Paleofloods in large alluvial systems

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The quantification of the recurrence time and the magnitude of flooding events is mainly based on direct measures (e.g. water discharge, precipitations) that are generally available only for the last decades or a few centuries. The use of palaeohydrological tools can significantly extent the records of past flood episodes, supporting the characterization of ancient extreme events and assessing their timing and magnitude. These data, compared with modern episodes, can provide a significant improvement on flood risk assessment. Moreover, the spatial and temporal distribution of extremes and flooding episodes can help to understand the role of climatic forcing on the occurrence of large events and the overall changes in flooding regimes. The interest in large alluvial systems is related to the possibility of considering flood sequences generated by mountain catchments which are not much characterized by local geographical conditions but can be sensitive to regional or global climatic variations.

The research will consider a multidisciplinary approach that takes into account geomorphological, sedimentological, geoarchaeological and documentary data (e.g. historical and written sources, chronicles). Target features for the reconstruction of paleoflood series in the alluvial plains mainly correspond to abandoned cut-off meanders and deltaic sequences while, in the mountain valleys and gorges, slackwater deposits are of major interest. In particular, the PhD student will carry out fieldwork (i.e. geomorphological survey, core and outcrop description) and lab activities (remote sensing, elaboration of LiDAR-derived DEMs, XRF-core scanner, LOI, geochronological models). Collaborations with national and international research institutes are planned for learning innovative methods and carrying out specific analyses (CNR-ISMAR Bologna; Utrecht University, ETH Ion Beam Lab Zurich).

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