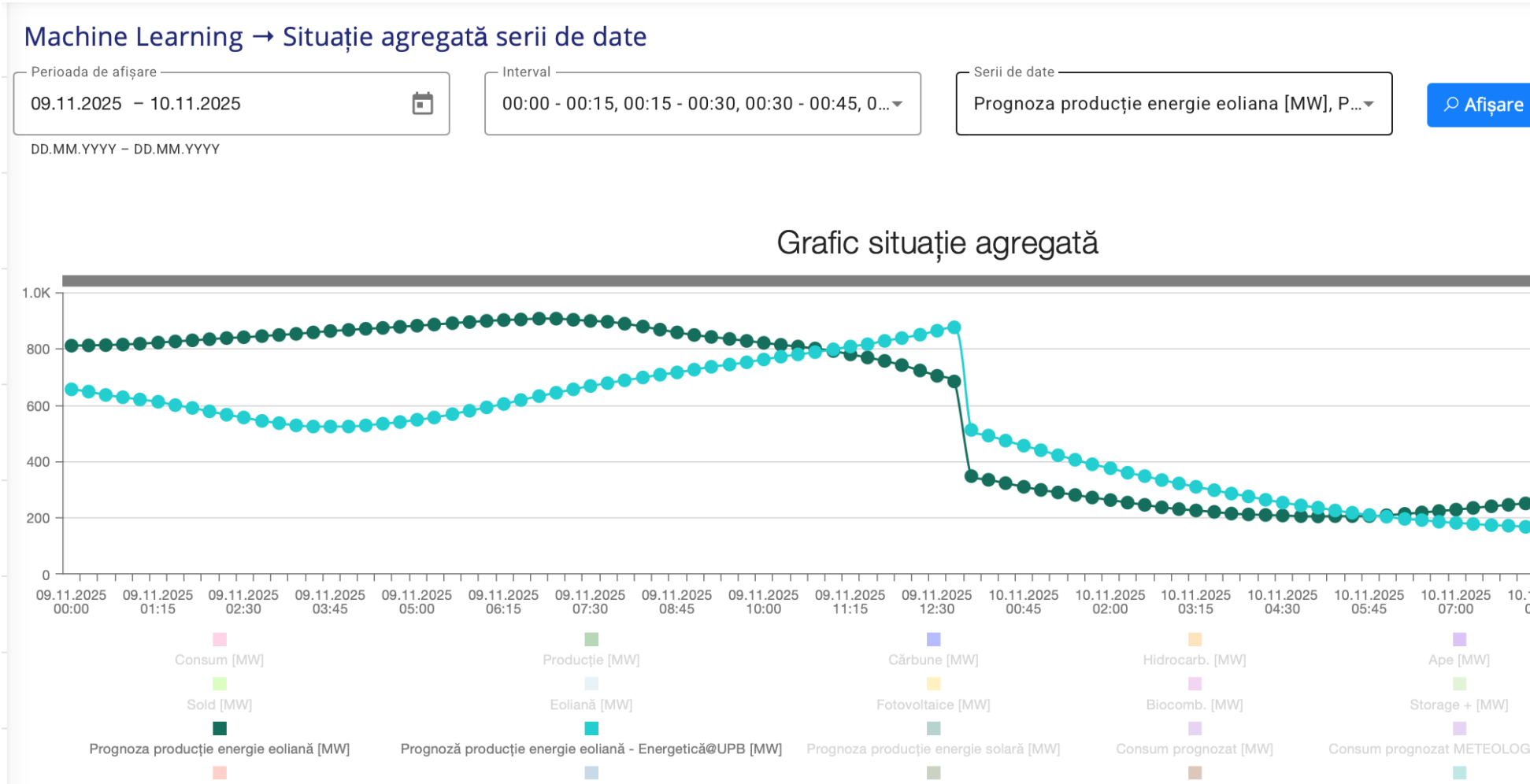
# Experiment numeric 3



# Eolian national azi



# Eolian national sfarsitul saptamanii



# In loc de concluzie

Va multumesc pentru atentie !

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