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**IAEA** *Atoms for Peace and Development*

**Seminar**

**“Expert Programme of Environmental Management and Prognosis of Nuclear Emergencies”**

**Tsukuba (Japan), 9 July 2017**

**Overview on the MODARIA II Programme:  
Modelling and Data for Radiological Impact Assessment**

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# Radiological impact assessment

## ***IAEA Safety Glossary***

*Assessment of the expected radiological impacts of facilities and activities ..... for the purposes of protection of the public and protection of the environment .....*

## **Radiological impact assessment**

- Prospective assessment of radiological impacts
- Conducted as part of any authorization process
  - New facilities and activities
  - Planning for remediation of affected areas
- Dose assessment during the management of emergencies

# Goals of MODARIA

- **Improve capabilities in radiological impact assessment**
  - Test, compare and develop methodologies and models
  - Analyse, evaluate and compile data
- **Addressing assessments in planned, emergency and existing exposure situations**
  - For people
  - For flora and fauna
- **Forum for discussion and exchange of experience**
- **Support to fulfil regulatory requirements in Member States**

# Previous International IAEA modelling testing programmes



- **1985-1991: BIOMOVs**
  - BIoSpheric Model Validation Study, sponsored by SSI (Sweden)
- **1988-1994: VAMP**
  - Validation of Model Predictions, prompted by Chernobyl
- **1991-1996: BIOMOVs II**
  - BIoSpheric Model Validation Study, with SSI, Sweden
- **1996-2001: BIOMASS**
  - BIoSphere Modelling and ASSessment, 1996-2001
- **2003-2007: EMRAS I**  
**2009-2011: EMRAS II**
  - Environmental Modelling for Radiation Safety, 2003-2007
- **2012-2015: MODARIA I**
  - Modelling and Data for Radiological Impact Assessment



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**MODARIA I (2012-2015)**

**Working Groups**

**Theme A: Remediation of Contaminated Areas**

**WG 1: Remediation strategies and decision aiding techniques**

**WG 2: Exposures in contaminated urban environments and effect of remedial measures**

**WG3: Modelling radiological impacts arising from NORM and radioactively contaminated legacy sites**

**WG4: Analysis of radio-ecological data**

## **Theme B: Uncertainties and Variability**

- WG 5: Uncertainty and variability analysis for assessments for routine discharges**
- WG 6: Environmental change in long term safety assessments of radioactive waste disposal facilities**
- WG 7: Models for accidental tritium releases**

## **Theme C: Exposures and Effects on Biota**

**WG8: Modelling exposures to biota**

**WG9: Radiation effects on populations of wildlife species**

## **Theme D: Marine Modelling**

**WG 10: Modelling of marine dispersion and transfer of radionuclides accidentally released from land-based facilities**



# Participants

**Typically ca 150 participants from more than 40 Member States**

- Operators
- Regulators
- State Agencies
- Technical Support Organisations
- Universities
- National Research Institutes

- **Mainly self-supporting**
  - Small amounts of IAEA
  - Limited to few participants with key contributions who could otherwise not attend
  - Big interest from countries in Africa, Asia, Latin America, and Eastern Europe
  - Less than 10 nominees from these countries could manage participation

# Dissemination of results

- **IAEA Publications**

- Each working group prepared an IAEA (TECDOCS)
- Technical Report series (TRS) in some cases

- **Papers in peer reviewed Scientific Journals**

- Publication of results is encouraged
- Large number of individual papers published on initiative of the WG from results obtained during BIOMASS, EMRAS I, EMRASII, MODARIA



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# **MODARIA II Programme 2016-2019**

# Development of the MODARIA II programme

- **Brainstorming session** during the last Technical Meeting of MODARIA I  
11 Nov 2015
  - 17 proposals
- **Consultants' Meeting** in Vienna  
29 Feb to 2 March 2016
  - Analyze the proposals in view of:
    - The Member States' needs to implement the IAEA Safety Standards
    - To develop assessment capabilities
    - To ensure appropriate control of exposures to the public
- **Technical meeting to launch MODARIA II**  
31 Oct to 4 Nov 2016
  - Working groups set up
  - Work plans for the next 3 years developed

*Proposals for Topics for the  
IAEA's Environmental Network  
MODARIA II:  
"Modelling and Data for  
Radiological Impact Assessments"*

*July 2016*

# MODARIA II Working Groups

## WG 1: Assessment and Decision Making of Existing Exposure Situations for NORM and Nuclear Legacy Sites

- WG Leader: Ming Zhu (USA)
- Scientific Secretary : Tamara Yankovich
- Methods and **tools for radiological impact assessments** and application to specific situations
- Methodologies for **decision analyses for remediation and closure** of NORM and legacy sites
- **Communication** and engagement with relevant interested parties
- **Training** for end users for the use of the NORMALYSA software

## WG 2: Assessment of exposures and doses plus effectiveness of countermeasures in urban environments

- WG Leader: Kathy Thiessen (USA)
- Scientific Secretary : Tamara Yankovich
- **Experience in Japan** following the accident at the Fukushima
- Modelling the **dispersion and redistribution** of radionuclides in an **urban environment**
- Effectiveness and impact of **remedial measures for urban environments**

# MODARIA II Working Groups

## WG 3: Assessment and control of exposures to the public and biota for planned releases to the environment

- WG Leader: Juan Carlos Mora (Spain)
- Scientific Secretary: Diego Telleria
  - Develop and apply an **integrated approach** to assess the impact of releases to the environment on both **humans and biota** from ionizing radiation.
  - Assessment of impacts from **short-term tritium releases**

## WG 4: Transfer processes and data for radiological impact assessment, including transfer in tropical and sub-tropical environments

- WG Leader: Brenda Howard (UK)
- Scientific Secretary: Sergey Fesenko
  - **Transfer parameters in Japan** determined after the Accident at the Fukushima NPP
  - Analysis and **updating key parameters** for use in radiological impact assessment
  - Assessment **models and data for tropical, semi-tropical and arid** environments

# MODARIA II Working Groups

## WG 5: Modelling radiation exposures and effects on wildlife

- WG Leader: Nick Beresford (UK), Jordi Vives i Battle (Belgium), [F Alonzo, (France)]
- Scientific Secretary: Diego Telleria
- Development of **simplified approaches for biota** dose assessment ( “graded approaches” )
- Modelling possible **effects to populations and need to fulfil regulatory requirements**
- **Uncertainties** associated with the different approaches and models

## WG 6: Biosphere modelling for long-term safety assessments of waste disposal facilities

- WG Leader: Tobias Lindborg, Sweden
- Scientific Secretary: Gerhard Proehl
- Systematic, transparent and robust conceptual framework for biosphere assessments for radioactive waste disposal facilities
- Addressing environmental changes due to **climate and landscape evolution**
- Scientific basis of **long-term dose assessments and complementary plausible assumptions**
- Update/extension of the **BIOMASS-6 methodology**, including numerical values and models to assess the long-term dose to hypothetical members of the public



## WG 7: Assessment of fate and transport of radionuclides released in the marine environment

- WG Leader: Raul Perianez, Spain
- Scientific Secretary: Paul McGuinnity
  
- Improvement of **fate and transport models** including processes not yet implemented
- **Reliability of models** for predicting dispersion under different situations (short term or long term)
- **Limitations of the models** to predict radionuclide dispersion in emergency situations

# Possible interactions between Working Groups

- **Remediation and remedial actions**
  - **WG 1:** Remediation and decision making & **WG 2:** Urban environments
- **Short-term releases of tritium**
  - **WG 2:** Urban environments & **WG 3:** Modelling releases to the environment
- **Models and data in tropical, subtropical and arid climates**
  - **WG 3:** Modelling releases to the environment & **WG 4:** Radioecological data
- **Integrated approach for humans for humans and biota**
  - **WG 3:** Modelling releases to the environment & **WG 5:** Effects and exposures to biota
- **$K_d$ -values for marine environments**
  - **WG 4:** Radio-ecological data & **WG 7:** Marine Modelling

# Mode of operation

- **MODARIA II will run from 2016-2019**
  - Final Technical Meeting in October/November 2019
- **One joint Technical Meeting per year of all working groups in Vienna**
  - Enable cooperation between working groups to address cross-cutting topics
- **Interim Meetings**
  - Held half-way between the Plenaries by the Working Groups
  - Vienna or other places

# Further information



The screenshot shows the IAEA website interface. At the top, there is a navigation bar with the IAEA logo and name, a search bar, and menu items: About Us, Our Work, News Centre, Publications, and Nucleus. Below this is a secondary navigation bar for 'Nuclear Safety & Security' with sub-links for Nuclear Applications, Nuclear Energy, Nuclear Safety & Security, Safeguards, and Technical Cooperation. The main content area features a sidebar on the left with a navigation menu for 'Nuclear Safety & Security' including links to Safety & Security Framework, Technical Areas, Services for Member States, Safety & Security Publications, Conventions & Codes, Education & Training, Meetings, and Special projects. The main content area has a heading 'MODARIA II' and a sub-heading 'Modelling and Data for Radiological Impact Assessments'. Below this is a section titled 'First Technical Meeting for MODARIA II' which contains text about the meeting dates (31 October to 4 November 2016), objectives, and participation requirements. A 'Resources' sidebar on the right lists MODARIA II, EMRAS II, and Environmental Assessment. A 'Page links' sidebar on the right lists Background, Objectives, Organization of the MODARIA Programme, MODARIA Working Groups, and three Technical Meetings. At the bottom of the page, there is a 'Feedback' section with a rating scale from Good (4) to Poor (0) and a 'Rate this page' button.

**MODARIA II**  
Modelling and Data for Radiological Impact Assessments

**First Technical Meeting for MODARIA II**

The first Technical Meeting (TM) for the MODARIA II programme will be held at the IAEA's headquarters in Vienna from **31 October to 4 November 2016**, during which the MODARIA II programme will be formally launched.

The objectives of the meeting are summarized in the Prospectus and Notes Verbale (in all official languages) which were recently circulated to all Member States.

Should you wish to take part in the TM, a Participation Form (Form A) must be completed and then forwarded to the competent official authority (Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority) of your respective country, for onward transmission to the IAEA.

Please note that your participation will only be registered when we receive your fully endorsed Participation Form, completed in your name. After the deadline for receipt through official channels (**19 September 2016**) has passed, you will subsequently receive a formal invitation to attend the meeting.

For further information please contact MODARIA

**Background of the MODARIA II programme**

The assessments of radiological impacts to people and the environment arising from radionuclides being discharged or already existent in the environment are necessary to prove compliance with regulatory standards, to support decisions during and after nuclear emergencies

<https://www-ns.iaea.org/projects/modaria/default.asp?l=116>

# Next technical Meeting

## 2<sup>nd</sup> Technical Meeting

**Vienna**

**30 October – 3 November 2017**





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*Thank you!*

