

## Ultrasensitive portable multiple laser continuous-wave cavity-ringdown spectrometer for CH<sub>4</sub> isotope analysis

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A portable NIR CW-CRD spectrometer was developed for stable isotope analyses of atmospheric CH<sub>4</sub> on Earth and Mars. The system consists of three DFB Laser diodes, two of which are tuned to the absorption peaks of <sup>12</sup>CH<sub>4</sub> and <sup>13</sup>CH<sub>4</sub> and the third of which is used to measure the baseline. A MEMS optical switch rapidly alternates the lasers feeding the cavity to measure absorbance of these two isotopic molecules of CH<sub>4</sub>. This measurement scheme avoids the high uncertainty data usually measured when the wavelength being tuned at waist of absorption line shape and overcomes partially the long-term drifting of the traditional CRDS system, thus fulfilling the high precision requirement for isotope analysis of trace gas methane. The detection limit of this system is to 1.4x10<sup>-12</sup> cm<sup>-1</sup> with integration time of 5 minutes. For ambient air on Earth which contains 1.8ppm CH<sub>4</sub>, under 100 torr pressure, the <sup>13</sup>CH<sub>4</sub> absorbance is 1.8x10<sup>-9</sup>cm<sup>-1</sup>, thus the equivalent precision of the δ<sup>13</sup>C will be less than one per mil for CH<sub>4</sub> in the atmospheric concentration.

Keyword, CW-CRDS, Isotopic ratio, Methane, greenhouse gas

## The structural analysis of Dunhua basin, China

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By means of two dimensional structure-stratigraphy interpretation of several seismic profiles and magnetic and gravity data, the paper analyzed the structural features and forming mechanism of Dunhua basin.

The results show that Dunhua basin perform as the two east-west trend fault depressions, the uplift between the fault depressions and the controlling normal faults were intersected with Dunmi fracture in an acute angle, and the Dunmi main fracture also formed a deep fault depression. Consequently the northern fault depression and southern fault depression that are the two east-west trend fault depressions, are all typical dextral strike-slip and extension basins in which major strike-slip fault is the Dunmi fracture.

The seismic data shows that the Dunmi deep fault depression developed a large number normal faults that obliquely with the Dunmi fracture within the Lower Cretaceous stratum. Dextral strike-slip faulting began in Early Cretaceous, and the fault depressions were happened again in Paleogene. According to interpretation of the gravity and magnetic section, Dunhua basin was transformed by thrust fault between Cretaceous and Neogene, and the main thrust direction pointed to the north. The thrusting may be associated with tectonic inversion after the late Cretaceous in the northeast area, China, which resulted in sinistral transpression along the Dunmi fracture.

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