Nick Howes

nchowes@gmail.com
nhowes@thewaterinstitute.org

Applied scientist and consultant with twelve years industry experience in geological data science and machine learning deployment: eight years in a cross-disciplinary team at Shell focused on subsurface characterization; four as a customer-facing software consultant at MathWorks, a developer of mathematical software. Domain expertise in geoscience, but committed to continuous learning, and have led consulting projects for clients in the energy, extraction, medical, manufacturing, semiconductor industries, and government.

Experienced in project requirement gathering, self-directed research, analytical reasoning, data integration, numerical modeling (physics-based and machine-learning), and guiding projects off the ground to a successful completion. Able to convey complex concepts via data visualization, publication, clear communication with stakeholders, and have presented at industry meetings, scientific conferences, and in governmental (state) settings. Value the feedback of others. Prioritize and foster strong collaborative relationships in technical and cross-functional interactions.

Experience

Senior Technical Consultant

MathWorks Inc., 2017-2021

- Helped organizations scope, develop, and deploy science and engineering solutions to address key business needs using MATLAB based software. Supported clients in energy, medical, manufacturing, and semiconductor industries, as well as regulatory governmental bodies.

- Led projects in areas of: artificial intelligence (AI), predictive maintainenace, data/experimentation management including "out-of-memory" big data, application development, cloud and on-premise parallelization/deployment, and domain specific numerical/analytical simulations.

- Responsible for pre-sales, customer-facing and internal project management, communication, and delivery on projects ranging in scope from 50-2500 hours.

- Developed internal software tools actively in use by the MathWorks consulting organization, including an automated machine learning framework. Contributed to features released in the commercial MATLAB product in the areas of geospatial mapping, data management, and AI.

- Co-authored conference proceedings with clients, including a geophysical application using passive seismic and machine learning for monitoring carbon capture and storage, and onshore exploration. The work was recognized with a top 25 paper award at the 2019 Society of Exploration Geophysicists Annual Conference (out of 1,077 submissions).

- Selected to attend and present at the 2018 MATLAB energy advisory board, which was established to coordinate MathWorks product strategy with significant users in the energy industry.

- Mentored entry-level engineers (1-3 years post-grad) in technical and non-technical skills required for consulting. These engineers actively contributed to customer facing projects, and later joined the organization as internal hires.

Applied Scientist

Shell International Exploration and Production B.V., 2009-2017

- Prototyped candidate technologies and new creative solutions to address workflow gaps in quantitative geological characterization and stratigraphic modeling of subsurface reservoirs as part of a cross-disciplinary team of geologists, geophysicists, and reservoir engineers.

- Appointed subject-matter expert (SME) in shallow marine and fluvial reservoir characterization (awarded 2016). Role was to coordinate with producing assets and communicate practical strategies for improved subsurface characterization and future development.

- Originated a subsurface analytics and AI platform to assess acreage with significant reservoir uncertainty and associated risks (sub-seismic scale). The proprietary technology is deployed as a desktop and web-based application, and has been validated in various business scenarios. The technology share of value in investment/divestment decisions to-date is >$150M.

- Developed a proprietary data framework/warehouse ("georecords") to store unstructured geologic data and automate feature engineering for machine learning. Data included georeferenced seismic and satellite images, interpretations, core, and well-log data.

- Applied novel stratigraphic modeling techniques in deepwater, shallow marine, and fluvial clastic oil and gas reservoirs to characterize field recovery and inform planning decisions. Techniques included reduced complexity and surface based models.

- Reservoir appraisal and development consulting for upstream projects in U.S., Canada, Australia, New Zealand, and Oman including static (geologic) and dynamic simulation. These projects included sector and full-field models, development of custom stratigraphic models, and authoring ECLIPSE grids for fluid simulation.

- Created content and led internal training course "Basins and Reservoirs" focused on geologic characterization of conventional reservoirs for the Shell Graduate Program (new hires) established in 2013. The course emphasized reservoir interpretation in the context of the larger depositional system, and taught source to sink and stratigraphic concepts using the Quaternary geology/geomorphology of Gulf of Mexico coastal plain and shelf.

Research Assistant - Teaching Fellow

Boston University, 2007 - 2009

- Research focused on prediction of coastal and wetland response to sea-level rise and storms using empirical data analysis and numerical models. Thesis: The impact of Wetland Loss on Inlet Morphology and Tidal Range Within Barataria Bay, Louisiana.

- Scripted data pre- and post-processing workflows in MATLAB to build inputs and analyze outputs of hydrodynamic numerical models (FVCOM and Delft3D). Contributed the model grid and configuration files used to develop a large scale hydrodynamic model of coastal Louisiana in a joint collaboration with Dr. Ioannis Georgiou at University of New Orleans. This model was used to plan/coordinate Coast Guard activities in the Macondo oil spill response.

- Acquired and post-processed (or digitalized) various geophysical, geotechnical, and sedimentological field and lab data including: acoustic doppler current profiler (ADCP), single beam sonar, ground penetrating radar, shear vane testing, and vibra/geoprobe coring.

- Developed an earth surface process model of wetland loss for the I-10 "Land bridge" corridor in Louisiana. Result was combined with FVCOM to examine potential impact of wetland loss on regional and event-scale hydrodynamics.

- Teaching fellow for Sedimentology: designed and led lab section.

Education

- Boston University, M.A. Earth Sciences, 2009 (GPA 4.0)
- Boston University, B.A. Earth Sciences, 2007 (Presidential Scholarship Recipient)

Proficiency

- Software development: Python, MATLAB
- Scientific / machine learning tech stack
- Object oriented programming, unit testing
- Geographic information systems / Geospatial frameworks (GIS): ArcGIS, QGIS, GDAL
- Subsurface software: Petrel, ECLIPSE, Shell proprietary interpretation software
- Compilation of domain-specific models (in Fortran, C, C++): Delft3D, FVCOM, GEOSX, generic scientific research code
- Low code app deployment / visualization frameworks: Streamlit, Plotly
- Database integration: SQL, NoSQL, cloud databases
- Cloud services: AWS, Azure (provisioning resources, remote file datastores, low/no-code ML offerings)
- Version control: Git, SVN, GitHub Actions (CI/CD)

Publications

Peer Reviewed [Selected]

- **Howes N.C.**, FitzGerald D.M., Hughes, Z.J., Georgiou I.Y., Kulp M.A., Miner M.D., Smith J.M., Barras J.A. 2010. Hurricane-induced failure of low salinity wetlands. Proceedings of the National Academy of Sciences of the United States of America, 107(32): 14014-14019.
- Jobe, Z.R., **Howes, N.C.**, Auchter, N. 2016. Comparing submarine and fluvial channel kinematics: Implications for stratigraphic architecture. Geology. 44(11): 931–934.
- van der Vegt, H., Storms, J.E.A, Walstra, D.J.R., **Howes, N.C.**. 2016. Can bed load transport drive varying depositional behavior in river delta environments? Sedimentary Geology. 345 (19-32).
- Martin, J., Fernandes, A. M., Pickering, J., **Howes, N.C.**, Mann, S., Neil, K. M. C. 2018. The stratigraphically preserved signature of persistent backwater dynamics in a large paleodelta system: the Mungaroo Formation, northwest shelf, Australia. J. Sediment. Res. 88, 850–872.
- Pettinga, L., Jobe, Z.R., Shumaker, L., **Howes, N.C.**. 2018. Morphometric scaling relationships in submarine channel-lobe systems. Geology 46(9): 819-822.
- Jobe, Z.R., **Howes, N.C.**, Straub, K.M., Cai, D., Deng H., Laugier, F.J., Pettinga, L.A., Shumaker, L.E. 2020. Comparing aggradation, superelevation, and avulsion frequency of submarine and fluvial channels. Frontiers in Earth Science. 8:53.
- van der Vegt, H., Storms, J.E.A, Walstra, D.J.R., Nordahl, K., **Howes, N.C.**, Martinius, A.W. 2020. Grain size fractionation by process-driven sorting in sandy to muddy deltas. The Depositional Record. 6(1).
- **Howes N.C.**, D. Kirschner, J. Mukherjee, and C. Daly. 2021. Detecting P-and S-wave arrivals with a long-short term memory (LSTM) network. Journal of Geophysical Research: Solid Earth. In Review.

Internal Reports [Shell]

- Jobe, Z.R., **Howes, N.C.**, Auchter,N. 2016. Comparing submarine and fluvial channel kinematics: Implications for stratigraphic architecture. SR.16.10895.
- Jobe, Z.R., Sylvester, Z., **Howes, N.C.**, Pirmez, C., Parker, A., Cantelli, A., Smith, R.D.A., Wolinksy, M.A., O'Byrne, C., Slowey, N., Prather, B. 2016. High resolution, millennial-scale patterns of bed compensation on a sand-rich submarine lobe, western Niger Delta slope. SR.16.10896.
- **Howes, N.C.**, Jobe, Z.R., Martin, J., Wolinsky, M.A., Bergman, S., Xue, G., Smith,R. 2015. Quantitative geologic characterization in channelized environments: Demonstration of the Modern analog database and analytics with case studies. SR.15.11628.
- Xue, G., **Howes, N.C.**, Martin, J., Ghammari, M., Smith, R. 2015. Impact of reservoir architecture on dynamic response in channelized fluvial reservoirs. A new workflow demonstrated on Sadad Field, Gharif Formation, Oman. SR.15.11631.
- Jobe, Z.R., Sylvester, Z., Parker, A.O., **Howes, N.C.**, Slowey, N., Pirmez, C. 2015. Rapid adjustment of submarine channel architecture to changes in sediment supply. SR.15.11783.
- **Howes, N.C.**, Martin, J., Jobe, Z.R., Brown, M. 2014. Modern analog database and analytics. SR.14.12715.
- Martin., J.M., **Howes, N.C.**, Rossi, V., Ghammari, M. 2014. Vertical scaling relationships in channels revisited: Insights from a global literature review and new methodologies. SR.14.12681.
- Jobe, Z.R., Sylvester, Z., **Howes, N.C.** 2014. Thin-bedded turbidite reservoirs: Depositional environments, shallow analogs, and a new database. SR.14.12403.

- Noirot, J.C., Alpak, F.O, McDiffet, D. Wolinksy, M.A., **Howes, N.C.**, Sylvester, Z., Barton, M.D., Chen, T., Dash, A., Tiller, G.M., Gradillas, B.M., Varner, M.A., Balogun, T.S. 2011. Stones appraisal: Computation and implementation of pseudo-relative permeability curves capturing the dynamic impact of fine scale stratigraphic details in the full field model. EP 2010-3248

Presentations and Media Reach

- 2019. Detecting P- and S- wave arrivals with a recurrent neural network. Society of Exploration Geophysicists Annual Meeting, San Antonio, TX. *Top 25 in Conference Award*.
- 2018. Deep Learning on sequence and time series data. MATLAB Houston Advisory Board, Houston, TX.
- 2016. Subsurface analytics and AI platform: Technology demonstration. Shell Global Exploration Conference, Houston, TX.
- 2015. Channel scaling and dynamics in the fluvial marine transition. SEPM Research Symposium: Channels, from geomorphic expression to stratigraphic record. AAPG Annual Meeting, Denver, CO. *Invited Speaker*.
- 2014. Subsurface analytics and AI platform: Technology demonstration. Shell Global Exploration Conference, London, UK.
- 2013. A conceptual framework and classification for the fluvial-backwater-marine transition in coastal rivers. International Conference of Fluvial Sedimentology, Leeds, UK.
- 2012. A conceptual framework and classification for the fluvial-backwater-marine transition in coastal rivers globally. American Geophysical Union Fall Meeting, San Francisco, CA.
- 2011. A novel method linking processes and stratigraphy in a tidal environment: Barataria Basin, Louisiana. AAPG International Meeting, Milan, Italy.
- 2010. Controls on wetland loss during large magnitude storms: A case study in Breton Sound, Louisiana. Governors Advisory Board for Coastal Activities, Baton Rouge, LA.
- 2010. Controls on wetland loss during large magnitude storms: A case study in Breton Sound, Louisiana. American Geophysical Union Fall Meeting, San Francisco, CA.
- 2010. Freshwater wetlands vulnerable in hurricanes. BBC science news

Affiliations

- Chevron Center of Research Excellence - Colorado School of Mines
- American Geophysical Union

Other

- Licensed pilot since 2003.