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measures, however reduction measures must be tailored to suit the conditions present in the environment.

Climate Change and its impact on the world

There are a myriad of climate change documents that exists. The rapid growth of literature in this subject is a testament to the increasing attention paid to the negative climate change.

One of the best surmises of the effects of climate change is documented in *Turn Down The Heat* (World Bank, 2013). It details the numerous climatic impacts on each continental region, notably for the Caribbean, a rise in the sea level of over 100 cm and the destruction of marine ecosystems if temperature climbs above 4 degrees Celsius. As Curacao is a relatively flat island that heavily relies on tourism, such a rise in sea level would effectively destroy the beaches and coral reefs that are a main attraction in the tourism industry. As Hato International Airport's passengers are mainly tourists, such an environmental change would have a disastrous impact on tourism and thus, passenger statistics. ICAO's *Aviation's Contribution to Climate Change* (International Civil Aviation Organization, 2010) and *Environmental Report* (International Civil Aviation Organization, 2013) details the various effects that civil aviation has on the environment, particularly civil aviations role of the CO₂ accumulation in the environment.

In addition to expert literature, there exists an increasingly large body of popular literature discussing the relationship between climate change and aviation emissions. For example, the BC-based David Suzuki Foundation has analyzed the CO2 intensity of aviation compared to other modes of transportation, GHGs and contrails produced by airplanes, aviation emission mitigation measures, and the potential impact of new technologies (David Suzuki Foundation).

Calculating the Carbon Footprint of Civil Aviation

Upon research, there are a countless number of carbon emission calculators on the internet with quite a few designed for aviation emission calculation. However, my research was focused on the emissions contributed within Curacao's aviation sector. There are

Exploring in vivo cholesterol-mediated interactions

between activated EGF receptors in plasma

membrane with single-molecule optical tracking

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Background: The flow rate in many cellular signaling processes occurs in various

types of membrane in the plasma membrane. Membrane cholesterol can alter these

signaling pathways of living cells. However, the process in which the interaction of

activated receptors is mediated by cholesterol remains unclear.

Methods: In this study, we measured single-molecule optical trajectories of optically

trapped single molecules moving in the plasma membrane of live cells and have

used an optical-membrane model. A random walk was developed and applied to

identify critical information from single-molecule trajectories.

Results: We observed that optically trapped particles have irregular step sizes

across cholesterol-enriched regions of the plasma membrane and can move faster than lipid

domains when subjected to lipid binding. The amount of cholesterol cholesterol can

significantly affect the quality of cholesterol regions of cholesterol-enriched phospholipids

Reduction of Semi-Truck Aerodynamic Drag

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The study focuses on a suspension system designed by Road Boss Inc. which reduces the frontal surface area of semi-trucks. The system replaces the traditional chassis by lowering the freight container between the drive and rear axles, thereby reducing the height and aerodynamic drag on the vehicle. To maximize this reduction, it is necessary to reduce the adverse effect of an enlarged gap between a semi-truck's drive axles and the trailing edge of the cab which results from lowering the container. Wind tunnel testing was conducted on a 1/34th scale model of a semi-truck at Re = 2.8 × 10⁶ in order to determine the drag reduction benefits of height reduction and the addition of fairings around the cab-container gap of the truck. Computational fluid dynamics analysis was used to further analyze gap and surface flow regions and model overall drag reduction to confirm similarity between the wind tunnel model and a full-scale road condition. The drag reduction due to change in height was 24% from total tunnel testing and 27% from CFD results. The addition of gap fairings created an additional benefit yielding an overall 38% reduction in drag.

Nomenclature	
A	= frontal area of the truck
C_d	= drag coefficient
D	= drag force
G	= gap size
$\frac{G}{2H}$	= normalized gap
h	= height
$\frac{h}{2H}$	= normalized height
k	= roughness parameter
L	= length
Re	= Reynolds number
U	= free stream velocity
ρ	= density of air
ν	= kinematic viscosity of air

1. Introduction
In recent history, standardized intermodal containers have dramatically improved cargo transportation speeds on ships, trains and semi-trucks. However, the efficiency of commercial highway trucks has been nearly stagnant since the 1970s and currently accounts for 20% of US greenhouse gas emissions. In the common road configuration, a container sits on a dolly above the vehicle's axle and sits about 10 inches off the road. An emerging company, RoadBoss, is developing a system that suspends a container between front and rear axles, moving the container closer to the road and reducing the frontal surface area of the truck, as shown by the streamlines in Fig. 1.

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Periodicals

¹Vatistas, G. H., Lin, S., and Kwok, C. K., "Reverse Flow Radius in Vortex Chambers," *AIAA Journal*, Vol. 24, No. 11, 1986, pp. 1872, 1873.

²Dornheim, M. A., "Planetary Flight Surge Faces Budget Realities," *Aviation Week and Space Technology*, Vol. 145, No. 24, 9 Dec. 1996, pp. 44-46.

¹Terster, W., "NASA Considers Switch to Delta 2," *Space News*, Vol. 8, No. 2, 13-19 Jan. 1997, pp. 1, 18.

All of the preceding information is required. The journal issue number ("No. 11" in Ref. 1) is preferred, but the month (Nov.) can be substituted if the issue number is not available. Use the complete date for daily and weekly publications. Transactions follow the same style as other journals; if punctuation is necessary, use a colon to separate the transactions title from the journal title.

Results

⁴Peyret, R., and Taylor, T. D., *Computational Methods in Fluid Flow*, 2nd ed., Springer-Verlag, New York, 1983, Chaps. 7, 14.

¹Oates, G. C. (ed.), *Aerothermodynamics of Gas Turbine and Rocket Propulsion*, AIAA Education Series, AIAA, New York, 1984, pp. 19, 136.

⁴Volpe, R., "Techniques for Collision Prevention, Impact Stability, and Force Control by Space Manipulators," *Teleoperation and Robotics in Space*, edited by S. B. Skaar and C. F. Ruoff, Progress in Astronautics and Aeronautics, AIAA, Washington, DC, 1994, pp. 175-212.

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Proceedings

⁷Thompson, C. M., "Spacecraft Thermal Control, Design, and Operation," *AIAA Guidance, Navigation, and Control Conference*, CP849, Vol. 1, AIAA, Washington, DC, 1989, pp. 103-115.

⁵Chi, Y., (ed.), *Fluid Mechanics Proceedings*, SP-255, NASA, 1993.

⁹Morris, J. D. "Convective Heat Transfer in Radially Rotating Ducts," *Proceedings of the Annual Heat Transfer Conference*, edited by B. Corbell, Vol. 1, Inst. Of Mechanical Engineering, New York, 1992, pp. 227-234.

At a minimum, proceedings must have the same information as other book references: paper (chapter) and volume title, name and location of publisher, editor (if applicable), and pages or chapters cited. Do not include paper numbers in proceedings references, and delete the conference location so that it is not confused with the publisher's location (which is mandatory, except for government agencies). Frequently, CP or SP numbers (Conference Proceedings or Symposium Proceedings numbers) are also given. These elements are not necessary, but when provided, their places should be as shown in the preceding examples.

Reports, Theses, and Individual Papers

¹⁰Chapman, G. T., and Tobak, M., "Nonlinear Problems in Flight Dynamics," NASA TM-85940, 1984.



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