



# Technologies & Solutions

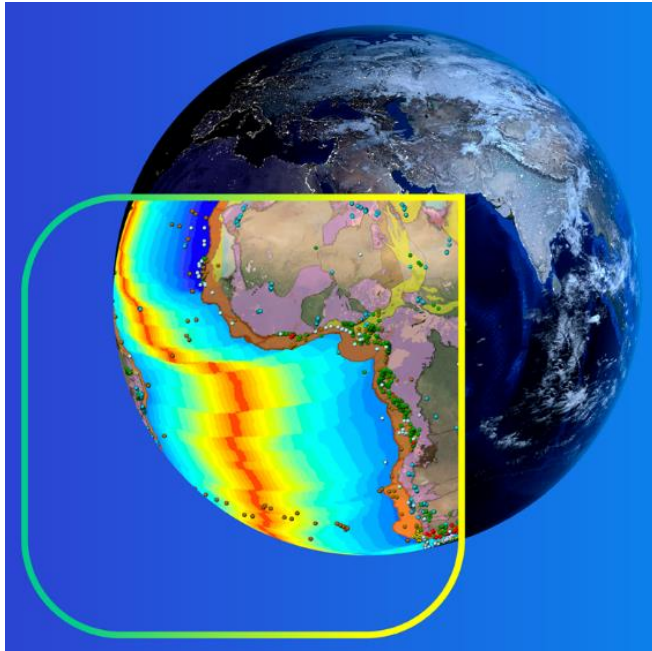
Providing unique perspectives on our planet

January 2024

[cgg.com](https://cgg.com)



# A global technology and HPC leader



**SEE THINGS DIFFERENTLY**

Providing a comprehensive range of data, products, services and solutions for complex digital, energy transition, natural resource, environmental and infrastructure challenges



INNOVATION



PEOPLE



QUALITY



SOCIAL  
RESPONSIBILITY



HSE  
EXCELLENCE

# Our values



## **We are problem solvers**

Curious and passionate about constantly advancing science and technology to discover new insights, innovations and solutions for all our stakeholders



## **We are open**

Always inclusive and believing good ideas can come from anyone, anywhere



## **We are responsible**

Caring deeply about the Earth and doing the right thing, always acting safely and with integrity



## **We are driven to go beyond expectations**

Continuously delivering outstanding service for our clients





# Our ESG commitments

## OUR SUSTAINABILITY CONTRIBUTION

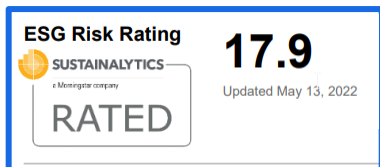
**Energy companies' CO<sub>2</sub> footprint reduction:** more accurate drilling locations to avoid hazards and optimally target reservoirs

**Energy companies' internal efficiency:** expertise & HPC resources & digital platform to optimize decision process

**Energy transition:** supporting the transition to a lower carbon future

**Environmental science:** improving awareness of local and global environmental changes

## OUR ESG RATINGS



#1-3 in Oilfield  
Services

#2 in Energy Services

## OUR CARBON NEUTRALITY STATEMENT



### CGG will achieve net zero by 2050

Aligned with our longstanding commitment to act responsibly and minimize the impact of our activities on the environment, in every sector of our business, we pledge to reach net zero emissions by 2050 in scopes 1 & 2 of the greenhouse gas (GHG) protocol

GHG emissions Scope 1+2 (K tons CO <sub>2</sub> eq)	2020: 53 Kt 2021: 45 Kt 2022: <b>41 Kt</b>	<b>50% reduction by 2030</b> 90% by 2050
% Low emissions energy mix (total kwh consumption Scope 2)	2020: 31% 2021: 36% 2022: <b>51%</b>	<b>50% in 2030</b> 90% in 2050 <i>or sooner depending on availability and prices</i>
Power usage efficiency (3 main centers)	2020: 1.33 2021: 1.35 2022: <b>1.42</b>	<b>&lt;= 1.2 by 2030</b>



# Our leadership



**Sophie Zurquiyah**  
CEO



**Peter Whiting**  
EVP Geoscience



**Dechun Lin**  
EVP Earth Data



**Agnès Boudot**  
EVP HPC and Cloud  
Solutions



**Jérôme Serve**  
Chief Financial Officer



**Eduardo Coutinho**  
EVP Group General  
Counsel



**Jérôme Denigot**  
EVP Group HR and  
EVP Sensing and  
Monitoring



**Hovey Cox**  
EVP Marketing &  
Sales and  
Communications



**Emmanuel Odin**  
Chief Sustainability Officer



# Financial overview: 2022 full year



Revenue  
**\$928 m**  
UP 3%\* Y-O-Y

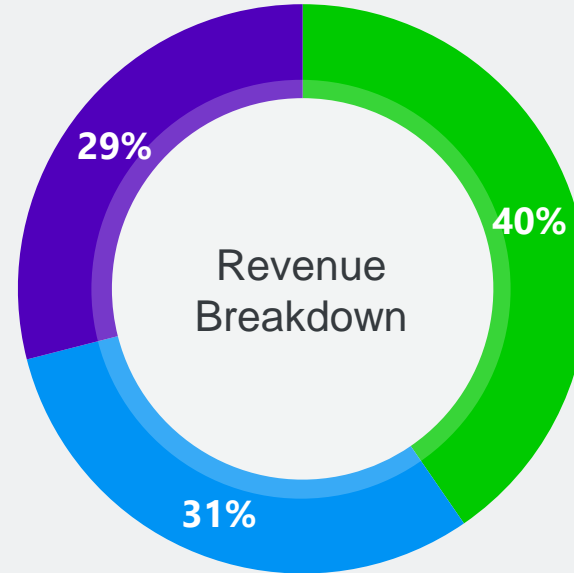


Adjusted  
EBITDAs  
**\$395 m**  
a 43% margin



Liquidity  
**\$398 m**

Sensing &  
Monitoring  
\$269 m



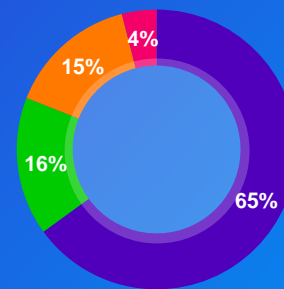
Earth Data  
\$375 m

Geoscience  
\$284 m



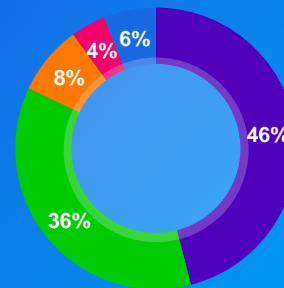


# Global services & expertize



Staff allocation by activity

- Operations
- Support
- R&D
- Sales



Staff allocation by Division

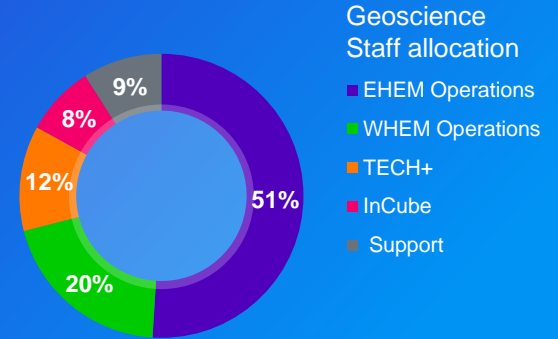
- Sensing & Mon.
- Geoscience
- HPC & Cloud
- Earth Data
- Support

## Geoscience

25 Locations Globally  
70% post graduate degrees  
27% PhDs



# Geoscience global footprint



## Geoscience

### 25 Locations Globally

- 16 Subsurface Imaging open centres
- 7 Subsurface Imaging dedicated centres

### Technical Staff

- 70% Post graduate degrees
- 27% PhD



# Our perimeter



## OUR STRENGTHS

### Remarkable data & technology

Unique Earth data library, imaging, geoscience and digital technologies

### Outstanding people & performance

Ingenuity, diversity and expertise driving innovation and exceeding expectations

### Exceptional ESG commitments

Enabling CGG and our clients to be more efficient, effective, responsible and sustainable

## OUR CORE BUSINESSES



### Geoscience

Established leader in subsurface imaging, geology and geoscience services



### Earth Data

The industry's most technically advanced seismic data and geologic studies in the world's key locations



### HPC & Cloud Solutions

70 years of pioneering computing technology for high-end Earth science, data science and digital solutions



### Sensing & Monitoring

Established leader in seismic equipment, downhole gauges and innovative structural monitoring solutions



# 2023 new business key achievements



## Digital

- Opening of a new UK HPC center, taking our global compute to **500 PFLOPS**
- Launch of innovative Outcome-as-a-Service HPC offering
- HPC contracts in the fields of Generative AI and biotechnology drug design
- Data transformation pilots and full-scale projects with Energy major



## Energy Transition

- Carbon storage projects from prospect characterization to planning for monitoring
- Integrated CCUS data packages in North Sea, US GoM and a new study for SE Asia
- First multi-client mining industry project in North America
- Pilot project to evaluate the regional prospectivity of Mongolia for critical minerals



## Infrastructure Monitoring

- 3 monitoring projects in France, including a stadium
- Monitoring pilot of a cable-stayed bridge in Houston with Texas DOT
- S-scan earthworks railway monitoring contract in the Middle East



New businesses  
percentage of  
2022 total segment  
revenue



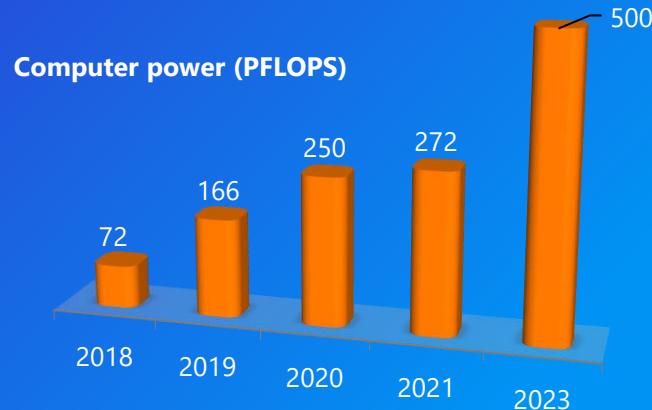
# HPC and Cloud Solutions

## HPC

- Supporting CGG's global Subsurface Imaging leadership
- Providing access to highly-optimized HPC resources and digital platform, and consulting services
- Opening of new UK HPC Hub, taking global compute to 500 PFLOPS

## Outcome-as-a-Service

- Delivering customized, capability-focused HPC and AI solutions for scientific and engineering domains
- Production-based financial model aligned with client's business objectives





# Geoscience Ecosystem



## Subsurface Imaging

Unmatched expertise, advanced geoscience & digital algorithms and excellent service in every image



## Geology

Leading geological and reservoir services and consultancy for natural resource development



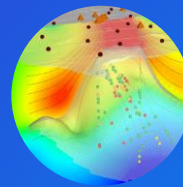
## Energy Transition

Applying our geoscience and digital expertise to geothermal, CCUS, critical mineral and environmental analysis and monitoring



## Data Transformation

Maximizing the value of data to improve business decisions with expert **Data Hub** transformation services and technology



## Multiphysics

Expert analysis and interpretation of multi-domain geophysical data for natural resources and environmental applications



## Earth Observation

Satellite Mapping intelligence from imagery for energy, mining, engineering and environment

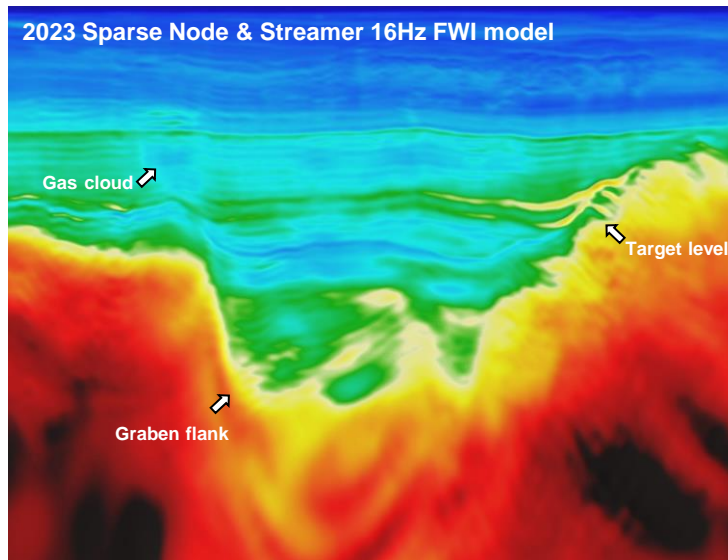
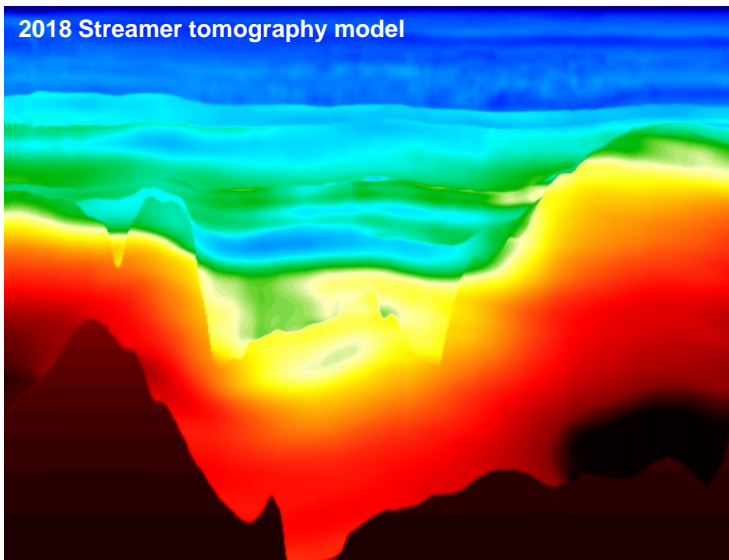


## Training

Bringing together the full breadth of CGG's **GeoTraining** capabilities to provide comprehensive learning path programs

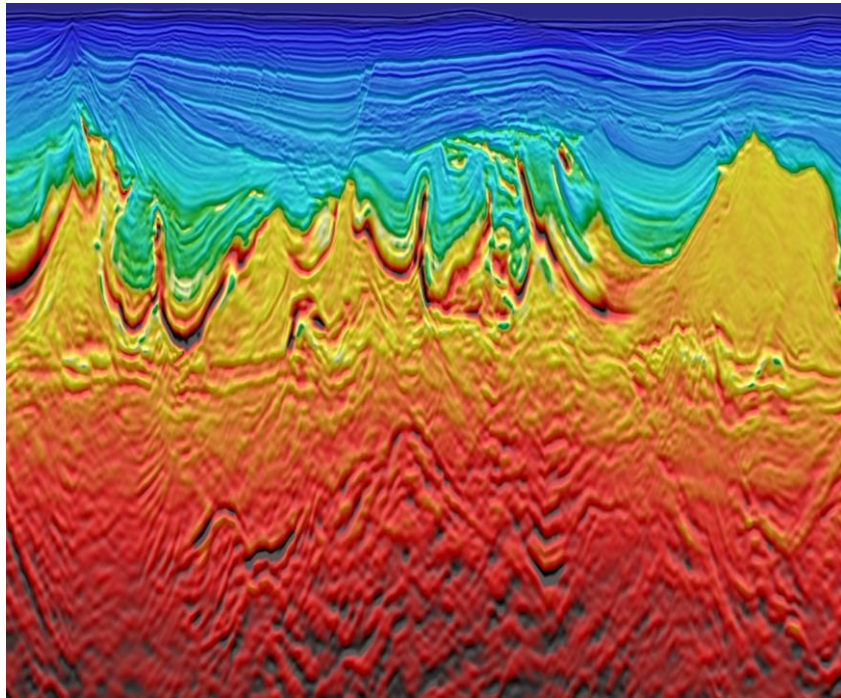
# Advanced imaging technology brings value to clients

- Driving advances in imaging technology to increase exploration success and reduce drilling risks
- More accurate image of the reservoir with better geological fidelity, allowing:
- Delineation of thin-bed reservoirs with confidence leading to new discoveries over the North Viking Graben area



Joint velocity model building with simultaneously acquired sparse node and streamer data, North Viking Graben. CGG Earth Data.





Seismic data reimaged using 30 Hz elastic time-lag full waveform inversion (E-TLFWI), Santos Basin, Brazil. CGG Earth Data.

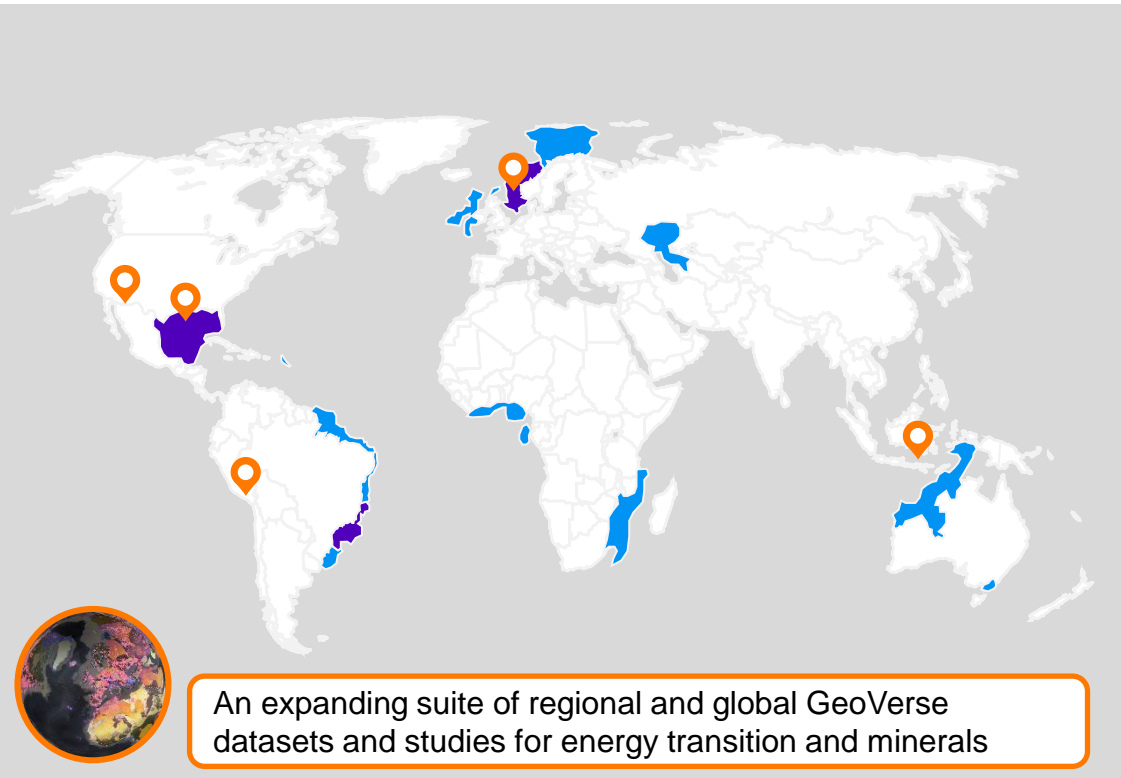
## The most recent and advanced data in the world's key basins and frontiers

- The highest quality seismic data library
- GeoVerse analytics-ready Earth data
- Versal unified seismic data ecosystem

➤ **The right data, in the right  
place at the right time**



# An evolving Earth Data library



## Core Basins

- Gulf of Mexico, Brazil pre-salt, North Sea
- High-end 3D seismic, OBN and reimagining for near-field exploration, reservoir development and production



## Developing

- Southeast Asia, Africa, Equatorial Brazil and Northwest Europe
- 3D seismic and integrated geoscience studies



## Energy Transition & Mining Studies

- CO<sub>2</sub> storage studies, SE Asia, GOM and North Sea
- Southeast Arizona mineral exploration integrated database
- Paleo-salar Lithium study, South America
- Global geothermal resource assessments

# Digital solutions enrich Earth Data offering

## Versal



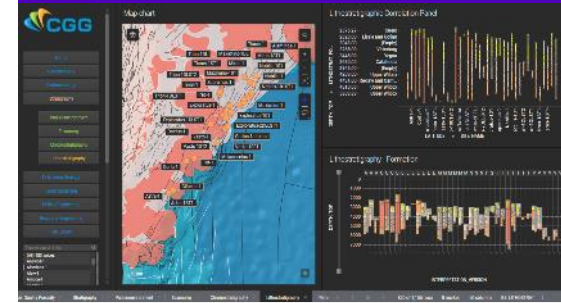
Unified seismic data ecosystem  
offering the vast majority of the  
world's multi-client seismic data  
CGG | TGS | PGS | SLB

## GeoVerse



A global integrated geological  
database ready for licensing

## GeoWells

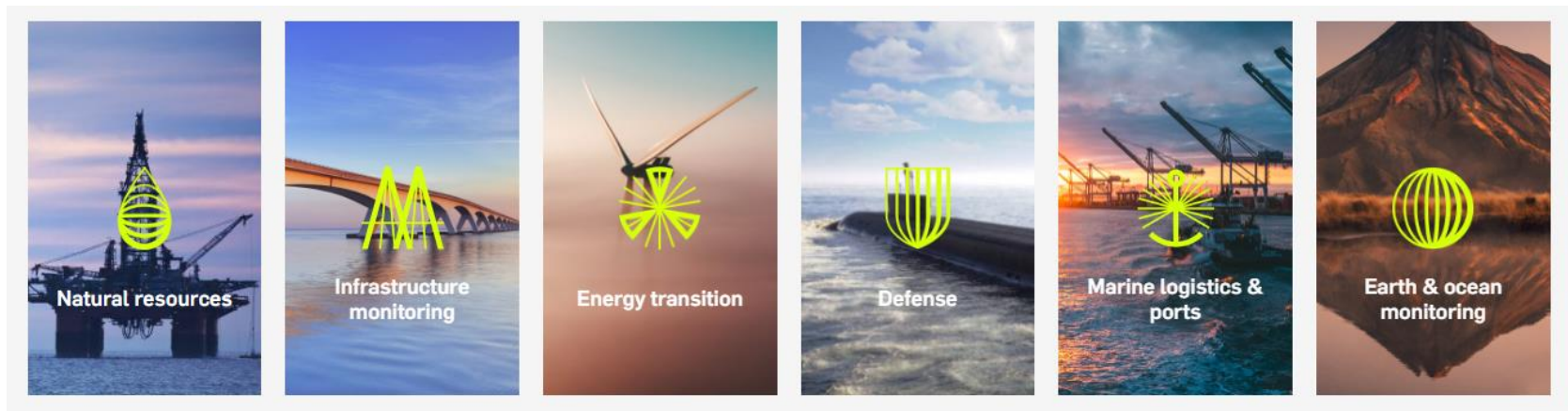


Advanced multi-discipline well  
data available in GOM (Mexico),  
Brazil pre-salt basins and Norway



**BUILDING AN ECOSYSTEM AND GLOBAL DIGITAL DATABASE  
FOR A NEW GENERATION OF MULTI-CLIENT PRODUCTS AND SERVICES**

# Sensing & Monitoring: Our Sercel offerings



Sercel is the world's leading designer and manufacturer of high-tech solutions for subsurface exploration.

From Earth and infrastructure monitoring, to energy transition, defense, oil and gas, it's in our DNA to adapt to any environment while providing insightful solutions.

**> THE FUTURE IN FOCUS**

# Sensing & Monitoring operational highlights



## Land & Marine

- Large deliveries of vibrators and geophone strings to North Africa and the Middle East
- Large deliveries of Ocean Bottom Nodes (OBN)
- Announcement of a full range of OBN nodes from shallow water up to 6000 m depth
- Successful completion of the first environmentally friendly broadband source solution, in the Gulf of Mexico
- Launch of MetaBlue, a Data-driven Marine Seismic Survey Management Solution



## New businesses

- Sales of S-scan geotechnical monitoring solution in the US for ash tailing characterization and in the Middle East for railway monitoring



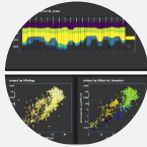
# New differentiated offerings in rapidly growing markets

## DIGITAL



### HPC & Cloud Solutions

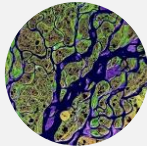
70 years of pioneering computing technology for high-end Earth science, data science and digital solutions.



### Data Transformation

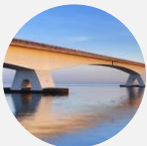
Creating curated decision-ready data for improved business decision quality with advanced Data Hub data transformation workflows.

## MONITORING & OBSERVATION



### Environmental Science

Monitoring of local and global environmental changes using geoscience data, technology and analytics.



### Infrastructure Monitoring

Detailed and continuous situational awareness to predict failures, respond to hazards and optimize preventative maintenance of structures and earthworks.

## ENERGY TRANSITION



### Carbon Storage

Expertise for screening, evaluating and monitoring sub-surface storage and risks



### Minerals & Mining

Services for exploration and monitoring of mine tailings, increasing awareness at all stages of the mining lifecycle.



### Geothermal

Evaluation of resource potential, optimization and monitoring of geothermal developments with greater subsurface insight.

## EARTH DATA



### Multi-Client Earth Data Library

Portfolio of digital products for natural resource and energy transition applications, with over 55 petabytes of data, backed by a unique taxonomy and data ecosystem.



# Data Hub expert data transformation services and technology



## Team

Subject matter experts  
Data scientists and engineers  
Machine learning engineers  
System developers and  
Cloud architects



## Technology

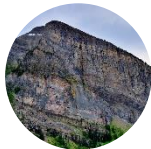
Dynamic pipeline of data transformation  
and latest-generation  
Machine Learning technologies  
(driven by HPC and Cloud)  
OSDU roadmap



## Taxonomy

> 50 years of subsurface knowledge  
>700 distinct data types  
Millions of processed files  
250,000 entities of  
subsurface terminology

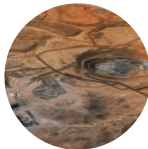
## Digitalization services



Geoscience



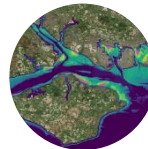
Engineering



Mining



Geothermal



Environmental



CCUS

## DaaS products built by Data Hub



GeoVerse  
global geology  
& geoscience



GeoWells  
regional data



# Data Hub workflow

## Input data

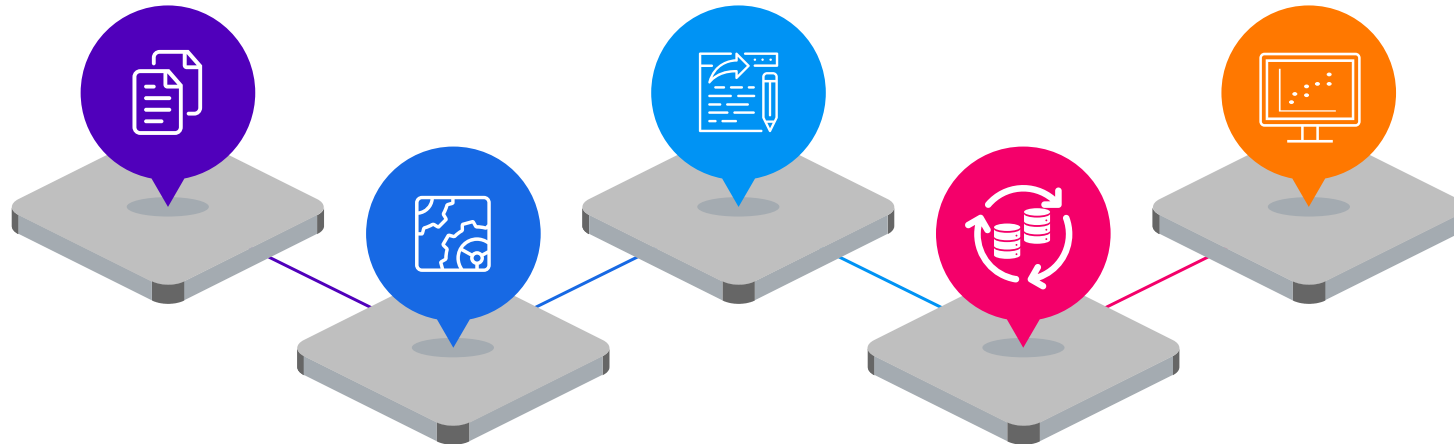
Ingest structured and unstructured data

## Extraction

Extract value from data sources into one consistent data model

## Curated data

Consistent evergreen database accessible to SME's through UI's and connectors to discipline-specific software



## Classification

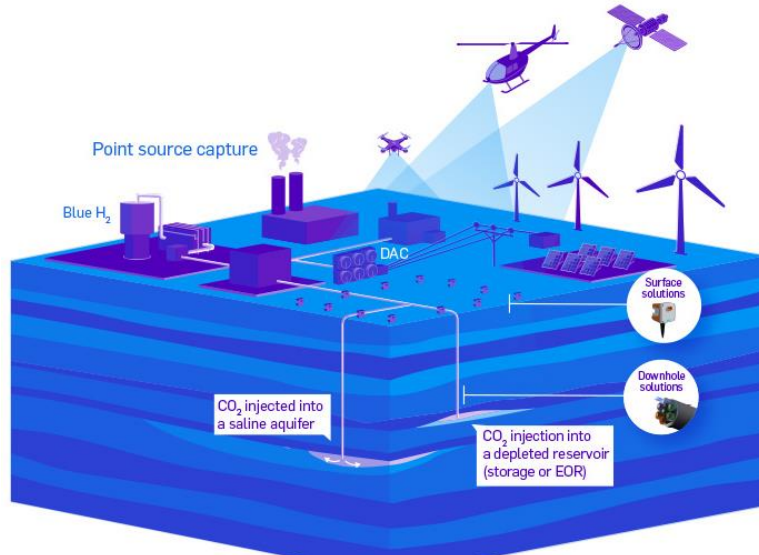
Classify data on a sub-document level to prioritize extraction & integration

## Enrichment & Integration

Integrate data across disciplines and generate new information from geoscience and engineering images

# Carbon Storage

Expertise spanning the Carbon Storage project lifecycle including participation in landmark CCS projects around the world such as Sleipner, In Salah and Gorgon. Leveraging experience across our different disciplines to provide solutions for:



- **Data** – transformation of legacy formats into analytics-ready data
- **Screening** – identification of CO<sub>2</sub> sites for safe, long-term subsurface storage
- **Imaging** – best-in-class seismic imaging for increased subsurface understanding
- **Planning** – diverse geological modeling for optimal seismic acquisition, storage and monitoring strategies
- **Monitoring** – tailored, cost-effective monitoring for increased site safety

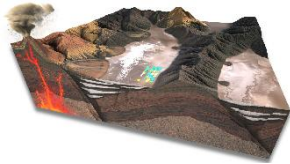
➤ 15 years of delivering impactful results in Carbon Storage

# Minerals & Mining

## Search & Visualize

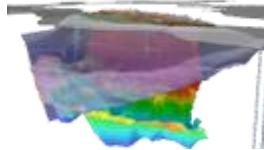
### Mineral Exploration Screening

Data-driven regional screening solution for brine, salt and placer hosted minerals essential for the energy transition



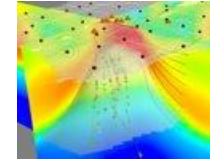
### Deep Mineral Exploration

Improving deep mineral play imaging efficiency through best-in-class technology applications



### Integrated Mine Imaging

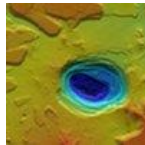
Cross-disciplinary production mapping and modeling ready for advanced analytics and modeling



## Measure & Monitor

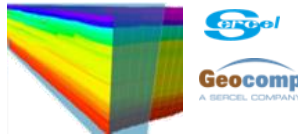
### MineScope

Remote, satellite-derived intelligence across mine sites to aid decision-making throughout the mining life cycle



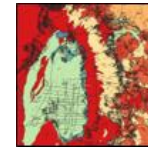
### S-Scan for Mining

Complete geophysical solution for monitoring changes in surface and underground structures to anticipate deformation and collapse



### RESSolution

Remote environmental & social baseline and monitoring systems driving the responsible management of Natural Capital



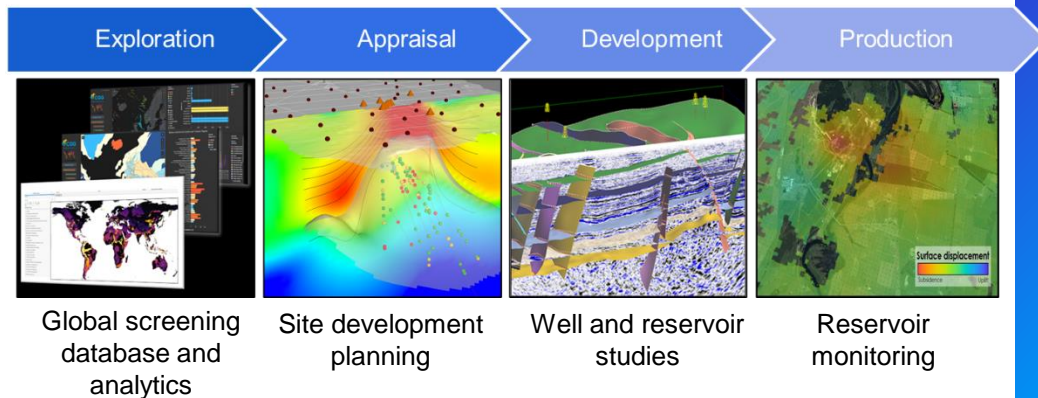
➤ Leveraging expertise across Equipment, Earth Data and Geoscience

# Geothermal

- **Independent** guidance to assess geothermal projects at a range of scales
- Exploring the 'Geothermal Value Chain'
- Evaluating the **scale** of global geothermal energy potential and providing insight for electrical power and heating
- Leveraging CGG experience and advanced **data analytics** in sedimentary basins and volcanic regions
- Dedicated **multi-disciplinary** team to guide and advise on global to prospect investment de-risking

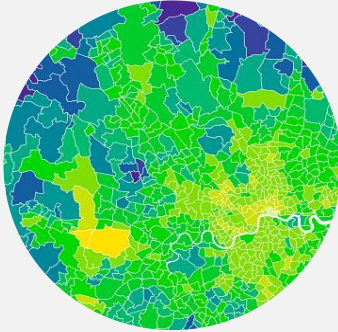


**Worldwide Experience**  
With over 150 geothermal projects and 2 global resource assessments



**Supporting the transition to a lower carbon future**

# Environmental Sciences



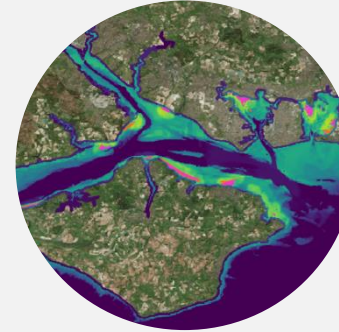
## Intelligence

Environmental data analytics workflows for climate, biodiversity, marine ecosystems, natural capital, geodiversity and nature-based solutions



## Monitoring

Monitoring the impact of infrastructure or specific human activity on the environment



## Climate Change Analysis

Integration of our environmental and data sciences to understand climate risk, resilience and carbon offset challenges



**Leveraging Environmental Science expertise with HPC, AI and remote sensing capabilities to provide data analytics-driven intelligence**



# Expanding Environmental Sciences portfolio

## Natural Insights data platform

- Enabling detailed geospatial analysis of environmental analytics and climate change risk factors
- Site suitability surveys for renewables and carbon-offsetting
- Natural capital assessments
- Asset monitoring



## SeaScope: Clean sea monitoring

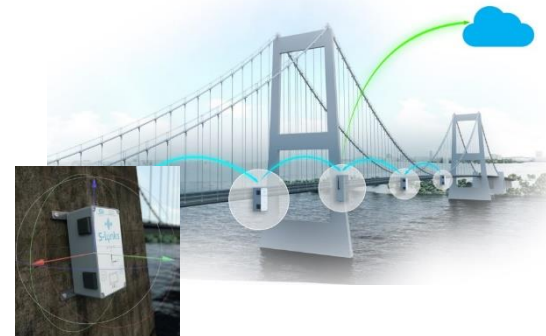
- Sea surface slick intelligence to strengthen situational awareness and mitigate risk
- Deliver value to environmental, operations, crisis response, legal and corporate teams
- Detection and classification of marine and coastal pollution using our unique satellite, ML and data expertise





# Infrastructure monitoring: Structural health & earthworks

- Solutions for monitoring critical infrastructure, earthworks and near-surface conditions
- Providing detailed and continuous situational awareness to respond to hazards and optimize preventative maintenance
- Advanced ultra-sensitive QuietSeis™ MEMS and DAS sensor technology
- Patented passive seismic imaging technology maps near-surface anomalies and changes
- Industry leading Earth observation data provision and interpretation
- Autonomous systems with minimal footprint with no impact on operations
- Real-time cloud delivery of results and analysis



# Structural health monitoring: Successful bridge test in the US



## Market

- Structural health monitoring market estimated ~2B\$
- Leveraging high-quality wireless sensors and imaging expertise to deliver solutions for critical infrastructures



## Cable-stayed bridge test in Southern US

- Instrumented cable-stayed bridge with S-Lynks sensor solution for a major infrastructure operator
- System measured vibration modes and cables tension, and will allow more relevant and targeted maintenance

# Earth Data platform & services

## Data as a Service



DaaS Portal with interactive applications for clients to access and use CGG Earth Data

## Versal



Unified seismic data ecosystem offering 70% of the world's multi-client seismic data  
CGG | TGS | PGS | SLB

## Management & Analytics



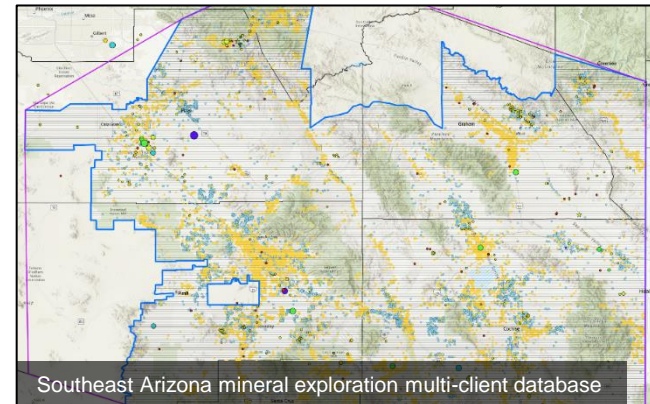
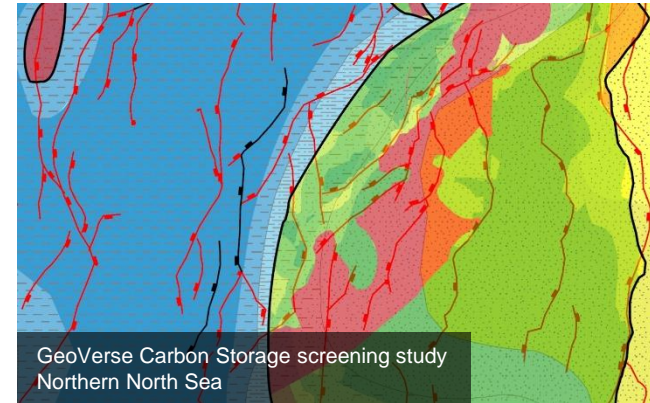
Simplified management, hosting and streaming of CGG and client data, plus analytics layer



**Data ecosystem enabling access, visualization, procurement, management and data mining**

# A growing and diverse Earth Data Library

- Applying our expertise to a develop new multi-client products for the energy transition
- Carbon storage
  - Applying a unique play-scale screening methodology to identify and de-risk carbon storage potential in the GoM and North Sea
- Mineral exploration data
  - New cross-discipline, multi-client project launched in SE Arizona to support mining industry
- Lithium studies
  - Global Li brine screening study leveraging geochemical data
  - Paleo-salar Li study for South America combining satellite and topographic modelling and ground truthing







# THANK YOU