European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*
COST Action TD1105

Comparing Sensor Data with the Aid of Self Organizing Maps

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COST is supported by the EU Framework Programme
ESF provides the COST Office through a European Commission contract

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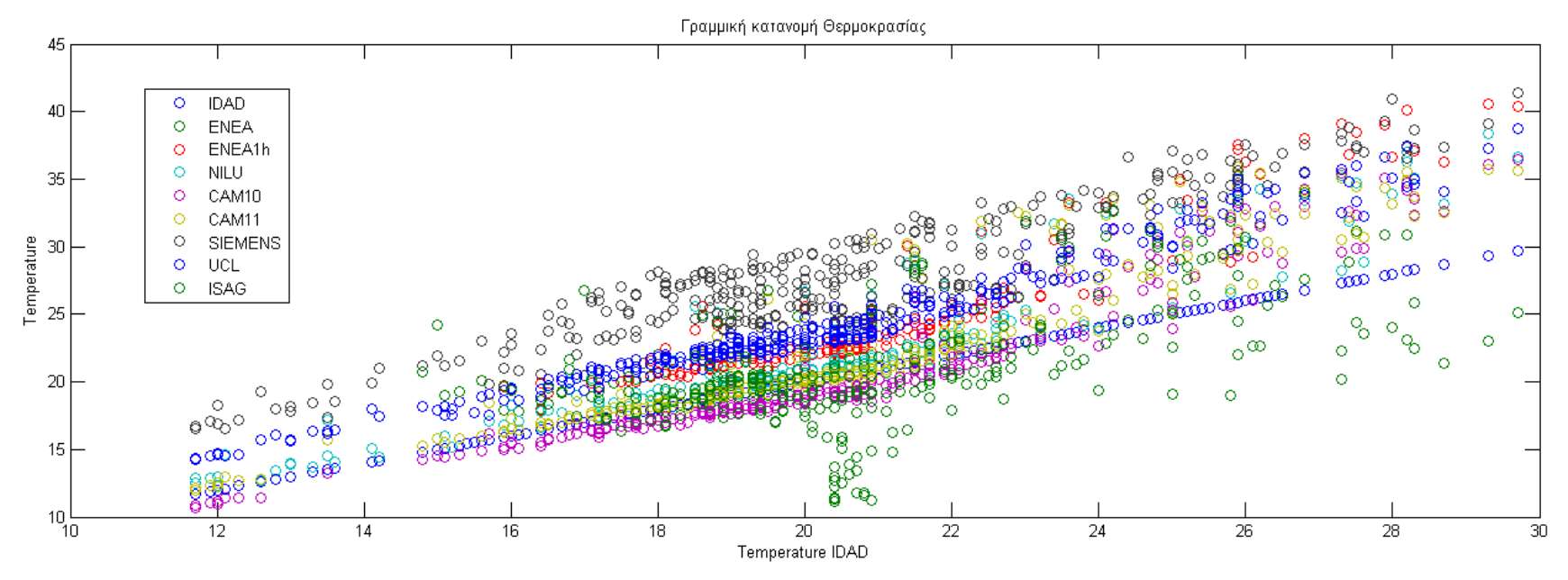
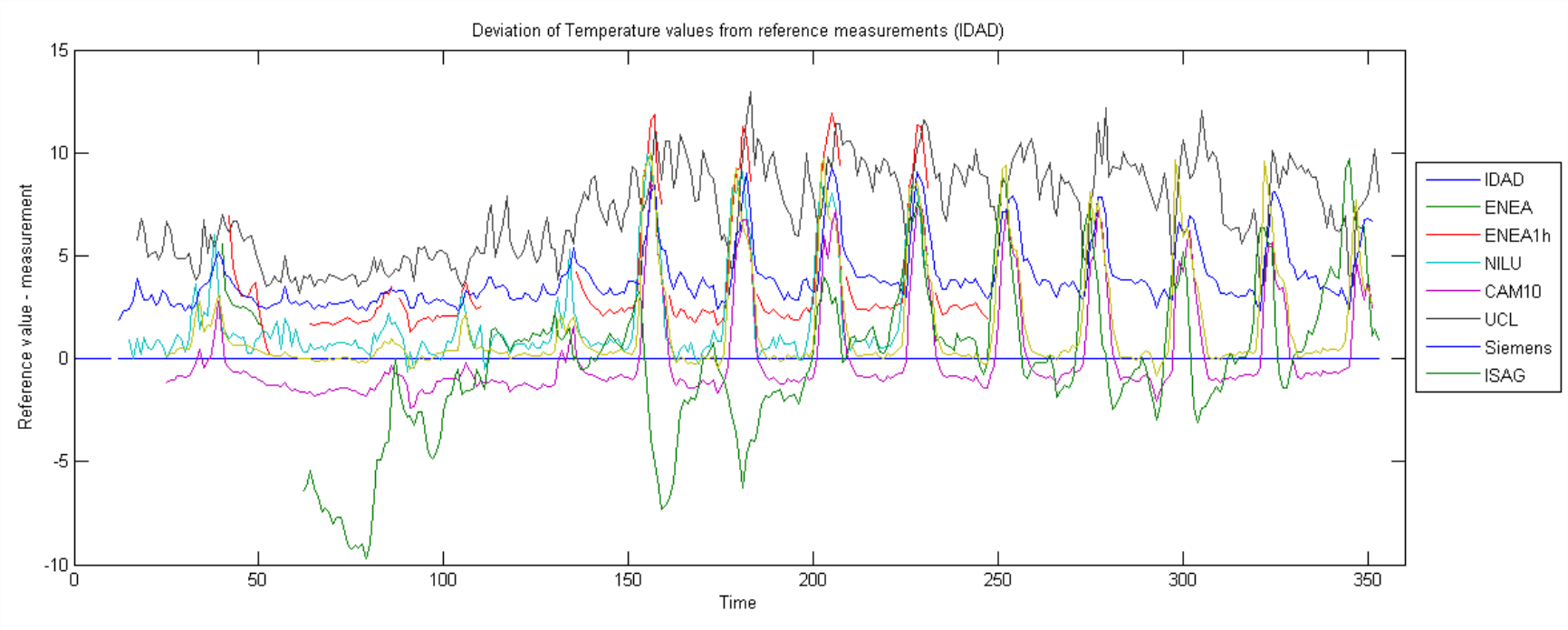
1. The need to compare sensor behavior



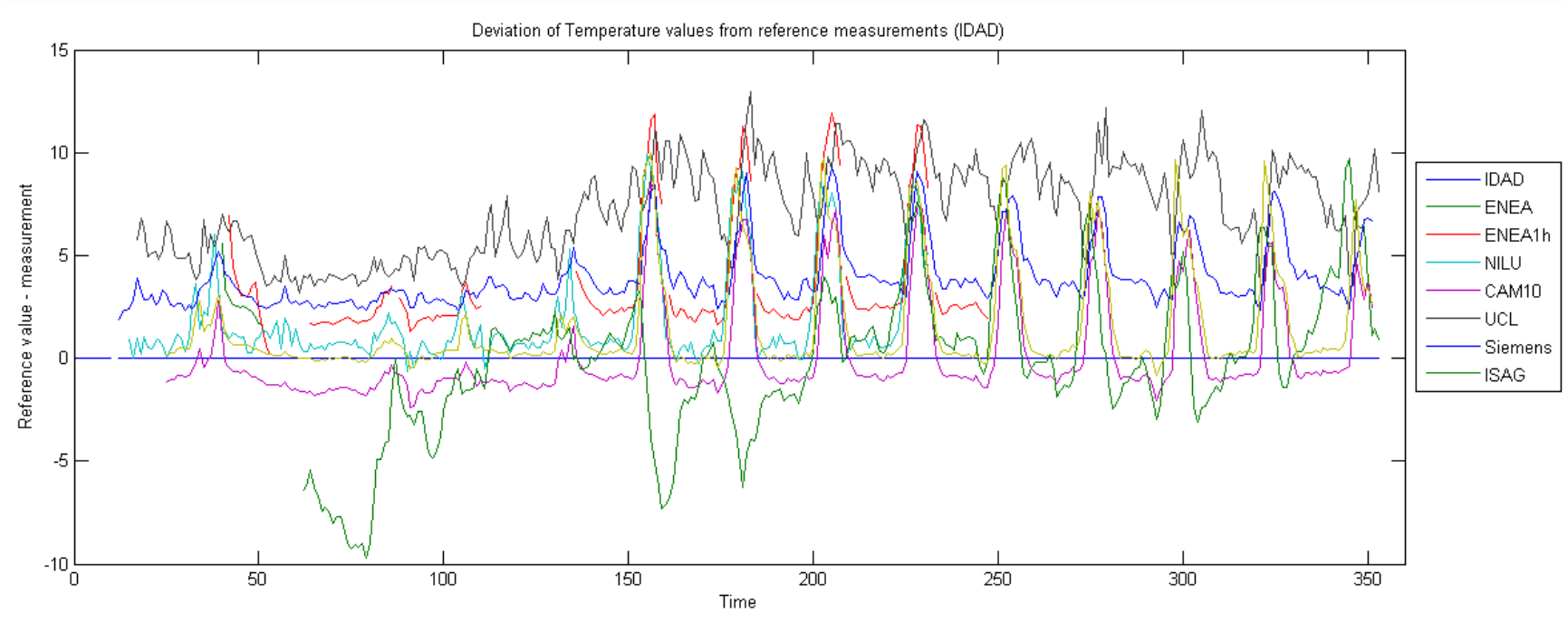
- Putting it all together is always a challenge

1. The need to compare sensor behavior



Our common starting point: differences and trends may become obvious but..

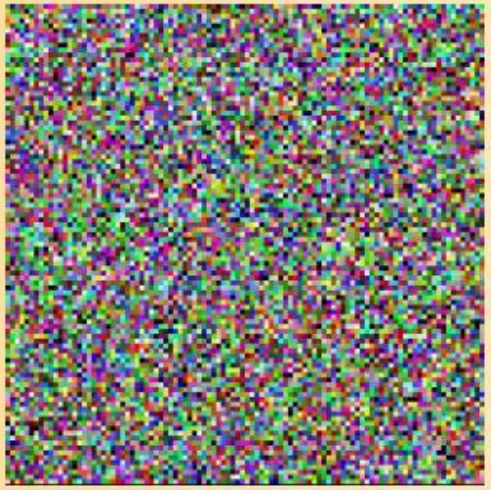
1. The need to compare sensor behavior



Our common starting point: differences and trends may become obvious but..

What about simultaneous, cross-parameter, behavior analysis?

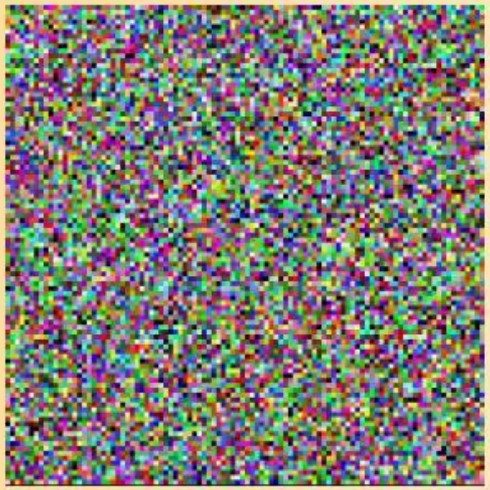
2. The SOM method



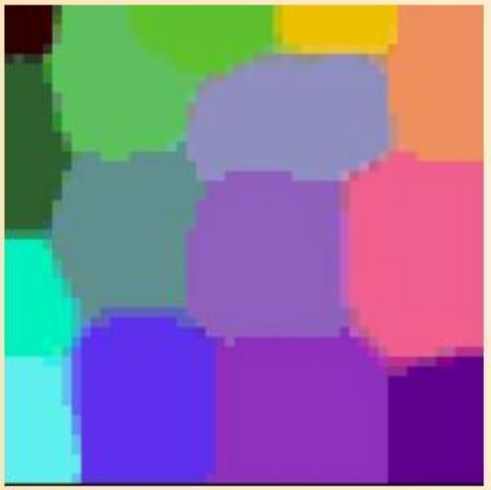
(Left) The initial stage of a Self Organization Map.

If there are relationships ("similarities" or "dependencies" within the data)

2. The SOM method



(Left) The initial stage of a Self Organization Map.

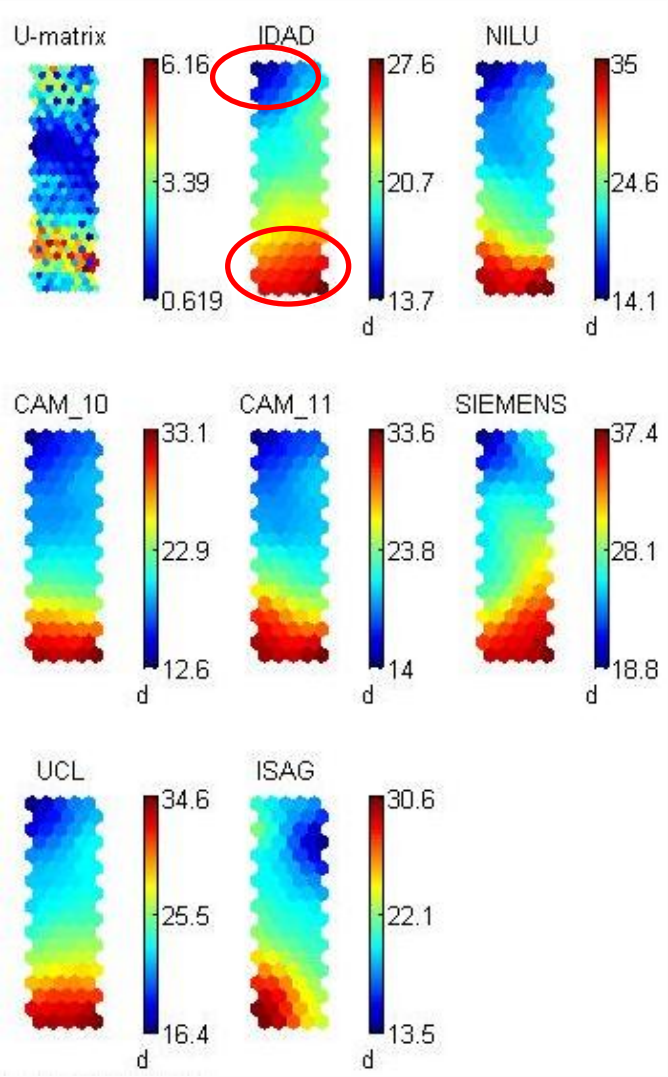


(Right) The final stage. Notice how similar colors are clustered together.

If there are relationships ("similarities" or "dependencies" within the data)

Can we identify them and create a profile?

3. Indicative results from Aveiro DB analysis

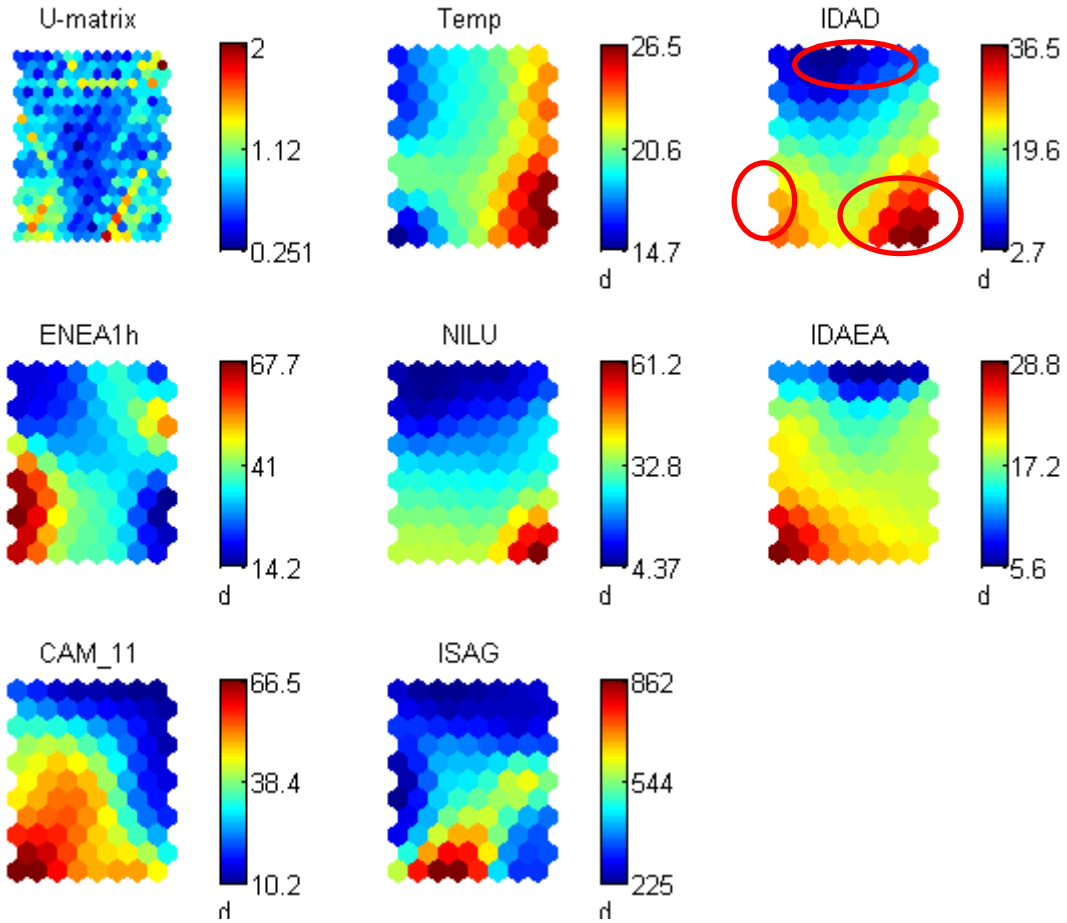


Temperature

Same areas in the SOM correspond to "similar" or "neighboring" measurement points

- Overall SOM pattern represents "real' pattern.
- All measurements in quite good agreement
- UCL and Siemens closer to IDAD

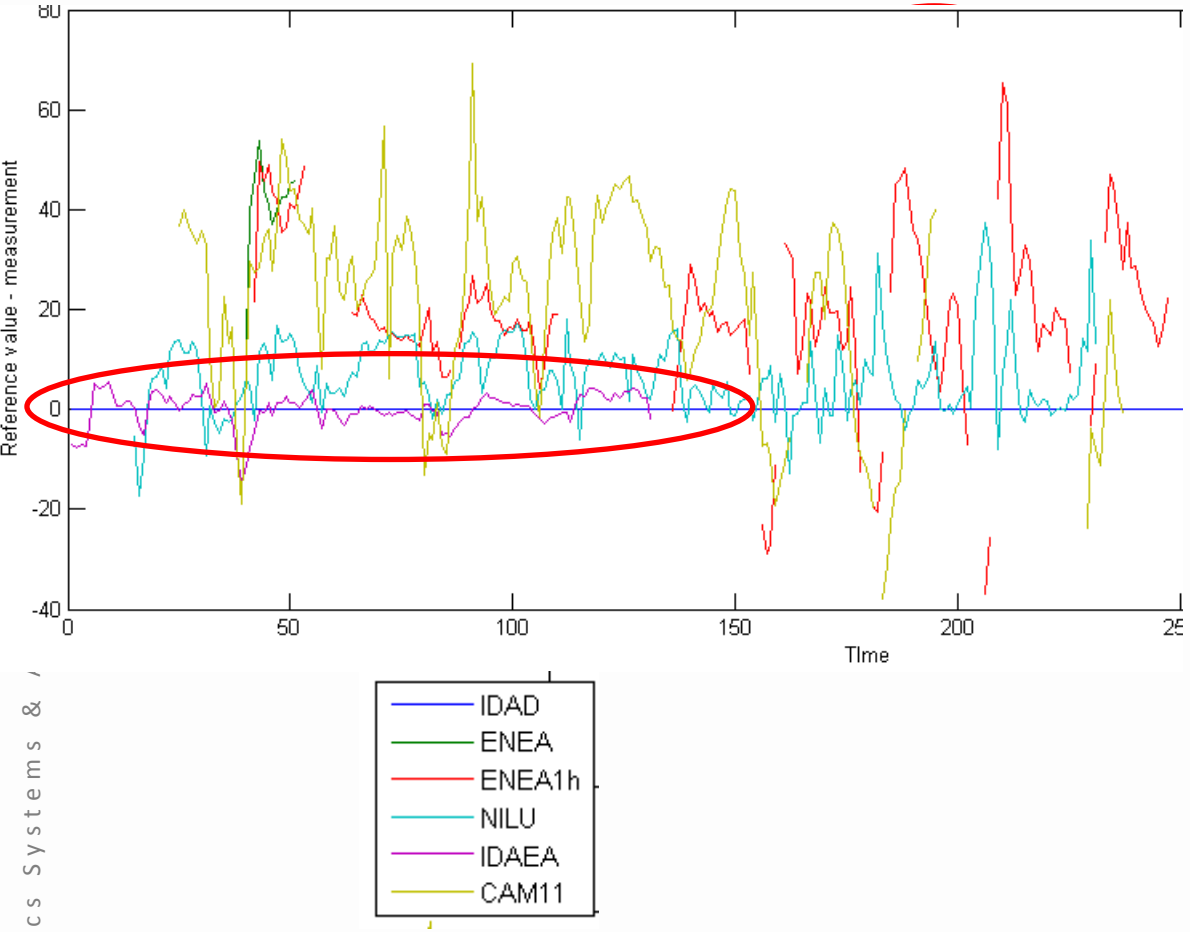
3. Indicative results from Aveiro DB analysis



O3

- Dependency from Temperature
- ENEA: high values in "wrong place", indicate sensor problems
- ISAG: wrong profile, major sensor problems.
- CAM_11: overestimations, lower sensitivity in lower values?
- IDAEA: lower sensitivity in lower values
- NILU: unbalanced behavior results in differences between higher and lower values. Overall best profile.

3. Indicative results from Aveiro DB analysis



O3

- Dependency from Temperature
- ENEA: high values in "wrong place", indicate sensor problems, incomplete dataset.
- ISAG: wrong profile, major sensor problems.
- CAM_11: overestimations, lower sensitivity in lower values~~?~~
- IDAEA: lower sensitivity in lower values due to incomplete dataset. **Overall best profile.**
- NILU: unbalanced behavior results in differences between higher and lower values. ~~Overall best profile.~~

4. First conclusions

- Profile analysis important forAQ sensor data
- An unsupervised, “inbiased” method necessary to be employed
- SOM-based analysis reveals patterns in behavior and relationships-interdependencies
- In combination with other graphs and math analysis may constitute a reference methodology for sensor data investigations

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