ISSN: 2754-6705

Journal of Mathematical & Computer Applications

SCIENTIFIC Research and Community

Research Article | Open Access

Climate Change May be Driven by Solar Microwaves and Radio Waves –A Molecular Modeling (DFT/MM) Study

Shozo Yanagida[1,2*] and Takeko Matsumura[2]

[1]Osaka University, Ibaraki, Japan

[2]Minerva Light Laboratory, Kyoto, Japan

***Corresponding author**
Shozo Yanagida, M3 Laboratory, Inc, Osaka University, Ibaraki, Japan.

Received: May 13, 2023; **Accepted:** May 17, 2023, **Published:** May 27, 2023

Keywords: Microwave and Radio Wave Energy of Sun, Thermo-Upconversion Induced by Microwave and Radio Wave, Influence of CO_2 on Global Warming, Density Functional Theory-Based Molecular Modeling

Introduction

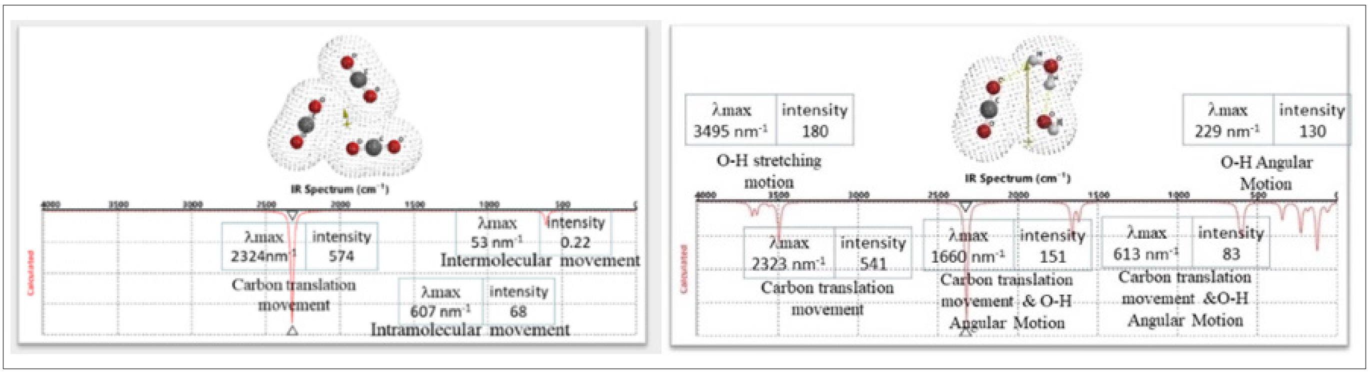
Global warming and climate change are commonly believed to be caused by carbon dioxide released as a result of human activities. However, there is a "solar activity theory" that claims that climate change is caused by solar activity [1]. As the sun emits energy in the form of microwaves and radio waves, it is expected that oceanic seawater and continental silica may be warmed by solar microwaves and radio waves, and that radiant heat may warm water vapor in the atmosphere [2]. This study uses density functional theory based-molecular modeling approaches to investigate the possibility of molecular heating by solar microwave and radio waves using representative molecules.

Methodology

The thermal effect induced by microwave energy is verified as thermal upconversion of microwave-radio wave energy absorption to infrared energy and release of the converted infrared energy to heat [3,4]. Infrared (4000-500 cm^{-1}) / microwaves / radio waves (500-0 cm^{-1}) (IR/FIR) spectra can be determined by DFT/MM using *Spartan* software (DFT/MM, B3LYP, 6-31G*). Water and silica molecules were selected as representative molecules of the humid oceanic atmosphere and terrestrial silica, respectively.

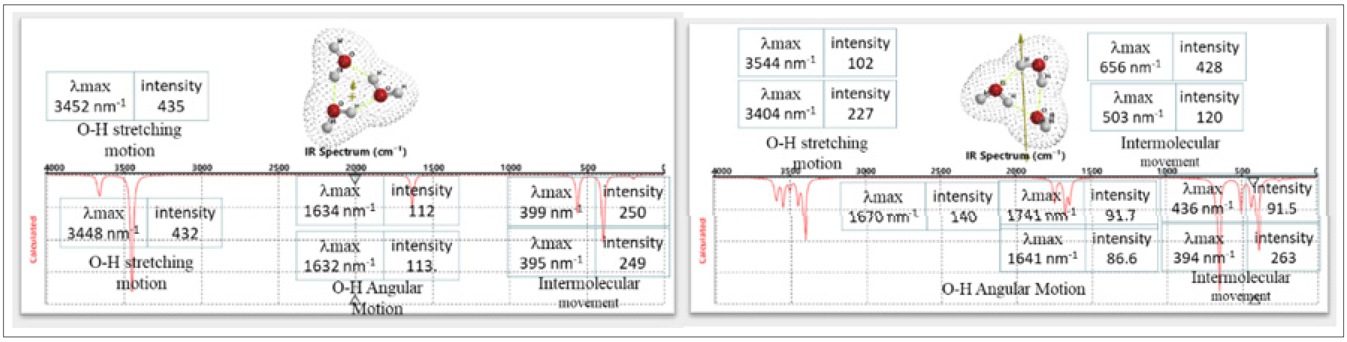
Results & Discussion

To verify whether atmospheric CO_2 absorbs solar microwave and radio waves, $[(CO_2)_3]$ and $[CO_2(H_2O)_2]$ were modeled to represent dry and humid atmospheric CO_2, respectively. The IR/FIR that they should have been foreseen and verified by DFT-MM. Their heats of formation, -2.90 and -6.90 kcal/mol, imply their favorable formation. The IR/FIR spectra are shown in Figure 1.



(a) (b)

Figure 1:
(a): Atmospheric dry carbon dioxide model $[(CO_2)_3]$ (heat of formation = -2.90 kcal/mol, dipole moment = 0.01 debye).
(b): atomospheric humid carbon dioxide model $[CO_2(H_2O)_2]$ (heat of formation = -6.90 kcal/mol, dipole moment = 3.33 debye).



(a) (b)

Figure 2:
(a): Water model in gaseous state [trigonal symmetry $(H_2O)_3$] (heat of formation = -19.9 kcal/mol, dipole moment = 0.01 debye).
(b): water model in liquid state [facial symmetry $(H_2O)_3$] (heat of formation = -23.4 kcal/mol, dipole moment = 44 debye).

The model $[(CO_2)_3]$ has small absorption peaks in the 500~0 cm-1 region, which is ascribed to the CO_2 intermolecular motion. The model $[CO_2(H_2O)_2]$ has similar but many absorption peaks with high intensity in the same IR and FIR region, which may be ascribed to H_2O intermolecular movement. Interestingly, CO_2 in high humid conditions could absorb solar microwave energy. However, as the maximum concentration of CO_2 in atmosphere is about 500 ppm at present, it is unclear whether it could absorb enough radiation to cause climate change on a global scale.

As the ocean atomosphere is in a state close to saturated vapor pressure, it may be approximated by modeling gaseous H_2O molecules. Figure 2a shows the IR/FIR spectrum of the gaseous H_2O model [trigonal symmetry $(H_2O)_3$], which has a low dipole moment (0.01 debye) that is characteristic of the gaseous state.

Figure 2b shows the IR/FIR spectrum of the liquid state H_2O model [facial symmetry $(H_2O)_3$] having a high dipole moment (44 debye), which is characteristic of the liquid state. Both IR/FIR specta show characterisitic absorption peaks in the 500-0 cm^{-1} region, which may be attributed to the intermolecular movement between H_2O molecules. Its molecular motion can be identified and confirmed by combining IR/FIR and aggregated molecular structures. The intermolecular movement supports the collision mechanism so far proposed for explanation of microwave thermal effect. Water molecules absorb microwave-radio wave (500-0 cm^{-1} more effectively when aggregation occurs via hydrogen bonds. In the Atmosphere, vapor state H_2O van der Waals aggregates may be more susceptible to microwave and radio wave absorption than ppm-order carbon dioxide.

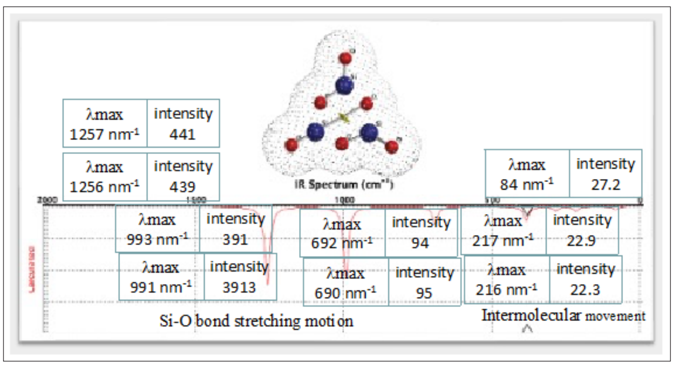


Figure 3: Land-based silica model $[(SiO_2)_3]$ (heat of formation = -186 kcal/mol, dipole moment = 0.1 debye).

Recently, it was reported that some SiO_2 nanoparticles can possess excellent microwave absorbing characteristics [5]. DFT/MM analysis verifies that the solid silica model $[(SiO_2)_3]$ gives IR/FIR derived from van der Waals aggregation of SiO_2 molecules.

Figure 3 shows that all maximam IR/FIR absorption peaks have much stronger intensity than those of the liquid state H_2O model (Figure 2b). This may suggest that some silica-based materials on the earth could be warmed by solar microwave-radio wave energy.

Conclusion

Solar flares occur during periods of high solar activity. The solar flares are thought to increase the energy of microwaves and radio waves in the atmosphere. The results from molecular modeling of water and silica suggest that microwave and radio waves energy may be absorbed by seawater, the oceanic atmosphere, and terrestrial silica, the main component of the Earth. However, given the complexity of Earth's atmospheric thermodynamics that affect the climate, further study is required to confirm the results experimentally and analyze the true impact of solar microwave and radio waves on global temperature rise.

References

1. Zbigniew Jaworowski (2003) Solar Cycles, Not CO2, Determine Climate. 21st Century Science & Technology http://21sci-tech.com/Articles%202004/Winter2003-4/global_warming.pdf.
2. Webinar, Geology (2022) https://geology.magnusconferences.com/speakers/2022
3. S Yanagida, T. Matsumura (2018) Computational Verification of Heating Mechanisms at Radio and Microwave Frequencies Using Density Functional Theory, AMPERE Newsletter 95: 27-32.
4. S Yanagida, T Matsumura (2019) Quantum chemistry molecular modeling for radio-frequency and microwave-frequency thermo-upconversion heating of metal oxides of NiO and Fe2O3, Conference: AMPERE DOI: 10.4995/AMPERE2019.2019.10234
5. Michael Green, Zhanqiang Liu, Peng Xiang, Yan Liu, Minjie Zhou, et al. (2018) Doped, conductive SiO2 nanoparticles for large microwave absorption. Light: Science & Applications 2018: 1-9.