



What is an orogen? IGCP Project No. 667: World map of the orogens

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The main rationale of the IGCP 667 project is to perform a map (1/10 000 000) of world (ancient and modern) orogens and to represent them along the geological history of the Earth. Therefore, the definition of an orogen is critical and obliges us to go back to the fundamentals of geology by identifying the key elements of an orogen and place them accurately on a map in order to delineate where they sit relative to the cratons boundaries and the pre-existing orogens. This approach will emphasize the steps of evolution of the continents.

Issues are multiples and include “accretionary” versus “orogenic” wedges and associated “internal” versus “external” zones, the magmatism associated to oceanic and to continental subduction and the relevance of separating syn- and post-collision magmatism. How to include the molassic basins, since they are successor (unconformable) basins although part of them is involved in the frontal and late deformation. In the concepts of orogens and suture zones, distinction is often made between intracontinental and ocean basins closure, whereas in fact we often observe in basins a transition via a propagator from ocean basin to intra-continental rift. In most cases, reactivation of former plate boundaries is observed and the map will highlight this aspect.

Early discussions focused on how the main elements should be represented on such a map. In the current discussions, the legend would involve different type of orogens: (i) the subduction orogen including ophiolites, metamorphism, magmatism and accretionary wedge, (ii) the collisional orogen including metamorphism, syn-collisional magmatism, molassic basin, nappes and (iii) the compression or intracontinental orogen. A reflection will also be made for ancient orogens when plate tectonics did not exist. As we go backward in time, the main elements could be simplified due to a lack of data, a lack of understanding, or a strong erosion, which unroofed the upper layers of the orogen.