



Towards a contextual representation of landforms

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Landform definition

- A landform is
 - "any physical feature of the Earth's surface having a characteristic, recognisable shape"
- Its definition is vague
 - Inherent knowledge
 - Cultural background
 - Related to a perception
 - Purpose or thematic knowledge



Is this a mountain?



Landform terminologies

- Definition of a caldera
 - USGS
 - "A **large basin-shaped volcanic depression** with a diameter many times larger than included volcanic vents; may range **from 2 to 50 km** (1 to 30 mi) across"

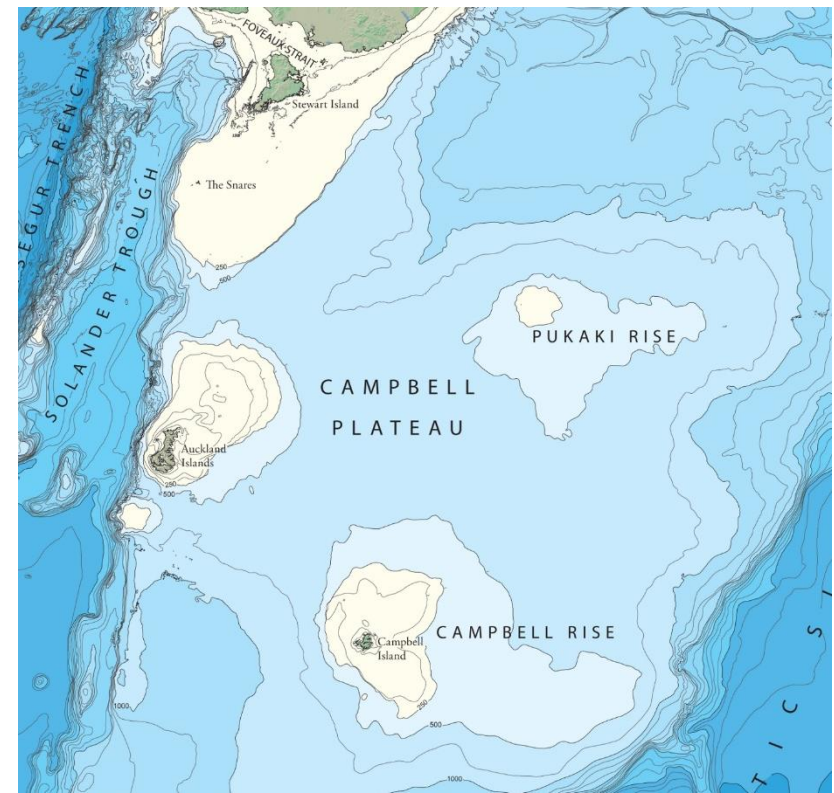


Landform terminologies

- Definition of a caldera
 - IHO (2008)
 - "A **collapsed** or partially-collapsed **seamount**, commonly of **annular shape**"
 - IHO (2013)
 - "A roughly circular, **cauldron-like depression** generally characterized by steep sides and formed by **collapse**, or partial collapse, during or following a **volcanic** eruption"
- Definitions agreed upon within a community
 - For communication and consistent naming
 - Not clear enough for modelling

Landform representation

- Landforms not explicitly modelled on maps
 - Areas of interest highlighted by cartographer
 - Navigation hazards on nautical charts
 - Landforms along trails on hiking maps
 - Left to user interpretation
 - From contour and spot height arrangement
 - From names



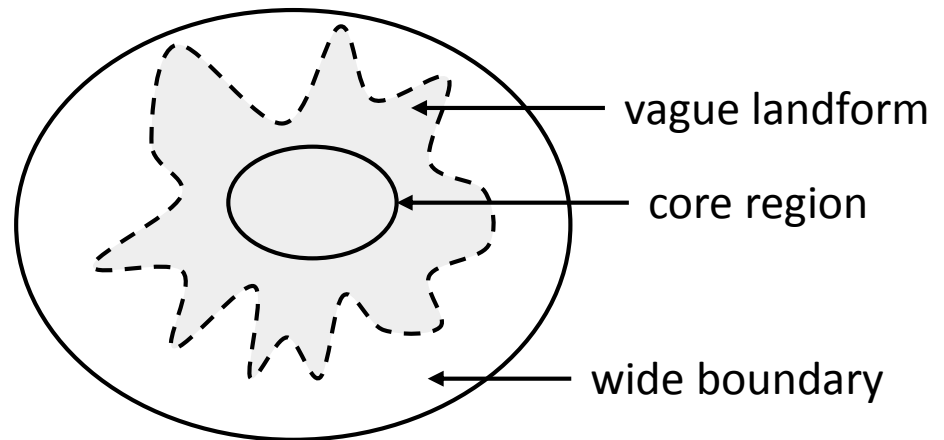


Question

- Can we automatically recognise landforms on a terrain model?
 - Assist users in generating map and in interpretation
- Problems
 - Complexity and vagueness
 - Landform is not an homogeneous region
 - DTM classification not adapted
 - Specific to a context or purpose
 - No universal definition

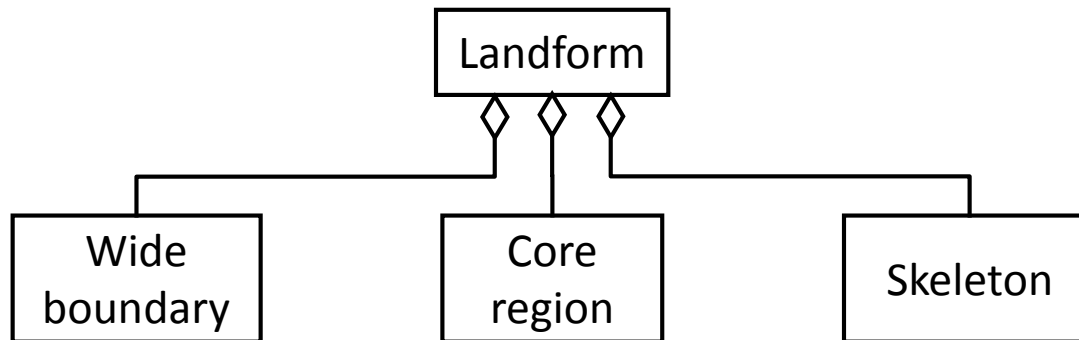
Principle

- Landforms are perceived from their salient features
 - A mountain is primarily defined by its summit
 - Landform skeleton
- No explicit boundary
 - Rough location



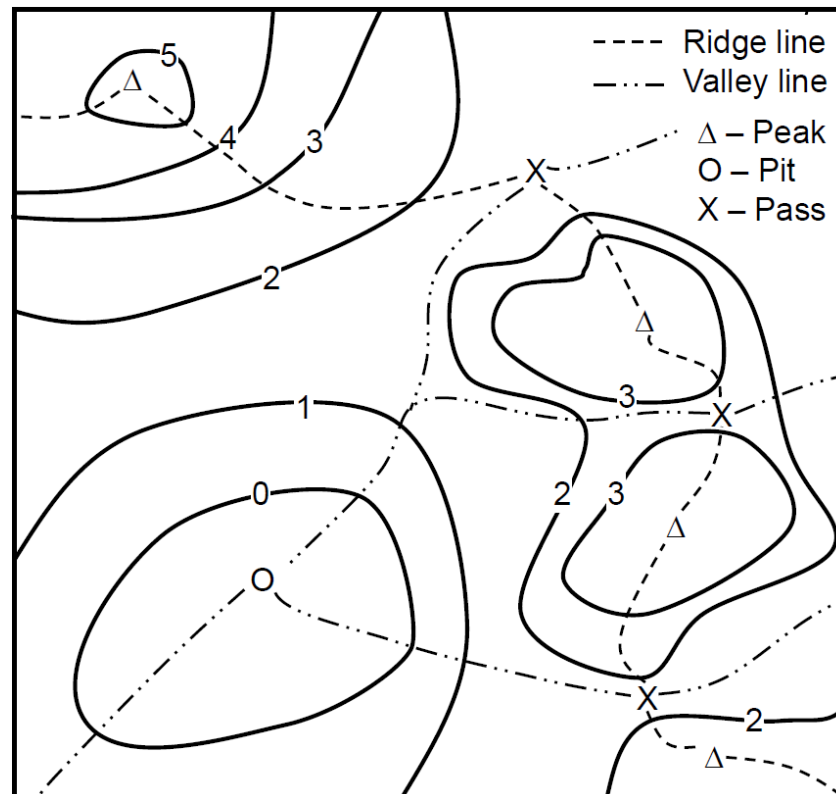
Landform prototype

- Common prototype for elementary landforms

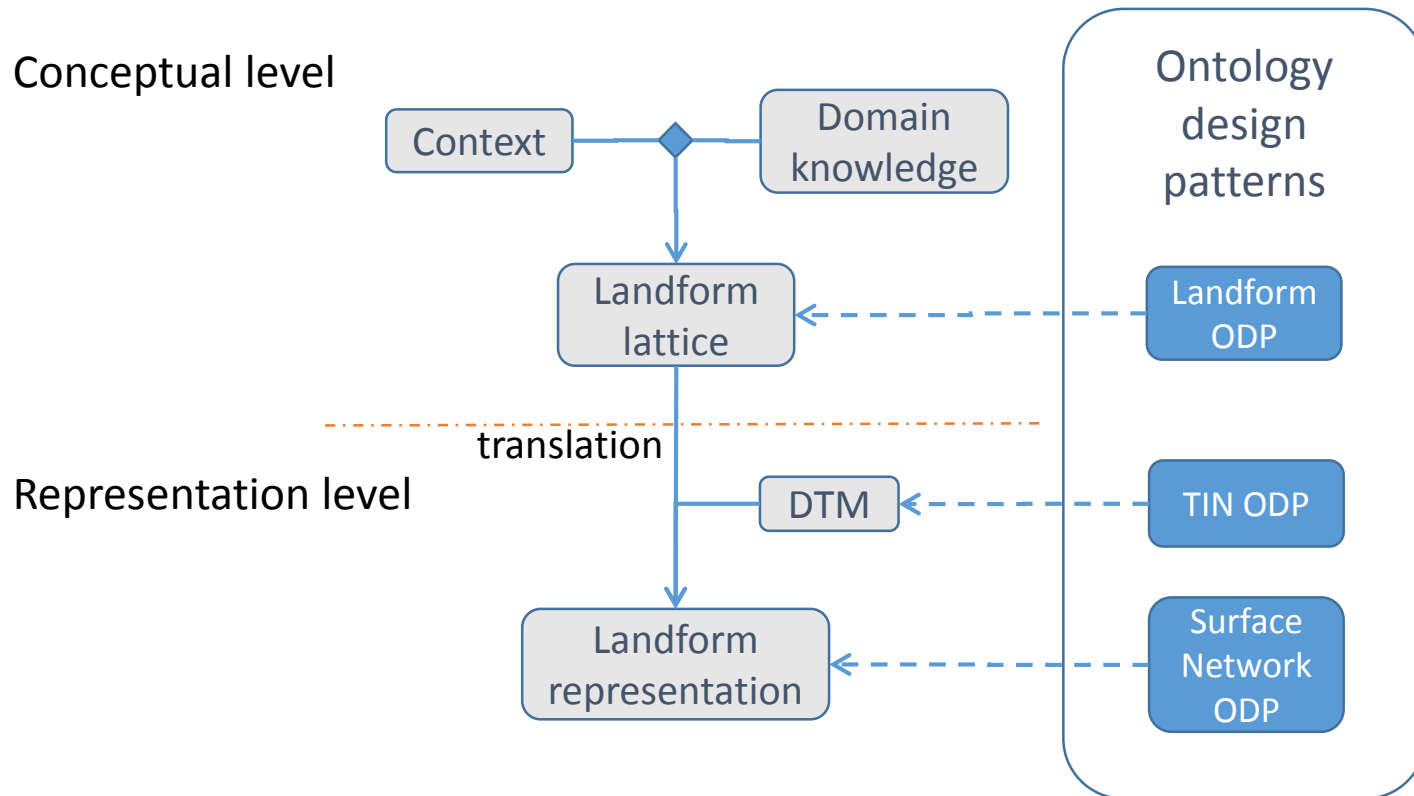


Surface network

- Topological structure from the DTM
 - Contain critical points and lines
 - Contour lines

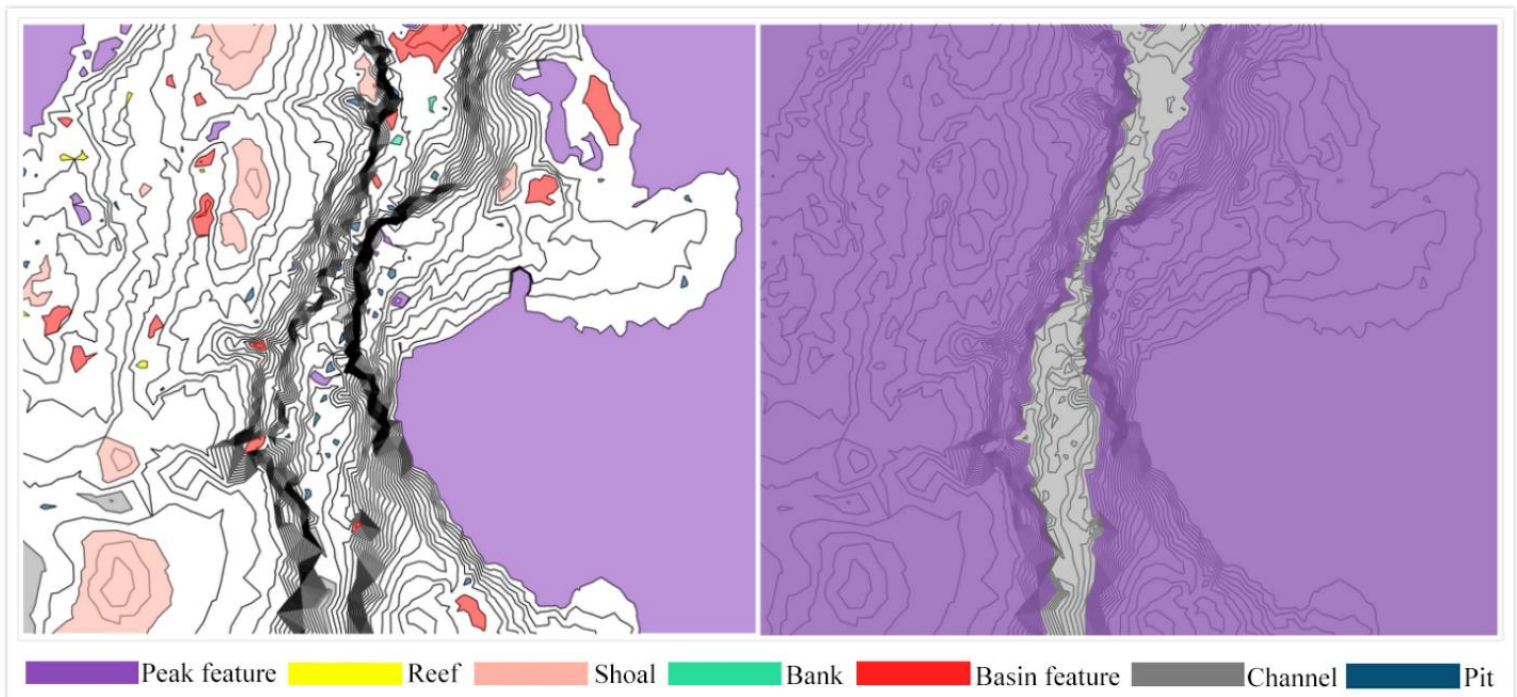


The framework



On going works

- Eminences and depressions from contours
 - Landforms at different LOD based on inclusion
 - Contours alone are not enough





Perspectives

- Case studies on a specific form
 - Establish a conceptual model following prototype
 - Discussion with geomorphologists
 - Characterise skeleton
 - Translate properties into attributes tractable from DTM
 - Extract candidate skeletons from surface network
 - Identify regions around skeletons
- Extend framework
 - Representation of domain knowledge
 - Map representation and user profile



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