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What have we been talking about? A data-analytics retrospective on Geoconvention

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Summary

Geoconvention is an annual geoscience conference held in Calgary and hosted by Canadian Energy Geoscientists Association (CEGA) formerly known as Canadian Society of Petroleum Geologists (CSPG), Canadian Society of Exploration Geophysicists (CSEG) and Canadian Well Log Society (CWLS). Using abstract titles dating back to 2004, we have applied Python scripting on the Jupyter platform to understand changes in themes and draw out trends. What are the topics that we are discussing more today than a few years ago? What are the topics that we talked about a lot and are no longer discussing? Using this retrospective approach, can we understand the trends that we are seeing into the near future and what does it mean for the next generation of geoscientists?

Purpose and Workflow

Over the course of the next decade, geoscientists will require an evolving set of skills to meet the demands of the energy transition and the developing need for digital applications. To understand trends in geoscience themes and what the current trends are, we performed a retrospective analysis of the Geoconvention poster and oral talks.

Between 2004-2022, a total of 5967 abstracts for talk titles are listed on the Geoconvention website. Machine learning was used to help with the classification and characterization of the themes that have been discussed. A first-pass extraction of the common words helped us frame categories and sub-categories into an initial keyword look-up table, which we were then able to use Python coding to allocate specific abstracts to themes. A couple of iterations were required to identify common bi-grams and tri-grams, as well as identify problematic keywords.

Once the talks were appropriately characterized, we were able to query the data for trends in themes by identifying words and themes commonly occurring together and how many talks hit on multiple themes.

Observations

Three years stand out from the general trends observed. Two of those years (2010 and 2020), were the years that Geoconvention was co-hosted with the Geological Association of Canada, Mineralogical Association of Canada and the International Association of Hydrogeologists – Canadian National Chapter. In these years there was an increase in overall talks, as well as a distinct increase in geological talks, specifically around non-hydrocarbon resources, mining, hydrogeology and geothermal themes. The other year that is an anomaly is 2016, when the AAPG Annual Convention was held in Calgary, resulting in an overall decrease in the number of talks and a proportional decrease in geological talks that year. Despite the online format in 2020 and 2021, there was no decrease in the number of talks in those years, however 2022 did see a decline in the number of abstracts with a return to in-person format.

Hydrocarbon Talks Persist….

The number of hydrocarbon resources talks remains consistent throughout the years with a declining trend in the proportional amount since 2015 as a result of a wider diversification of themes in recent years. Specific play types, however, have some trends that are observed in the data. Coalbed methane and coal-related talks drop after 2009, coinciding with a drop in natural gas prices. Talks related to shale plays peak in 2011 and decline slowly through 2017, with a sharp decrease after that. Oil sands, bitumen and heavy oil talks peak in 2013, and like the shale plays, decrease through 2017 with noticeably fewer talks from 2018 onwards.

Trends can be seen in specific formations. Talks related to Montney or Duvernay Formations have increased since 2011, peaking in 2019. Cardium was discussed in more than two talks per year between 2012-2017. Paired with the trend in shale plays, it shows that shale-play presentations have gotten more formation-specific since 2011. Grosmont talks peaked in 2012, with no talks related to Grosmont after 2017, following the general trend in oil sands/bitumen talks, however, this trend is not as noticeable in talks related to McMurray or Mannville.

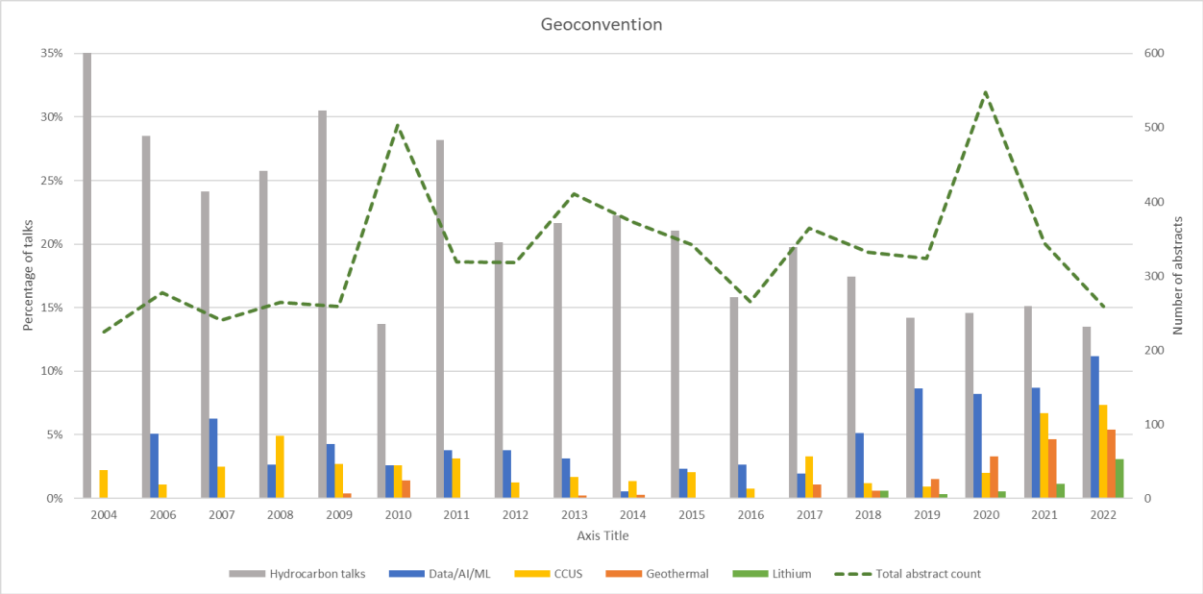
Non-Hydrocarbon talks increasing….

Apart from the years 2010 and 2020, the number of non-hydrocarbon resource talks makes only a small proportion of the total talks at Geoconvention. However, since 2018, the diversification of resources can be observed in percentages of the themes discussed. For example, lithium related talks show a steadily rising trend since 2018.

Talks related to the energy transition into alternative forms of energy, such as geothermal or means to reduce global carbon emissions, such as carbon capture and sequestration (CCS), are also on the rise in the last few years, but still only comprise a small proportion of the total number of talks at Geoconvention. CCS talks have been discussed throughout years of geoconvention, with projects like Weyburn and Quest, but since 2018 we have seen a steady increase in the proportion of these talks. Geothermal talks have seen a proportional year-on-year increase in talks since 2018.

Big Data is getting bigger….

Data analysis related talks have had a steady increase since 2017, reflecting the importance of data science, artificial intelligence and big-data in the role of geoscience.



References

Geoconvention. (n.d.). *Abstract Archives.* https://geoconvention.com/abstract-archives/