



Center News

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ADAC's Fall 2020 Fellowship Graduates

By: Ellee Matthews; ADAC Education & Administrative Manager

From participating in high-level conferences focused on advancing the capabilities of the U.S. Coast Guard (USCG) in the Arctic domain, to conducting field research in remote regions of Alaska, ADAC fellows are no strangers to challenge, hard work, and perseverance. As such, graduating from the ADAC Fellowship program is no small feat, as it illustrates the culmination of two years of tackling difficult assignments, reaching new limits academically and professionally, gaining new knowledge and skills, and contributing invaluable research to the USCG. Furthermore, each of these accomplishments are achieved while balancing school, personal lives, and in the case of this year, the COVID-19 pandemic. With that said, this fall, ADAC is proud to announce the graduation of three undergraduate students from ADAC's Fellowship Program: Jack McCaslin, Raul Reutov, and Jessica Manning.

Jack McCaslin is an undergraduate student at the University of Alaska Anchorage (UAA) where he is working towards a degree in Mechanical Engineering. Jack joined the fellowship program in January 2019, and since then, has been a critical member of numerous ADAC programs and projects. For instance, Jack has been an avid participant of ADAC's 10-week Arctic Summer Internship Program for two summers, where he participated in activities ranging from surveying on the tundra at the Barrow Arctic Research Center (BARC) in Utqiagvik, Alaska, to tackling several disaster-response related group assignments. Furthermore, Jack has made important contributions to ADAC's Geofencing and ICECON projects, where he worked under the guidance of Dr. Shawn Butler at UAA. When asked what Jack will miss most about the ADAC Fellowship, he stated "the tundra in Utqiagvik, the in-person ADAC fellowship meetings, Ignite[style] presentations, and most of all, the people I had the privilege of meeting and working with."

Another esteemed student from UAA, Raul Reutov just recently graduated with his bachelor's degree in Computer Science. A member of the ADAC Fellowship Program since March 2019, Raul has been a critical component of several ADAC supported

research projects and programs, including the summer internship program, as well as the ICECON and Geofencing projects where he worked alongside Jack. Notably, Raul also helped to produce an ice reporting phone app as a component of the ICECON project – a crucial feature to advancing the mission needs of the USCG in the Arctic. When asked what he would miss most about the ADAC Fellowship Program, Raul stated "being a part of Arctic research that is making a difference," as well as "the ADAC members that constantly help each other to reach their goals." This coming spring 2021, Raul will be participating in an internship program through the National Aeronautics and Space Administration (NASA). Following this internship, Raul will attend either Johns Hopkins University or the Massachusetts Institute of Technology (MIT) for a master's degree in Space Systems Engineering.

Last, but most definitely not least, Jessica Manning is a current student at the University of New Hampshire (UNH), where she is simultaneously completing her bachelor's degree in Environmental Engineering while also working on an accelerated master's degree in Civil and Environmental Engineering. Another member of the ADAC Fellowship Program since January 2019, Jessica has played a vital role in numerous ADAC projects and programs as well. For instance, Jessica was involved in a wide variety of activities as a participant of ADAC's 2019 and 2020 Arctic Summer Internship Programs, ranging from biological studies on unique bird species in the Arctic, to the development of a comprehensive index of ice modeling capabilities designed for ADAC's Arctic Maritime Spills Modeling (AMSM) project led by Dr. Nancy Kinner at UNH. Furthermore, Jessica has spent the last two academic years as a critical member of the AMSM team as they work together to advance oil spill modeling efforts to improve government-led responses to maritime spills in the Arctic domain. When asked what she will miss most about her fellowship with ADAC, Jessica explained that, like Jack and Raul, she will also miss ADAC's in-person fellowship meetings, particularly the moments in which ADAC's Executive Director, Church Kee, would share outstanding mentorship opportunities, and of course, many stories from his past.

To say that that the ADAC team will miss these fellows is an understatement. However, we couldn't be more proud of how far they have come, and of the many accomplishments they are sure to achieve in their futures. Congratulations Jack, Raul, and Jessica!

Mass Sea Life Die-Off Creates Mystery in Russia's Far-East

By: Connor Keesecker, Research & Communications Associate

In September 2020, local visitors to a small beach on the southeastern coast of the Kamchatka Peninsula began to observe the signs of a mass die-off of sea life. Social media posts emerged, showing grizzly scenes of piles of dead marine animals on Khalaktryskiy Beach in the Russian Federation's Far-East. The majority of the victims were crabs, sea urchins, octopi, and other benthic organisms that spend most of their lives on the seafloor.

Soon visitors to the beaches began to experience physical reactions as well. Surfers, who have long flocked to Kamchatka for the peninsula's ideal position on Northern Pacific currents, came down with mysterious symptoms like swollen eyelids, rashes, and vomiting.

Quickly, residents and environmental non-governmental organizations began to suspect that an unreported pollution incident had occurred. Observers raised suspicions that toxic chemicals could have seeped from a nearby pesticide storage facility or rocket fuel may have leaked a test site used for military drills in August.

After the massive diesel spill near Norilsk months earlier, both environmental watchdogs and the Russian Federal government quickly launched investigations into the incident. However, what they found soon turned the culprit from a human-caused disaster to a dangerous natural phenomenon.

According to Russia's Investigative Committee, investigators searching for signs of industrial pollution found no heightened levels of heavy metals or oil in the water. Instead, water samples contained significantly reduced dissolved oxygen levels, making a Harmful Algae Bloom (HAB) the primary suspect behind the die-offs.

Scientists later confirmed the presence of high-levels of algae capable of producing toxins in water samples taken between late September and Late October. While the toxins produced by these algae species can kill wildlife and cause the symptoms experienced by beach visitors, the depleted oxygen supply in the water could have also caused the mass death in marine life. As algae blooms grow, they consume more of the available oxygen through respiration. In a Harmful Algae Bloom event, algae's density becomes so great that blooms can create low-oxygen "dead zones" where plants, fish, and other sea life cannot survive.

While HAB events have long been observed by fishermen and scientists within the Northern Pacific, these events' frequency has increased in past decades. As ocean temperatures rise, the algae species that can cause HABs have expanded their range into more northerly waters. This presents considerable risk to ecosystems and communities in the Arctic, which have no previous exposure to HAB events. With these algae species now endemic in the Arctic, warmer summers and reduced sea ice coverage provide algae with more opportunities to grow and create harmful blooms.

As investigators learn more about the exact causes of the mass die-off event in Kamchatka, the possibility of a Harmful Algae Bloom incident illustrates the importance of environmental monitoring in remote regions. By maintaining consistent and accurate domain awareness, the scientific community can track the spread of harmful blooms and learn more about the implications it may have for a changing Arctic ecosystem.

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Contamination Cleanup



Image from Siberian Times

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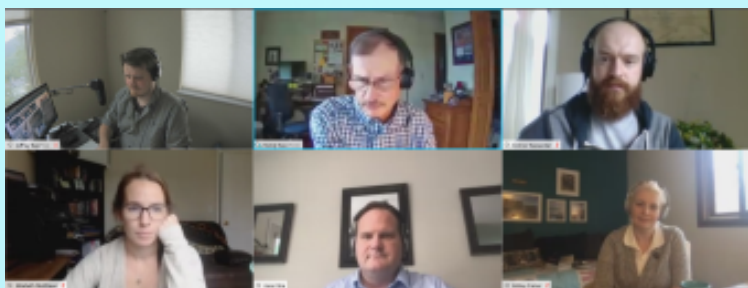
Season's Greetings from ADAC

By: Maj Gen Randy "Church" Kee, Executive Director

Dear and distinguished Colleagues,

Good afternoon from your friends at the Arctic Domain Awareness Center at the University of Alaska/UAA.

In looking back what has to be labeled as one of the more difficult years in many decades, the ability to be resilient and the strength to endure are quite applicable in many ways. At this small center of Arctic Research, we can well and honestly relay, that overall, we have been so very more fortunate than most in weathering through this year of COVID19. Our research agenda has managed to adapt to telework and socially distant practices, our student fellows have managed to continue their education and research assistance-ships via conference calls and our convening



activities have also well transitioned as much as possible to conference calls and other on-line mediums. As such, since moving into an unplanned COVID response construct starting on 17 March 2020, we can well state that we have managed to cope, enduring and progress in our endeavors as a research center and as a research network.

This fall has been a blur of activity in research, conferences and student activities. Some highlights include the ACCUSARS conference with the North American and Arctic Defense and Security Network, two service focused Wilson-ADAC Arctic Security Dialogues, the USCG Maritime Risk Symposium, the Canadian Maritime and Arctic Safety and Security Conference, Alaska Federation of Natives Annual Meeting and Bristol Bay Roundtable, Hudson Institute Arctic Security discussions and the opportunity to brief the Senate Security Subcommittee for Transportation, Commerce and Science.



We are looking forward to a brief holiday respite, and a chance to think, reflect and prepare for what is going to be a busy sprint of a Spring Semester and more in 2021. Overall, we are planning to remain in a telework/distance protocols approach from January through the end of Spring Semester (2 May 2021). Please mark your calendar for the next ADAC Customers' and Partners Roundtable on 13 Jan 2021, the Canada-U.S. Advancing Arctic Security Collaboration (ACCUSARS II) conference on 25-26 Feb 2021 as early 2021 events that you can participate. We have the Arctic Senior Leader Summit on 10-11 March 2021 and the Arctic Maritime Horizons Exercise and

Arctic IoNS 2021 Workshop. Once we get to May, we are hoping to transition from telework to mostly in-person activities. Exceptions to this will be the DHS S&T Centers of Excellence Summit 18-21 May 2021 and the ADAC Annual Meeting on 26-27 May 2021....which will proceed as virtual events.

We look forward to once again conducting the Arctic Environmental Security Course at UAA, and a number of student focused activities to include conducting going back to Utqiagvik this coming summer, for our Arctic Student Intern Project at the Barrow Arctic Research Center.

We hope and pray all remains well for you and yours and we look forward to a future where social distancing becomes a fading concern.

Warmest wishes and very respectfully, Church



Approaches to the Arctic

Finding the Balance Between Nature, Man, and Government

By: Jason "Olaf" Roe, Senior Research Professional

Arctic regions have traditionally been viewed as areas where economic development and natural resource extraction are highly cost prohibitive due to the routine presence of severe temperatures, scarce infrastructure, and ice-blocked access to shore. As warming trends accelerate and ice retreats for a greater percentage of the year, these same regions are now being considered as areas potentially well-positioned for economic growth stemming from increased interest in LNG exportation, the construction of Deepwater ports, and Aquaculture industry development. Additional potential catalysts for Arctic economic growth include the extraction of mineral deposits, Arctic tourism, Deepwater Arctic port logistics support, and maritime transport support industry expansion, among others. Growth in any one of these partner industries could significantly reduce the economic barriers for the others through the development of transportation infrastructure and decreased shipping costs. Coincident with this potential collective growth are likely significant increases in activity including air and vessel traffic and increased coastal construction. Prudent management and regulation of these activities will require science-based decision making that serves to protect both economic growth and complex Arctic ecologies.

A critical first-step in meeting basic requirements for science-based decision making is fine-tuning the development of a precise and comprehensive baseline scientific understanding of the increasingly dynamic Arctic environment. Understanding, quantifying, and modeling the forces currently impacting the Arctic is essential to accurately identifying the appropriate factors, weather natural or man-made, behind future changes. Support for a fine-scale comprehensive baseline has been broadly expressed across a multitude of Arctic Stakeholders. This support includes that of climate scientists, who strive to better understand and more accurately model local and global climate; industry professionals, who seek to plan and engineer efficient, sustainable, and environmentally responsible operations; and Federal, State, local, and Tribal governments, whose policies must safeguard the Arctic environment, protect traditional subsistence activities, and promote greater Arctic security.

Our scientific understanding of the Arctic has been traditionally constrained by our limited ability to explore and measure this vast region.



That scientific exploration has been restricted by many of the same factors that have traditionally impeded economic development, namely a harsh environment, extremely limited infrastructure, and high transportation costs. As new technologies and methodologies are implemented that offer to more precisely observe and measure the Arctic environment remotely and at reduced costs, there also exists a substantial opportunity to jointly conduct Arctic research through cooperative federalism and private-public partnerships amongst stakeholders. Technologies easily leverageable through these partnerships include Unmanned Aerial Systems, Autonomous Underwater Vehicles, and new satellite and radar sensing capabilities. These new systems can provide significant increases in the fidelity and frequency of measurements and gather data remotely with significantly reduced risks. Perhaps the time is right to further reduce individual stakeholder costs by conducting Arctic research through cooperative federalism and private public partnerships amongst Arctic stakeholders.



**ARCTIC DOMAIN
AWARENESS CENTER**
A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE

ADAC's Mission

The Arctic Domain Awareness Center, led by the University of Alaska, develops and transitions technology solutions, innovative products, and educational programs to improve situational awareness and crisis response capabilities related to emerging maritime challenges posed by the dynamic Arctic environment.



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