The Traveler visited four institutions and gave five presentations on a variety of topics involving stellar explosions, including measurements at ORNL's Holifield Radioactive Ion Beam Facility, computer simulations, nuclear masses, nuclear data processing and dissemination, and structure and reaction models of unstable nuclei. Some of the details follow. This visit was supported by JUSTIPEN, the Japan - U.S. Theory Institute for Physics with Exotic Nuclei.

(1) Theoretical Nuclear Astrophysics at National Astronomical Observatory [NAO] Tokyo
The traveler gave a presentation on "Element Synthesis Calculations in Novae and X-ray bursts", discussing ORNL post-processing and full-hydrodynamic element synthesis calculations of stellar explosions with T. Kajino and his students and postdocs at the NAO Tokyo. The role that unstable nuclei play in these explosions was emphasized. Kajino's group members gave short presentations on their work as well, followed by a lively discussion on a number of current topics in astrophysics and nuclear physics of unstable nuclei.

(2) Nuclear structure of n-rich nuclei in the r-process path at Univ. of Tokyo
The traveler gave a presentation on "Stellar Explosions and the Structure of Subatomic Nuclei" to T. Otsuka and his group at the Univ. of Tokyo. He discussed the structure of neutron-rich exotic nuclei 83Ge, 85Se, 131Sn, 133Sn, and 135Te that have been measured at ORNL's HRIBF. He also detailed the efforts to link our measurements of (d,p) on unstable nuclei to their nuclear structure and to their neutron capture cross sections. Currently, no shell model calculations have been carried out on the nuclei near N=82 nuclei measured at HRIBF, and these would greatly help the interpretation of our results. In the near future, Otsuka's group may be able to perform structure calculations of nuclei near N = 82, and they are interested in eventually helping to explain some of our latest experimental results.

(3) Nuclear mass models, Nuclear Data Assessments, and Nuclear Astrophysics at the Japanese Atomic Energy Agency [JAEA] Tokai
The traveler gave a presentation on "Probing Stellar Explosions with Radioactive Beams and Computer Simulations", which detailed both the HRIBF measurements for nuclear astrophysics and the nuclear data evaluations, data processing, and explosion simulations synergistically carried out at ORNL. Several discussions were had on the future of nuclear mass models and their use in astrophysics with H. Koura, as well as on new features to add to the nuclearmasses.org software system that he is a collaborator on. In a potential future collaboration, the traveler discussed efforts at JAEA by S. Chiba to calculate neutron capture cross sections on neutron-rich unstable nuclei, which are relevant for a theoretical interpretation of ORNL measurements. The traveler also discussed element synthesis calculations and computational nuclear astrophysics with N. Iwamoto at JAEA, as well as planned the next steps in a collaboration with him on a library of s-process reaction rates for element burning calculations in red giant stars.

(4). Dissemination of RIKEN RIBF Measurements on Unstable Nuclei at RIKEN RIBF
RIBF scientist H. Sakurai arranged a one-day mini-workshop – on nuclear astrophysics data – around the Traveler's visit. The Traveler gave a presentation on "Opportunities and Suggestions for Nuclear Data Activities in Japan", which explored a variety of mechanisms that may ensure that the valuable data from RIKEN RIBF on unstable nuclei is disseminated to nuclear scientists around the world. Specifically, the Traveler detailed (a) the Computational Infrastructure for Nuclear Astrophysics [CINA] system that has the capability to process some of the new RIKEN results into formats needed by astrophysics researchers, (b) the software at nuclearmasses.org that disseminates and analyzes nuclear mass datasets [measurements, evaluations, and theoretical models], and (c) activities within the US Nuclear Data Program and the International Nuclear Structure and Decay Data Network. There were 7 presentations on a variety of topics in nuclear astrophysics data, nuclear measurements, and nuclear data from scientists throughout Japan. The workshop attendees are drafting up a plan to enhance communication and avoid duplication of efforts in this field in Japan. The Traveler will become a Visiting Scientist at RIKEN and will help contribute to these data efforts.

(5). Theoretical Nuclear Astrophysics at RIKEN
The traveler gave a presentation on "Element Synthesis Calculations at ORNL" to Y. Motizuki at RIKEN that specifically explored (a) the impact of ORNL measurements of unstable neutron-rich nuclei in the r-process path on calculations of supernova nucleosynthesis; (b) the new capabilities of CINA to quickly determine waiting point nuclei and bottleneck reactions on proton-rich unstable nuclei in novae and X-ray burst simulations; (c) recent ORNL results on the unexpectedly high sensitivity of r-process calculations to the value of the neutron capture cross section on certain neutron-rich nuclei in the r-process path. The results of this last effort were contrasted to those from other groups doing sensitivity analyses of reactions on neutron-rich unstable nuclei. Plans for future possible collaborative calculations may be drafted soon.