WG10 – Modelling of marine dispersion and transfer of radionuclides accidentally released from land-based facilities

MODARIA

IAEA
International Atomic Energy Agency
Scenarios

1) Fukushima releases in the Pacific Ocean
   - Intercomparison of hydrodynamic submodels
   - First simple dispersion exercise
   - Generation of input data for WG8 biota dynamic modelling exercise

2) The Baltic Sea: modelling Chernobyl fallout
   - Scenario description potentially finished: distributed on June 6\textsuperscript{th}, 2013
   - First modelling results to be discussed
Fukushima: several models already working

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<thead>
<tr>
<th>Institute</th>
<th>Scale</th>
<th>Circulation</th>
<th>Model type</th>
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<td>NCOM, JCOPE2</td>
<td>Lagrangian</td>
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Model harmonization

An ocean transport model consists of two sub-models

- Hydrodynamic model
- Dispersion model (advection, diffusion, sediments...)

Which is the main responsible of differences in output?
Run models with the same forcing to evaluate differences

Compare:
- Time series of currents at given locations
- Current fields at given times

Next:
- Source term
- Atmospheric deposition
Current field examples, April 30th
(sea surface)
Time series of currents

141°E, surface

Days after March 11

Direction (deg)
SST data for the first week of April

IMMSP (Ukraine) has made a quantitative comparison of modelled SST fields

It will be discussed during this meeting
Simple dispersion exercise

Arbitrary constant release

No atmospheric deposition

Dissolved radionuclide

Time frame: March 26 to May 30

Each team uses its own hydrodynamic data/calculations

Results:
-time series of radionuclide concentrations in surface water
-map of surface radionuclide concentrations
Example of results:

What happens if all models use the same hydrodynamics?: phase 2 of the exercise
Baltic Sea

- Complex scenario
  - Hydrodynamics (salinity gradients, ice, etc)
  - Multiple radionuclide sources, although Chernobyl dominates
  - Remobilisation of radionuclides from sediments

- Proposed exercise
  - 5 year of calculation after Chernobyl pulse
  - Provide:
    - Time series of 137-Cs concentrations in water and sediments at specific sites
    - Time series of 137-Cs inventories in water and sediments
    - Concentration maps (water/sediment) at the end of simulation

- Objective: test output sensitivity to water/sediment interaction descriptions
Chernobyl fallout resulting 137-Cs concentrations in surface water

Two exercises:
1) sediments initially clean
2) background concentrations in sediments considered
137-Cs inventories in the Baltic Sea: water and sediments