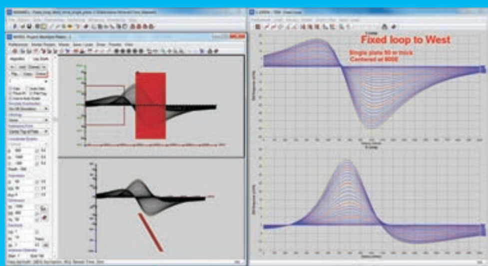
Condor Consulting Inc.

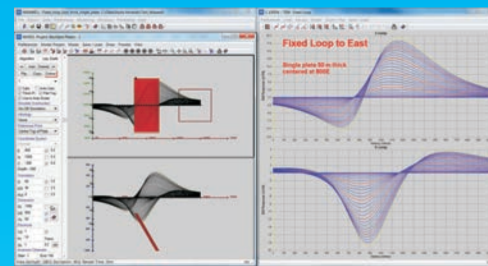
Spacial Resolution of Airborne TEM and FLTEM

COMMENTS

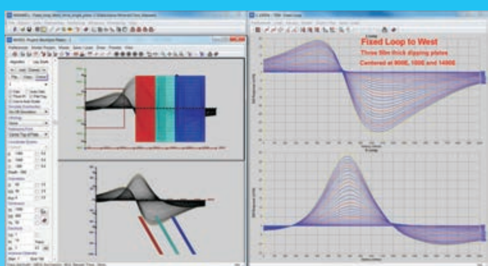
SINGLE CONDUCTOR



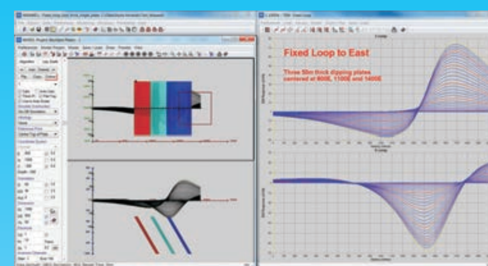
For the simple case of a single conductor dipping at 60 deg, for the ground fixed-loop system, using transmitters both east and west, the Z-comp crossover and X-comp peak both lie close to the top of the conductor. For the west loop, where the conductor is dipping away from the loop, there is a small shift in the crossover/peak TOWARDS the loop compared to the top of the conductor (i.e. up-dip). For the east loop, where the conductor is dipping towards the loop, there is a small shift in the crossover/peak in the down-dip direction on the early channels, but paradoxically this location moves up-dip close to the top of the conductor on later channels. There is no suggestion of a large shift in the anomaly laterally down-dip in the conductor.



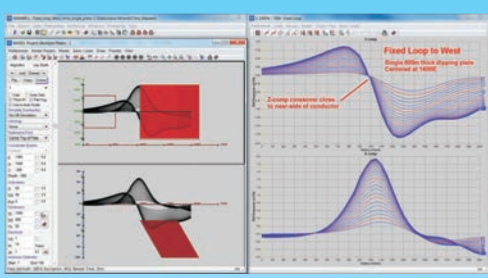
THREE CONDUCTORS



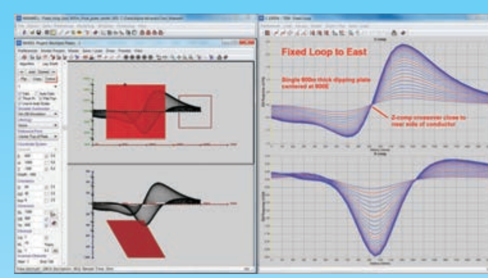
In the case of the ground fixed-loop system, when three dipping conductors are present (each separated by 300 m), ONLY THE CONDUCTOR NEAREST TO THE TRANSMITTER LOOP IS CLEARLY DEFINED. The other two conductors are “screened” by the nearest conductor and only small responses are produced, which would likely not be recognizable in field surveys.

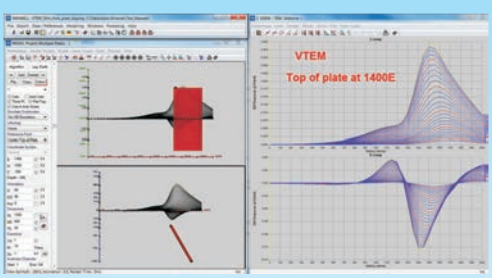


THICK CONDUCTOR

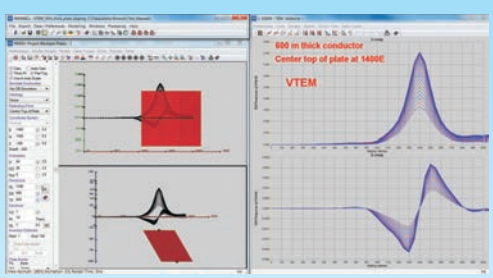


This conductor is 600 m wide, with a flat top and may represent a thick graphitic unit. In the case of the ground fixed-loop survey, a crossover/peak response correlates closely with the NEAR side of the conductor, for both west and east loops. In both cases the far side of the thick conductor is poorly defined and would likely not be recognized in a field survey. If an EM survey is carried out using transmitter loops positioned both east and west then two apparently unrelated conductors will be defined, one from each loop.

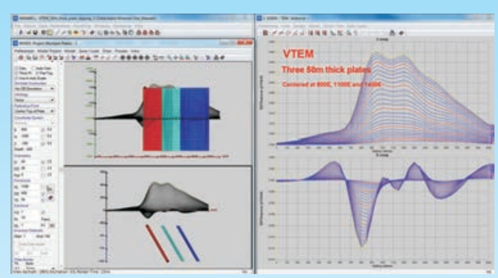




VTEM also defines the position well, but may require Maxwell modeling of the observed data to more precisely define the actual conductor location for drill testing.



For VTEM a single, wide peak is observed on the Z-comp and a crossover correlating with the center of the body on the X-comp. Basically VTEM just sees the flat top of the conductor. There is no ambiguity in the conductor location.



For VTEM, when three dipping conductors are present all three conductors produce significant responses on both Z and X components. For conductors dipping east (to the right), the westernmost conductor is most clearly defined while the other two conductors produce smaller but significant responses.

CONCLUSION

These model results demonstrate the advantages of continuous moving loop systems such as VTEM, compared to ground fixed-loop surveys. Multiple, sub-parallel and/or en echelon conductors and thick conductors are resolved by VTEM, while the fixed-loop surveys suffer from “screening” of conductors and thick conductor edges. The high transmitter moment of the newer VTEM systems means that the effective magnetic field induced into the ground is as high or higher than ground fixed-loop systems (with the possible exception of close to the loop edge). In the past, ground follow up of airborne EM was the norm because ground surveys were located on pegged lines (which were then used for siting drill holes) and because ground surveys usually included all three components (Z, X and Y) which enabled more accurate and robust modeling of conductor geometry. However, the GPS used by VTEM (and other airborne systems) is highly accurate and enables positioning of conductors within a few meters and the newer systems measure all three components which facilitates robust conductor modeling.