Near Earth Object-Related Activities in the UK

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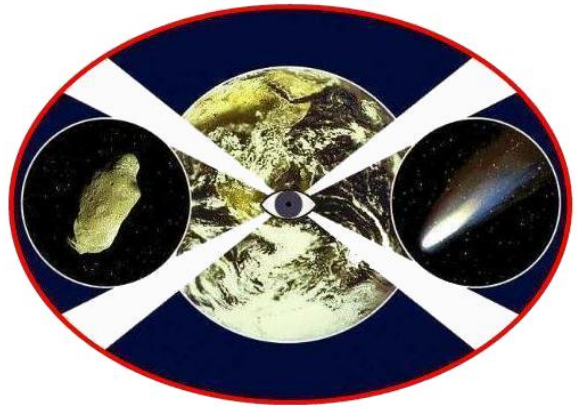
Outline

- Communicating NEO Issues
  - Information Centres
  - Education
- Assessing the Risk
  - Development of Tools
  - Quantifying Societal Risk and Financial Exposure
- Preparing for Mitigation
  - In-Situ Characterisation of NEOs
  - Pre-Cursor Activities

Spaceguard Centre

- Located at Powys Observatory
- International Spaceguard Information Centre
- Liaises with Spaceguard organisations in 17 countries
- Focus of Comet & Asteroid Information Network (CAIN)
- Primary Science Adviser for Faulkes Telescope NEO project
- Private funding for Spaceguard NEO Astrometry Project

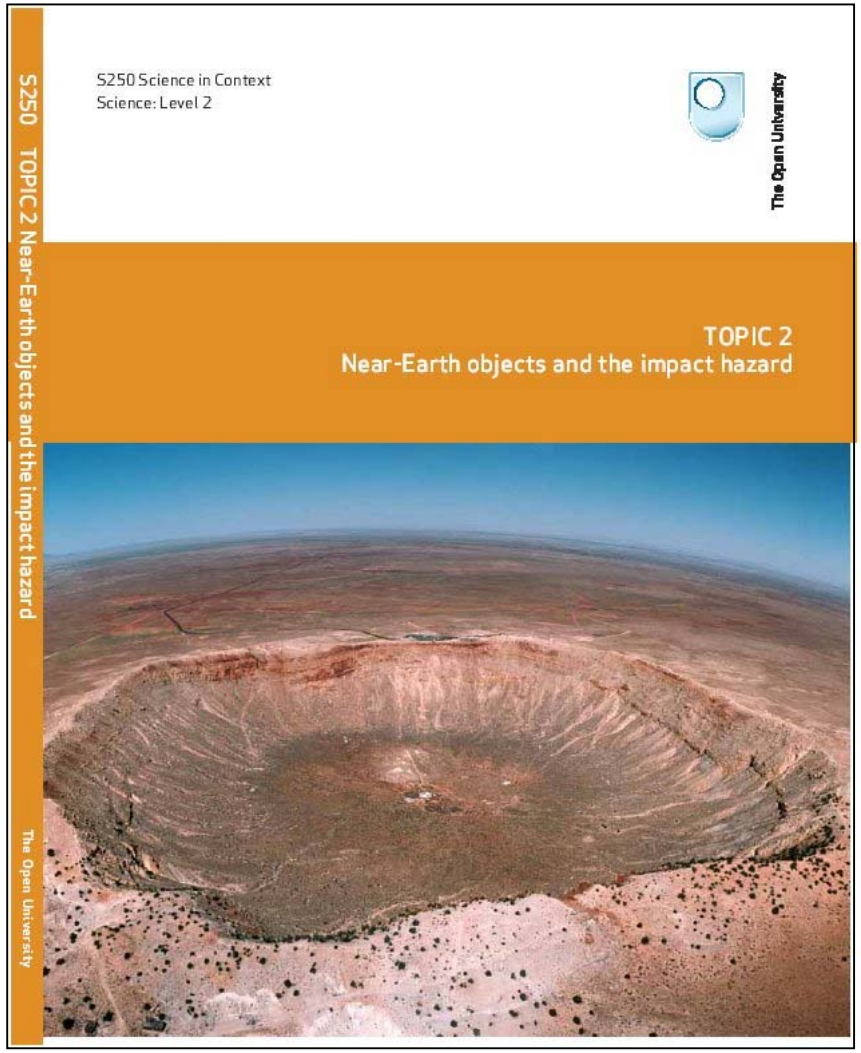


NEO Information Centre

- Established in response to UK Task Force Report
- Main Centre based in Leicester, 3 regional Centres
  - W5, Belfast
  - Natural History Museum, London
  - Royal Observatory, Edinburgh
- Physical and virtual exhibits
- Website www.nearearthobjects.co.uk
- Latest NEO news and FAQs

Education

- Interaction with schools through Centres
- Open University Undergraduate Course
  - Near Earth Objects & The Impact Hazard
- Postgraduate PhDs, e.g.
  - Thermal IR and Optical Observation of NEAs
  - Penetrometry of NEOs



Development Of Tools

- Suite of tools being developed to assess risk
- Simulates entry into atmosphere of range of characteristic NEOs
- Predict hazard transmission by:
  - Radiation
  - Blast Wave
  - Tsunami
- Assess population at risk, predicted casualties, impact on infrastructure/property

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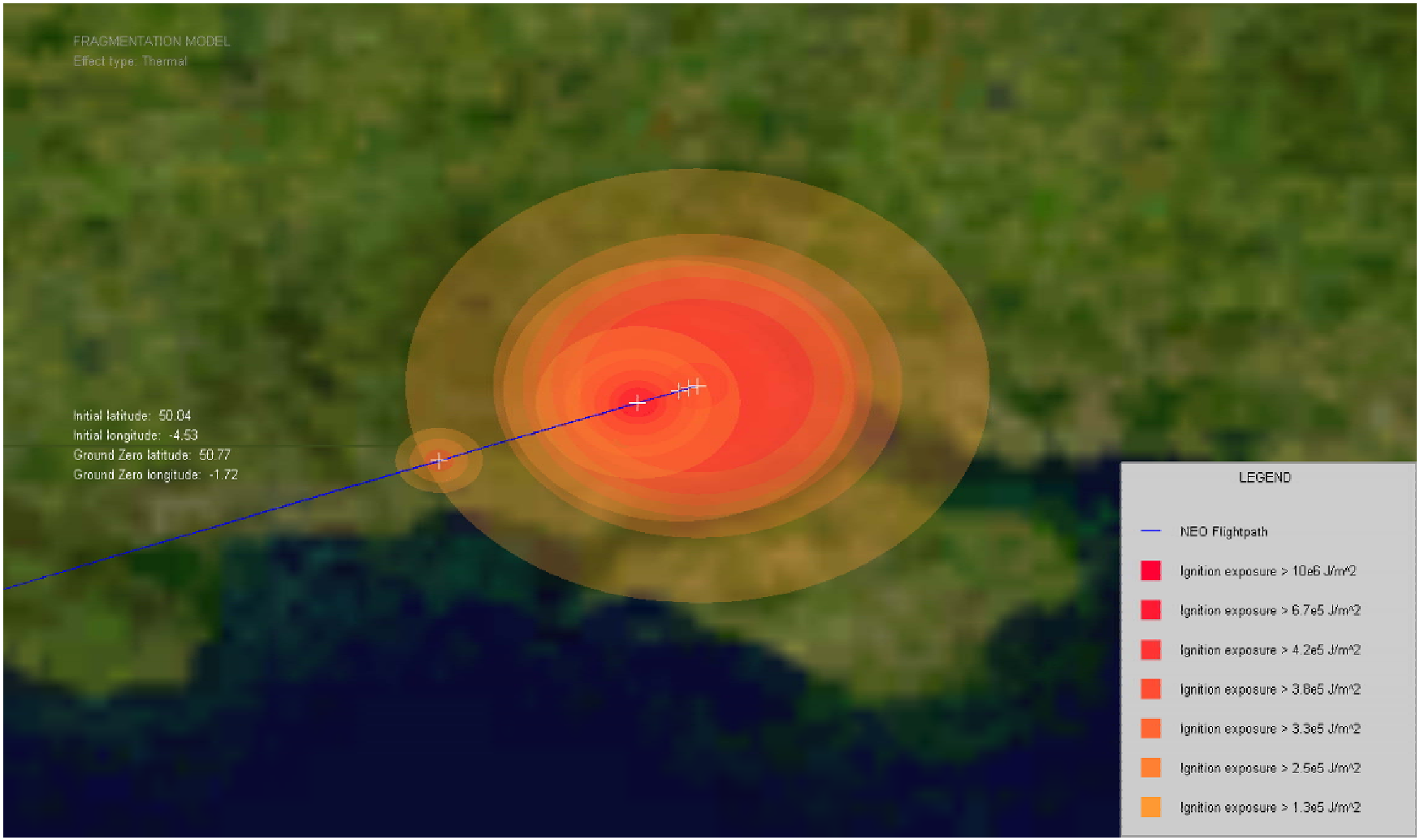
Radiative Transfer Following Breakup



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Blast Wave Following Break-up

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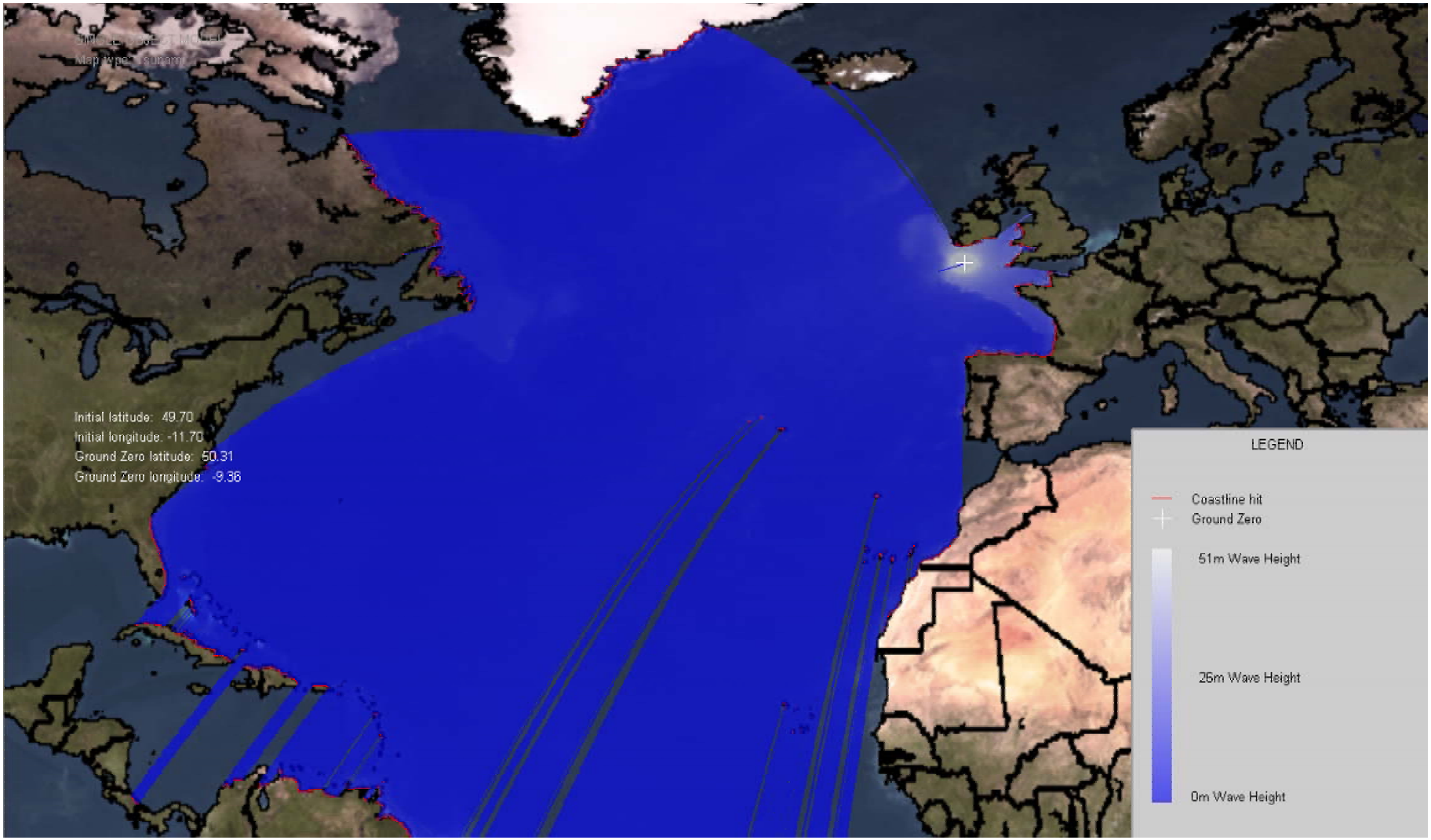
Tsunami Wave Generated



In-Situ Characterisation

- **SIMONE - Smallsat Intercept Missions to Objects Near Earth**
- **FLEET OF SPACECRAFT :** 5 identical microsatellites, each rendezvousing with a different type of Earth-crossing NEO
- **OBJECTIVES: O**btain the detailed physical and compositional data on NEO population
- **ADVANCED TECHNOLOGY:** Gridded ion engines provide propulsion and power is supplied from an ultra-lightweight solar array
- **MINIATURISATION:** A suite of small science instruments

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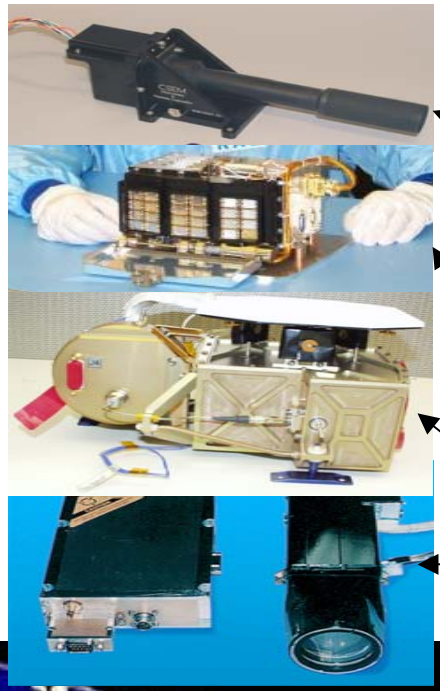
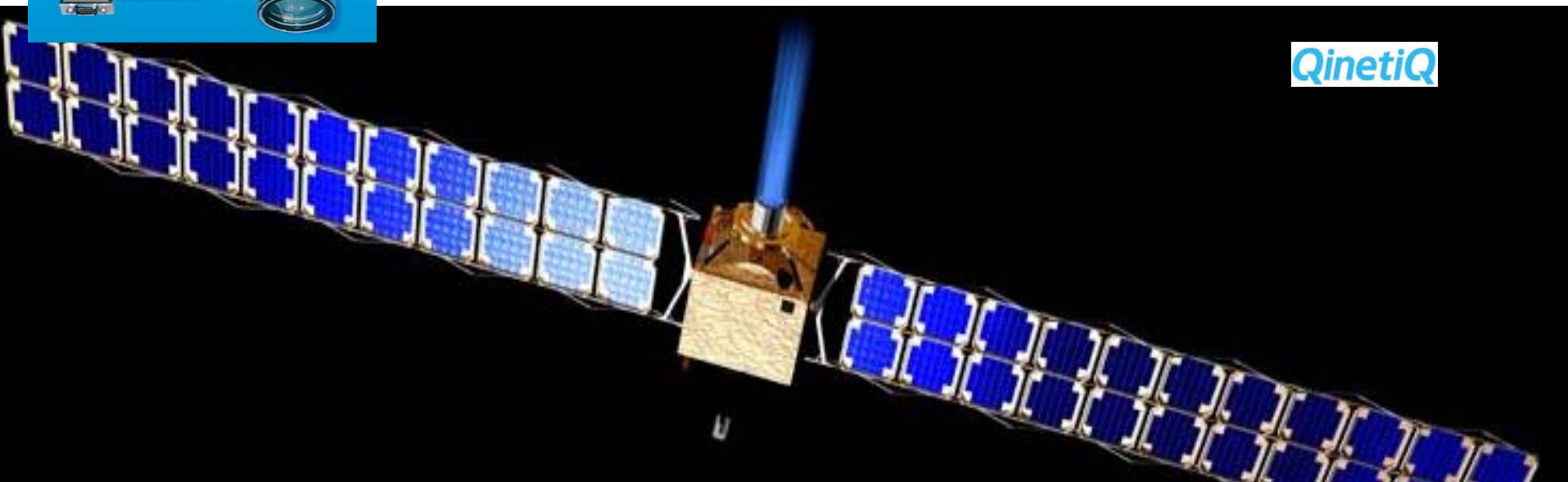
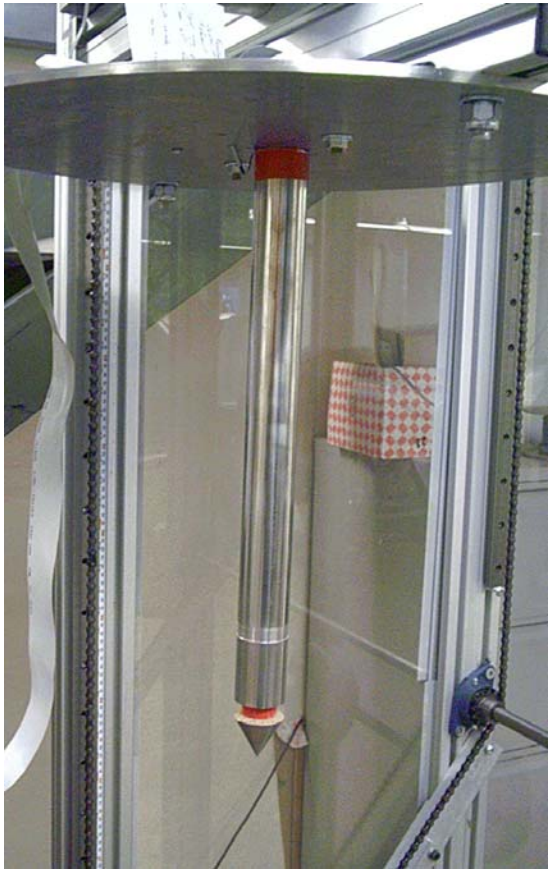


Instrument	Measurements
Multi-spectral Imaging System	Asteroid size, shape, topography, navigation
Radio Science Investigation	Mass -> bulk density (with shape model)
X-ray Spectrometer	Chemical composition
Near-Infrared Spectrometer	Mineral composition
Laser Altimeter	Size, shape, topography, navigation



Pre-Cursor Activities



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NEO risk management issues to be addressed

OBJECT IDENTIFICATION	ORBIT DETERMINATION	CONSEQUENCE DETERMINATION	IN-SITU CHARACTERISATION	MITIGATION	EVALUATION
		POLICY			
CATEGORISING, CATALOGUING, NOTIFICATION	SENSOR TASKING	NOTIFICATION, RISK CRITERIA	ROLES, RESPONSIBILITIES	TREATY COMPLIANCE, AUTHORITY, RESPONSIBILITY	OUTCOME NOTIFICATION
		INFRASTRUCTURE			
SENSOR AVAILABILITY, LOCATION	SENSOR COORDINATION, PRIORITISATION	TOOLS, VULNERABILITY	PAYLOAD DELIVERY, DATA COMMUNICATION	PAYLOAD DELIVERY, COMMAND & CONTROL	SENSOR TASKING
		SCIENCE			
SENSOR LOCATION, DETECTION THRESHOLD	FOLLOW -UP STRATEGY	MULTI-DISCIPLINARY STUDIES	SENSOR DEVELOPMENT, DATA EXPLOITATION	NEGATION PHYSICS	SHORT TERM TRAJECTORY PREDICTION