
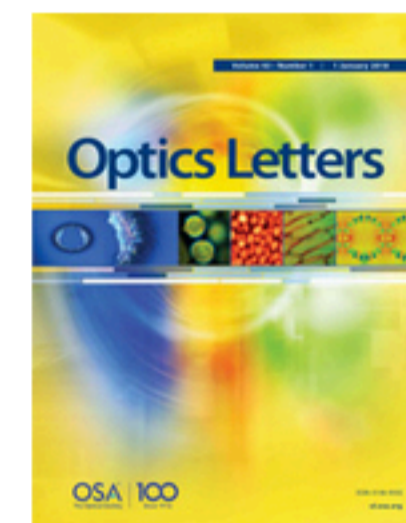


Portable laser spectrometer for airborne and ground-based remote sensing of geological CO₂ emissions

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Abstract

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Figures (4)

Tables (1)

References (23)

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Abstract

A 24 kg, suitcase sized, CW laser remote sensing spectrometer (LARSS) with a ~2 km range has been developed. It has demonstrated its flexibility in measuring both atmospheric CO₂ from an airborne platform and terrestrial emission of CO₂ from a remote mud volcano, Bledug Kuwu, Indonesia, from a ground-based sight. This system scans the CO₂ absorption line with 20 discrete wavelengths, as opposed to the typical two-wavelength online offline instrument. This multi-wavelength approach offers an effective quality control, bias control, and confidence estimate of measured CO₂ concentrations via spectral fitting. The simplicity, ruggedness, and flexibility in the design allow for easy transportation and use on different platforms with a quick setup in some of the most challenging climatic conditions. While more refinement is needed, the results represent a stepping stone towards widespread use of active one-sided gas remote sensing in the earth sciences.

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