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Subsurface Potential for CO₂ Injection in Buenos Aires Province, Argentina: A Preliminary Study in the Claromecó Basin

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Abstract Body:

In recent years, carbon capture and storage (CCS) has emerged as an essential alternative for transitioning towards an environmentally sustainable future. Reducing anthropogenic CO₂ emissions constitutes a new paradigm driving the frontier of knowledge.

In Argentina, the assessment of CO₂ storage potential is in its early stages. The Claromecó basin is a Carboniferous-Permian foreland basin located in the center-east of Buenos Aires province, bounded by the Sierras Australes to the southwest and Tandilia System to the east-northeast. It has a total area of 65.000 km², encompassing 40.000 km² in the continental sector whose sedimentary infill correlates with the outcropping sequence in the Sierras Australes. The interest of this contribution lies on the presence of coal beds in the subsurface, interesting lithology for CO₂ capture due to its high capacity of storage by adsorption.

This study aims to further advance knowledge of CO₂ storage potential linked to the stratigraphic record of the Claromecó basin, focusing on the regional presence of reservoir and seal rocks based on direct (core and microscope description) and indirect (geophysical) data of well drilling. The study area includes the cities of Laprida and General Lamadrid, covering an area of 1075 km². The geological unit is the Tunas Formation (Early Permian), consisting of fine-medium sandstones alternating with gray mudrocks, carbonaceous mudrocks and green claystones interbedded with coal beds.

Evaluating reservoir rocks, coal beds were described between 900-600 meters below wellhead (mbw), with accumulated thickness up to 16 meters, and thin-bedded and spaced coal between 600-170 mbw. Based on its thickness and depth, the lower section was identified as a potential site of interest. An isopach map was developed, highlighting the presence of coal and thicknesses distribution in subsurface, which in turn show good lateral continuity and a decrease towards the north of the basin.

Regarding the seal, massive claystones were identified lying directly above the coal beds and overlain by compact sandstones with low measured permeabilities (<0.1 mD) and absence of fractures. A multilayer seal is proposed, with mudrocks as a first barrier and sandstones as upper seal.

Advances in-depth knowledge of potential CO₂ storage reservoirs are of vital importance to improve understanding of the Buenos Aires province subsurface as potential site for carbon capture and storage (CCS).

** Denotes presenter*