

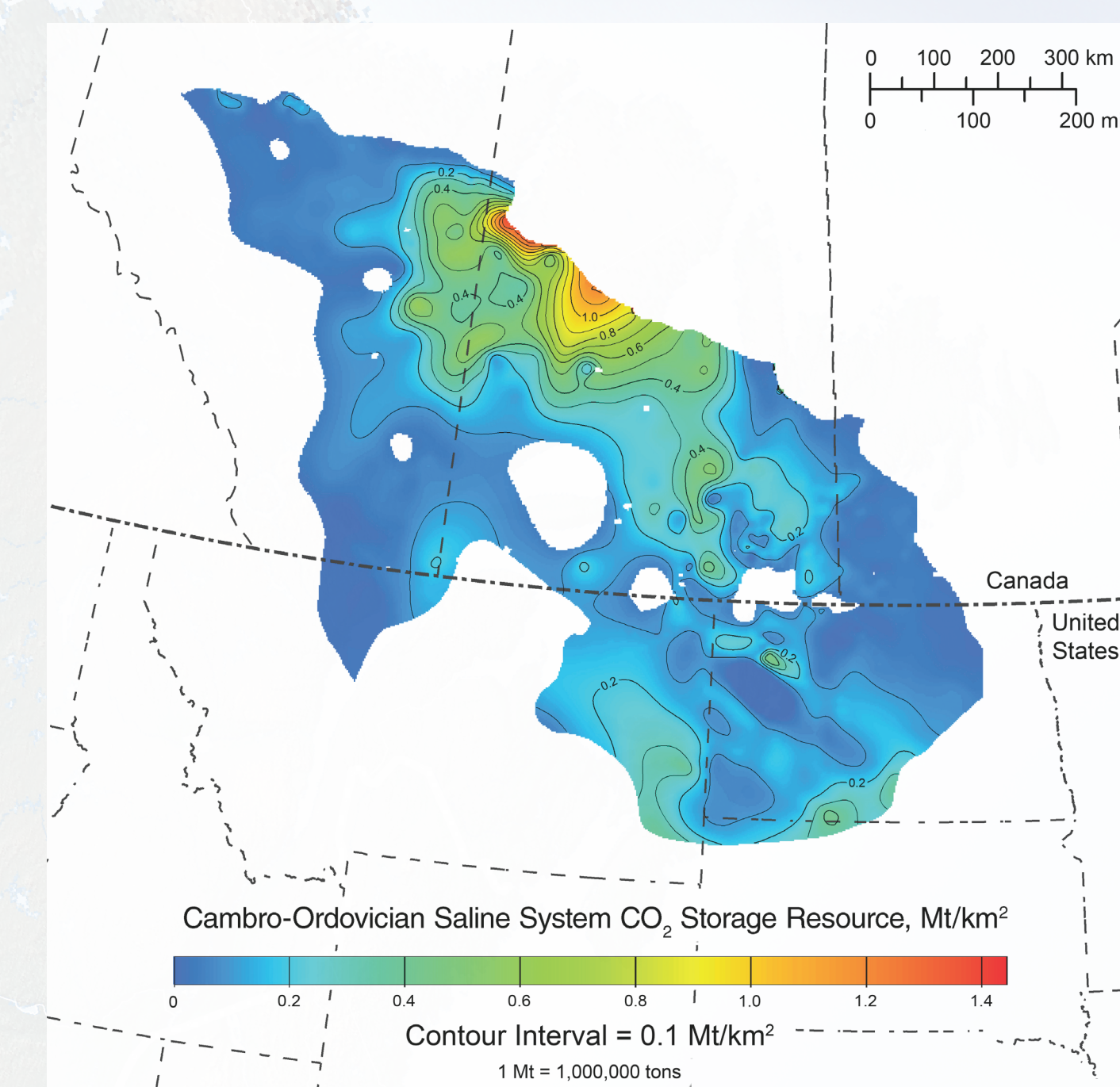
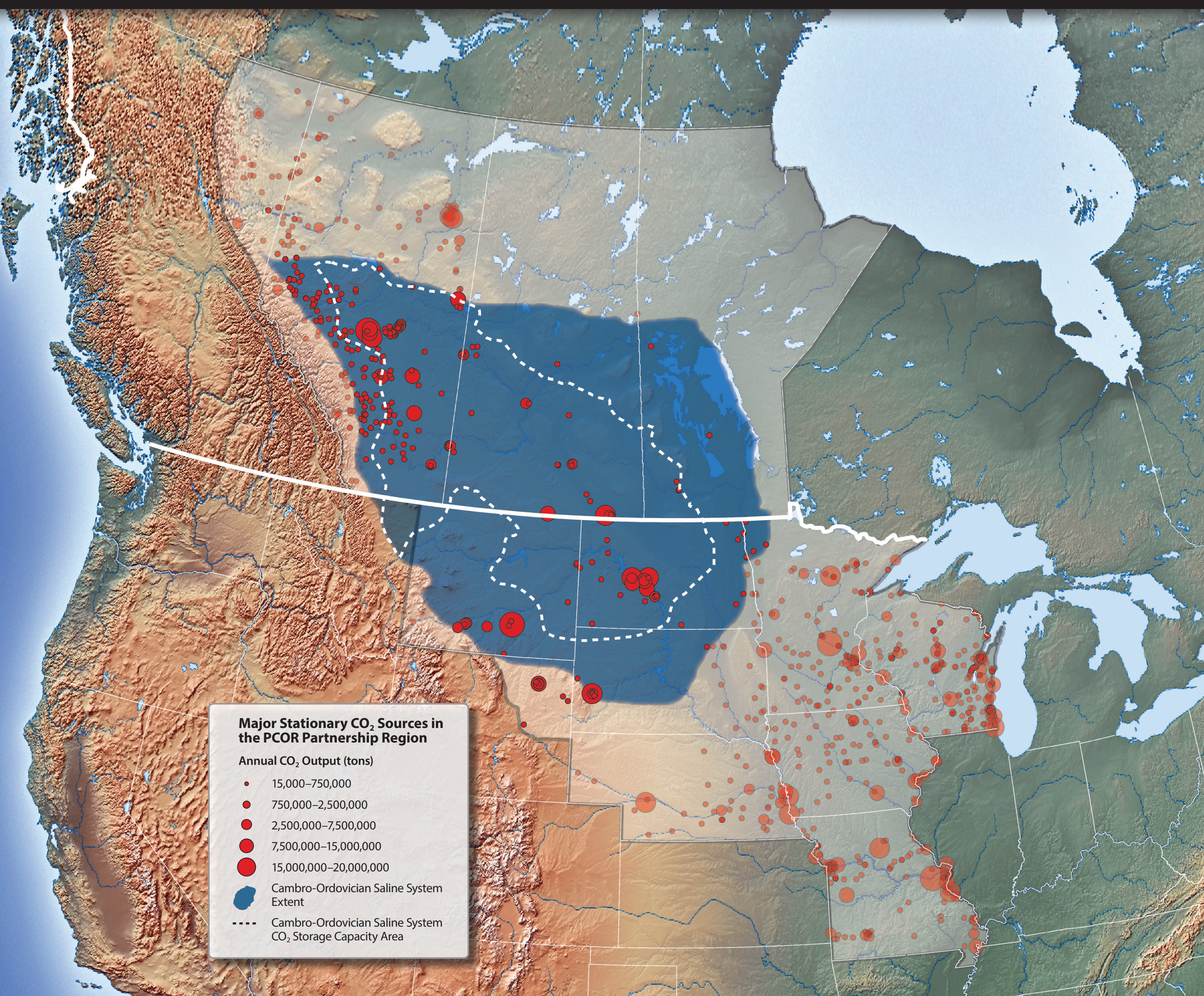
CO₂ Storage of the Cambro-Ordovician Saline System in the Northern Great Plains–Prairie Region of North America

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Abstract

A binational effort between the United States and Canada is under way to characterize the lowermost aquifer system in the Williston and Alberta Basins of the northern Great Plains–Prairie region of North America in the United States and Canada. This 3-year project was the goal of determining the potential for geologic storage of CO₂ in rock formations of the 1.34-million-km² Cambro-Ordovician saline system (COSS). To date, no other studies have attempted to characterize the storage potential of large, deep aquifer systems that span the U.S.–Canada international border. Significant effort is being devoted to understanding the geological and hydrogeological architecture of the COSS and its CO₂ storage resource. The transboundary nature of the project presents challenges with respect to stratigraphic nomenclature and data integration. Once the challenges are overcome, the result will be a unified geological model that encompasses the entire area of study that extends from central Alberta in Canada to South Dakota. Preliminary results indicate a storage resource of 114 Gt CO₂. The Plains CO₂ Reduction Partnership at the Energy & Environmental Research Center is leading U.S. efforts, and Alberta Innovates – Technology Futures is leading Canadian efforts. Other partners in the project are the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and Princeton University in the United States and Saskatchewan Industry and Resources; Manitoba Water Stewardship; Manitoba Innovation, Energy and Mines; CanmetENERGY; Natural Resources Canada; TOTAL E&P Ltd.; and the Petroleum Technology Research Centre in Canada.



As part of the effort to join the resulting data from both countries, a strip of the Canadian data which extended from the 49th parallel to the 50th parallel was incorporated into the data on the U.S. side (A–D). This step provided necessary control to eliminate edge effects of the U.S. data and ensure that when the full data sets were joined across the border there would be a smooth gradient (E–F). A salinity cutoff of 10,000 mg/L was also used to restrict the extent of the COSS suitable for CO₂ storage. The resulting CO₂ storage resource values are 28 Gt for the U.S. portion and 86 Gt for the Canadian portion, for a combined total of 114 Gt of CO₂ storage resource potential at the P50 probability level.

