Weekly Report – December 15, 2023

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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TRAVEL AND MEETING REPORTS

6th GEO Blue Planet Symposium focused on "Digital Solutions for Sustainable Oceans."

The 6th GEO Blue Planet Symposium, organized by CISESS Scientist and GEO Blue Planet Executive Director Emily Smail and held October 31 to November 2 in Seoul, Republic of Korea, was a resounding success, bringing together a global community focused on "Digital Solutions for Sustainable Oceans." Hosted by the Korea Maritime Institute (KMI), this event marked a significant step forward in ocean and coastal sustainability where each day was planned by distinct activities and objectives. The first day, themed around Ocean and Coastal Challenges, began with insightful keynotes and plenary sessions, focusing on the pressing issues in the Asia-Pacific region and the integration of digital solutions for sustainable ocean management. The second day's workshops were designed to focus specific thematic areas, including marine litter, fisheries, bathymetry, coastal adaptation planning, fostering collaborative discussions and scientific advancements. The third day's Symposium Forum synthesized the learnings, emphasizing the role of newly established GEO Blue Planet Asian Secretariat at Korea Maritime Institute (KMI) in enhancing regional cooperation. Looking ahead, the symposium set a strategic direction for future initiatives, aiming to strengthen the global commitment to preserving our oceans through enhanced digital integration and collaborative efforts. This is expected to amplify activities not only in the Asia-Pacific but also globally, contributing significantly to the broader goal of oceanic conservation and sustainability.

(Emily Smail, CISESS & STAR/SOCD, emily.smail@noaa.gov; Funding: Ocean Remote Sensing)

TRAINING AND EDUCATION

CISESS Scientist Ron Vogel Speaks at Blue Crab Data Workshop

The Chesapeake Bay Stock Assessment Committee held a Blue Crab Data Workshop on December 5-7, 2023 to review sources of environmental and biological data that may help model the blue crab population for improving the management of this important marine resource and iconic Chesapeake Bay delicacy. Blue crab numbers are highly variable every year

and several population surveys suggest a long-term decline. Re-evaluation of management decisions, such as harvest limits, occurs yearly and have been based solely on stock surveys. Now, for the first time, the committee will use environmental data to conduct modeling research to understand the species' yearly variability. Ron Vogel, CISESS Senior Faculty Specialist, participated in the workshop as a subject matter expert on environmental data from satellites to be used in the modeling research. NOAA's sea surface height anomaly and ocean vector winds were identified as key satellite products for understanding the survivability and distribution of larval crabs while in their off-shore life stages outside of Chesapeake Bay, prior to their re-entry into the Bay. The aim of the modeling is to improve decisions for sustainably managing the species while protecting the livelihoods of local crab fishers.

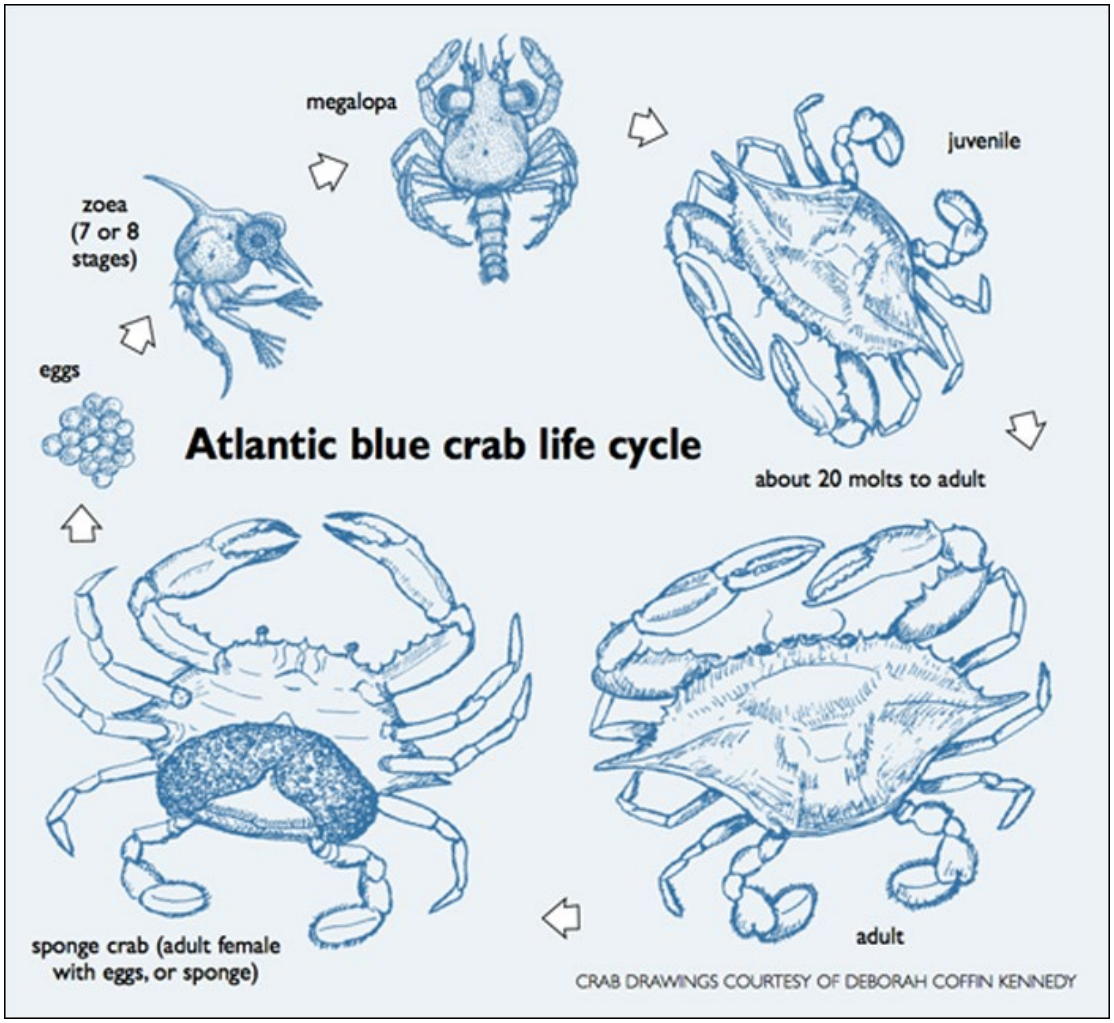

***Figure**: Blue crabs spend their early larval stages in off-shore water, making them vulnerable to ocean circulation and other highly variable environmental phenomena. (Graphic from Maryland Sea Grant Chesapeake Quarterly, 2012.)*
(Ron Vogel, CISESS, vogelr@umd.edu; Funding: Ocean Remote Sensing)

PUBLICATIONS

Satellite Microwave Observations of the Hunga Tonga Eruption's Atmospheric Waves
Citation**: Lee, Yong-Keun;** Neil Hindley, **Christopher Grassotti,** and Quanhua (Mark) Liu, 2023: The Hunga Tonga-Hunga Ha'apai volcanic eruption as seen in satellite microwave observations and MiRS temperature retrievals. *Geophys. Res. Lett*., **50**(23), e2023GL106439. https://doi.org/10.1029/2023GL106439.
Summary: The December 2023 *Geophysical Research Letter* published this study about the Hunga Tonga-Hunga Ha'apai Volcanic Eruption, which is the first attempt to perform a detailed analysis of the stratospheric impact of the eruption from satellite microwave observations. Two of the authors are CISESS scientists, one is a NOAA scientist, and the fourth, Neil Hindley, is from the University of Bath, UK. The strongest volcanic eruption since the 19th century occurred on January 15, 2022 at Hunga Tonga-Hunga Ha'apai, generating unprecedented atmospheric waves not seen before in the satellite era. The researchers used satellite microwave observations from (1) Advanced Technology Microwave Sounder (ATMS) on board the National Oceanic and Atmospheric Administration (NOAA)-20 and the Suomi-National Polar-orbiting Partnership (SNPP) and (2) Advanced Microwave Sounding Unit (AMSU)-A on board Meteorological operational satellite (MetOp)-B/MetOp-C to study these waves in the stratosphere immediately after the eruption. The NOAA Microwave Integrated Retrieval System (MiRS) was applied to these microwave observations to produce atmospheric temperature profiles. The atmospheric Lamb wave and fast-traveling gravity waves are clearly revealed in both the brightness temperatures and the MiRS retrieved temperatures, revealing their vertical phase structures.

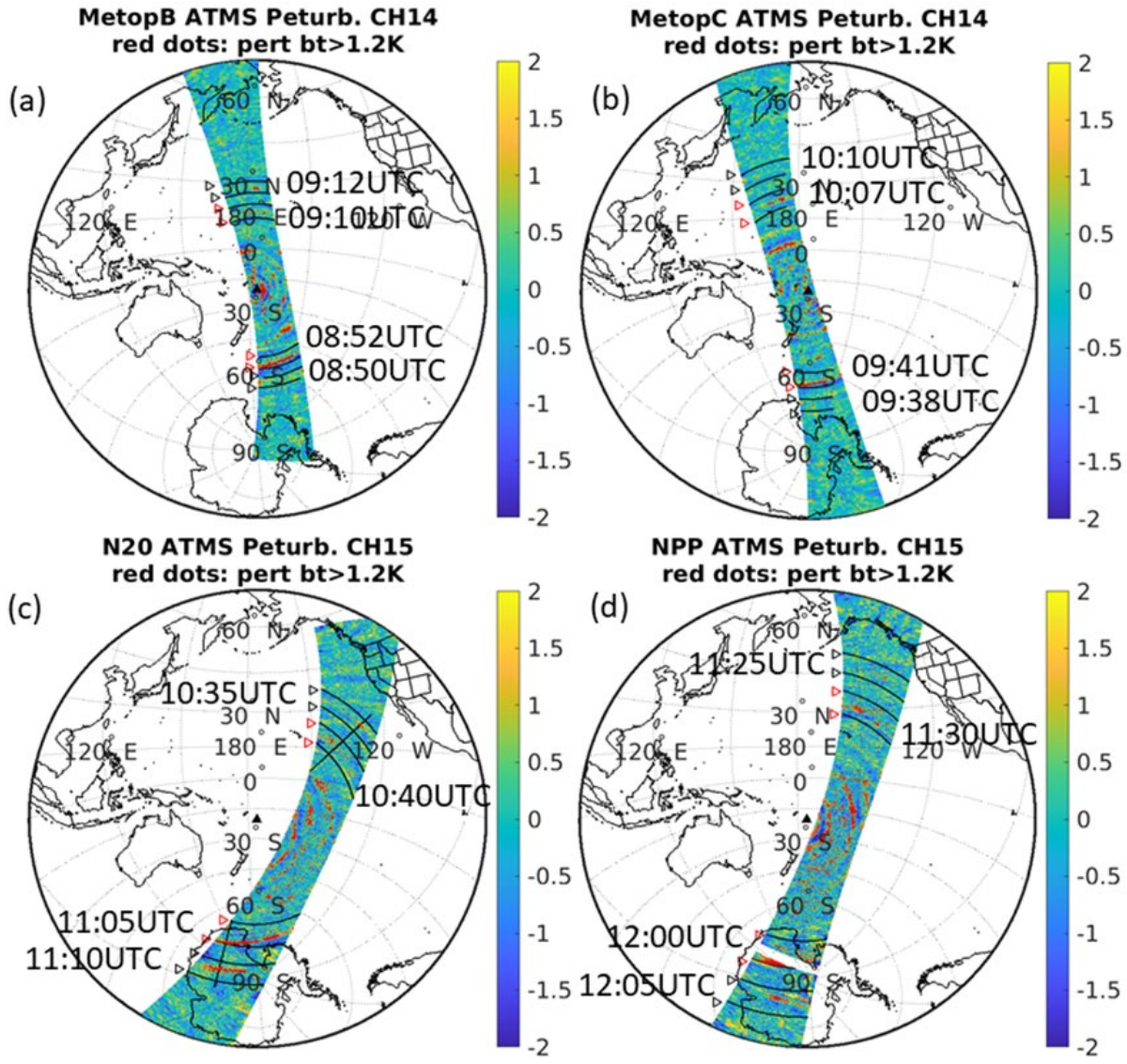

Figure 1. The local perturbations in observed microwave brightness temperatures from an ascending orbit of (a) MetOp-B AMSU-A channel 14, (b) MetOp-C AMSU-A channel 14, a descending orbit of (c) NOAA-20 ATMS channel 15, and (d) SNPP ATMS channel 15 on January 15, 2022. The black triangle at the center for each panel is the Tonga volcano location. The outermost black-curved lines from the Tonga volcano location correspond to a phase speed of 330 m/s assuming that the perturbation has been generated at the time and location of initial volcanic eruption. From the 2nd outermost black-curved lines to the innermost lines, the phase speeds are 300, 270, and 230 m/s, respectively. The time information in each panel indicates the approximate observation time for the Lamb wave (between 300 m/s and 330 m/s indicated by black right-pointing triangles) and for the lead gravity wave (between 230 m/s and 270 m/s indicated by red right-pointing triangles). Red dots indicate the pixels where the brightness temperature perturbation is larger than 1.2 K.
(Yong-Keun Lee, CISESS, yong-keun.lee@noaa.gov ; Funding: JSTAR)