The Tiangong-1 re-entry: lessons learned for NEO hazard and communication

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The recent uncontrolled re-entry of the Chinese Tiangong-1 space station represented a unique opportunity to test our ability to face a potential space threat in a real-case operational scenario. The Italian Space Agency (ASI) has worked side by side with the Italian Civil Protection Department and other National Operative Entities in order to prepare and be ready to put in place suitable mitigation strategies. A joint Tiangong-1 re-entry campaign was organized involving research and governmental institutions and a technical board was timely set up and met regularly at the Italian Civil Protection headquarters for analysing the possible threats (e.g. critical infrastructures on the ground, air traffic control, safety procedures etc.). A timeline for managing operations was agreed for triggering actions such as tasking different kind of sensors (e.g. optical vs radar) or evaluating the geographical distribution of the level of alert. Critical milestones were identified, e.g. when the re-entry prediction uncertainty narrowed to less than 24 hours and when the actual re-entry ground tracks could be confidently computed. The committee became permanently operational during the Tiangong-1 critical passes over Italy and ASI provided the technical information to the Civil Protection management in order to decide the activation/deactivation of local departments spread across Italy. ASI has been also coordinating with the Civil Protection for communicating with the media, which turned out to be a very sensitive task because of the widespread interest raised in the news by the re-entry of such a peculiar object. The communication was successful in conveying to the general public correct and timely information, thus preventing unjustified alarms.

Lessons learned from the Tiangong-1 re-entry operational experience range from highlighting the role played by internal communication (e.g. customizing technical/scientific information to standard civil protection operational procedures) to setting up proper interfaces at international level (e.g. the European EUSST consortium among France, Germany, Italy, Spain, and UK devoted to space surveillance), and to realize to which extent the knowledge of the space threats and of some basic mitigation rules is essential in order to make crisis management effective.

As such they can be fruitfully transferred to the NEO hazard, which has necessarily relied so-far on the organization of impact exercises at various level of complexity. This is of particular interest because the next generation sky surveys devoted to NEO discovery using wide field high sensitivity telescopes are likely to routinely detect meteorite-dropping bodies before they enter the atmosphere with sufficient warning time to undertake mitigation actions. Commonalities and differences between the SST and NEO segments are presented and discussed toward establishing a common ground for facing low probability threatening events coming from space at an operational level.