#### What is GAIA?

The Johns Hopkins University Applied Physics Laboratory is creating an interdisciplinary, collaborative environment to address the impact of climate change on national interests through the Global Assimilation of Information for Action (GAIA) project. The purpose of the GAIA collective is to explore consequences, gaps, and resolutions for specific concerns arising from a changing climate. As part of this exploration, we have begun to develop visualization tools and techniques to illustrate the impact of climate change on subjects ranging from public health to crop production with the intention to better inform scientists, policy-makers, educators, and the public. Here, we present key features of the GAIA visualization website and highlight specific, simplified methods of using climate model, medical, and meteorological data to illustrate the impact of climate change on individuals and society. Simple and concise analysis and visualization is required to emphasize the critical importance of climate change adaptation strategies.

#### Visualizing Climate Change

Climate model data is often complex and difficult for an individual user (non-climate scientist) or policy maker to extract and use for immediate investigation. There is not a straight-forward method for these users to determine the impact of climate change on social, economic, financial, and health related aspects. Analysis of climate data often involves knowledge of:

1. Complex, Multi-variable scenarios 2. Understanding of initial conditions 3. Ability to parse through large dataset 4. Create specific software/code to extract data from model scenarios 5. Ability to convert basic science variables (e.g. atmospheric temperature, pressure) into a tangible understanding (e.g. disease *incidence rate)* 



Figure 1: GAIA's goal is to turn knowledge into actionable information by providing data to users which may then be used to inform the decision makers.

# Visualizing the Impact of Climate Change with GAIA

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**MADATA VISUALIZATION** Visualization Areas IPCC AR4 Data isualize the IPCC AR4 data for recipitation and temperature under igh, medium, and low emissions enarios in Google Earth. Visualizing Climate Change We have developed a few examples of how IPCC climate model data may be used to show global changes in publ ealth and food security. In these examples, we attempt to illustrate how climate model data may be utilized to mphasize the growing concern of the hanging climate to the public. Air Quality and Respiratory Data Using the EPA's Air Explorer, we show the ozone and PM 2.5 levels for the Baltimore, MD area and explain the significance of these constituents to Climate Toolbox seful links to online tools from NOAA PA, and others sualization & Climate Resources nteresting papers on the visualizati of climate data Back to GAIA

Decision Maker **Results** 



Figure 2: Snapshots from the GAIA data visualization webpage. Material includes a Google Earth display of climate data, climate resources and tools, methods of investigating climate change and its impact of public health.

# http://gaia.jhuapl.edu

GAIA's extensive network of experts in areas of public health, national security, atmospheric science, climate science, and risk analysis facilitates fusing a broad, collective knowledge base to ingest basic climate model data and develop real-world scenarios that are more readily accessible for decision makers, health practitioners, and the public.

#### Examples of tangible data products of decision making:

- region?

While these are complex issues that likely involve knowledge of many variables, simple assumptions may be made to illustrate 'order-ofmagnitude' results.

Year	MD: Cost (billion \$ 2008)	DC: Cost (billion \$ 2008)	VA: Cost (billion \$ 2008)
2015	0.2	0.04	0.1
2020	0.3	0.07	0.2
2035	0.8	0.2	0.5
2050	1.3	0.3	0.9
2100	2.9	0.7	1.9

# GAIA Goal: Demonstrate climatic change impact through tangible ideas

- experts

### **Future Direction**

GAIA wants to improve communication of science to decision makers. Decision makers are not just policy makers & government officials. Decision makers include ANY decision maker whose role requires knowledge of the impact of a changing environment on a specific concern or goal.







## What GAIA Does Differently

1. How does asthma prevalence change with climate in the DC metro

2. What is the dengue fever incidence rate worldwide in 2050? 3. What is the rice yield forecasted for 2020?

> **Table 1:** We have investigated the financial cost of asthma on the medical system in the DC region based on changes in ozone from 2015 to 2100. Full results may be veiwed at the poster 'The Impact of Climate Change on Air Quality and Respiratory Disease: Maryland/DC Metropolitan Area,' A. Kaushiva

Drive data visualization & discussion

Encourage engagement

Drive political action and influence public thought

• Develop a community of interest and enroll subject matter

• It is critical to continue to translate science to actionable ideas GAIA has developed a multi-institutional infrastructure to facilitate idea development and foster collaboration

GAIA has developed a basic visualization capability – working to expand with tools tailored to foster non-expert understanding of climate change impacts

Always open to suggestions for new ideas & members



JOHNS HOPKINS GLOBAL WATER PROGRAM





