IMPACT

A Climate Assessment Resource for the Florida Keys Marine Ecosystem

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What is IMPACT?

- IMPACT stands for Integrated Marine Protected Area Climate Tools
- Its purpose is to provide detailed climate and climate change information at the MPA scale to assist managers, decision makers and stakeholders in understanding and quantifying the vulnerabilities and impacts of climate variations and change on the MPA ecosystems in order to inform adaptation and mitigation.
- IMPACT refines historical climate data to resolve variability and trends at sub-regional scales and combines those scaled data with oceanographic and ecological data to identify and quantify critical climate drivers of ecosystem change.
- IMPACT has a threefold approach:
  - Develop climatologies that integrate atmospheric, oceanographic, and ecological data and resolve variations at scales relevant to the MPA.
  - Couple these climatologies with climate model output to assess potential future impacts and inform adaptation strategies.
  - Possibly utilize climatologies as a basis to inform short-term critical impact forecasts relative to forecast weather conditions.
- Data and products from NODC, NCDC, NDBC, AOML, NCCOS, CPC, KEY and others.

Why IMPACT?

MPA managers generally do not have an atmospheric science background, and existing climate information can be a challenge to properly interpret, especially relative to complex ecosystem impacts.

While some products do address climate impacts (e.g., NOAA CRW Coral Bleaching alerts), there are no comprehensive products available to ecosystem stewards to assess and quantify climate change impacts in the context of adaptation strategies.

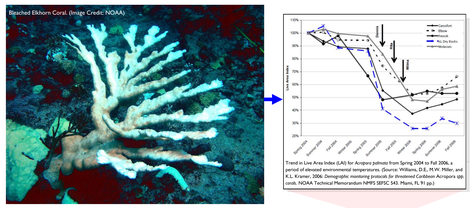
Global Climate model projections are often too coarse to meaningfully relate potential climate change information to local ecosystem processes.

In situ observations can be few and far between.

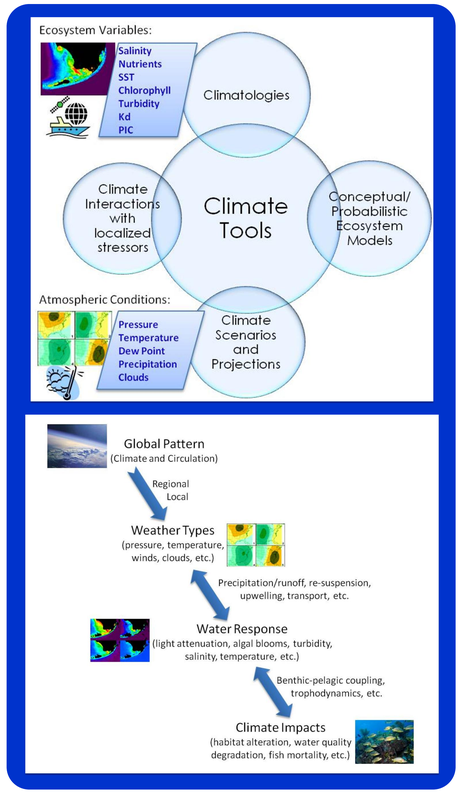
Satellite observations are generally masked near coasts.

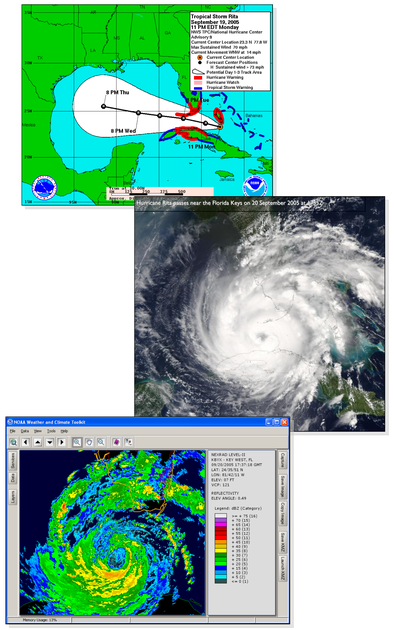
IMPACT seeks to address these information gaps by combining atmospheric, oceanic, and ecologic data to facilitate rapid assessment of important climate change considerations.

† Posthumous. Dr. Keller was involved in this project until his untimely death in March, 2010.

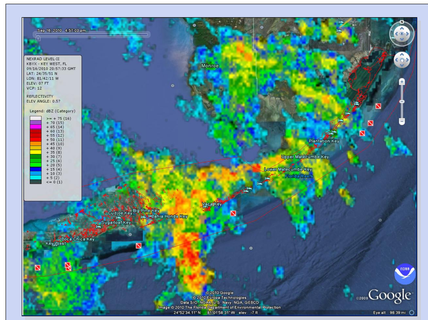


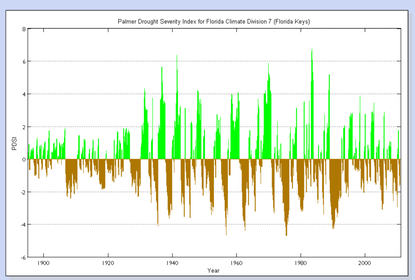
By combining data on species coverage with physically-linked environmental variables, it not only becomes possible to identify and quantify environment-ecosystem relationships, but also to extend those relationships backward or forward in time at places where information may currently be lacking.

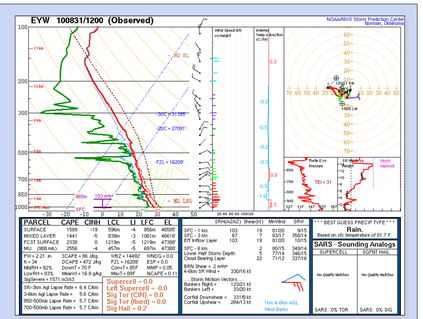




Tropical Cyclones, such as Hurricane Rita in September 2005, can substantially impact MPA ecosystems. Diverse information such as track forecasts, radar and satellite information can be combined and used to inform sub-regional impact assessments on those ecosystems, and can be integrated into cyclone climatologies which can quantify changes in cyclone impact drivers over the MPA.







Convective precipitation can quickly introduce large quantities of fresh, acidic water into the ocean surface layer, either directly or through land-based runoff. Precipitation information can also be useful in determining cloud coverage and potential light interception. Radar, soundings and even convective forecasts can be combined to produce information concerning trends and variations in precipitation potential, intensity, and even geographic coverage. This information can be used by MPA managers to determine changes in impact potential from heavy or widespread rain fall or cloud cover.

Where can IMPACT be used?

Initially, IMPACT is being developed for the Florida Keys National Marine Sanctuary. However, as the suite of integrated climate products are developed, they will be adapted for use in other MPAs, with the level of detail and accuracy being dependent upon the quantity and quality of the environmental data available in and around the MPA.

How does IMPACT help?

Managers can use graphical climate products to quickly determine the characteristics of climate change over their MPA. In particular, IMPACT can help answer questions such as:

- How quickly is the climate changing over the MPA?
- Is the entire MPA being affected equally by change, or are some areas more prone to impact than others?
- What climate variables associate most closely with observed ecological impacts, and in what ways?

Who will benefit from IMPACT?

MPA managers who must incorporate climate change into long-range management plans, or who must be able to translate climate information quickly into ecosystem impact stress mitigation efforts.

Researchers who need to identify and/or better quantify the relationships between climate drivers and ecosystem responses at various scales.

Stakeholders who may gain a healthier or more resilient ecosystem and will become better informed of potential climate impacts.

When will IMPACT be ready?