GAWPS - A MRST-Based Module for Wellbore Profiling and Graphical Analysis of Flow Units

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Motivation, purpose, and background

Why
“Rock typing and flow unit identification (...) have been challenging due to the complexity of pore networks (...) facies changes, and diagenetic processes. ” (Riazi, 2018)

What▶ Lack of open-source tools;
▶ Petrophysical data integration;
▶ Education and formation;

For
Provide routines that carry out graphical analysis for wellbore profiling by using classical methods and automated flow unit classification.

Background
A hydraulic flow unit is the REV of total reservoir rock whose geological and petrophysical properties are internally consistent (...)” (Amaefule, 1993)

HFUs are (Cannon, 2015):

i. facies, for geoleogists;
ii. corr. zones, for petrophysicists;
iii. reservoir layer, for engineers;
iv. all that, for modelers

Graphical methods involve:
▶ statistics;
▶ histograms and prob. plots;
▶ clustering;
Figure 1: GAWPS communication with MRST core objects.

Demo script:

```matlab
coord = [30,65; 48,100];

[G,gw,rock,indw] = resmodel(coord,’SPE10’);

[lp.F, lp.Lc] = classiclorenz(G, rock.perm, indw);
```

Figure 2: Computational routines currently available.

Code repository (+examples):
https://github.com/gcpeixoto/gawps
Figure 3: SPE10 (wells)

Figure 4: Cluster map

Figure 5: Winland plot

Figure 6: Derivative SMLP

Figure 7: MLP

Figure 8: FU classif.
Figure 9: Norne (wells)

Figure 10: UNISIM-I-D (wells)

Figure 11: NCFC plot

Figure 12: NRQI plot

Figure 13: Histogram

Figure 14: Prob. plot
Final comments

- What GAWPS still need of?
  - Feedback from experts and users
  - Tests on additional models
  - Improve RPS (baffles, barriers, FUs) clustering method
  - Expand capabilities to reach a robust release

- Acks go to:
  - Dr. K-A Lie (SINTEF)
  - Symposium organizers
  - Session audience

Cited references

- (Amaefule et al., 1993), DOI: 10.2118/26436-MS
- (Cannon, 2015), DOI: 10.1002/9781119313458
- (Riazi, 2018), DOI: 10.1016/j.petrol.2017.10.025

Further references

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- DOI: 10.1016/j.petrol.2016.06.008