

From Observation to Mitigation: Leveraging LSST, the Global Fireball Observatory, and DREAMS to Prepare for Asteroid Impacts

Supervisors: Hadrien Devillepoix and Ellie Sansom

The threat of asteroid impacts on Earth necessitates the detection and tracking of potentially hazardous asteroids to develop effective mitigation strategies. This PhD project aims to explore the combined use of the Vera Rubin Observatory (Legacy Survey of Space and Time - LSST) and the Global Fireball Observatory for identifying asteroids impacting the Earth. The upcoming Australian Dynamic REd All-sky Monitoring Survey (DREAMS)'s high-cadence near-infrared observations will open a new parameter space on the asteroid population. With proprietary access to these three world class facilities, the candidate for this project will be in a unique position to push our knowledge of asteroids in our Solar System, and specifically the ones that can threaten the Earth. The main aim of this PhD project is to advance our understanding of the asteroid population and its potential impact on Earth by using LSST and fireball networks to detect and track potentially hazardous asteroids. The secondary aim is to make use of cutting-edge data from the Australian DREAMS telescope infrared survey, a so far poorly explored parameter space for asteroid characterisation. This PhD project has significant scientific and practical significance. Scientifically, it will advance our understanding of the asteroid population and its potential impact on Earth, and it will contribute to efforts to protect Earth from potential asteroid impacts. Practically, it will develop and test new algorithms and software tools for analysing LSST and DREAMS data, which can be used by astronomers and planetary defence experts to detect and track potentially hazardous asteroids, and to develop and implement mitigation strategies. Overall, this project will contribute to the ongoing efforts to study asteroids and their potential impact on Earth, and to protect our planet from potential catastrophic events.



Left: Discovery of asteroid 2022 WJ1 in telescope image (Catalina Sky Survey).

Right: Fireball 3 hours later when the object impacted the Earth's atmosphere (Global Fireball Observatory).