



How to recognise sill induced hydrothermal vent structure in large igneous provinces: key observations from outcrop to seismic.

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A significant component of large igneous provinces is the intrusive plumbing system which feeds the main eruptive pulses. When such intrusions are found invading into large sedimentary basins, they interact with the host rocks and can generate large amounts of gases from their metamorphic aureoles. If gas generation and pressure conditions reach critical conditions they can escape to the surface through hydrothermal vent structures which rise up from the intrusions and pierce the surface. Yet how are such structures recognised within the overlying stratigraphy through which they breach? In this contribution we look at how sill induced vent structures are recognised from outcrop examples through to their identification in 2D and 3D offshore seismic data. The distribution of vent structures can be shown to be widespread in Large Igneous Provinces, with some key examples found in the Karoo, Siberia, and North Atlantic Igneous Province (NAIP). There is particular focus on those within the NAIP using mapped examples from offshore seismic data and with onshore examples from NW Scotland, highlighting the variability of these structures and their deposits. As the availability of 3D data from offshore and onshore increases, the full nature of the volcanic stratigraphy from the subvolcanic intrusive complexes, through the main eruption cycles into the piercing vent structures, can be realised along the entirety of volcanic rifted margins and LIPs. This will help greatly in our understanding of the evolving palaeo-environments, and climate contributions during the evolution of these short lived massive volcanic events.