Radionuclide Sequestration and Bioavailability Interpretations: Lessons Learned from the Recent USDA Test Exercise

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Background

- March, 2011 a magnitude 8.9 earthquake occurred off the coast of Japan
- This earthquake generated a tsunami which caused extensive damage to infrastructure
- Included in this infrastructure was one of the several nuclear reactors Japan uses to generate electricity
- A cascade of oversights, bad decisions, and technical problems resulted in a release of radioactive material into the air and water off Japan
- Shortly afterward, winds carried this material to the western US
- Shortly after this, the NSSC was contacted for information related to radioactive materials in soils

Background: Core Mission of the Soil Survey Program

> make an inventory of the soil resources of the United States;

> keep the soil survey relevant to ever-changing needs;

> interpret the information and make it available in a useful form; and

> promote the soil survey and provide technical assistance in its use for a wide range of community planning and resource development issues related to non-farm and farm uses.

Relevance

- In anticipation of disasters, in 2006 the NSSC was asked to develop interpretations for bioavailability and sequestration of radioactive cesium and strontium
- These results are generated in Datamart downloads but may not show up on Web Soil Survey
- Can be found on the Soil Data Access Facility

Questions Asked

* What is the impact?
  - Radioactive iodine on dust particles is readily transmitted to milk of grazing animals
- What is the fate of radioactive materials?
  - Held in soil, taken up by plants, pass through
- What should be done?
  - Remove soil, remove plants, ?

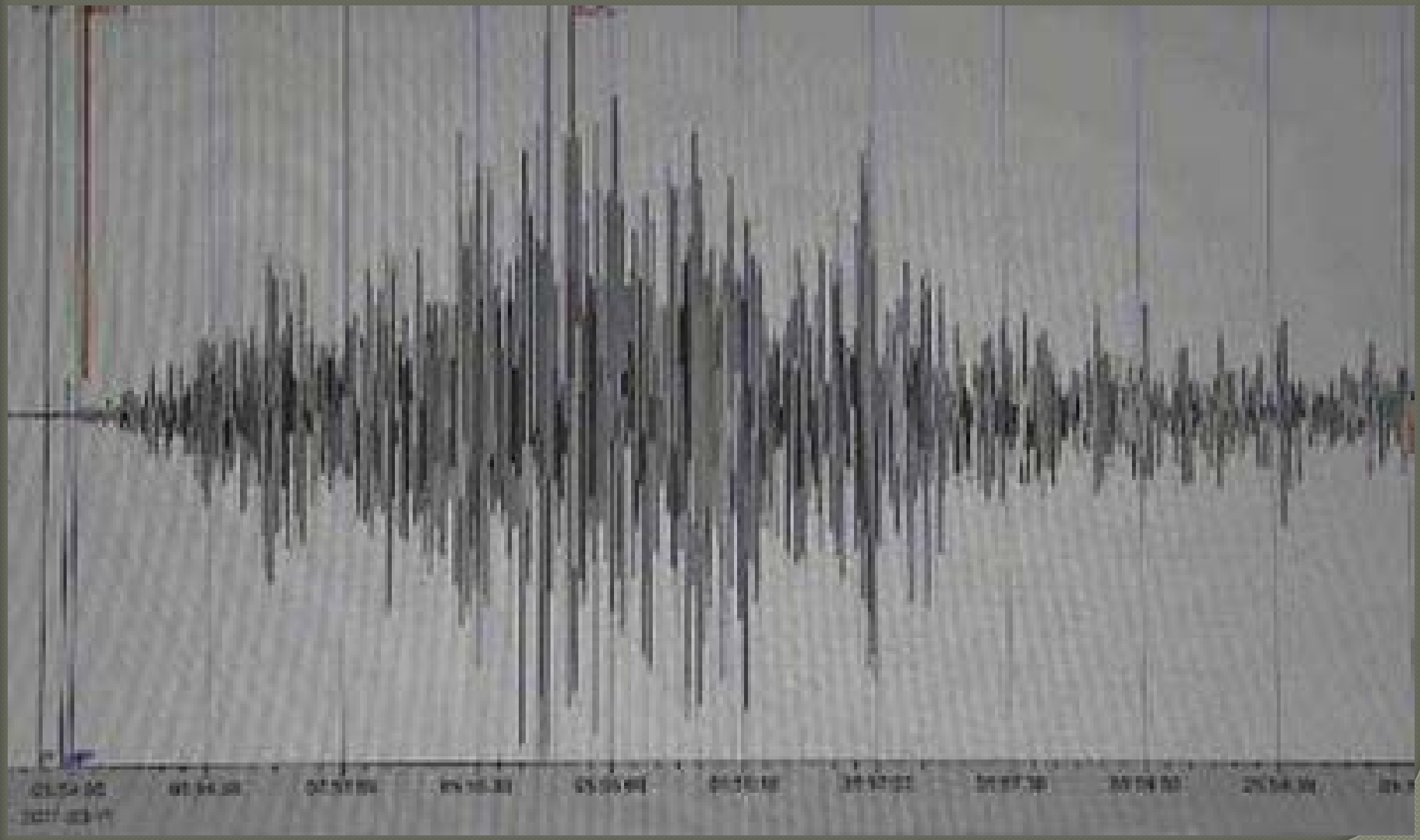
Questions Asked

- Where do these soils occur?
- Mapping of interpretive output

Lessons Learned

- Gridded SSURGO developed by the Geographic Research Unit (GRU) and NSSC allows rapid linking of mukeys and display of spatial data
- Templates for states prepared in advance by Sharon Waltman and Steve Peaslee and data vetting by Paul Finnell were essential
- Fuzzy system and modeling semantics and "limitation" versus "suitability" in a neutral connotation, ie is sequestration a limitation or a suitability, is it "good" or "bad"?

Lessons Learned

- Good fit of scales and "land use"
- Needed an interpretation for Iodine in soil, since that turned out to be the major public concern
- Probably need nuclide specific interpretations to better capture fates of materials
- Need to consider leaching as a fate to target areas where groundwater may be at risk

Thank You