INIGO

QUANTIFYING HURRICANE RISK

Using cutting edge computer science and AI

InSPIRe: Inigo Storm Prediction & Impact Research

UNIVERSITY OF CAMBRIDGE

INIGO

FOR THE LOVE OF DATA

INNOVATIVE RESEARCH

UNIVERSITY OF CAMBRIDGE — InSPIRe (INIGO STORM PREDICTION & IMPACT RESEARCH) — INIGO

InSPIRe is a pioneering collaboration between Inigo and the Institute of Computing for Climate Science (ICCS) at the University of Cambridge

Our partnership harnesses cutting edge climate research, computer science, research software engineering, artificial intelligence, and data science to further our understanding of the climate and to improve our ability to predict extreme events.

The research is exploring the complex factors that influence both the frequency and severity of Atlantic hurricanes making landfall in the United States.

HOW INIGO LEVERAGES THE COLLABORATION TO DEVELOP AND VALIDATE INTERNAL VIEWS OF RISK.

INFORM

Collaborate with leading climate scientists at the University of Cambridge to ensure our understanding of the science is robust and market-leading.

DEFINE

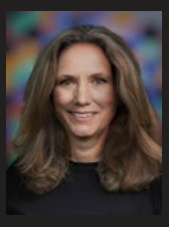
Integrate the latest science, internal expertise, and vendor models to define an evidence-led Inigo View of Risk.

VALIDATE

Validate the Inigo View of Risk through rigorous review by academic and industry experts.

This partnership provides Inigo with critical, science-driven insights to anticipate, assess and manage climate-related risks, transforming complex science into market-leading advantage.

ICCS RESEARCH TEAM



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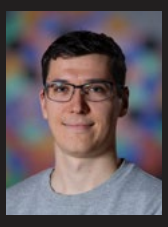


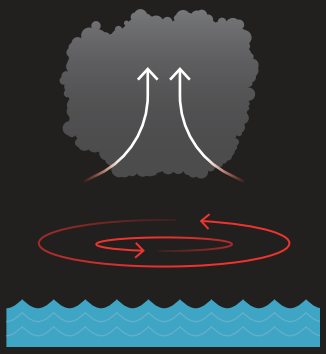
CHARLES POWELL PHD

Postdoctoral Research Associate in Atmospheric Dynamics

TROPICAL CYCLONE FORMATION: THE KEY INGREDIENTS

SEA SURFACE TEMPERATURE

Warm sea surface temperatures provide the fuel for tropical cyclone formation and intensification.

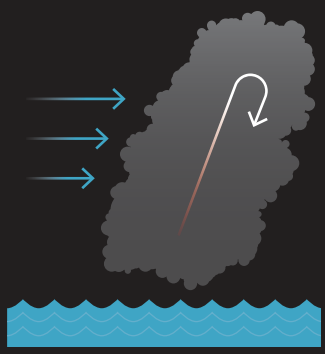


VORTICITY

Strong vorticity, a measure of rotation, enhances the organization of tropical systems as they intensify.

MID-ATMOSPHERE RELATIVE HUMIDITY

Moist air in the mid-atmosphere allows storms to gain energy enhancing growth, whilst dry air inhibits their growth.



VERTICAL WIND SHEAR

Winds that increase with height disrupt tropical cyclone organization and limit intensification.

ICCS explored how these ingredients are related to hurricane formation in climate models.

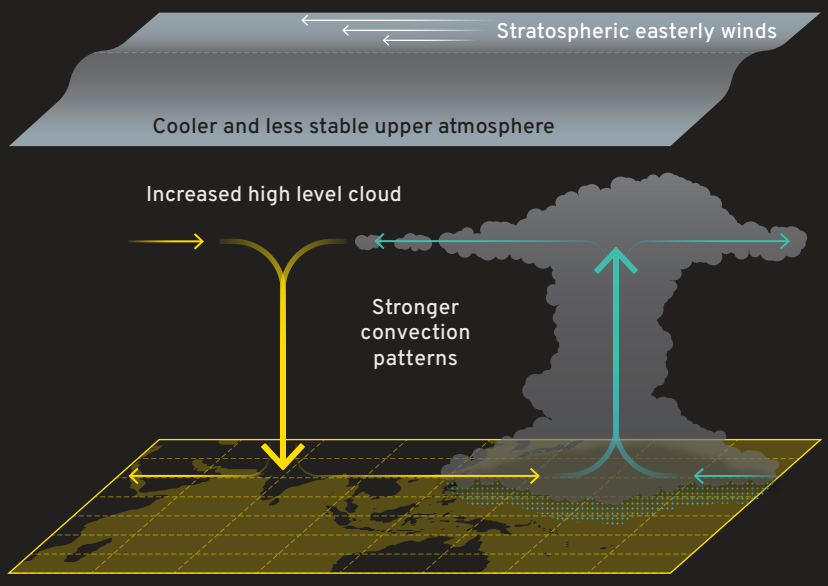
Moist air in the mid-atmosphere allows storms to gain energy enhancing growth, whilst dry air inhibits their growth.

Vertical wind shear is also a significant predictor, though it remains challenging to forecast.

The next step is to integrate these insights into the Inigo modelling framework.

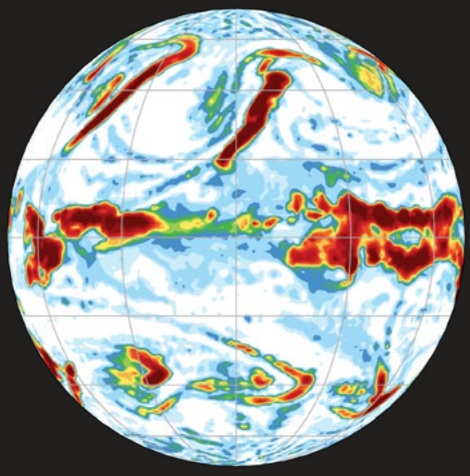
WHAT IS THE STRATOSPHERE AND HOW MIGHT IT HELP US PREDICT ATLANTIC HURRICANES?

The stratosphere is the second layer of the atmosphere, above where our weather occurs, which can influence the weather below



Stratospheric winds influence the atmosphere below, modifying patterns of tropical convection and wave activity.

Better understanding this downward influence will enable better predictions of hurricane formation and intensification.

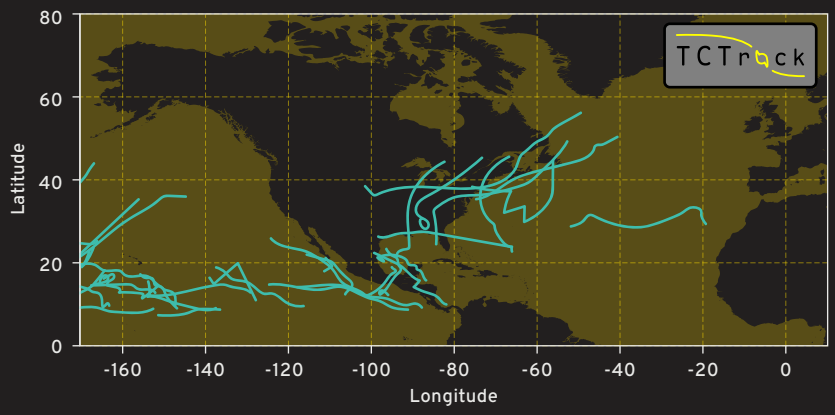


ICCS are using idealised simulations to understand the stratosphere-connection and improve forecast skill.

SUPPORTING ACADEMIC RESEARCH THROUGH OPEN-SOURCE SOFTWARE

- There are various algorithms used to detect tropical cyclones in climate models, they are known as tracking algorithms.
- They may require different inputs, be hard to configure and produce outputs in different formats.
- Scientific results can be sensitive to the choice of tracking algorithm.

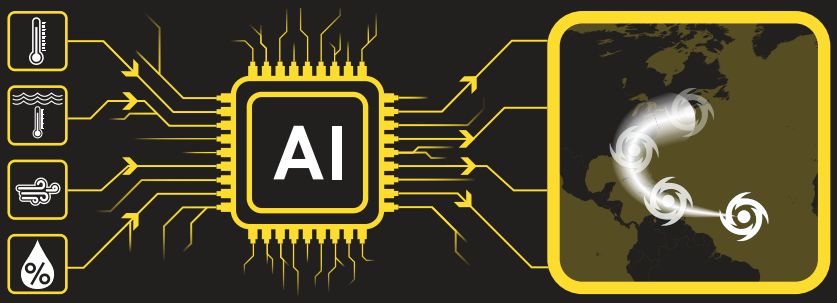
TC TRACKS - 1950 HURRICANE SEASON



Through our partnership, ICCS have developed an open-source software package providing a common interface to multiple tracking algorithms allowing for the first time a comprehensive comparison of their results.

USING AI TO IDENTIFY HURRICANE FORMATION

- Cyclogenesis (the birth of storms) remains hard to predict using traditional, or mechanistic, methods.
- ICCS have developed a machine learning model that recognises the physical patterns preceding a storm to predict and locate cyclogenesis events in the Atlantic and Pacific.
- The model highlights the importance of physical processes, such as sea surface temperature and wind shear, in cyclogenesis.



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