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JSTO
SCIENCE AND TECHNOLOGY UPDATE

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STRATCOM Center for Combating WMD, Research and Development Enterprise,
Chemical/Biological Technologies Directorate (DTRA/SCC-WMD(RD-CB))

Acting Director's Message

By COL Michael P. O'Keefe, USA

Colonel Michael O'Keefe, Acting Director, Chemical & Biological Directorate

Welcome to the first edition of the Joint Science and Technology Office (JSTO) ***Science and Technology Update***, where we will communicate current events and technical progress in the areas of the Department of Defense Chemical Biological Science and Technology (S&T) Program. As the Acting Director at the Defense Threat Reduction Agency's Research and Development Enterprise, Chemical/Biological Technologies Directorate, the main role I serve is to lead the organization in executing its function as the Joint Science and Technology Office within the Chemical and Biological Defense Program. Many of you reading this are a part of our community or are performers associated with us.

We want this quarterly update to improve communication about our direction with current stakeholders and to interest potential performers, especially those who may not believe their research is related.

The work we fund is a little over $600 million, and our portfolio spans Medical Counter Measures, Transformational Medical Technologies, Biosurveillance, Non-Traditional Agents, Warfighter Battlefield Protection, and Basic Science/Threat Agent Science.

Our group of scientists and business people work to get the best science, wherever it may be found. We rely on the significant and critical contributions of the DoD laboratories, especially those of Edgewood Chemical Biological Center, Medical Research and Materiel Command, Air Force Research Laboratory, and Navy Research Laboratory.

We are working to strengthen relationships in how our portfolio is executed while also reaching out to our academic and international partners to find innovation and additional capacity.

It's important for us to be able to connect with current performers and to seek potential new performers who can drive advances in the sciences and technology of ChemBio Defense. We currently have a number of performers that epitomize the best science being done in academia; and they are helping us to work through the tough problems in our programs. We would love to see more interest from those who believe they have something to offer.

See Acting Director Page 2

INSIDE THIS ISSUE

ACTING DIRECTOR'S MESSAGE from page 1

The quarterly JSTO Science and Technology Update is designed to provide a flavor of what we do across our portfolio. In this first edition, Mr. Jerry Glasow, Chief of our Information and Analysis Division (CBI), will focus on information sciences including modeling and simulation, warning, and reporting. He will also share with us where he plans to take this area. Information sciences is a critical effort that not only provides warning for troops against weapons of mass destruction attacks, but also provides timely information and the right analytical tools to permit leaders to make good decisions.

This issue also includes an update from one of our performers in information sciences, Mr. William Ginley, and a pair of technical articles.

Each quarter we will provide news in a particular science or technical area, along with insight from those managing the efforts and performing the work. We want the JSTO Science and Technology Update to be of technical interest to you, so we'll also include technical articles of scientific interest from performers in our program.

Finally, this first issue will give you a glimpse into what we have in store for the Chemical and Biological Defense S&T Conference this November in Orlando, Florida. Many of you attended last year's first combined Medical and Physical S&T conference in Dallas, and I think you will agree we achieved critical mass in a broad and diverse portfolio. This year's conference will again feature the combined sciences. Our format will be to include as many posters as last year, but this year's agenda will offer more time for viewing them. I've been asked, "How do you know the best science when you see it?" My answer is, "Sometimes when you see it for yourself, you know it!" Come see for yourself! We look forward to having you join us at the conference.

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CBI 411

By Jerry Glasow, CBI Division Chief

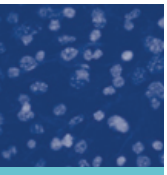
One of the first steps I am taking as Division Chief is to rename the CB Information Systems Capability Development Division to be the CB Information and Analysis Division. Why the name change? Back in 2003, I helped write the Chemical and Biological Defense Program (CBDP) Implementation Plan language for test and evaluation (T&E), modeling and simulation (M&S), and analysis. However, I was promoted and assigned away from being able to help implement the vision I intended.

For T&E, I intended robust capabilities to ensure adequate T&E. Instead, we lack the methods and tools (e.g., M&S) needed to show operational effectiveness based on demonstrated performance, what the CBDP T&E Executive calls Comprehensive Evaluation or Big-E.

For M&S, I intended a formal program that developed and fielded M&S tools for operations, analysis, acquisition, training, and T&E; and an end to randomly arriving and competing models and simulations. Instead, we're still using multiple hazard prediction tools, and we couldn't create a viable program to deliver operational effects M&S tools.

For analysis, I intended a defensible analytical basis underpinning each requirement and programmatic decision. Instead, we have Capabilities Based Assessments, Functional Area Assessments, Functional Solutions Assessments, and Analyses of Alternatives (AoAs), but we have lost the audit trail of our quantitative requirements; we're doing ex post facto requirements clarification analyses; and we've discovered that you can't get good AoAs in 90 days.

These problems have a common root cause. Put simply, we haven't institutionalized the analysis capabilities (people, data, methods, and tools) that are the hallmark of conducting highly capable analyses. The Army has the Center for Army Analysis, the Training and Doctrine Command Analysis Center, and the Army Materiel Systems Analysis Activity; the Navy has the Center for Naval Analysis; and the Air Force has the Air Force Studies and Analysis Agency; but the CBDP has not cultivated an analogous capability.



I have accepted my current position because I see it as one possible means to address these problems. Specifically, we need to combine the research and development (R&D) responsibilities for analysis capabilities with the operations research responsibilities for doing our analyses. Separated, both of these areas suffer to the point of failure—we don't get the analysis capabilities we need and we don't get the analytical products we need. This brings me back to the name change. The old name, "CB Information Systems Capability Development," ignores the predominance of analysis as the heart of what we need CB information systems to do and it perpetuates the separation of developing analysis capabilities from doing analysis.

As the Chief of the Information and Analysis Division, I want to be responsible for both the R&D to develop CBDP analysis capabilities and the operations research for doing CBDP analyses. My goal is to move from managing performers who develop and transition piece-wise analysis capabilities to managing performers who simultaneously use those analysis capabilities for doing CBDP analyses. Under this business model, the traditional develop-and-transition-science-and-technology paradigm shifts to become a develop-use-maintain-transition paradigm. These new performers are super-users who develop, use, and maintain analysis capabilities while doing analysis tasks. We transition these capabilities only when there is sufficient general-user need (e.g., warfighters) and the capability is mature enough for general users. In some cases, such transitions would be for formal fielding on the Service's information systems (e.g., Joint Program Manager (JPM)-Information Systems and JPM-Guardian); in other cases, such transitions would be to organizations whose missions require in-house analytical capabilities (e.g., T&E organizations).

Obviously, this kind of change requires support across the CBDP. Because these problems are so important, I am open to alternative solutions. At some point a few years from now, I want to be able to step back and see we've made significant progress via any solution that works.

Advanced Epidemiological Modeling and Disparate Data Fusion to Support Comprehensive Global Biosurveillance

By Nancy Nurthen, S&T Manager, Medical & Surveillance Information & Analysis

Background

Today's policy documents increasingly recognize an interdependent relationship between national security and public health, both nationally and internationally. The spread of contagious disease, from either naturally occurring outbreaks or bioterrorist events, has emerged as one of the most significant threats to national security because of advances in modern biological science and technology, the potential ease of acquiring and deploying bioweapons, and the interconnectedness of our global community. (See figure 1.) Our nation's ability to defend itself against an emerging infectious disease (EID) depends entirely on the ability of other nations to defend themselves, some with potentially far fewer resources.

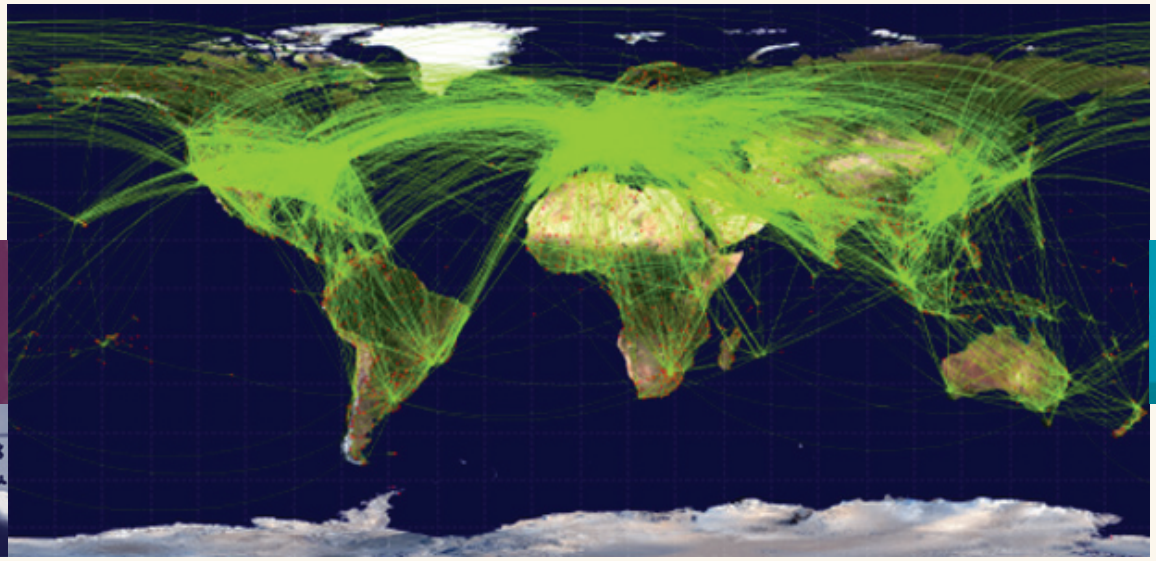


Figure 1. World map of airline routes (http://openflights.org/blog)

Emerging Threat

The May 2010 National Security Strategy states that the threat of contagious disease transcends political boundaries; and the ability to prevent, quickly detect, and contain outbreaks with pandemic potential has never been so important. An epidemic that begins in a single community can quickly evolve into a multinational health crisis that not only causes millions to suffer but also sparks major disruptions to travel and trade.[1]

To address this threat, we must rely on the ability to rapidly detect, classify, and provide early warning for contagious disease outbreaks among human, animal, or plant reservoirs around the world. Also important will be the capability to analyze the behavior of large populations during naturally occurring disease outbreaks or bioterrorist events. Decision-makers need key data to estimate the following:

- Spatio-temporal spread of the disease
- Severity of the disease outbreak
- Projected peak time and duration of the disease outbreak
- Use and effect of early mitigation measures such as vaccine, social distancing, pharmaceuticals, and quarantine, etc.
- Optimum and targeted deployment of limited medical resources

A rapid estimation and response capability requires both capturing relevant, disparate, near-real-time information and a high-fidelity modeling component to estimate the progression of a contagious disease through complex, socially networked, interdependent populations.

See Advanced Epidemiological Modeling Page 5

Emerging Technology for Emerging Threats

An important piece of the Chemical Biological Information and Analysis Division (CBI) mission is to "Support the advancement of the CB S&T knowledge base by tracking emerging threats and technology and by ensuring efforts to provide responsive technologies that address current and future threats." In this regard, CBI noted the following significant gaps in current early warning and disease modeling and simulation capabilities:

- There is no central source on contagious disease spread that also provides individualized data on who, where, or when people are infected coupled with geospatial visualization tools to support government, military, and public health planners and decision-makers.

- Multiple disparate data sources for biosurveillance-related data exist, are often global reaching but mission compartmentalized, and frequently lacking a reporting and data-sharing component that results in a lack of analytical association between all of the available information.

Contagious Disease Modeling

Traditional epidemiological models use systems of differential equations to classify members of population groups by their movement through disease-transition states. These are known as compartmental or deterministic models, the most common of which is the model that contains the disease states Susceptible, Infected, and Recovered (SIR).

These models assume that (1) the population is "fully mixed," (2) there are average contact and infection probabilities among individuals, (3) subpopulations are partitions of the general population, and (4) subpopulations do not overlap and are also fully mixed. These models do not account for individual decisions, actions, or complex interactions among the population being modeled. Today's decision-makers need access to high-fidelity estimations of disease spread using models comprising more detailed conceptualizations of the underlying population and contact structures to answer complex questions such as the following:

- When to close schools and which schools to close (elementary, middle, high, universities) and for how long
- When to sequester troops and at what group size for force protection
- When to recommend social distancing by eliminating nonessential activities
- If there is a need to target interventions and, if so, on which populations and in what time frame

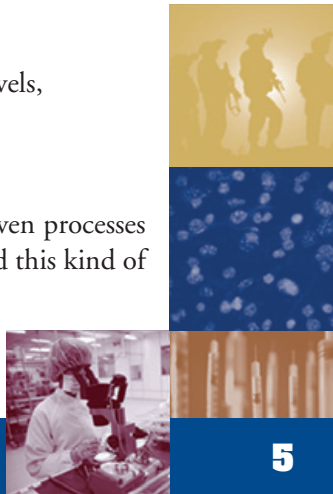
A great deal of work has been done under NIH's Modeling of Infectious Disease Agent Study (MIDAS), which is a collaboration of research and informatics groups working to develop computational models of the interactions between infectious agents and their hosts, disease spread, prediction systems, and response strategies. This work has promoted advancement in computational techniques and numerical methods that result in revolutionary capabilities regarding epidemiological modeling.

A group at Virginia Tech's Network Dynamics and Simulation Science Laboratory, affiliated with MIDAS, has done work for DTRA by developing an approach that includes the following features, as shown in figure 2:

- Constructs highly resolved representations of population and underlying information infrastructures (demographic and U.S. Census data, household structures)
- Simulates the daily movements and activities patterns of large populations in realistic environments (travel surveys, cell phone towers)
- Overlays models of disease transmission onto these populations
- Simulates dynamic interactions between individuals, infrastructures, and environments (activity levels, locations and sequences)
- Analyzes model outputs to inform decisions and guide future research

This approach moves individuals rather than population groups through disease states using interaction-driven processes that account for social contacts and networks. An opportunity exists to rapidly leverage, enhance, and expand this kind of work both in response to the emerging threat and in support of global biosurveillance.

See Advanced Epidemiological Modeling Page 6



Data Fusion

There is no doubt that several agencies and organizations in the United States and around the world are already collecting important biosurveillance data, including the National Institutes of Health, Centers for Disease Control and Prevention, DoD Global Emerging Infections Surveillance and Response System, World Health Organization (WHO), and others. Additional streams of global health data will be collected and shared according to International Health Regulations (IHR) 2005. In response to the threat from EIDs, 194 countries have signed on to be IHR compliant by 2012 in establishing capacities to detect, assess, and report any "public health emergency of international concern." Per IHR 2005, Part II–Information and Public Health Response, Article 6, this notification must come to WHO within 24 hours by the most efficient means of communication possible.[2]

Summary

Recent policy and program strategy documents have detailed the need for coordinated and concentrated U.S. government efforts in collaboration with domestic and international partners to address new and emerging biological threats. In addition to the National Security Strategy, the National Strategy for Countering Biological Threats states that reducing the risks presented by the deliberate or accidental release of a biological agent requires the use of all instruments of national power, close coordination among all sectors of government, and effective partnerships among public and private institutions both nationally and internationally.[3]

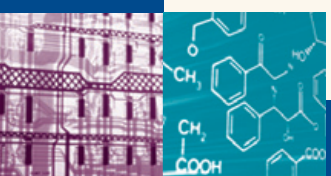
Figure 2. U.S. Census form, cell phone tower locations, activity level and location sequence

CBI is excited about the potential opportunity to work with other DTRA divisions, U.S. government agencies, international partners, industry, and academia to identify, leverage, and enhance emerging technology as well as develop future S&T capabilities to integrate global outbreak detection and agent-based modeling and simulation capabilities. This work would support the development of a prototype global biosurveillance data fusion and modeling tool that would provide decision-makers with more comprehensive, near-real-time situational awareness and a high-fidelity course of action analysis capability.

1 White House. National Security Strategy, May 2010. Accessed June 21, 2010. http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf.

2 World Health Organization. International health regulations (2005), 2nd ed. Accessed June 21, 2010. http://www.who.int/ihr/9789241596664/en/index.html

3 White House. National Strategy for Countering Biological Threats, November 2009. Accessed June 21, 2010. http://www.whitehouse.gov/sites/default/files/National_Strategy_for_Countering_BioThreats.pdf



An Interview with William Ginley

Chief of the Nuclear, Chemical, Biological Battlefield Branch at Edgewood Chemical and Biological Center

By Dr. Christine Boyd

Mr. William Ginley is originally from western New York, near Buffalo. He received his Bachelor of Technology in Computer Science in 1984 from the Rochester Institute of Technology and began his career working with the Army, which led him to Picatinny, NJ, and eventually Aberdeen, MD, where he now works at the Edgewood Chemical and Biological Center. He works on the development of chemical and biological detectors and the integration of those detectors from a data communications aspect. Mr. Ginley has worked on such projects around the world and is currently involved with several projects for DTRA.

Mr. Ginley is also an avid hiker when he is not busy integrating sensors. He takes every opportunity to hike up mountains and through the National Park system. He's hiked along parts of the Appalachian Trail, including its end points, Mt. Katahdin in the north and Stone Mountain in the south. Mr. Ginley resides in Bel Air, MD with his wife, who is a General Education Diploma educator, and their two sons, ages 12 and 8.

What is one of your current projects?

Under CBI, I work on a project called JCID on a chip (JoaC). For the Joint Warning and Reporting Network (JWARN) to be fully realized, it needs sensor data. The sensor data is connected to the system by a hardware device, called JCID (JWARN component interface device). It goes between the sensor and the network. When JWARN started, they were building the JCID. We decided it was in our long-term interests to remove that middle piece of hardware. What was happening in that hardware could happen in a sensor; should happen in a sensor. So we started a project, which was called JCID on a chip, and we basically intended to take that hardware and make it a chip that you could embed or, more importantly, a piece of software that you could give to a sensor developer and say, "Here's everything you need to know to get your sensor data into JWARN."

We just transitioned that to JPMIS (Joint Program Manager Information Systems) on May 14 this year. It was a big deal for us, because it finally brought the program over into the PM, where they will now take it forward and put it out into the field in a fashion that they see fit. We did a lot of that work with their help. We continue to use this JCID on a chip inside the S&T tech base, because it allows us to work other parts of the whole architecture for moving sensor data into information systems. The JCID on a chip debuts with the Common CBRN Sensor Interface (CCSI) too.

One of our challenges now is that we have very limited communications and bandwidth to push data through systems, and so we have to come up with creative ways to push a lot of data through little pipes without breaking the pipes. These advanced technology demonstrations at DTRA give us opportunities to test those things and see where we break it, how much data we can get before we break it.

What are the next steps forward with this project?

From the program management side, now that we've given it to JPMIS, they are looking at standardizing around their JCID with the current capability plus our JoaC. They now have multiple ways of bringing data to JWARN. They can give someone a list of which pieces of equipment or software to use. They'll look for opportunities to bring other sensors online either as an embedded software capability or connected in with their existing hardware. From our perspective, we just want to keep using it in the S&T community, testing it, expanding the CCSI capabilities and keep looking for ways to build more sensor algorithmic support. We'll do that for about another year before we pass that forward.

See William Ginley Page 8

 from page 7

How do you interface with the end-user vs. the Joint Priority List (JPL)?

One of the things I like to claim as my forte in this whole thing is that I'm more experimental, more field-based S&T. I'm always looking for an operational venue in which to demonstrate. I've been in the desert every summer for the last 15 years doing a test somewhere. The ones that work the best for us are the ones where we can bring in soldiers, airmen, or sailors to pilot the projects we're working on. We maintain a list of willing active reserve folks and work with the combatant commanders to donate some people who will come out and test our solutions.

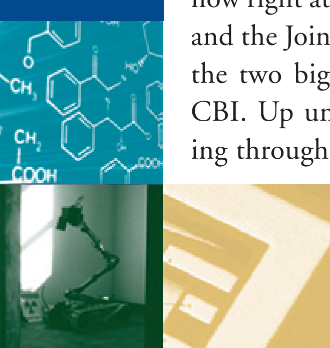
As far as the JPL is concerned and how we match up the end-user requirements with what's on the priority list, a lot of times we do that in the context of the technology demonstrations that we're doing. DTRA casts these things where we have a technical side and an operational side. We have a different manager for each side. I tend to always be on the technical side because I'm in the S&T community. But for us to build something that has true utility in the field, we need an operational manager and an operational perspective. It's usually the responsibility of the operational manager to track our technical solutions into the joint priority list. We identify three or four items on the JPL for each project that we're working on, look at the technical solution, and then match up the technical solution into some evaluated criteria that the operational manager assesses for us.

What capability gaps do you see in JSTO, and what potential gaps do you see for the future? What is the next step in chem-bio information technology?

I always liken myself to being a plumber. I've spent my entire S&T career up to this point building sensors and building pathways to networks so that the sensors can relay the information into a network. We're now right at a point where JWARN is coming online, and the Joint Effects Model (JEM) is fielding. They're the two big projects that we target our S&T to in CBI. Up until this year when JWARN was still going through all its operational tests, the S&T we did was recognizing where JWARN would be. We were spending all our time getting data to JWARN and looking to make sure that we could reliably do that. We're now to the point where we can say that the basic plumbing is in place. The sensors, network paths, radio bridges, and information systems are there. We're finally to the point where we can ask, "What more can we do with it? How much data can we actually get through the system?" If we can get more information out of the sensors, we can get more intelligent decision-making done on the C2 side. Now we're thinking about the ability to iterate on the data we have and make better decisions from it.

Right now, our world is about bringing chem-bio defense information to the chem-bio defense system. There are all kinds of other sensors out there. There are intelligence systems that feed data into their own systems. We're trying to tap into those other sensing systems, other modalities, and merge their data with our data. We think they could tell us something about the environment we're operating in that our sensor can't determine on its own. If I knew what their sensor was seeing, and I knew what this person was thinking, and I knew what my sensor was seeing, I could merge all that information together, and I could look at it in a way that I couldn't look at it before. That's where we're going with it.

The other aspect of what we're trying to do is merge the whole thing together. Right now we have a sensor, a radio, and a C2 system; and they kind of exist as separate entities. With the JoaC, we're merging the sensor and the interface device together, but we still need a network bridge—either an Ethernet cable or a wireless radio to get to the C2 system. Maybe we could package it all together so that we have a sensor, the information system, or the algorithms of the information system, all in the same box so that you're making a decision downstream of where you could make it before with less equipment, less set-up, and less training. We're putting a lot more sophistication in the sensors themselves so that they'll do the processing. That should keep us busy for the next couple of years.



Defense R&D Climate Analysis Being Used Across Government

By John R. Hannan, Ph.D., S&T Manager, Warning & Reporting Information & Analysis

CBI has partnered with the National Center for Atmospheric Research (NCAR) on a research and development (R&D) effort to support the modeling of atmospheric transport and dispersion (AT&D) of chemical, biological, radiological, and nuclear agents released into the atmosphere. This CBI-funded partnership has resulted in a one-of-a-kind, dual-use, 21-year climatology dataset that supports both Department of Defense (DoD) missions and non-DoD applications, which depend on climate information. With budget cuts expected in DoD and government in general, more emphasis is being placed on remaking the defense industrial base into a national technology industrial base including dual-use approaches to R&D.[1]

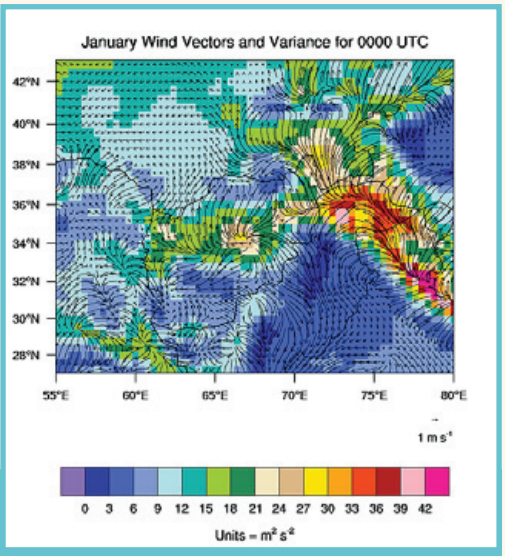


Figure 1. Example of January wind vectors and climatological variance

The original defense-related motivation for this work was to provide the Joint Effects Model (JEM) AT&D system with high-resolution climatology data to assist military commanders who must develop plans of action for responding to releases of hazardous materials into the atmosphere during battlefield operations and homeland defense. When military commanders prepare their strategic battle plans, they must distill an array of information about the area where operations will take place to identify hazards that airborne and ground forces might face. A key piece of information needed as input to decision support tools, such as JEM, is typical or climatological weather one might encounter and how this may help or hinder operations. This kind of planning takes place weeks or months in advance of actual operations, well beyond the range where individual weather features or events can be forecast with any credibility. Therefore, it is imperative that accurate climatological data be available to help define the representative atmospheric conditions for a given day. (See figure 1.)

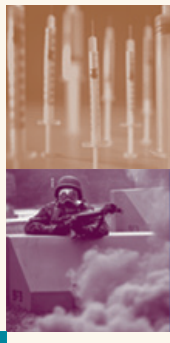
Because of the unique quality of the CBI/NCAR climatology dataset, in terms of temporal and spatial fidelity (global, 40 km horizontal resolution at hourly intervals), the dataset currently is being mined by a community of scientists in both academia and government for a range of nondefense climate studies such as:

- Evaluating weather extremes: worst- and best-case scenarios
- Wind energy resource assessments
- Climatological information at remote locations
- Regime-appropriate uncertainty estimates that account for the variability of weather patterns
- Daily and seasonal variability of temperature, humidity, wind, solar radiation, cloud cover, and rainfall at any point on the globe

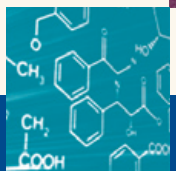
The National Aeronautics and Space Administration, the Western Power Administration, and the Navajo Nation are all leveraging the dataset to develop a more accurate and efficient method for generating long-term wind resource assessments for potential wind farms. The CBI/NCAR dataset is being used to identify dominant weather regimes over particular study areas in Arizona and the Missouri Valley and as a starting point for high-resolution downscaling.

The University Corporation for Atmospheric Research Africa Initiative is applying the dataset to explore and understand the onset and cessation of the meningitis season in western Africa. The project is a part of a larger effort aimed at integrating environmental, health, and development data into products that can be used to monitor variables, analyze trends, and identify relationships among different variables to support the prediction of emerging threats, and also to provide the basis for a robust early-warning system that will improve health, food security, and development and conservation outcomes.

Other recent studies conducted directly by CBI and NCAR researchers using this dataset have already yielded important findings about the global climate previously not documented in scientific literature. For example, a pair of companion papers recently published in the Journal of Climate[2,3] provided insight into the global distribution and characteristics of diurnally varying, low-level jet streams (LLJs), including their horizontal, vertical, and temporal structure, and the subsequent effect on global and regional precipitation extremes. (See figure 2.)



See Defense R&D Climate Analysis Page 10



DEFENSE R&D CLIMATE ANALYSIS from page 9

The studies examined the basic mechanisms that give rise to LLJ formation and subsequent influence on the regional climate, particularly extreme rainfall events, which have important societal impacts, for example by causing flooding, replenishing reservoirs, and affecting agricultural yields. (See figure 3.)

It was demonstrated in these studies that the CBI/NCAR climatology database accurately simulated the diurnal cycle, extremes, and spatial structure of rainfall globally compared to satellite-based precipitation datasets and, therefore, was suitable for examining LLJ-rainfall linkages. The studies also showed that statistically significant relationships between LLJs and nocturnal precipitation extremes exist in at least 10 widely disparate regions around the world, some well-known and others undocumented until now, including the U.S. Great Plains, Tibet, northwest China, India, southeast Asia, southeast China, Argentina, Namibia, Botswana, and Ethiopia.

CBI is pleased that its investment in climatology research specifically for use by JEM has sparked such tremendous interest by the climate research community outside of DoD. This is an important development since the Fourth Assessment Report (AR4)[4] of the Intergovernmental Panel on Climate Change concluded that global climate change will cause discernible changes in ocean temperatures, continental-average temperatures, temperature extremes, and wind patterns, all of which have far reaching socioeconomic and ecologic impacts. Now more than ever there is a compelling need for accurate information about the local, regional, and global climate; how it has evolved in the past; how it is likely to change in the future; and how it has and will impact human activities.

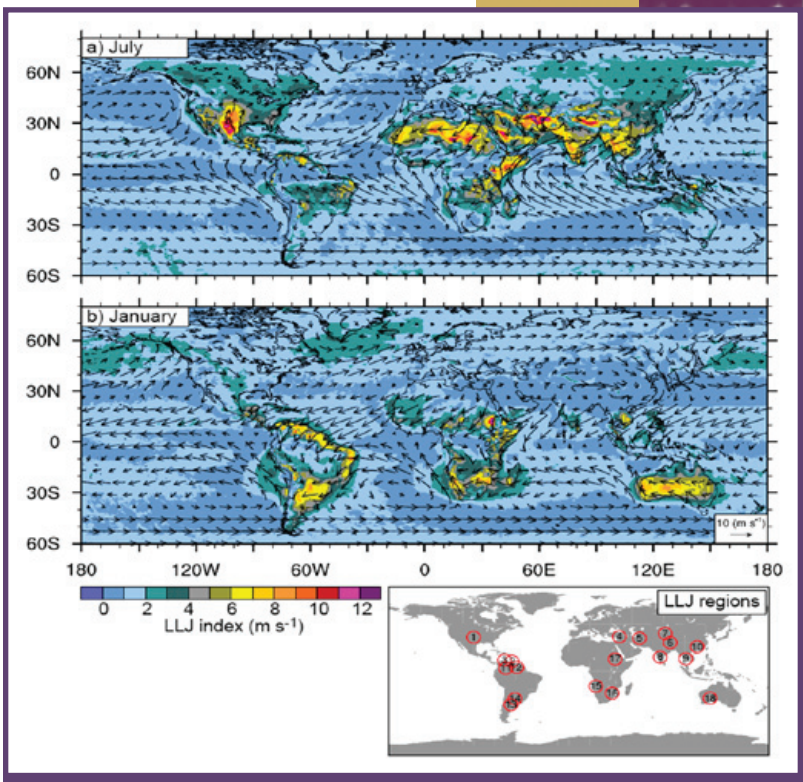


Figure 2. Mean LLJ index (shaded) at 0000 LST for 1985-2005 for (a) July and (b) January. The mean 500-m-AGL winds (arrows) are plotted atop the LLJ index at approximately every twentieth grid point (~10 deg). Numbered boxes in the inset correspond to LLJs examined in the study.

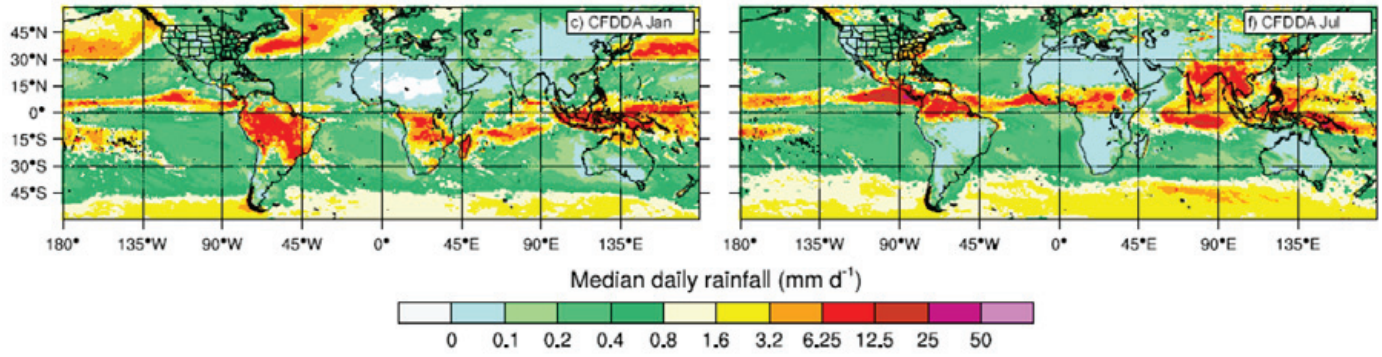


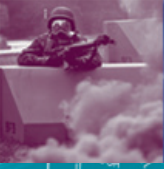
Figure 3. The median daily rainfall (mm d-1) for 2003-2005 for January and July

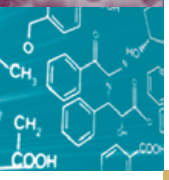
1 Brandt, L., Defense Conversion and Dual-Use Technology: The Push Toward Civil-Military Integration, Policy Studies Journal, Vol. 22, 1994

2 Monaghan, A.J., D.L. Rife, J.O. Pinto, C.A Davis, and J.R. Hannan, Global precipitation extremes associated with diurnally-varying low-level jets, J. Clim. JCLI-3515, 2010

3 Rife, D.L., J.O. Pinto, A.J. Monaghan, C.A. Davis, and J.R. Hannan, Global distribution and characteristics of diurnally-varying low-level jets, J. Clim. JCLI-3514, 2010

4 Climate Change 2007 Synthesis Report, A Report of the Intergovernmental Panel on Climate Change, 2007





Did you know?

On July 2, 2010, the President signed an Executive Order that, when implemented by the relevant Departments and agencies, will help the United States achieve a crucial balance between two goals that are sometimes seen as being in conflict: Increasing the Nation's defenses against the threat of biological weapons and reducing the hurdles that legitimate scientists face as they pursue research on potentially dangerous microbes.

http://www.whitehouse.gov/the-press-office/executive-order-optimizing-security-biological-select-agents-and-toxins-united-stat

Researchers have made the surprising finding that graphene-based nanomaterials possess excellent antibacterial properties. Although antibacterial materials are widely used in daily life, and the antibacterial properties of nanomaterials are increasingly being explored and developed as commercial products (see for instance: "Antibacterial nanotechnology multi-action materials that work day and night"), their cytotoxicity and biocompatibility has raised questions and concerns.

http://www.nanowerk.com/spotlight/spotid=17000.php

The destruction of chemical weapons that have been declared to the Organisation for the Prohibition of Chemical Weapons (OPCW) by States Parties under the provisions of the Chemical Weapons Convention (CWC) has surpassed 60 percent of global stockpiles, according to data reported by the OPCW Technical Secretariat in The Hague.

http://www.opcw.org/nc/news/article/global-campaign-to-destroy-chemical-weapons-passes-60-percent-mark/

Washington State University researchers have developed a way to store energy and provide defenses against potential biological attacks from terrorists. Washington State University professor Choong-Suk Yoo, who recently published the results of the study in the online edition of Nature Chemistry, told news.opb.org that he was successful in using xenon diflouride as a way to store energy by turning gas into a solid. Yoo also said that, in addition to creating this "battery," he has also made what could eventually become a germ-fighting super-oxidizing compound.

http://www.bioprepwatch.com/news/213772-new-energy-storage-method-may-fight-bioterror

PharmAthene, Inc., a biodefense company developing medical countermeasures against biological and chemical threats, announced today that it continues to make solid progress in its lyophilized recombinant Protective Antigen (rPA) anthrax vaccine development program. The Company has recently demonstrated that its lyophilized rPA vaccine candidate is structurally stable and potent at various temperatures up to and including 70 degrees centigrade.

http://www.sacbee.com/2010/07/08/2876582/pharmathene-develops-thermostable.html

A superthin computer just two molecules thick can solve complex problems and, somewhat like the human brain, can evolve to improve and perform many operations simultaneously. This molecular processor can also heal itself if there is a defect, researchers added.

http://www.msnbc.msn.com/id/36788441/ns/technology_and_science-innovation/

Symyx Technologies, Inc. has released the Symyx Direct 7.0 data cartridge—an innovative, one-stop solution for registering, searching, and retrieving chemical and biological entries stored in relational databases. Supporting the continued expansion of biologics in today's pharmaceutical, biotech, and materials science R&D pipelines, Symyx Direct 7.0 improves R&D efficiency, project team collaboration, and IP management by enabling multidisciplinary project teams to visualize, explore, and compare novel macromolecular sequences and chemical structures stored in a single, fully searchable corporate registry system.

http://www.marketwatch.com/story/symyx-direct-bridges-the-gap-between-bioinformatics-and-cheminformatics-2010-06-22?reflink=MW_news_stmp

ChemBio Directorate Gears Up for Third Annual S&T Conference

By Carl Brown, Staff Director, Strategic Communication and Outreach, DTRA/SCC-WMD-RD-CB

Planning is well underway for the 2010 Chemical and Biological Defense Science and Technology (CBD S&T) Conference, to be held November 15-19 at the Hilton Orlando in Florida. Each year the Defense Threat Reduction Agency (DTRA), executing the Joint Science and Technology Office function within the Chemical and Biological Defense Program, hosts this significant event to foster strategic communication across government, academic, and industrial spheres. This premier conference combines and builds upon events and applications from the 2007 BioDefense Research Conference in Philadelphia, the 2008 CBD Physical S&T conference in New Orleans, and the 2009 CBD S&T Conference in Dallas.

At the Dallas conference last year, DTRA-CB hosted over 1,300 attendees, 900 of whom had direct contact and discussion with representatives at the CB Outreach booth. There were 867 abstracts submitted, 568 poster presentations, 225 oral presentations, 29 student scholarships awarded, 16 parallel sessions, and 7 notable keynote speakers. The 2010 conference is shaping up to eclipse this successful event.

Participants gather to hear a keynote address at the 2009 S&T Conference in Dallas

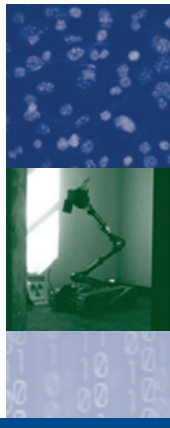
Dr. Stanley Cohen, a world-renowned geneticist and keynote speaker from Stanford University, best summed up the Dallas conference, "I've long believed if I attend a meeting, and if I have learned two things by the end of the meeting that are useful and directly applicable to my lab, then going to the meeting has been a success." He went on to say, "And at this particular meeting, it has been like a candy shop and I have well exceeded that quota."

The 2010 CBD S&T Conference theme is Accelerating Science for the Warfighter and Beyond, and its purpose is to identify and examine the best new and dynamic developments in areas of basic and applied research in the chemical and biological defense landscape. This will be the second time that the latest developments of the medical and physical science disciplines of chemical and biological defense for the warfighter will be showcased simultaneously. Confirmed keynote speakers include the following:

- Nobel Laureate Dr. Robert Grubbs from the California Institute of Technology Division of Chemistry and Chemical Engineering
- Dr. Tara O'Toole, Under Secretary for Science and Technology, Department of Homeland Security
- Dr. Nathan Wolfe, Director of the Global Viral Forecasting Initiative
- Dr. Richard Danzig, former Secretary of the Navy, and chairman of the Center for New American Security

For the first time, the CBD S&T conference will include special panel sessions held on Monday and Wednesday afternoons. Panels will be chaired by distinguished experts Dr. W. Seth Carus, Deputy Director of the Center for the Study of WMD and Distinguished Research Fellow at the National Defense University, and Dr. Drew Endy, Stanford University Bioengineering faculty and President, BioBricks Foundation (invited), who will facilitate panel presentations on the Defense S&T establishment and synthetic biology followed by dynamic question-&-answer sessions.

This year's other new addition is DTRA CB Industry Day, which will conclude the conference on Friday, November 19. Industry Day will highlight current and future science and technology business opportunities and how to pursue them. Attendees will have the opportunity to meet with DTRA CB senior leaders and S&T managers responsible for overseeing the directorate's portfolio. Industry Day will be especially beneficial to current and aspiring performers and collaborators, as well as anyone interested in learning about the Department of Defense's procurement and contracting processes.



See S&T Conference Page 13

S&T CONFERENCE from page 12

Over 1,000 abstracts have been received to date in 32 topic areas related to chemical and biological detection, protection, medical countermeasures, information systems, and decontamination. The conference will create an opportunity for interaction and collaboration between the following chemical and biological scientific areas:

- Agent understanding
- Medical countermeasures
- Detection and diagnostic technologies
- Novel modeling and simulation
- Protective technologies

These and additional topics will be addressed through hundreds of combined keynote, oral, and poster presentations. Outstanding members of the chemical and biological research community will be recognized with awards based on the quality of the individual research and presentations submitted to the conference.

The Chemical and Biological Defense S&T Conference has become one of DTRA's most effective forums for promoting and encouraging high-quality science. Its technical allure to young DoD-candidate scientists makes it a great supporter of the Deputy Director, Research and Engineering's Science, Technology, Engineering and Mathematics initiative. Additional information can be found on the conference website at http://cbdstconf2010.sainc.com/.

Readers are cordially invited to register and encourage others to attend. See you in Orlando!

News and Information Resources

Office of the Deputy Assistant to the Secretary of Defense for Chemical and Biological Defense Programs (OATSD(CBDP))
http://www.acq.osd.mil/cp/index.html

Joint Program Executive Office for Chemical and Biological Defense (JPEO CBD)
http://www.jpeocbd.osd.mil/packs/Default2.aspx?pg=0

Chemical, Biological, Radiological, & Nuclear Defense Information Analysis Center (CBRNIAC)
https://www.cbrniac.apgea.army.mil/Pages/default.aspx

U.S. Army Medical Research and Materiel Command (MRMC)
https://mrmc-www.army.mil/

U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)
http://www.usamriid.army.mil/

U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)
http://usamricd.apgea.army.mil/

Walter Reed Army Institute of Research (WRAIR)
http://wrair-www.army.mil/

Edgewood Chemical Biological Center (ECBC)
http://www.ecbc.army.mil/

U.S. Army Natick Soldier Systems Center (NATICK)
http://www.army.mil/info/organization/natick/

Air Force Research Laboratory (AFRL)
http://www.wpafb.af.mil/AFRL/

Navy Medical Research Center (NMRC)
http://www.med.navy.mil/sites/nmrc/Pages/index.htm

National Defense Industrial Association (NDIA)
http://www.ndia.org/Divisions/Divisions/ChemicalBiologicalDefense/Pages/default.aspx

Universtiy of Pittsburgh Medical Center (UPMC) Center for Biosecurity
http://www.upmc-biosecurity.org/website/biosecurity_briefing/index.html

CBRNe World
http://www.cbrneworld.com/

Bio-IT World
http://www.bio-itworld.com/

Chemistry World
http://www.rsc.org/chemistryworld/

Foundation for Biomedical Research
http://www.fbresearch.org/aboutfbr/tabid/423/default.aspx

Network Science
http://www.netsci.org/Science/index.html

Science-Business eXchange
http://www.nature.com/scibx/index.html

Technology Review
http://www.technologyreview.com/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