Application of TORG

The use of TORG in mineral exploration can envisaged as outlined below. When starting to explore one has a model in mind to search for, eg Hemlo style gold deposit, or a porphyry copper-gold deposit, or a Mississippi style zinc deposit. For each of these types of deposits there are geological settings that are similar, obviously the reason to start looking for such a type.

In geological models the position of faults associated with certain rocktypes and alteration haloes play an important role. Fig 31 shows a series of rocktypes separated by a fault and overprinted by an alteration halo cause by a granitoid. A special weathering area is also delineated.
In all there are as rocktypes A, B, C, D, E, G, K. The fault F, weathering area W. The alteration halo is indicated by H. So there are four different object classes. A control-object can be put together with the required objects. This control object can be used to search the geological map of fog 32. It should be realised that the rocktypes do not necessarily to be the same. Fig 32A shows the TORG of the combo found in fig 32 that matches the control-object .

When the combos are found that match the c-o one can validate them according attribute information and other geological constraints.

The search for these 4-Dimensional combos can be done very fast because it only a complex data base query. This would be far more difficult in a normal GIS environment. The power of TORG is especially the fact that n-dimensional searches can easily be done.

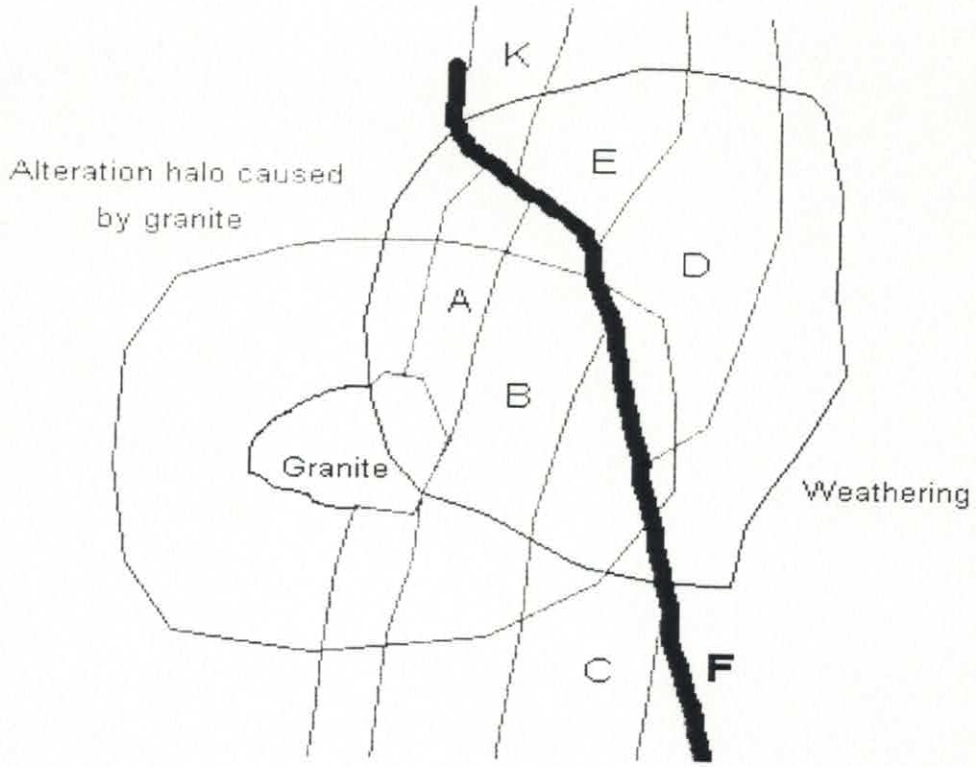

Fig 31 : The control object for a regional search

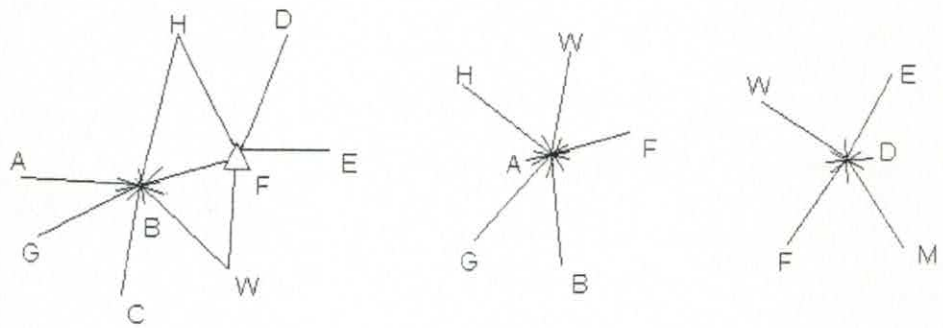

fIG 31 A : TORG of control-object based on fig 31.
Two additional TORGs.

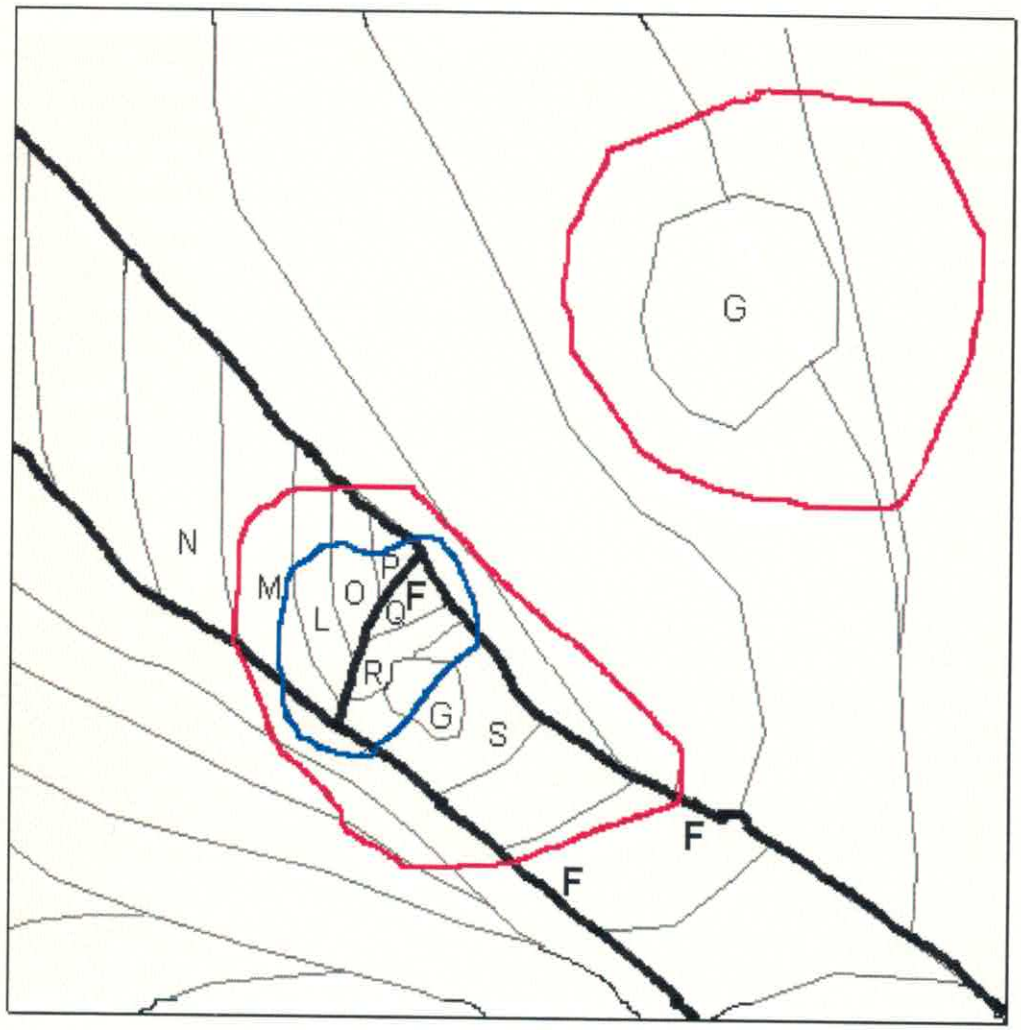

Fig 32 : Geological map with different rocks, faults

alteration haloes, and weathering patterns.

F = fault

L, M, N, O, P, Q, R, S = rocktypes

boundary of weathering

boundary of alteration

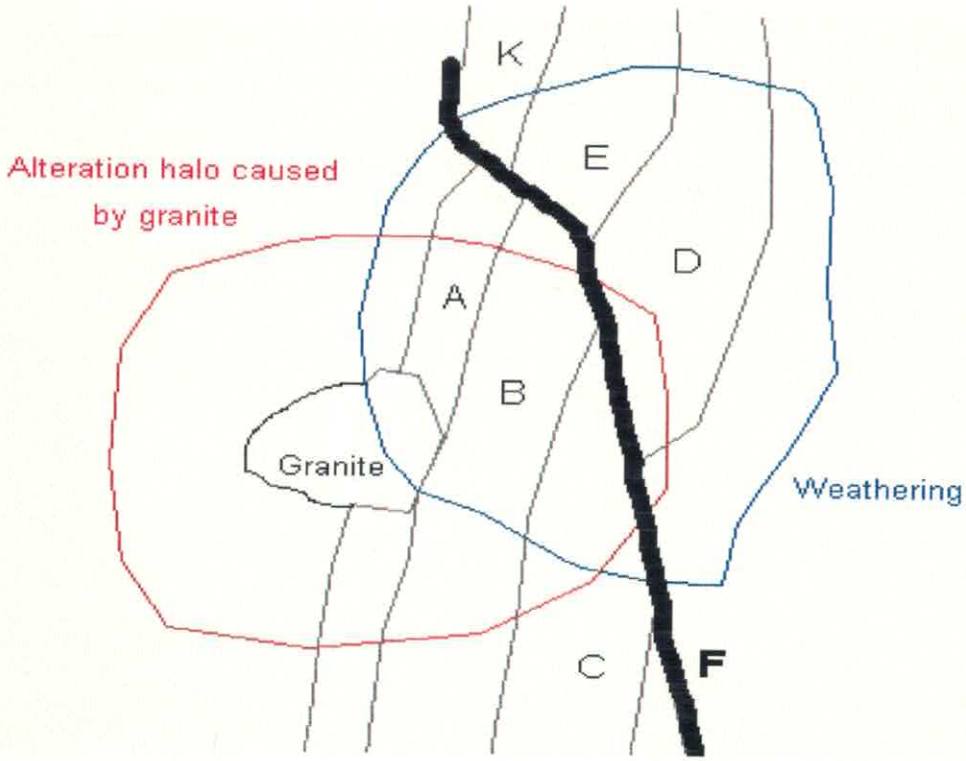

Fig 31 : The control object for a regional search

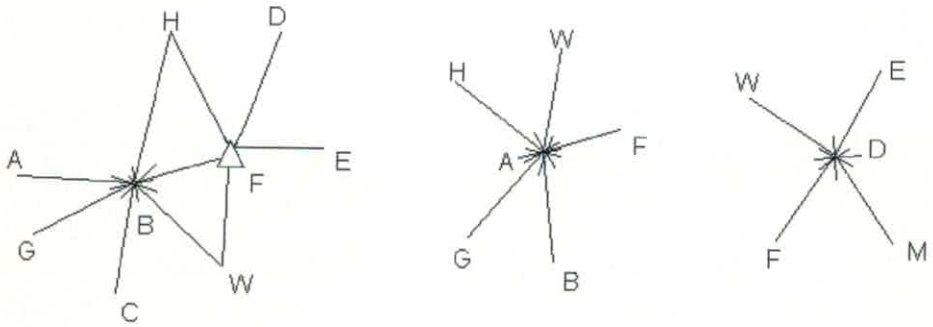

fIG 31 A : TORG of control-object based on fig 31.
Two additional TORGs.

5. Conclusion

The paper shows that there are many issues involved in getting a faster search mechanism for n-dimensional topological problems. Before searching can commence relationships between neighboring objects have to be recorded. These features can relate to the type of intersection between objects. Or to the establishment of a controlling set of topological relationships used in the search.

The creation of Tolopogy-Object_Relation-Graph (TORG) is the central issue of this paper. A TORG is a graph rep[resenting all types of topological relationships with its neighbors, including the transition of one type intersection to another, eg from touch to an overlap.

The paper concludes with an application in mineral exploration. A geological model of area of known mineralisation is represented as a TORG (the control-object). This control-object is used to search for a geological setting that has the same topological relationships but is location in a different region.

TORG may possibly be difficult to implement software but has enormous potential for spatial searches.

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APPENDIX I

Definitions

There has to be agreement on a series of definitions of string related items. There seems to be no clear usage of some names in the literature. The following table lists suggested definitions of them.

arc	A string open ended. A string that forma the boundary between 2 topological objects, e.g. the line connecting 2 adjacent squares.
boundary	A general term to indicate the line with thickness zero that separates two or more objects. A boundary does not have to be a closed string.
outface	The 3D equivalent of an outline. A closed polyface. Like a hull constructed by a wire frame
outline	Build from one or more arcs forming the boundary between the object inside the outline and the world outside. The boundary has no thickness. Existing in 2D and 3D space. An outline forms the boundary between two or more adjacent objects.
plane	An unbounded 2D surface
polyface	An open surface formed by polygons.
polygon	A 2D surface that is bounded by arcs or an outline
polyline	A string (?closed) build up of many segments
segment	Building block of any string
solid	The 3D object that is bounded by an outface.
surface	A boundary / "hull" of n-D objects. Minimally 2D but can get many dimensions. So surface is not a precise enough word to describe an open 3D surface eg like produced by a DTM