Opportunity Title: Through the Earth Information
Opportunity Reference Code: IC-17-02

Organization	Office of the Director of National Intelligence (ODNI)
Reference Code	IC-17-02
How to Apply	**Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.** **Complete your application** – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.
Application Deadline	3/31/2017 6:00:00 PM Eastern Time Zone
Description	**Research Topic Description, including Problem Statement**: This research topic covers new technology and new techniques that enable communication and imaging through the earth. The goal is to improve on existing techniques for underground communication and subsurface imaging of conducting and non-conducting objects. Current techniques include very low frequency (VLF) magnetic field commination, ground penetrating radar (GPR) imaging and gravity mapping. Improvements that are most valuable are increasing the range and resolution of imaging or the range and bit rate of communications. However, solutions should not rely on substantially increasing the power or footprint of existing technologies; ideal solutions would also substantially decrease the size and transmitted power of the technology. In addition, imaging solutions should not assume that objects can be “tagged” by, for example, inducing vibrations or current through them, and communication solutions should not assume any existing architectures such as, for example, buried conductors. This topic particularly supports the proof-of-concept demonstration of proposed solutions, in either a laboratory or field environment. **Example Approaches:** The topic does not seek incremental improvements on existing techniques such as GPR, VLF magnetic fields, ground conductivity methods, ultra- or infrasound or seismic excitation. However, fusion of different techniques may provide advantages when different approaches have complementary strengths and weaknesses, in particular for different soil types. Increases in resolution and sensitivity using a single modality may also come from, for example, using sensor networks, diversifying the waveforms of any transmitted signals or improved processing techniques. The exploitation of existing signals, such as fields from power lines, would offer a desirable passive approach to the imaging problem. Novel sensor types that reduce size and enhanced sensitivity, for example quantum electromagnetic field sensors or high-performance MEMS inertial sensors, may also offer new solutions to this long-standing problem.

Eligibility Requirements	• **Citizenship:** U.S. Citizen Only
	• **Degree:** Doctoral Degree.
	• **Discipline(s):**
	  ◦ **Business** (11 👁)
	  ◦ **Chemistry and Materials Sciences** (12 👁)
	  ◦ **Communications and Graphics Design** (6 👁)
	  ◦ **Computer, Information, and Data Sciences** (16 👁)
	  ◦ **Earth and Geosciences** (21 👁)
	  ◦ **Engineering** (27 👁)
	  ◦ **Environmental and Marine Sciences** (14 👁)

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- **Life Health and Medical Sciences** (45 👁)
- **Mathematics and Statistics** (10 👁)
- **Other Non-Science & Engineering** (13 👁)
- **Physics** (16 👁)
- **Science & Engineering-related** (1 👁)
- **Social and Behavioral Sciences** (28 👁)