CLAIMS

1. A system, comprising:

a processing resource;

a memory resource coupled to the processing resource, wherein the memory resource stores instructions executable by the processing resource to generate a subsurface resistivity profile as a function of depth for a surveyed area by a non-iterative computation modeling process to identify a resistivity anomaly indicative of hydrocarbons, the non-iterative computation modeling process comprising instructions to:

apply a first transformation to an x-component of a vector potential of measured electromagnetic (EM) field data from a marine survey performed with at least one source to yield a first boundary value problem (BVP);

wherein the at least one source comprises a pair of electrodes forming a horizontal electric current dipole source;

wherein the x-component is in a horizontal direction in-line with the horizontal electric current dipole source;

apply a second transformation to the first BVP to obtain a second BVP;

determine a first boundary condition based on at least one of the first transformation and the second transformation and a measurement point;

apply the first boundary condition to at least one of the first BVP and the second BVP;

discretize a second boundary condition in depth and frequency;

solve the second BVP according to the first boundary condition and the second discretized boundary condition; and

receive solutions to the second BVP at a plurality of measurement points, yielding the subsurface resistivity profile.

2. The system of claim 1, wherein applying the first transformation comprises applying a zero-order Hankel transformation.

3. The system of claim 2, wherein the x-component of the vector potential of the measured EM field data is in-line with a towed sensor cable and where x is a sailing direction.

4. The system of claim 1, wherein the measurement point is on a towed sensor cable or an ocean-bottom cable.

5. A non-transitory machine-readable medium storing instructions executable by a processing resource to

generate a subsurface resistivity profile as a function of depth for a surveyed area by a non-iterative computation modeling process to identify a resistivity anomaly indicative of hydrocarbons, wherein the non-iterative computation modeling process comprises instructions to

transform an x-component of a vector potential of measured electromagnetic (EM) field data from a marine survey performed with at least one source;

wherein the at least one source comprises a pair of electrodes forming a horizontal electric current dipole source;

wherein the x-component is in a horizontal direction in-line with the horizontal electric current dipole source;

estimate conductivity as a function of depth to obtain a first boundary value problem (BVP);

transform the first BVP to remove a conductivity dependency of the first BVP and to obtain a second BVP;

estimate a boundary value for a given conductivity;

discretize the second BVP in depth below a water surface and frequency;

solve the discretized second BVP using the estimated boundary value; and

receive solutions to the discretized second BVP at a plurality of measurement points, yielding the subsurface resistivity profile.

6. The medium of claim 5, wherein the instructions executable to obtain the first BVP include instructions executable to obtain an ordinary differential equation.

7. The medium of claim 5, wherein the instructions executable to obtain the second BVP include instructions executable to obtain an integro-differential equation.

8. The medium of claim 5, wherein the instructions executable to estimate the conductivity comprise instructions to estimate the conductivity of a marine environment as a function of depth only.

9. The medium of claim 5, wherein the instructions executable to estimate the boundary value for the given conductivity include instructions executable to use a Hankel transform variable equal to zero.

10. The method of claim 5, wherein the given conductivity is a known conductivity of seawater and a conductivity of a subsurface.

11. A method, comprising:

generating a subsurface resistivity profile as a function of depth for a surveyed area by a non-iterative computation modeling process to identify a resistivity anomaly indicative of hydrocarbons, the non-iterative computation modeling process comprising:

applying a first transformation to an x-component of a vector potential of measured electromagnetic (EM) field data from a marine survey performed with a source array to provide an ordinary differential equation with boundary conditions at measurement points along a marine survey cable;

wherein each source of the source array comprises a pair of electrodes forming a horizontal electric current dipole source;

wherein the x-component is in a horizontal direction in-line with the horizontal electric current dipole sources;

applying a second transformation to the ordinary differential equation to:

provide an integro-differential equation that is independent of the subsurface resistivity profile in depth; and

remove a conductivity dependency from the ordinary differential equation; and

estimating the subsurface resistivity profile for each source position in the source array based on the integro-differential equation.

12. The method of claim 11, wherein the measurement points are offset from each source position.

13. The method of claim 11, where applying the second transformation includes rewriting the first transformation as a function of the second transformation.

14. The method of claim 11, wherein generating the subsurface resistivity profile includes integrating the measured electric field data along the marine survey cable, and obtaining a boundary value from a model with a known seawater conductivity and an estimated subsurface conductivity.

15. The method of claim 11, further comprising:

injecting an electric current into a fluid volume; and

recording the measured EM field data with an EM receiver resulting from injecting the electric current.

16. A method of generating a geophysical data product, the method comprising:

obtaining measured electromagnetic (EM) field data from a marine survey performed with at least one source comprising a pair of electrodes forming a horizontal electric current dipole source;

generating a subsurface resistivity profile as a function of depth for a surveyed area by a non-iterative computation modeling process to identify a resistivity anomaly indicative of hydrocarbons, the non-iterative computation modeling process comprising:

applying a first transformation to an x-component of a vector potential of the EM field data to yield a first boundary value problem (BVP), wherein the x-component is in a horizontal direction in-line with the horizontal electric current dipole source;

applying a second transformation to the first BVP to obtain a second BVP;

determining a first boundary condition based on at least one of the first transformation and the second transformation and a measurement point;

applying the first boundary condition to at least one of the first BVP and the second BVP;

discretizing a second boundary condition in depth and frequency;

solving the second BVP according to the first and the second boundary conditions to generate the subsurface resistivity profile as a function of depth for a surveyed area to identify a resistivity anomaly indicative of hydrocarbons;

receiving solutions to the second BVP at a plurality of measurement points, yielding the subsurface resistivity profile; and

recording the subsurface resistivity profile on a non-transitory machine readable medium, thereby generating the geophysical data product.

17. The method of claim 16, wherein the non-transitory machine-readable medium is suitable for importing onshore.

18. The method of claim 16, wherein recording the geophysical data product comprises recording the geophysical data product offshore or onshore.