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Geo-flightseeing - How to use Google Earth to Bring Virtual Field Trips to the Regional Scale

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SUMMARY

The start of the 21st Century has been marked by the revolutionary accessibility of information provided by virtual globes.
These tools can be used by everyone, from students integrating their work into a synthesised whole or by energy industry teams looking to coherently bring together all their surface-upward data.
Such globes can also represent a structural interpretation tool, enabling deductions to be formulated from the surface outcrop imagery.

In this paper, we illustrate how Google Earth can provide an aerial geological journey across the Apennine-Alpine chain and its power as a presentational and learning device. During this virtual field trip, we examine features at the regional scale, before selectively zooming in to highlighting areas of interest. What kind of information can be displayed and how can our data-voracious geoscientist integrate it with other geoscience tools?

We illustrate how such a technology can be used in formulating a coherent integration of data from above, within and below the surface. This we hope will encourage geoscientists to harness the benefits provided by virtual globes, such as Google Earth, to geological projects and the art of interpretation.

We live in an era of unparalleled access to information about the Earth's surface. Following the breakthrough of satellite remote sensing in the 1970's, GIS tools were developed in the 1980's, which has led at the start of the 21st Century to the revolutionary vision of our planet provided by virtual globes. Whether the resources to investigate a geological feature from the air are available or not, such a view is now available to researchers, consultants and geo-technical staff everywhere within Earth Science.

At one extreme, these new tools can be used by students integrating fieldwork or research results into a synthesised whole, at the other, by energy teams looking to bring together coherently all surface-upward data, such as seismic lines, fault traces, aeromagnetics through to the all-important well-spots. For them, mistakes in facility locations can cost tens of millions. In certain settings, e.g. thrust belts or sag basins, these virtual globes may even provide a structural interpretation tool, enabling deductions to be made from surface outcrop imagery.

In this video demonstration, we want to specifically show how Google Earth can be used to provide an aerial geological journey across the Apennine-Alpine tectonic chain and its consequent power as a presentational and learning tool. We examine features at the mega-regional scale, before selectively highlighting areas of interest that illustrate key elements of the story. What kind of information can be displayed and how can our data-voracious geoscientist integrate it with other geoscience tools?

Geoflightseeing Catalogues could have utility in industry, academia and geo-tourism. For airborne survey companies, or those directly working in fieldwork organisation, such displays will probably become used on a routine basis. Beyond acting as a presentation tool in facilities planning, virtual field trips or logistics however, there is the education power such a collaborative 3D experience allows; the almost limitless ability to integrate open-source data, in audio-visual and graphical format and customise content, is an opportunity uniquely available in the public domain from a virtual globe.

There is increasing talk among software vendors of integration between standard geoscience applications and virtual globes. What next, a GE push-button in our geomodelling packages? Ongoing development enthusiasm from Google and competition from Microsoft, NASA and others, with the addition of sub-surface integration and key analytical tools they may provide in the coming decade, we might expect such a package to become the 3D GIS tool of choice. Even,...a new Geologist's Powerpoint?

This demonstration illustrates how powerful such a technology can be in formulating a coherent integration of information from above, within and below the surface from disparate data sources, which we hope will encourage geoscientists to harness the full benefit provided by virtual globes such as Google Earth to geological projects and the art of teaching interpretation from an early stage.