First geological interpretations of gas content of coal seam field, Cesar sub-basin, Colombia

Lead researcher

Victor Sepulveda[1]
v.sepulvedac@uq.net.au

Joan Esterle [1], Sebastian Gonzalez [2], Sue Golding [1], Victor Sepulveda [1]
[1] The University of Queensland School of Earth & Environmental Sciences
[2] The University of Queensland Centre for Natural Gas

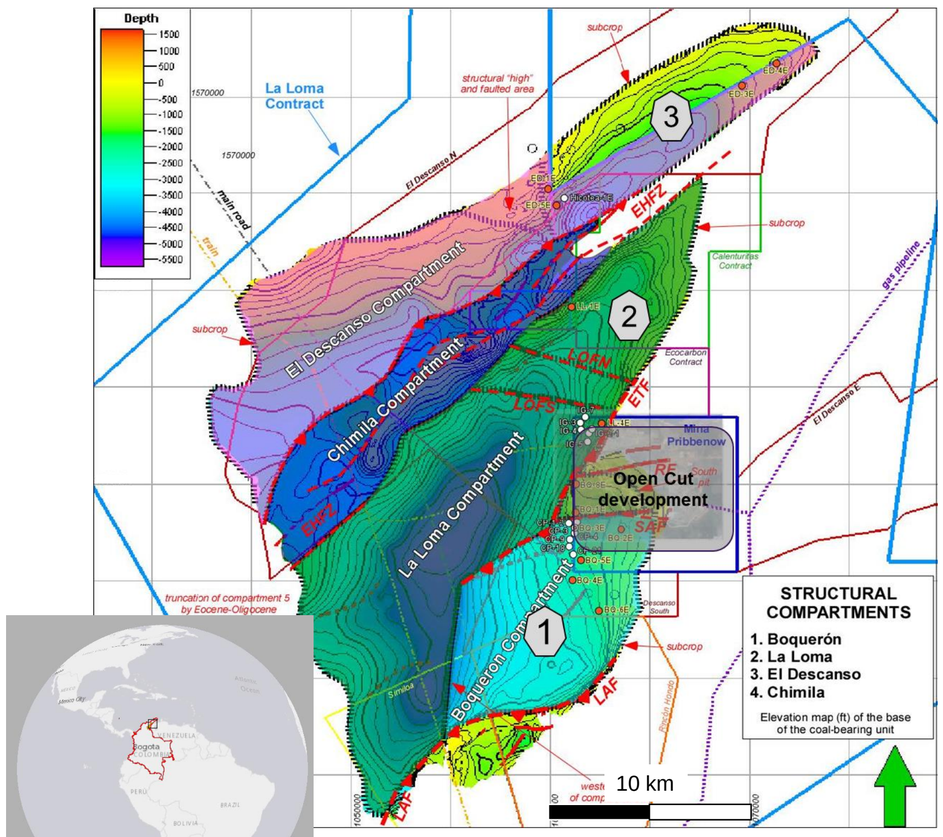

Figure A: Structural Map Base Coal bearing unit Cuervos Fm. See stratigraphy in Figure B.

Scientific problem

- Colombia is the world's fifth-largest exporter of low ash, low sulphur thermal coal, (11.300 Btu/lb) (EIA 2016).
- Coal seam gas (CSG) characteristics of the Paleocene Cuervos Formation (Fm) of the Cesar Rancheria Basin, including gas origin, gas generation and retention processes, have not been addressed.

Focus

- This research focuses on understanding how different factors such as depth, coal properties, pressure and temperature influences CSG origin and generation on different geological domains within the sub-basin.

Methods and data

- A total of 44 water and 15 gas samples were collected from 21 wells with multiple-seam completion for stable isotope analysis of $\delta D\text{-}CH_4$, $\delta D\text{-}H_2O$, $\delta^{13}C\text{-}CH_4$, $\delta^{13}C\text{-}CO_2$ and dissolved inorganic carbon (DIC), which is a widely used approach for determining gas origin (Golding, Boreham & Esterle, 2013).
- Two clusters of data were analysed separately per compartments (see Figure A) due to the influence of distance between wells and high angle thrusts with sequence repetition.

Cuervos Fm Stratigraphy

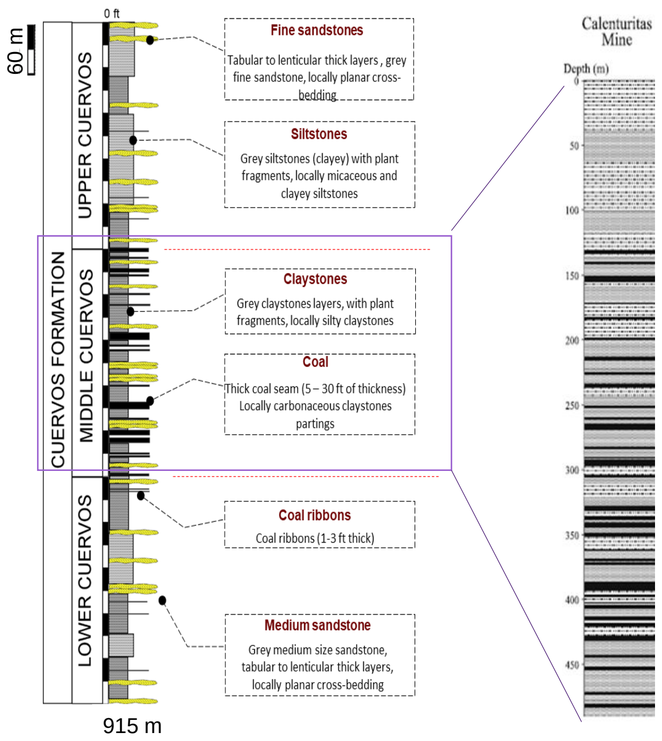

Figure B: Cuervos Fm is a Mid-Late Paleocene Fm. deposited in a floodplain and coastal swamp environment. Net coal thickness 30-44 m. Coal depth ranges between 60 to 540 m. (Drummond Ltd., 2012)

Preliminary results

- Gas content with depth for all the data (Figure C) shows an overall positive trend.
- Gas content normalisation to ash and moisture basis with depth (Gas Gradient – Figure D) allowed the identification of locations with high gas content and saturation. (Hamilton, S. K., Esterle, J. S., & Golding, S. D. (2012).
- Scatter in Gas gradient over the study field is apparently masked by maceral composition (not shown).

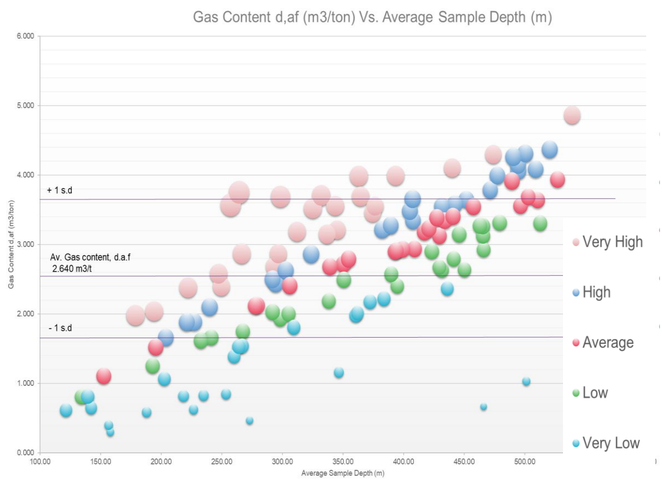

Figure C: *Scatter in Gas gradient over the study field*

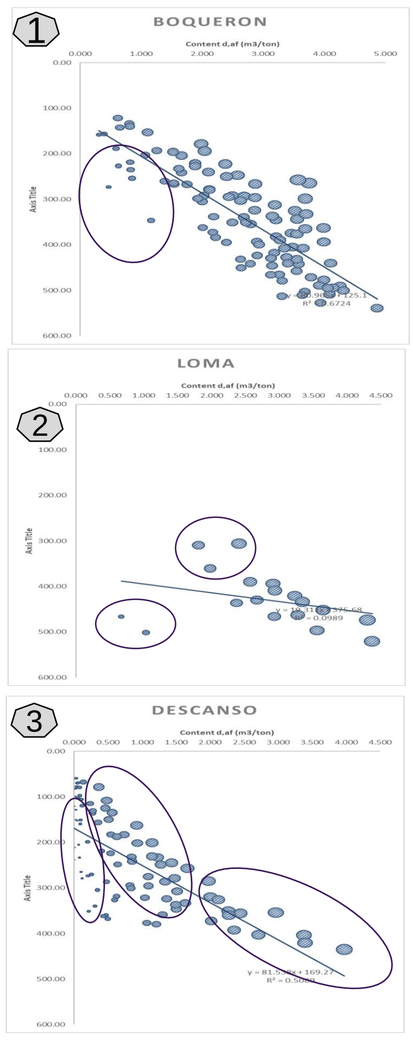

Figure D: *Gas content trends over the three compartments (see Figure 1)*

Preliminary Conclusions

- Gas content increases with depth as a general trend, although subsets of data per compartment and gas gradients reveal intervals of increase-decrease-increase trends at certain depths, possibly due to maceral composition and coal quality (not shown).
- High and very high gas gradients classifications are present in all the wells but not all coal seams.
- Descanso compartment (Figure D (3)) shows a non-increase followed by a sharp increase trend around 250 m depth, possibly due to hydrodynamic influence.

References

Hamilton, S. K., Esterle, J. S., & Golding, S. D. (2012). Geological interpretation of gas content trends, Walloon Subgroup, eastern Surat Basin, Queensland, Australia. International Journal of Coal Geology, 101, 21-35. doi:https://doi.org/10.1016/j.coal.2012.07.001

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Research with real world impact

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