

Status and perspectives of SARNET network



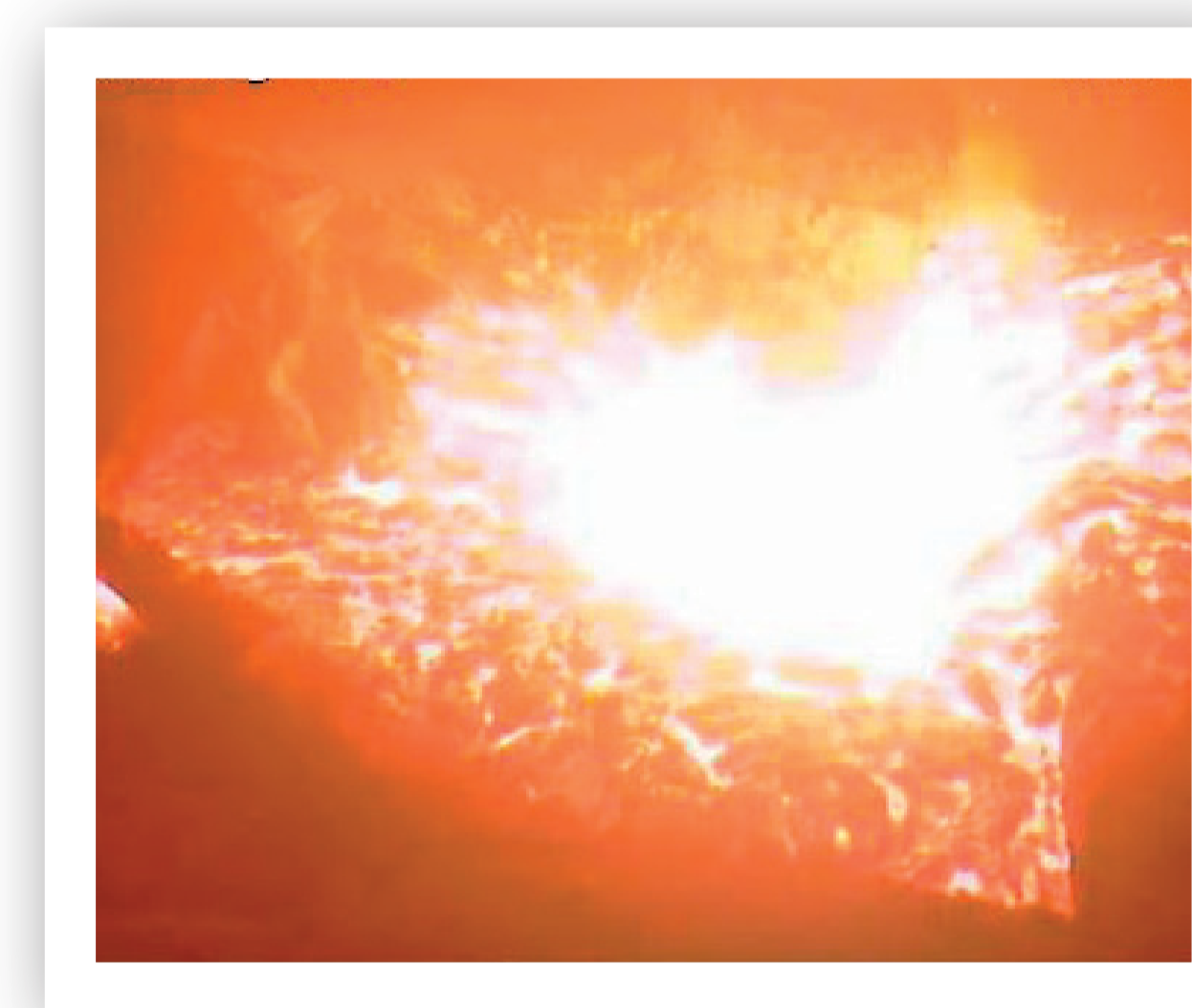
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43 organisations (research, universities, industry, utilities, safety authorities and TSO) from 22 countries network their capabilities for R&D on Severe Accidents (SA) in SARNET (Severe Accident Research NETwork of excellence) in the EC FP7 for 4 years from April 2009. The overall work represents about 40 persons per year (230 researchers and 20 PhD students). A 43rd partner is currently joining the network: BARC (India). See www.sar-net.eu

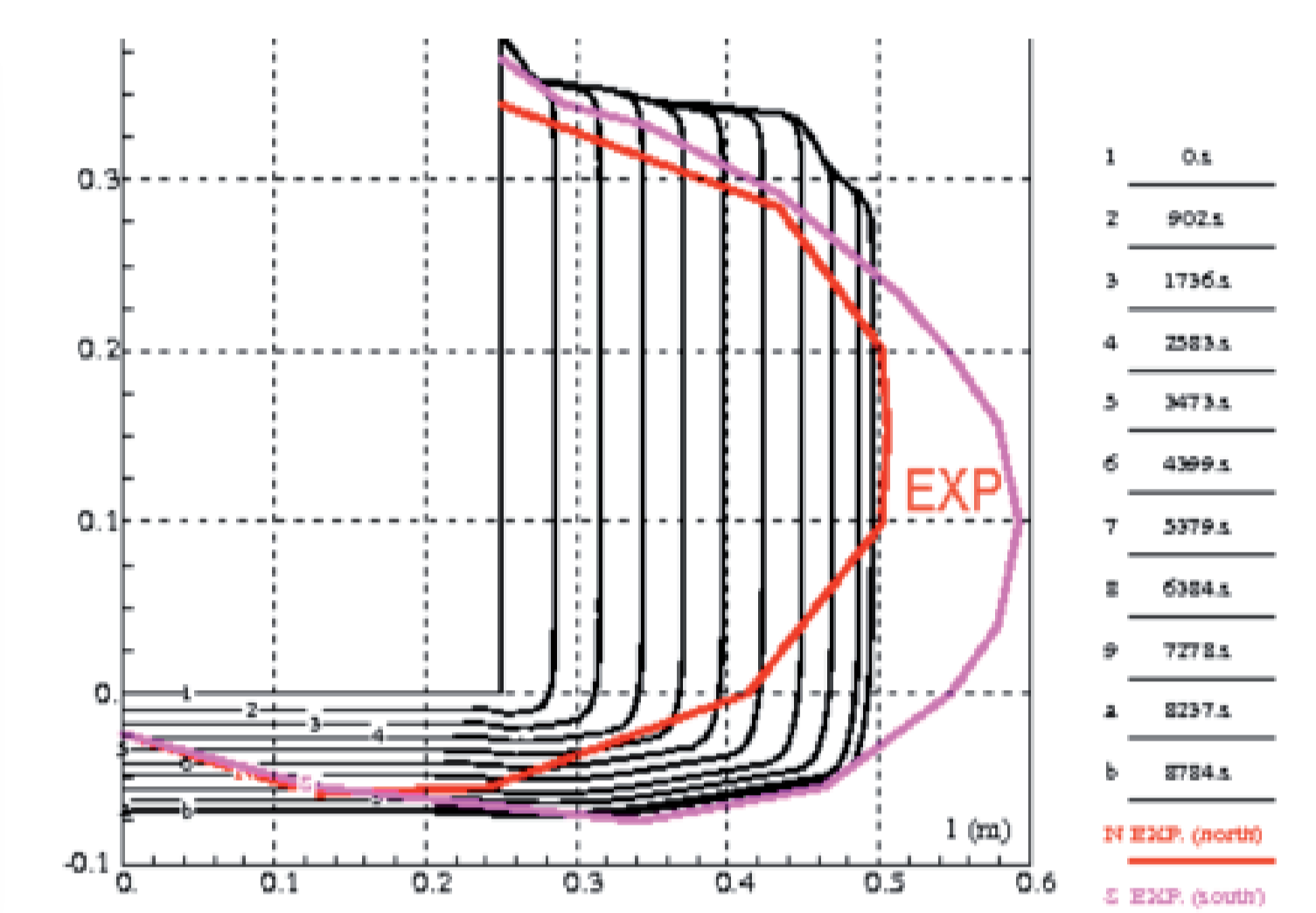
GOOD PROGRESS OF WORK

- Capitalising knowledge in common tools like ASTEC IRSN-GRS integral simulation SA code and DATANET experimental database, based on STRESA tool (recent active storage of KIT, VTT and KTH experiments).
- Collaborative work on Corium, Containment and Source Term phenomena: good progress on the 6 high-priority issues (physical models, joint interpretation of existing experiments, new experiments..): corium/debris coolability; Molten-Core-Concrete-Interaction (MCCI); steam explosion; hydrogen combustion in containment; oxidising impact on source term; iodine chemistry.
- Disseminating the knowledge to nuclear emergent countries and to younger generations: Education courses (large success of the Course in Jan.2011 in Univ. of Pisa with 100 participants), mobility of young researchers, ERMSAR conferences (next one hosted by GRS in Cologne, 21-23 March 2012), textbook of 900 pages to be released end of 2011.
- Research priorities: an expert group is currently updating the research priorities as defined in 2007, accounting for the Fukushima accident.

- MCCI: progress on understanding the origin of anisotropic ablation for silica-rich concretes through VULCANO tests with real corium materials and other tests in simulating materials; improvement of physical models and simulation codes that will allow more reliable and realistic predictions for the concrete ablation kinetics in the reactor case.

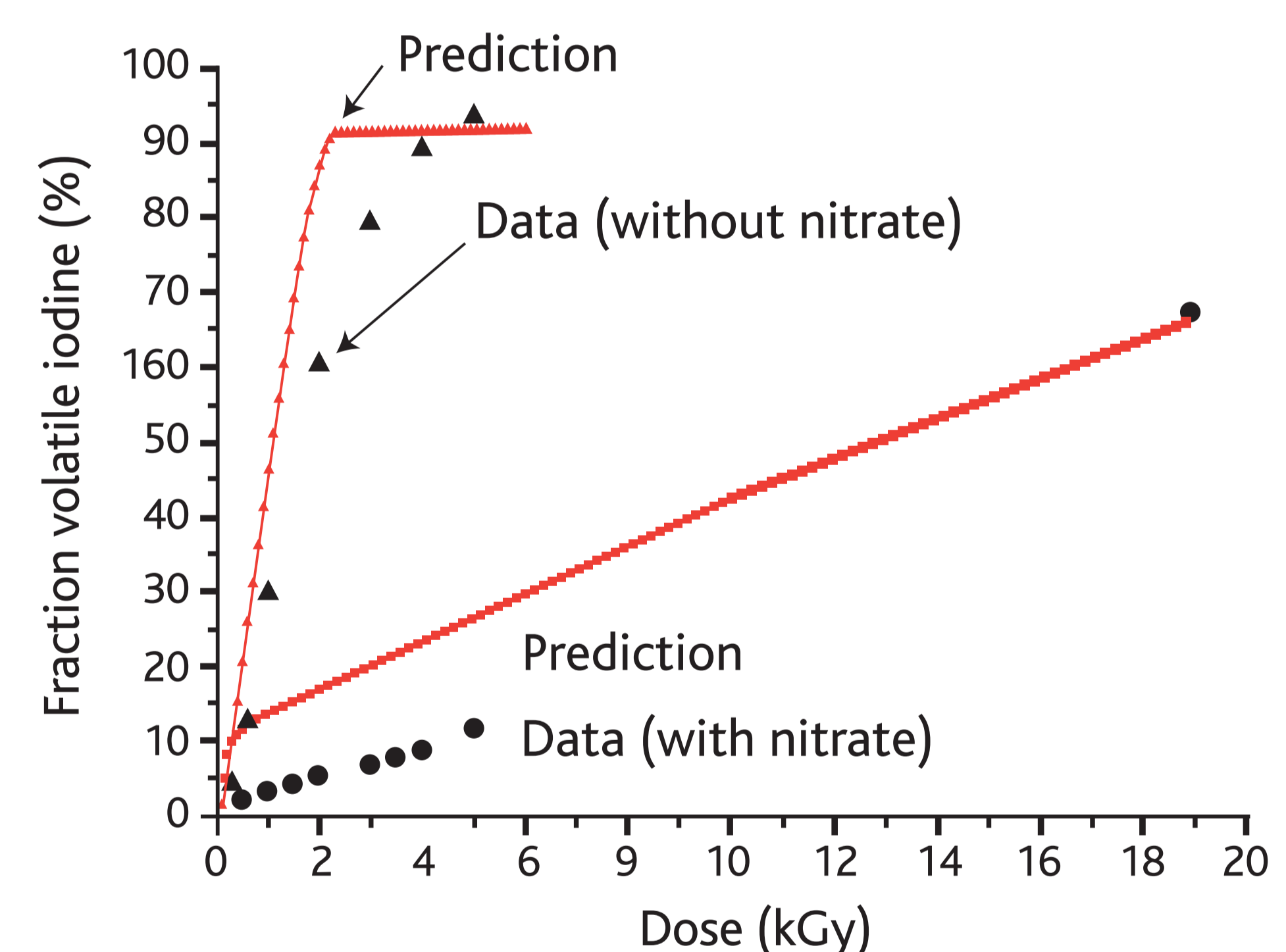


VULCANO VBS U4 experiment (CEA)



ASTEC IRSN calculation of cavity shape of CCI3 ANL experiment (oxide corium, siliceous concrete)

- Highlighted importance of impurities in a sump (nitrous oxides, chloride, silver, tin...) on iodine volatilization through PSI experiments. Effect captured by the mechanistic models (see the Figure below).



Participants to the Pisa Course in January 2011.

EXAMPLES OF OUTCOMES

- Coolability of debris beds in reflooding conditions: progress of new experiments with close synergy between teams, PEARL (IRSN) in 2D large-scale, QUENCH-debris (KIT) and DEBRIS (IKE).
- Benchmark exercise between simulation codes (ASTEC, MELCOR, ATHLET-CD) starting on a TMI2-like scenario in close collaboration with OECD/CSNI/WGAMA.
- Good results of assessment of the latest version ASTEC V2.0 by 27 partners on 52 experiments.
- Several successful benchmarks between simulation codes, based on experiments on condensation and hydrogen mixing and combustion (CONAN in Univ. Pisa, THAI experiments with recombiners, ENACCEF in CNRS for IRSN ...).

PERSPECTIVES FOR THE SUSTAINABILITY OF SARNET

The SARNET experts' pool should assess the remaining issues on severe accidents for Gen.II-III NPPs from 2013, after the current FP7 project, and propose relevant R&D programmes to address them, when needed. Severe Accident research remains a crucial part of reactor safety that must be capitalized and preserved for the European reactor fleet needs. Discussions must continue on the links with SNETP that has already delegated to SARNET the role to rank the R&D priorities.

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