

# METEOR: Modelling Exposure Through Earth Observation Routines



Colm Jordan<sup>1</sup>, Kay Smith<sup>2\*</sup>, John Rees<sup>1</sup>, Paul Henshaw<sup>3</sup>, Vitor Silva<sup>3</sup>, Mhairi O'Hara<sup>4</sup>, Tyler Radford<sup>4</sup>, Shubharoop Ghosh<sup>5</sup>, Charlie Huyck<sup>5</sup>, Luca Petrarulo<sup>6</sup>, Aileen Lyon<sup>6</sup>, Claire Simon<sup>6</sup>, Lucrezia Tincani<sup>6</sup>, Charles Msangi<sup>7</sup>, Ganesh Jimjee<sup>8</sup> and Suman Pradhan<sup>8</sup>

<sup>1</sup>British Geological Survey (BGS), Keyworth, UK; <sup>2</sup>British Geological Survey (BGS), Edinburgh, UK; <sup>3</sup>Global Earthquake Model Foundation (GEM), Pavia, Italy; <sup>4</sup>Humanitarian OpenStreetMap Team (HOT), Washington DC, USA; <sup>5</sup>ImageCat Inc, Long Beach, CA, USA; <sup>6</sup>Oxford Policy Management Limited (OPM), Oxford, UK; <sup>7</sup>Disaster Management Department of the Prime Minister's Office (DMD), Tanzania; <sup>8</sup>National Society for Earthquake Technology (NSET), Nepal [\\*kmcm@bgs.ac.uk](mailto:kmcm@bgs.ac.uk)

<http://meteor-project.org/>

METEOR is a three year project that started in February 2018, funded by the UK Space Agency International Partnership Programme. Led by the British Geological Survey, it is developing innovative Earth Observation (EO) routines to deliver robust national-scale exposure and natural hazard data with a focus on Nepal and Tanzania.

The escalating impacts of natural hazards are caused mostly by increasing exposure of populations and assets. Poor understanding of the distribution and character of exposure (buildings and infrastructure) in ODA countries is a major challenge when making Disaster Risk Management (DRM) decisions. Robust and quantitative methods are required to justify resilience decisions and risk mitigation.



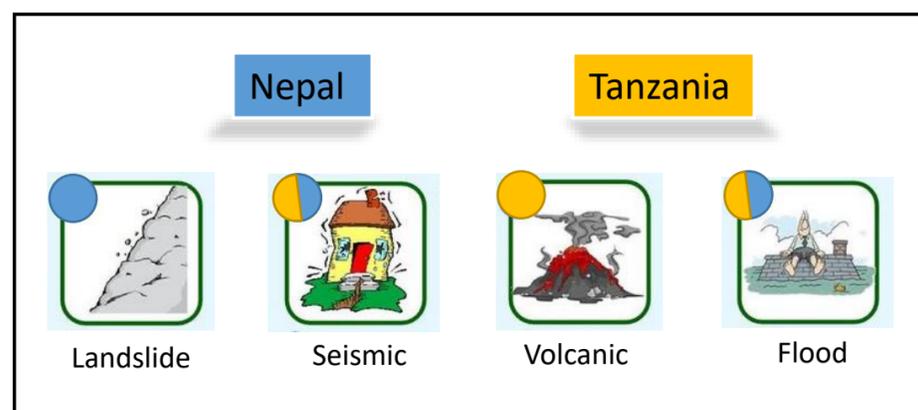
Gorkha Earthquake Reconstruction in Nepal

METEOR takes a step-change by developing and delivering rigorous and open routines (protocols) and standards to allow quantitative assessment of exposure, with explicit uncertainties.

$$\text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability}$$

The exposure data will be co-developed with partners in Nepal and Tanzania, with country-wide openly-available data subsequently delivered for the 47 least developed countries in the DAC list of ODA recipients.

National-scale geohazard footprints will be developed and provided openly for Nepal and Tanzania. We will investigate the interaction of these multi-hazards and their potential impacts on exposure.



Geohazard data will be developed and openly disseminated

All of our work is co-designed and co-delivered with our partners. The process of building capacity and co-delivering new consistent data will promote welfare and economic development and demonstrate the applicability of the techniques elsewhere. METEOR progress is tracked within the project by a dedicated Monitoring & Evaluation process that includes baseline, midline and endline interviews.



Flooding in Tanzania (image from BBC.com)

All METEOR results will be openly and freely disseminated. We will deliver:

- Exposure taxonomy and data models
- Country-wide exposure data for 47 countries
- Hazard footprints for Nepal and Tanzania
- Training materials and tutorials
- Better-informed DRM decisions that meet the demands of international drivers (e.g. UN Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction)