MACCSIMIZE SAFETY!

INSIDE THIS ISSUE

U.S. Nuclear Regulatory Commission

Rockville, MD

MACCS website:
https://maccs.sandia.gov/

What is the MACCS Consequence Analysis Code?

Overview

The MACCS consequence analysis code was developed and is used to evaluate the offsite consequences of radioactive releases to the environment. MACCS models atmospheric transport, emergency and long-term protective actions, radioactive exposure pathways, dosimetry, health effects, and economic consequences.

MACCS outputs capture a variety of metrics, including dose, health effects, fatality risk, economic losses, and land contamination.

MACCS can be used for regulatory and cost-benefit analyses, environmental reports and impact statements, plant-specific evaluations of severe accident mitigation alternatives, U.S. Department of Energy documented safety analyses, probabilistic risk assessments, and numerous research studies.

FALL 2024 | OCTOBER 21–25
INTERNATIONAL RAMP AND MACCS USER GROUP MEETING
North Bethesda, Maryland (outside Washington, D.C.)

Using RAMP Codes and MACCS in a Regulatory Framework
Codes of Interest: RASCAL, VARSKIN, MACCS and more!

Registration will open in June 2024

SAVE THE DATE!

Registration for the 2024 International MACCS User Group (IMUG) Meeting and User Workshop, which will take place from October 21 to 25, 2024 at the Nuclear Regulatory Commission (NRC) Headquarters is now open. This year, 2024 IMUG will be a joint meeting with the "Radiation Protection Computer Code Analysis and Maintenance Program (RAMP)" users group meeting. You will get an opportunity to learn about other NRC radiological codes and meet other users interested in atmospheric transport, dosimetry, and emergency preparedness. Additionally, this year the MACCS workshop will include hands-on training exercises. Workshop participants are encouraged to bring their laptops so they can learn and become proficient with the MACCS Code Suite. This is the first joint IMUG and RAMP event. This is also the first in-person IMUG since 2019!

2023 International MACCS User Group Meeting RECAP
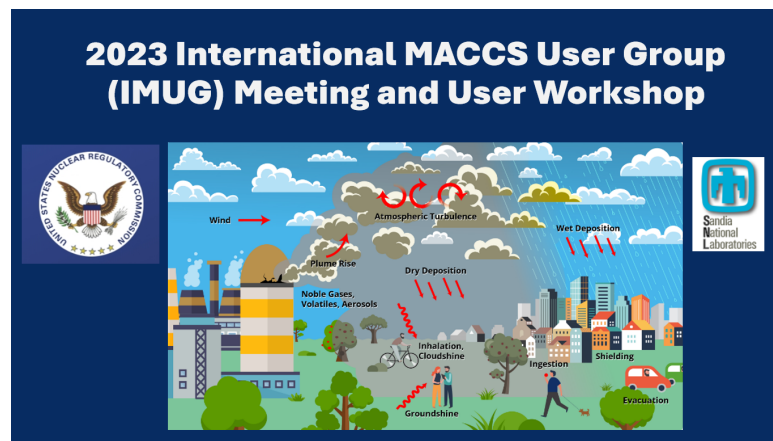
The NRC hosted the 2023 International MACCS User Group (IMUG) Meeting from September 11-14, with remote participation facilitated by the United States Nuclear Regulatory Commission. The meeting drew 140 participants, including instructors and staff, and welcomed CSARP members from 20 countries and 60 organizations. Here are some poll results from the event—your feedback shaped our discussions!

1. What do you think of a joint meeting with RAMP?

More Details

● Yes, sure!	31	
● No, thanks.	8	
● What is RAMP?	2	

1. Would you like to attend the IMUG 2024 and the workshop in person? (Can select Multiple answer)

More Details

- ● Yes — 8
- ● Yes, but it would be difficult. — 9
- ● I prefer the virtual meeting and ... — 6
- ● I don't know yet. — 3
- ● Yes, if a more in-depth training i... — 1

1. Will you attend in-person if a more in-depth training is offered?

More Details

- ● Yes — 14
- ● No — 5
- ● Maybe — 20

1. How often and how long the MACCS workshop should be?

More Details

- ● One day every year — 3
- ● Two days every year — 4
- ● Three days every year — 25
- ● One week every year — 4
- ● One day every year with longer ... — 6

Dr. AJ Nosek

Dr. AJ Nosek is a nuclear accident consequence analyst at the U.S. Nuclear Regulatory Commission (NRC). AJ helps direct development of the MACCS consequence analysis code, and he is the author of the MACCS Theory Manual.

AJ manages MACCS code distribution for the NRC using the MACCSCodes@nrc.gov email account and was a dose analyst responding to the Fukushima Daiichi nuclear disaster through the NRC Incident Response Center. AJ has a BS and MS in Nuclear Engineering and Engineering Physics and a PhD in Industrial and Systems Engineering specializing in Decision Science and Operations Research from the University of Wisconsin-Madison. His dissertation is on assessing the recovery and costs of a nuclear accident as informed by the Fukushima Daiichi nuclear disaster.

AJ lives with Tanya (wife) and Truman (13-year-old son) in Wisconsin. He loves volleyball, video games, and foraging for mushrooms.

Dr. Nazila Tehrani

Dr. Nazila Tehrani is a nuclear accident consequence analyst at the U.S. Nuclear Regulatory Commission (NRC). Nazila manages the MACCS consequence analysis code project, and she has developed an efficient MACCS sample problem. Nazila has a BS and MS in Chemical Engineering and a PhD in Nuclear Engineering from the University of Tennessee. Her dissertation is on developing an artificial neural network that is capable of accurately predicting total dose for large solar particle events in deep space missions, from several input doses early in the event. The network can update its total dose predictions during the event as new input data are received. The parametric fits and actual calculated doses for the skin, eye and bone marrow are used. Results from testing indicate that the network can predict total doses from large events that are outside the training set to within 4% very early in the event.

Nazila enjoys walking Bean!

Meet Dr. Elena Yegorova!

Dr. Elena Yegorova is an atmospheric scientist at the U.S. Nuclear Regulatory Commission (NRC). Elena joined the NRC in August 2013. Prior to joining the NRC Elena was a post-doctorate researcher with NASA Goddard Space Flight Center utilizing NASA's climate models to study greenhouse gases' impact on the atmospheric oxidizing capacity. Elena received her Double Bachelor of Science Degrees in Computer Science and Physical Sciences from University of Maryland, College Park. Elena completed her Master of Science and Doctor of Philosophy Degrees in Atmospheric and Oceanic Sciences also from University of Maryland, College Park. Elena is interested in numerical modeling of atmospheric processes as they are related to dispersion of contaminants in the environment. Elena supports both the MACCS and RAMP teams with some current projects including:

- SIERRA atmospheric transport and dispersion (ATD) module validation
- MACCS ATD modeling
- MACCS potassium iodide (KI) modeling

Elena looks forward to increased collaboration and interaction with both the domestic and international MACCS/RAMP user community.

More MACCS team members: Dr. Keith Compton in brown vest and to the left of Dr. Compton and clockwise, Dr. Kyle Clavier, Dr. Salman Haq, Mr. Steven Shockley, Mr. Luis Betancourt (Branch Chief), Ms. Amy Sharp, Dr. Nazila Tehrani, and Dr. Tina Ghosh.

SANDIA AND CODE UPDATES

Meet Dr. Dan Clayton!

Dr. Dan Clayton is a Distinguished Member of the Technical Staff at Sandia National Laboratories in Albuquerque, New Mexico. He is the Principal Investigator for the MACCS code (Accident Consequence Model), evaluating potential risks and consequences to the public for potential accidents of nuclear power plants at Sandia. He is also the Project Manager of the Space Nuclear Systems Launch Safety group, simulating and predicting behavior of nuclear components during space launch accidents at Sandia. Dan received his B.S. and Ph.D. degrees in Chemical Engineering from Brigham Young University. His areas of expertise include atmospheric transport and dispersion, consequence analysis, launch accident sequencing, model development/coding, and risk assessments.

He enjoys spending time with his wife and five kids (two now married) in both indoor activities (e.g., board games, movies, etc.) and outdoors (e.g., traveling, games, flying, etc.)
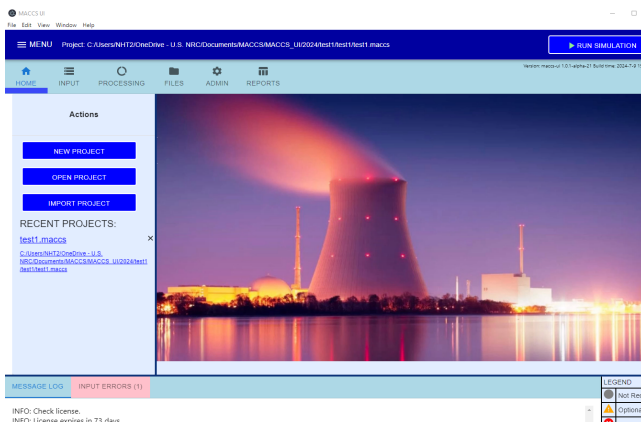

SecPop

SecPop version 4.4.0, release is in 2024. This version includes support for 2020 census data and 2017 county data , added support for locations in AK and HI, updated to run on Java 17, updated documentation to clarify how population and economic multipliers are applied to the non-farm wealth per capita.

CODE UPDATES

MACCS-UI

MACCS-UI version 5.0 offers a user interface and functionalities akin to WinMACCS, but with a modern feel and up-to-date user experience. MACCS-UI release is in 2024.
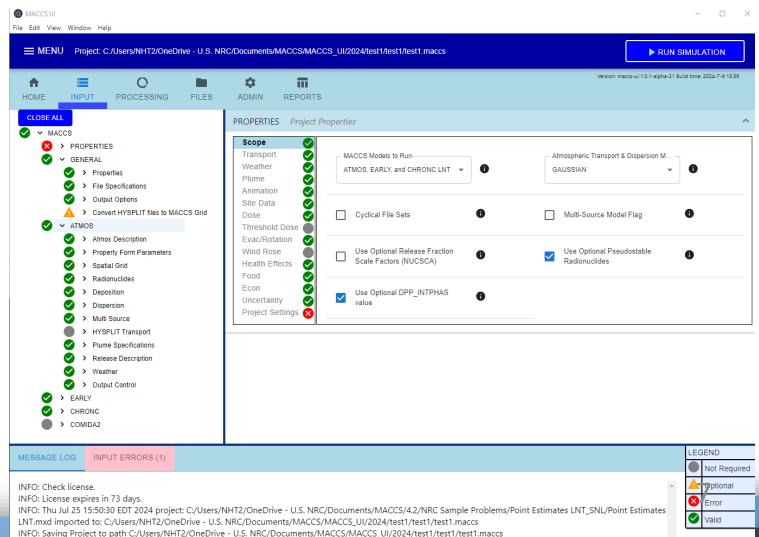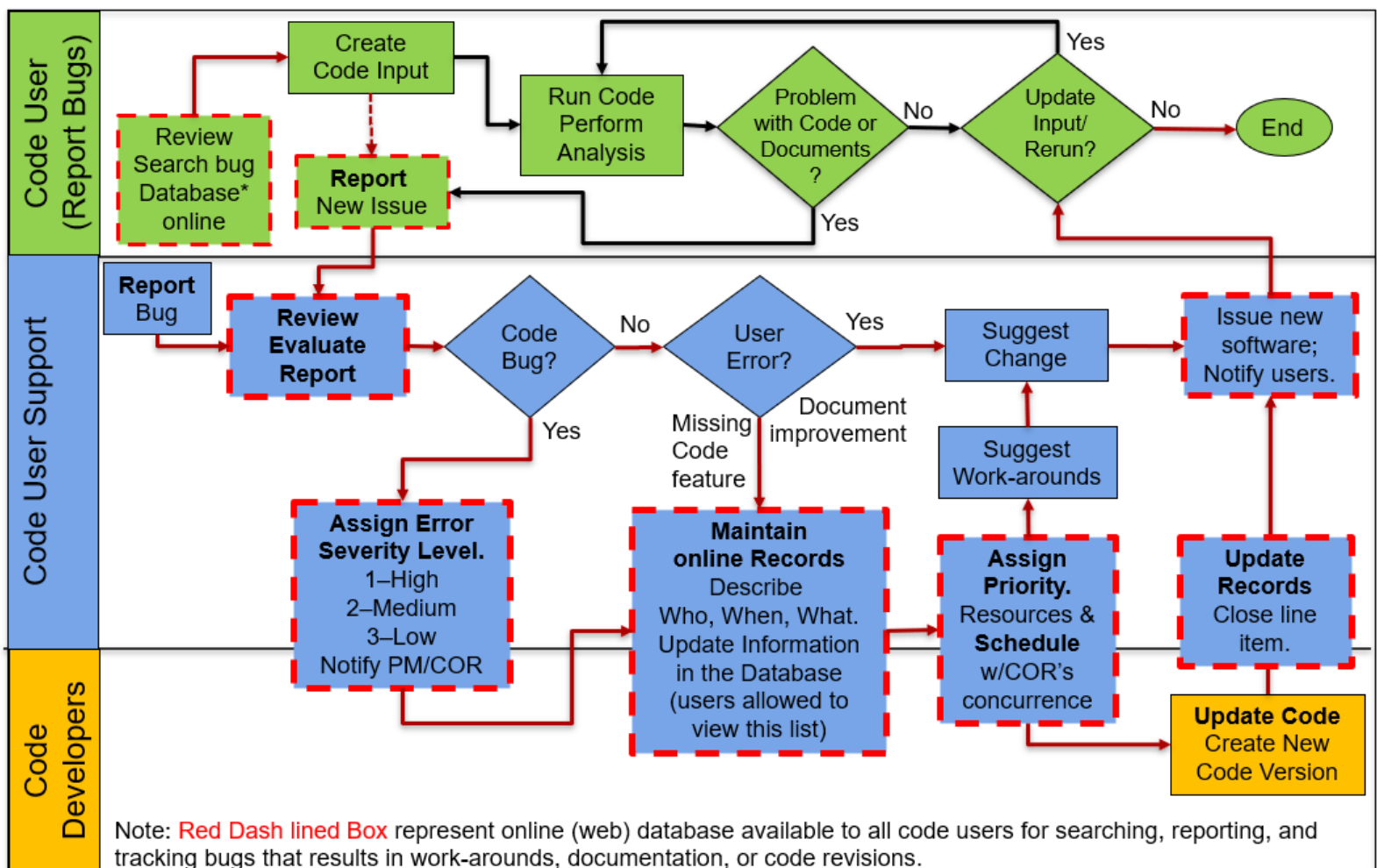
Welcome to FogBugz, Online Database for MACCS Users

MACCS Newsletter – 2024

An analyst typically ensures that existing errors or bugs in computer software will not significantly impact the results. This means a list of errors or bugs is readily available to the analyst before runs are made or results are analyzed. Furthermore, when an analyst suspects an issue with the results of a computer program or documentation, a bug-reporting system is available to report the problem. The problem could be a computer code bug, error, or unclear documentation. The software user support team is responsible for reviewing the problem report, issuing a clarification, or assigning a severity level to the reported bug. User support staff can also identify a workaround to obtain acceptable results. Once the severity level of a bug is assigned, a priority level is usually assigned depending on the resources available to make corrections and reissue the software patch or upgrade, along with a release date schedule. The error report with a list of problems, severity level, priority level with workarounds, and release date with corrective actions is maintained online. The users have access to reported problems and corrective actions. The following diagram shows this process.

Software Problem Reporting and Corrective Action Process/Database

Code users can report problems and bugs in a web-based database after release of a code version.
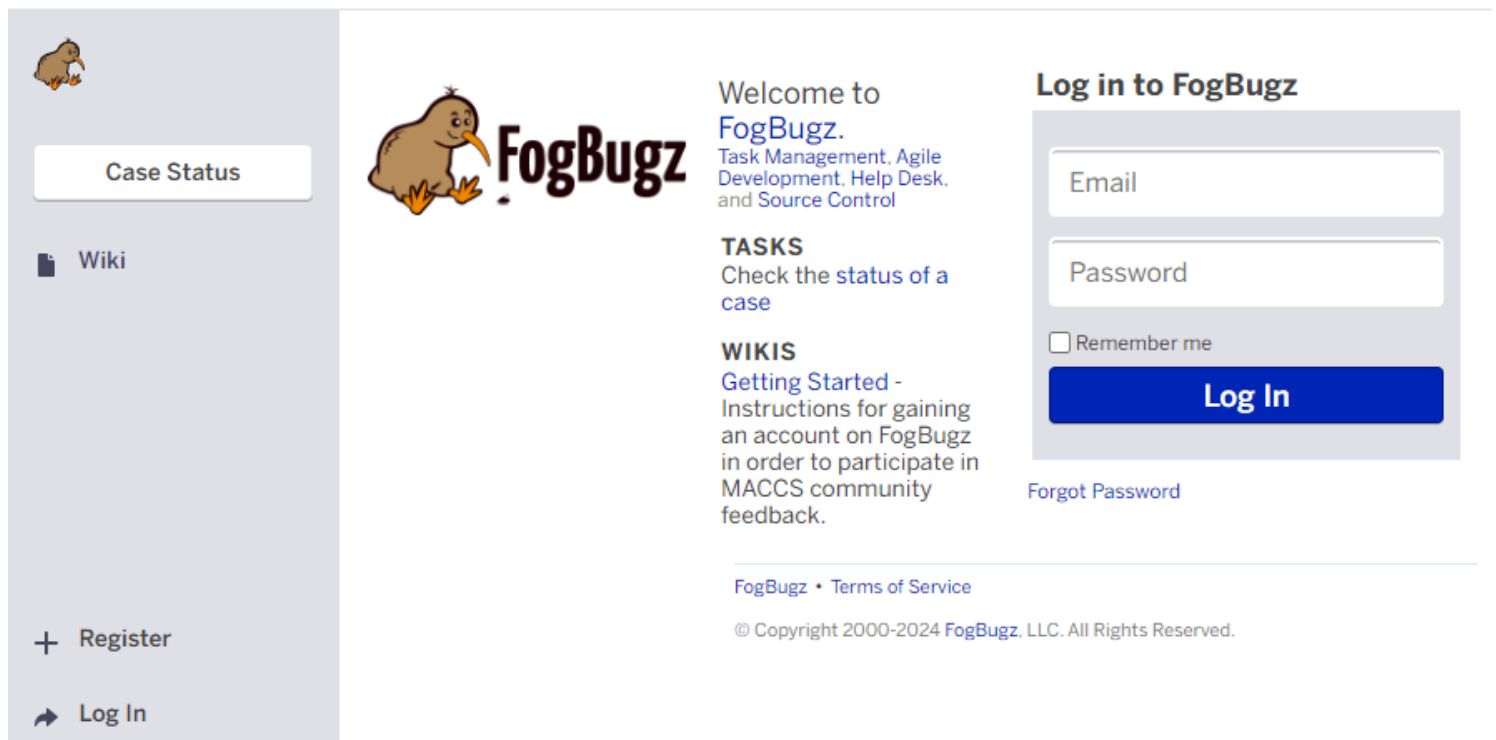

Note: Red Dash lined Box represent online (web) database available to all code users for searching, reporting, and tracking bugs that results in work-arounds, documentation, or code revisions.

If you have any questions regarding the problem reporting and corrective action process and online database for Software users, please contact Dr. Salman Haq, salman.haq@nrc.gov.

Use FogBugz to enter your MACCS suggestions for improvements! You can review FogBugz system for other users' entries related to the MACCS Code Suite. Let's capture your wish list for MACCS in the FogBugz! Please use https://ersdt.fogbugz.com/login?dest=%2fdefault.asp to login in FogBugZ. If you have any question about Fogbugz please contact Sandia National Lab, maccs-questions@sandia.gov.
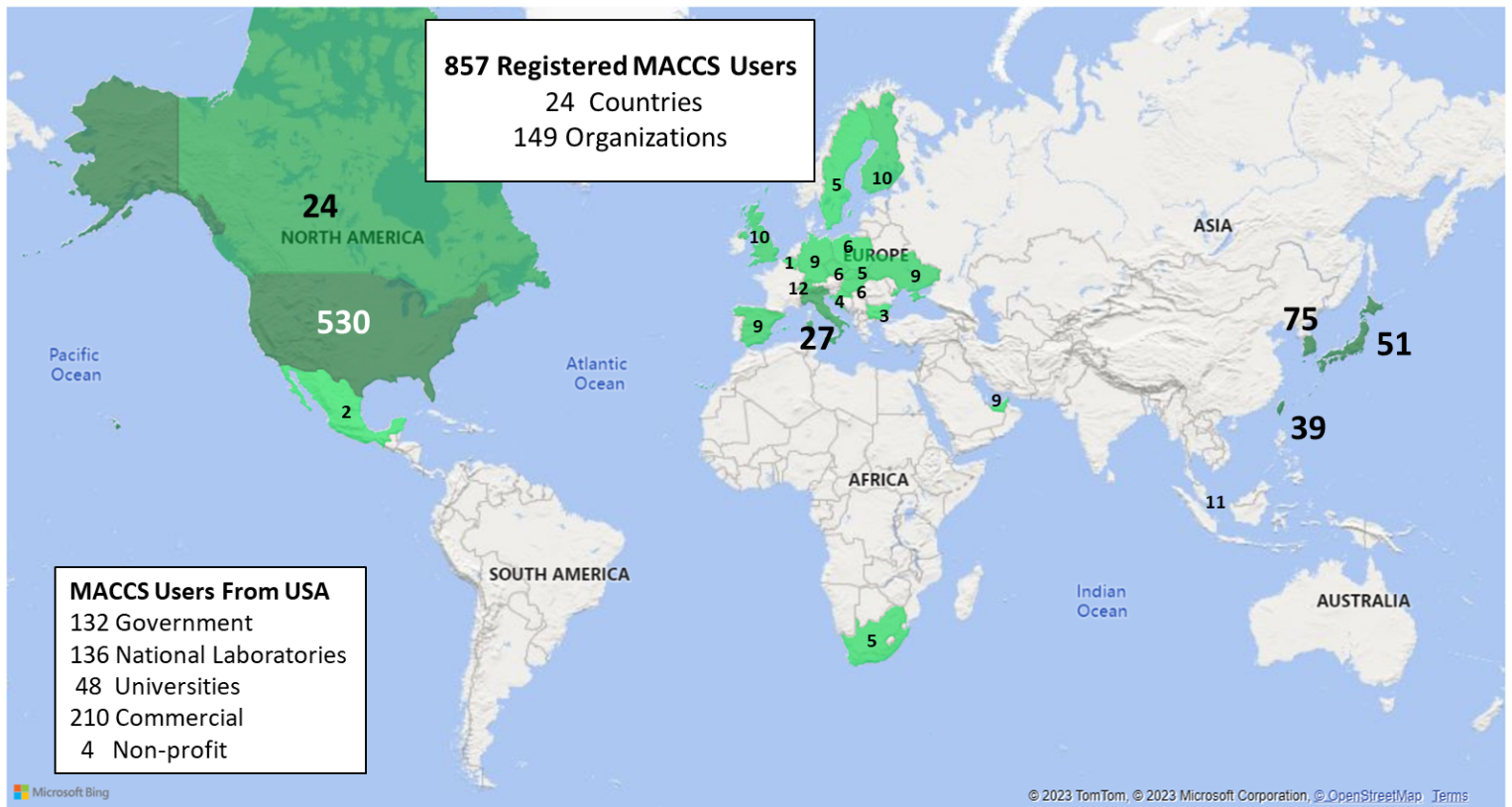
International Partners

Did you know that MACCS has over 857 users, and approximately 300 are international? MACCS users' community includes 24 Cooperative Severe Accident Research Program (CSARP) Member Countries.

857 Registered MACCS Users
24 Countries
149 Organizations

24 NORTH AMERICA

530

2

MACCS Users From USA
132 Government
136 National Laboratories
48 Universities
210 Commercial
4 Non-profit

10 / 10

5 / 10

EUROPE 6 / 6 / 5 / 9 / 1 / 9 / 12 / 4 / 6 / 3

9 / 27

9

5

ASIA 75 / 51 / 39

11

AUSTRALIA

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MACCS Advanced Reactor Initiatives

The MACCS development team is currently working on several advanced reactor initiatives to ensure that the MACCS code continues to meet regulatory needs for consequence analysis.

Item	Phenomenological Areas	2019	2020	2021	2022	2023	2024	Reports
CA1	Atmospheric Transport and Dispersion (Nearfield Modeling)	X	X	X				**SAND2021-6924**
CA2	Radionuclide Release Screening			X	X			**SAND2022-12018**
CA3	Radionuclide Release Screening (Atmospheric Transport and Dispersion & Dosimetry)				X			**SAND2022-12766**
CA4	Dosimetry and Health Effects (Tritium Modeling)				X	X	X	**SAND2022-12016**
CA5	Radionuclide Evolution in Atmosphere					x	x	**In progress**

Radionuclide Evolution in the Atmosphere (Task CA5)

Relevant Environmental Transformation Processes
- Chemical Reactions
- Oxidation
- Agglomeration
- Hygroscopicity

Current MACCS Capabilities
- Radionuclide Decay and Ingrowth
- Dry Deposition
- Wet Deposition

Other Atmospheric Transport and Dispersion Models
- HYSPLIT
- CMAQ
- WRF-CHEM
- SORAMI
- RASCAL
- RATCHET

WE'D LOVE TO HEAR FROM YOU!

The MACCS Team welcomes your thoughts and feedback on any code features and enhancements for the MACCS codes Suite and the MACCS website. Please send your feedback to MACCSCodes@nrc.gov.

See you in 2025 IMUG meeting!

Future Focused Research Activities

The NRC is researching using National Centers for Environmental Prediction data to support severe accident consequence analysis at locations without onsite meteorological data.

Environmental Justice

The NRC is planning to initiate research on how MACCS can use census data and other data sources to enable the reporting of community vulnerability indices for populations around a site. The NRC also plans to re-evaluate how MACCS models recovery decisions in low-income areas.

Radionuclides Accident Consequence Analyses for Space Launch

The United States is developing space nuclear systems where such systems safely enable or enhance space exploration or operational capabilities [NSPM-20].

IN THE NEXT ISSUE OF MACCSimize Safety …

- 2024 IMUG (International MACCS Users Group) Meeting Recap
- Code Updates and Highlights
- New MACCS Download Site
- More Details on the 2025 MACCS Users Group Meeting
- …and More!!