Visualization for Island Climate Resilience

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Abstract

Change(HI) is a National Science Foundation-funded project that aims to develop novel tools and an interdisciplinary workforce to study and understand the existential threat of climate change. The project aims to provide fundamental and actionable insights into Hawai'i's climate science and produce data products, collection strategies, and analysis tools, that can be readily applied to other Pacific islands as well. This paper briefly introduces the project's data visualization and public communication strategy.

Keywords: climate visualization, visceralization, physicalization.

Index Terms: Human-centered computing – Visualization Applied computing – Physical sciences and engineering Information systems – Information systems applications

1 Introduction

The climate and geography of Hawai'i present unique challenges when measuring, gathering, and analyzing climate-related events, which have become more frequent and intense in recent years. Hawai'i lacks adequate high-resolution data products needed to model climate impacts, plan alternative energy, and improve current weather forecasts. Such data, along with innovative data science, analytics, and visualization can yield actionable climate science impact, which in turn, will boost Hawai'i's transition to a data-driven, "smart" economy.

2 The Plan

CHANGE(HI)'s research plan is divided into four themes: 1) monitoring, visualizing, and communicating change; 2) predicting and simulating regional climate change; 3) ecohydrology of change; 4) characterizing land-use change tradeoffs [1]. The first theme, relevant here, seeks to accelerate scientific discovery by leveraging advanced visualization cyberinfrastructure, and developing AI-enhanced data analysis and visualization software, and communicating discoveries in ways that people with limited understanding of science and climate science can understand.

3 Accelerating Climate Discovery

To visualize and analyze data we use CyberCANOEs (Cyber-enabled Collaboration Analysis Navigation & Observation Environments) [5]; high-resolution tiled displays deployed across the University of Hawai'i system. CyberCANOEs are driven by the SAGE3 (Smart Amplified Group Environment) middleware for enabling AI-enhanced data and visualization-rich collaboration built using natural language, no-code, or Jupyter notebooks. This enables users to analyze data more effectively and facilitates cross-disciplinary collaboration on everything from ultra-wide-band displays to laptops [7]

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4 Communicating Climate Discovery

Based on a report from the Organization for Economic Co-operation and Development that assessed adult competencies, 40% of US citizens are unable to understand climate change findings solely through text, tables, and graphs [6]. Therefore our communication strategy will leverage techniques from data visceralization [4], such as data physicalization [2] and Virtual Reality (VR), utilizing experiences gained from collaborating with the Hawai'i State Energy Office on the development of a projection-mapping system [3] and a VR experience to visualize scenarios towards 100% renewable energy generation by 2045.

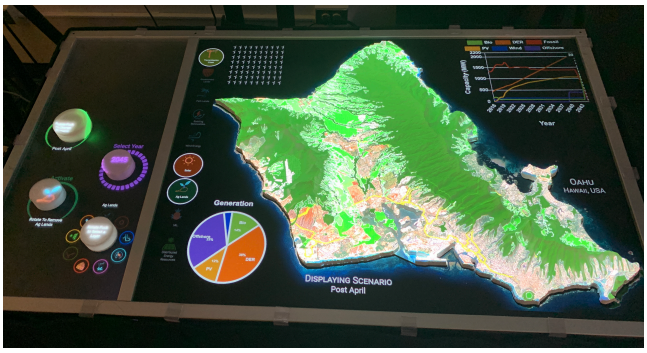

Figure 1: Data physicalization of Hawai'i's renewable energy transition plan.

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