

About Us

BRI is a cutting-edge technology company that has developed unique and novel approaches to understanding pollution from satellite space mobile in situ data from air pollution and various sources, to marine pollution of oil, as well as from the deep sea of the seabed.

BRI is dedicated to environmental consulting, instrumentation development, satellite analysis and validation, and environmental assessment.

Established in 2003, BRI handles complex projects; subcontracting multi-institution, international projects for Fortune 500 companies, universities, the United States Navy, NASA, ESA (European Space Agency), and other government agencies.



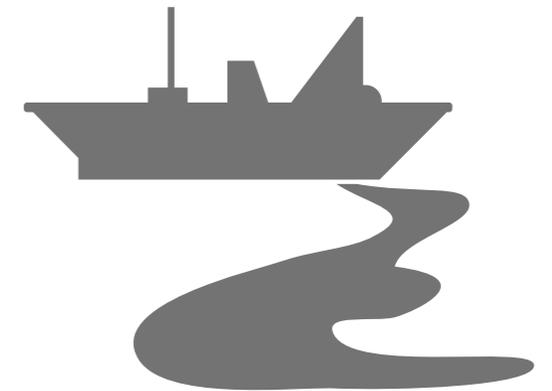
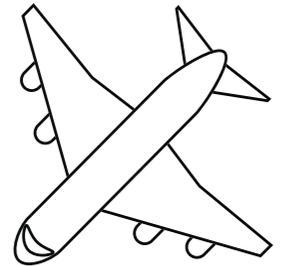
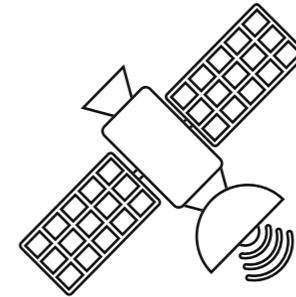
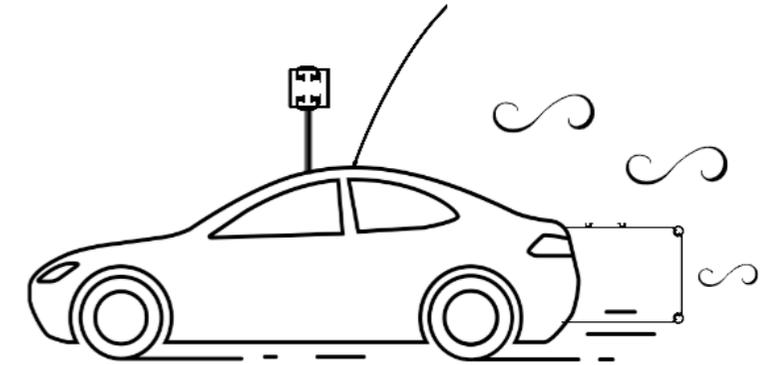
Pictured: Dr. Ira Leifer, BRI CEO and Chief Scientist during an interview with CNN. Leifer was a part of a government team of experts commissioned by President Obama to determine the flow of oil leaking out of the Gulf of Mexico.

Bubbleology Research International



Questions?

5910 Matthews St., Goleta, CA 93117
+1805-683-3333
info@bubbleology.com
www.bubbleology.com



Bubbleology Research International

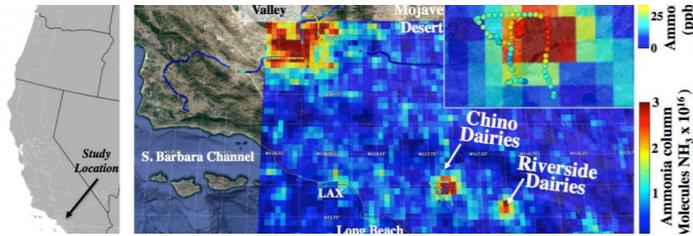
Approach; Remote Sensing



- Remote sensing is making measurements far from the instrument. This can be done from an airplane, space, even a car.

Trace Gas Emissions

- Remote sensing uses the color in light to determine the type and amount of gas. The color comes from the gas absorbing light like a stained glass window. The deeper the feature, the stronger the color and the more gas.
- Ammonia emissions (gas) from the dairies were studied from space.



Satellite remote sensing of the Chino Dairy complex.

Deepwater Horizon



- Satellite imagery of oil spills help capture the size and is used to fight oil spills.
- Remote sensing of oil detects it, figures out where to send ships, and helps assess the damage of an oil spill.

Deepwater Horizon oil spill from NASA satellite.

Natural Oil and Gas Seepage

- In Santa Barbara oil and gas seep into the ocean and make natural oil slicks.
- BRI is studying these oil slicks.



- BRI remote sensed the oil.
- BRI successfully profiled the floating oil at sea temperature at 40 micron resolution.



Approach; AMOG AutoMOBILE trace Gas Surveyor

"AMOG solves real-world science problems!"



The BRI AutoMOBILE trace Gas (AMOG) Surveyor system, pictured in front of an oil and gas processing plant.

- A mobile air quality lab that collects data at up to highway speed.
- AMOG was developed to validate satellite trace gas observations by recording fast, high quality meteorology and trace gas.
- BRI studied emissions with AMOG combined with airplane remote sensing data that mapped emissions.

Pollution & Climate Problem

- Air pollution affects human health, ecosystem health, and food production.
- Emissions of greenhouse gases, such as carbon dioxide, methane, and nitrous oxide block heat from escaping to space - warming climate.
- These gases enter the atmosphere from a variety of human sources including fossil fuel production and burning, coal transportation, natural gas pipelines, livestock and other agricultural activities, and landfills.

Solution

- BRI develops new techniques such as fusion of remote sensing and in situ data collection for monitoring trace gases.
- We perform mobile air quality measurements utilizing AMOG.



AMOG (AutoMOBILE trace Gas) Surveyor on an access road at the California Polytechnic State University Dairy

Applications; California Husbandry

Husbandry emits a range of trace gases with air quality, climate, and human health impacts that are predicted to grow.



Background

- Californians love dairy products, we produced about \$6.56 billion worth of dairy products in 2017, however this causes environmental impacts particularly in communities nearby.
- These communities nearby are often minorities or underserved populations, the nearby neighborhoods often poor, bare most of the brunt and the cost of these environmental impacts.



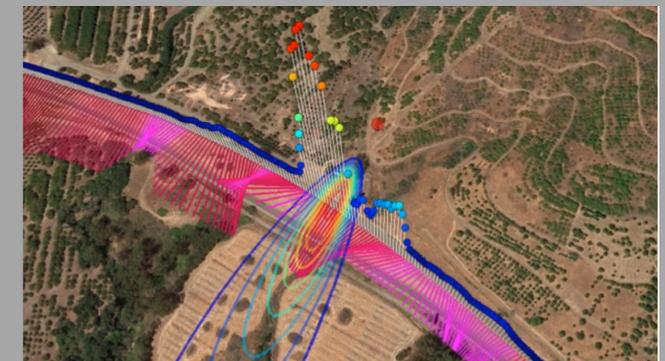
Pictured: Cows on a feedlot. Photo taken Dec. 27, 2017, at Lisbon, N.D. (Forum News Service/Agweek/Mikkel Pates)

- Industry trends are towards more intensive animal production (more animals per facility). Thus, feedlots and dairies crowd animals (less space per animal), enhancing emissions compared to small dairies.

"BRI research found solutions for small dairies to reduce emissions economically while maintaining high quality".

Natural Gas Pipeline Leak Detection

- Pipeline leaks are an important source of greenhouse gas.
- California is working to reduce these leaks.
- The distribution network is complex so we need new fast techniques!



Natural Gas Pipeline Leak Detection at highway speed. Methane and wind measurements modeled to determine likely source location.