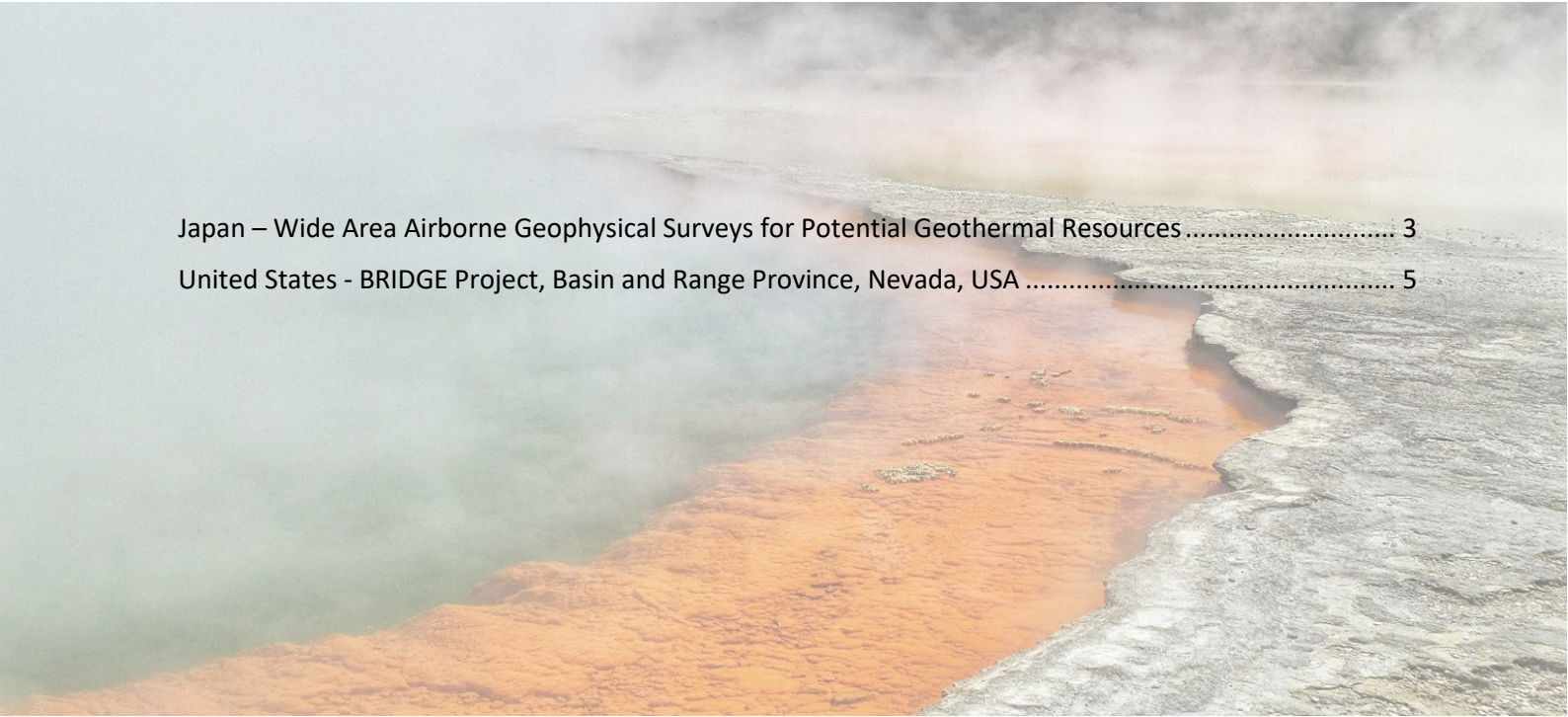


Geothermal Smart Management Solution (GSMS)

Xcalibur Smart Mapping

Japan – Wide Area Airborne Geophysical Surveys for Potential Geothermal Resources 3

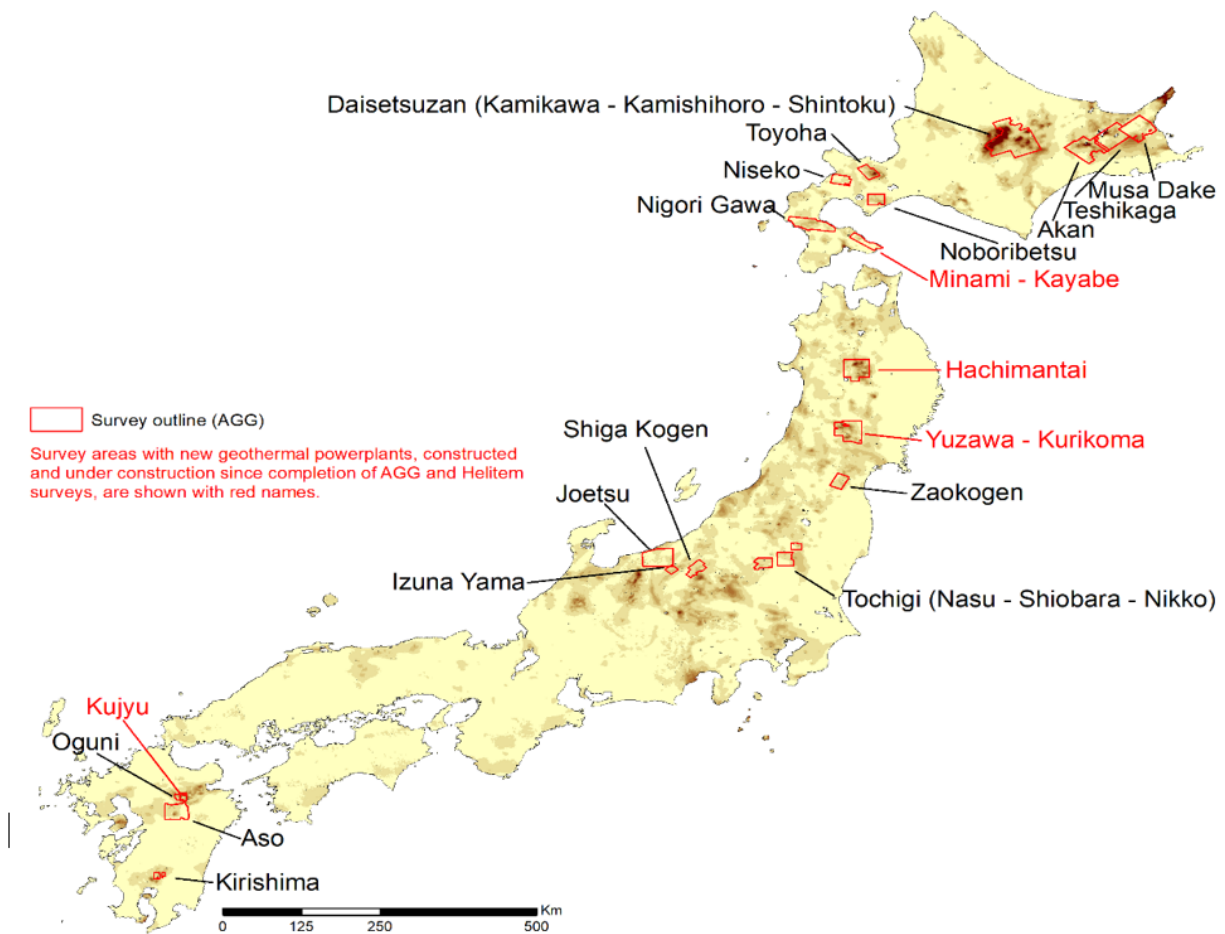
United States - BRIDGE Project, Basin and Range Province, Nevada, USA 5



Japan – Wide Area Airborne Geophysical Surveys for Potential Geothermal Resources

The Wide Area Project is an initiative to progress and promote geothermal development and aims to providing geothermal developers with sufficient geoscience information to make an investment decision to initiate exploration and development of geothermal resources in Japan.

The Project, funded by JOGMEC (Japan Organization for Metals and Energy Security), started in 2012 and has continued each year since. To date 20 large airborne survey areas have been flown with HELIFALCON and HELITEM at locations spread along the full length of Japan.

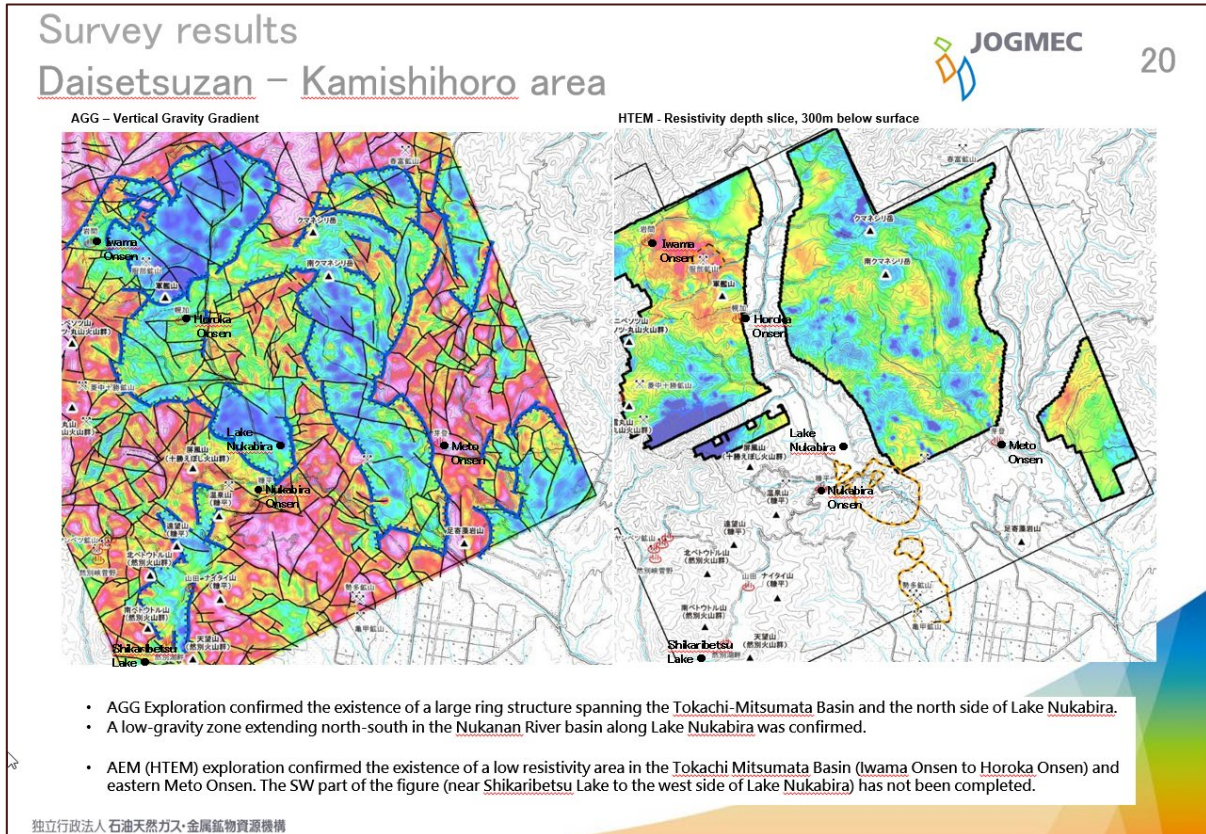


HELIFALCON and HELITEM survey areas in Japan

The HELIFALCON AGG gravity surveys are used to map geological structure such as caldera's, basement depth and shear systems, enabling structural interpretation of key geological features that influence hydrothermal fluid circulation.

The HELITEM AEM electromagnetic and magnetic surveys are used map the distribution of the geothermal alteration zone (the seal or cap rocks), and to acquire information on the upper surface of the geothermal reservoir.

The Wide Area airborne surveys have continued each year since 2012. In areas Xcalibur has surveyed over this time, four geothermal power stations have been built, or are under construction, since completion of the AGG and HTEM surveys.



HELIFALCON and HELITEM data with interpreted geothermal structures and clay caps. Modified from Shimuzu 2022

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United States - BRIDGE Project, Basin and Range Province, Nevada, USA

The BRIDGE Project (Basin and Range Investigations for Developing Geothermal Energy) is an US DoE funded initiative to develop and demonstrate technology and work-flows to systematically identify and explore for hidden geothermal reservoirs in the Basin and Range Province of the western USA.

Hidden geothermal systems, those that do not have surface thermal expressions (such as warm-hot springs, fumaroles, steaming ground, etc), have historically mostly been identified serendipitously from shallow wells drilled for other purposes such as groundwater or mineral exploration. Most non-hidden geothermal systems in the B&R have already been explored and/or developed. *(Reference: Schwering et al, BRIDGE, GRC Transactions V46, 2022)*

In 2022, Xcalibur acquired a total of 1,877 line kilometers of HELITEM low frequency electromagnetics for BRIDGE in Nevada, USA. The high-resolution resistivity data were analysed and compared with MT resistivity, surface geology, temperature data and well data.

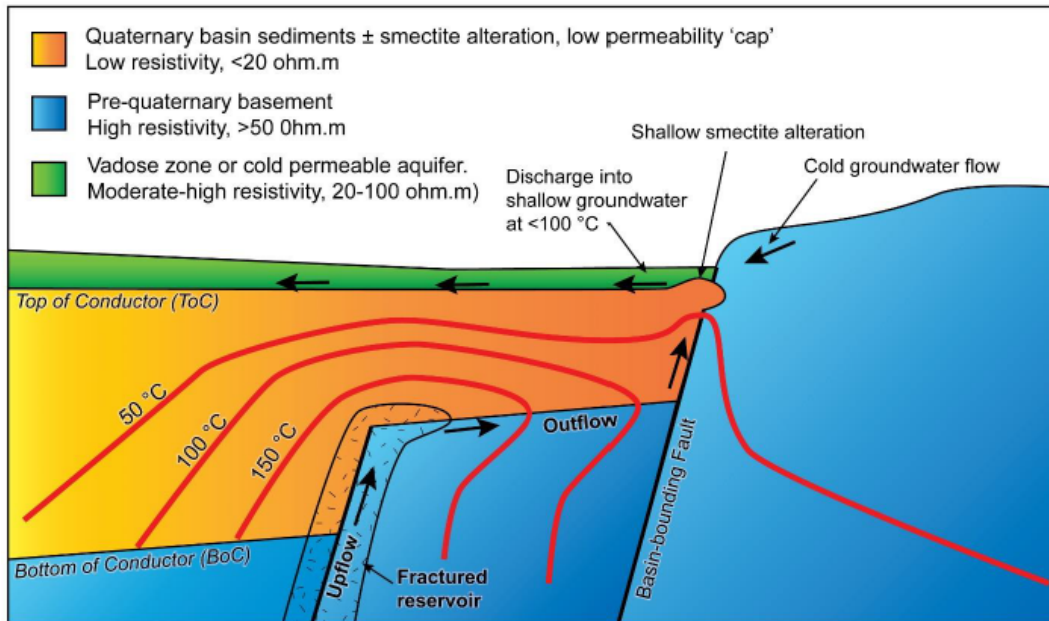
The project concluded that;

“HELITEM surveying provides an accurate and high horizontal resolution image of resistivity in the upper few hundred metres in the Basin and Range Province. HELITEM thus images shallow smectite-clay rich zones that act as low vertical permeability caps over geothermal systems in the B&R”

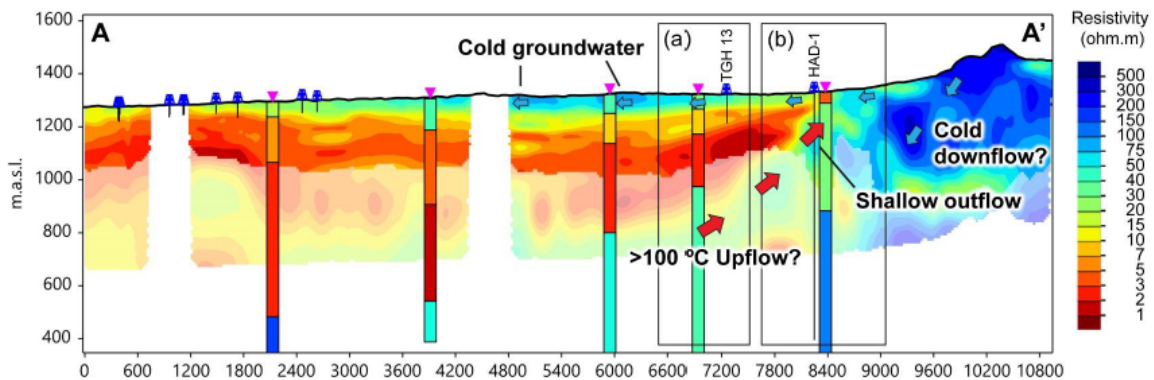
and

“The BRIDGE project team believes the use of HELITEM to be a significant step forward in how to more systematically identify potential hidden geothermal systems relative to previous, mostly serendipitous discovery of such systems”

(Reference: Sewell et al, HTEM, GRC Transactions V47, 2023)



Conceptual resistivity structure of hidden geothermal system (Reference: Sewell et al 2023, GRC Transactions V47, 2023)



HELITEM (plus MT) resistivity cross section over interpreted hidden geothermal system, Nevada, USA. (Pink triangles are MT stations and the coloured bars beneath are 1D MT inversions) (Reference: Sewell et al 2023, GRC Transactions V47, 2023)

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