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Airborne Detection and Tracking of Geologic Leakage Sites JAMEY JACOB, RAKSHIT ALLAMRAJU, ALLAN AXELROD, CALVIN BROWN, GIRISH CHOWDHARY, TAYLOR MITCHELL, Oklahoma State University — Safe storage of CO_2 to reduce greenhouse gas emissions without adversely affecting energy use or hindering economic growth requires development of monitoring technology that is capable of validating storage permanence while ensuring the integrity of sequestration operations. Soil gas monitoring has difficulty accurately distinguishing gas flux signals related to leakage from those associated with meteorologically driven changes of soil moisture and temperature. Integrated ground and airborne monitoring systems are being deployed capable of directly detecting CO_2 concentration in storage sites. Two complimentary approaches to detecting leaks in the carbon sequestration fields are presented. The first approach focuses on reducing the requisite network communication for fusing individual Gaussian Process (GP) CO_2 sensing models into a global GP CO_2 model. The GP fusion approach learns how to optimally allocate the static and mobile sensors. The second approach leverages a hierarchical GP-Sigmoidal Gaussian Cox Process for airborne predictive mission planning to optimally reducing the entropy of the global CO_2 model. Results from the approaches will be presented.

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