ANTON 安東

Geological Engineering

Service Centre

东方智慧 全球分享

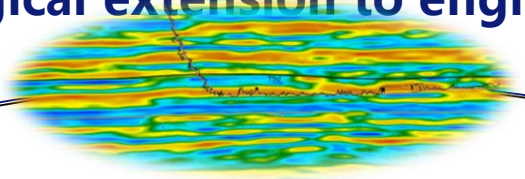
Oriental wisdom , Global sharing

CONTENTS

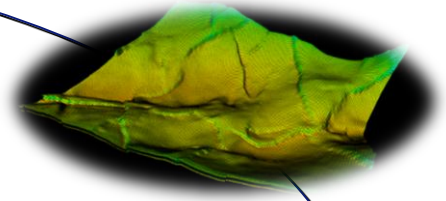
I. Introduction to Geological Engineering Services

ANTON 安東

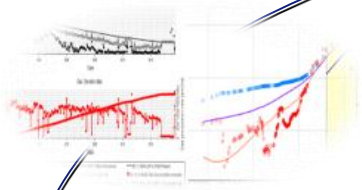
Geological engineering services focus on the close integration of geology and engineering, solving the "last mile" of geological extension to engineering



Fine etching of reservoirs

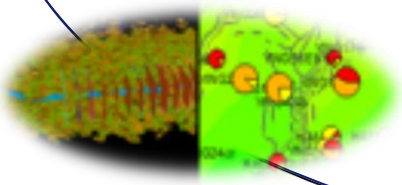


Fine 3D geological and mechanical modelling

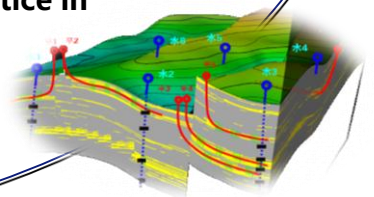


Tracking of production dynamics and evaluation of results

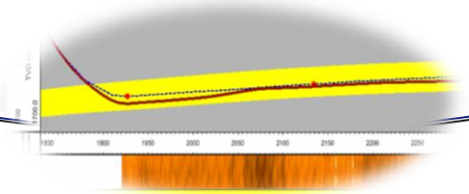
1. A focus on the integration of geology and engineering.
2. Building on existing results from oil and gas fields, with timely updates and iterations of geological and mechanical models.
3. Providing real-time, dynamic optimization recommendations.
4. Focusing on a single well for a single strategy. Geological research results are applied to engineering practice in a timely manner.



Fracturing programme optimisation and real-time tracking adjustments



Platform (well area) well location optimisation



Drill tracking optimised for adjustment

Integrated research and implementation of geo-engineering based on an integrated platform, an integrated team, and the implementation of integrated management

All-in-one platform

- Integrated and compatible software platforms and workflows based on multidisciplinary data

Integrated software and data platform for geological engineering

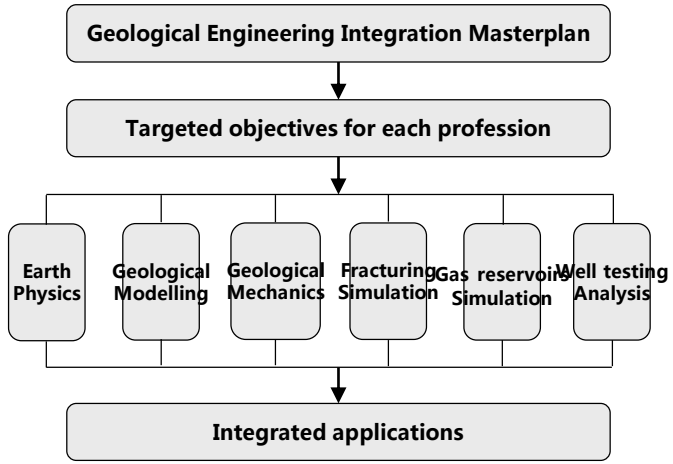
All-in-one team

- Multi-disciplinary teams in geology, geomechanics, fracturing, gas reservoir simulation, well testing, etc.

Geological Engineering Integration Team Exchange

Integrated management

- A synergistic management structure with integrated overall objectives and targeted objectives with individual responsibilities

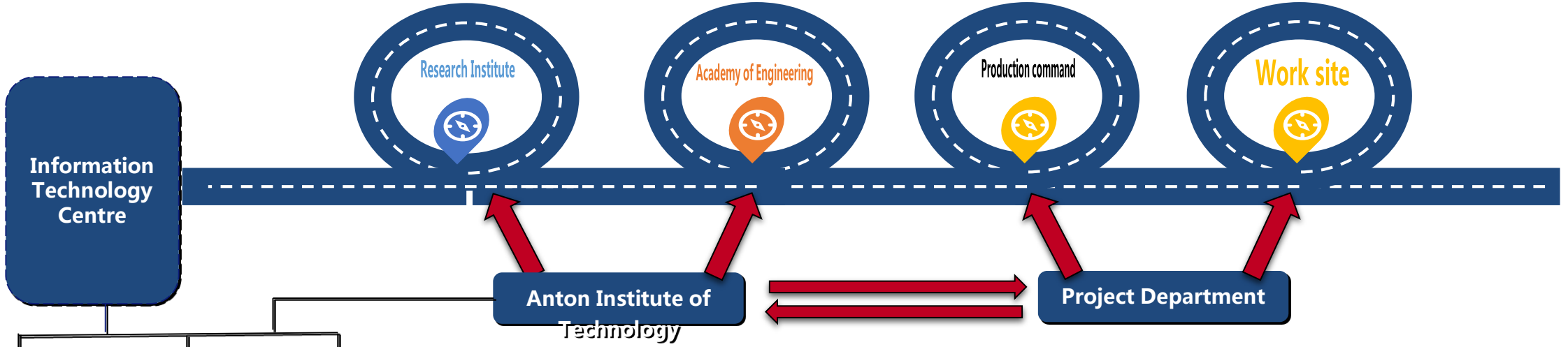


Integrated Geological Engineering Management Framework

I. Introduction to Geological Engineering Services

ANTON 安東

☐ Combination of geology and engineering, indoor and on-site



☐ **Real-time sharing of reservoir geology and engineering research**

☐ Further update reservoir understanding and guide project implementation based on existing results from client research institutes and engineering schools

☐ Real-time iteration of geological and mechanical models through project implementation data to deepen reservoir understanding and optimise engineering solutions

24-hour reservoir geotechnical expert support

☐ **A geological service team that goes to the front line**

☐ On-site follow-up by optimization engineers to provide solution optimization

☐ Real-time feedback on geoengineering data

☐ Back office support, front office landing

☐ Supervision of supervision

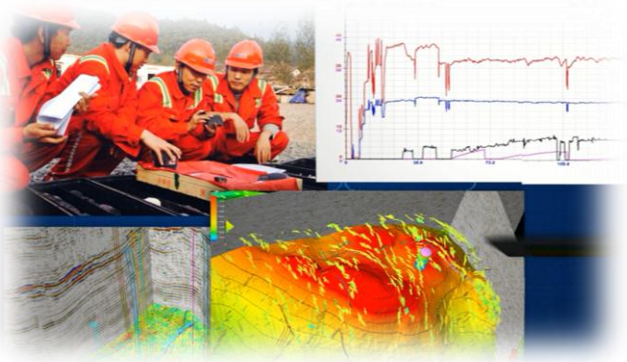
☐ Mode of service

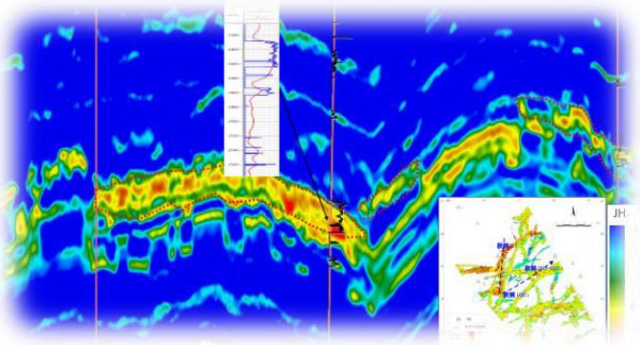
☐ Integrated geoengineering studies and implementation (turnkey + venture turnkey); integrated geoengineering studies combined with drilling; integrated geoengineering studies combined with production enhancement.

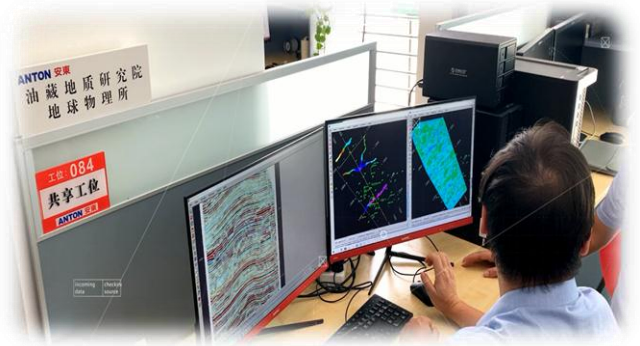
Objective: Increase production, speed and safety

☐ Featured Technology

- 3D seismic data refinement processing and reservoir prediction technology.
- 3D geological fine modelling and horizontal well optimization deployment techniques.
- Natural fracture identification and fine delineation.
- Three-dimensional geomechanics and well wall stability studies.
- Complex fracture network fracturing techniques for unconventional oil and gas reservoirs.
- Old well unlocking and tapping technology







CONTENTS

1、Well seismic combination, fine description of high-quality reservoir spreading, optimal selection of development sweet spot, well deployment optimization

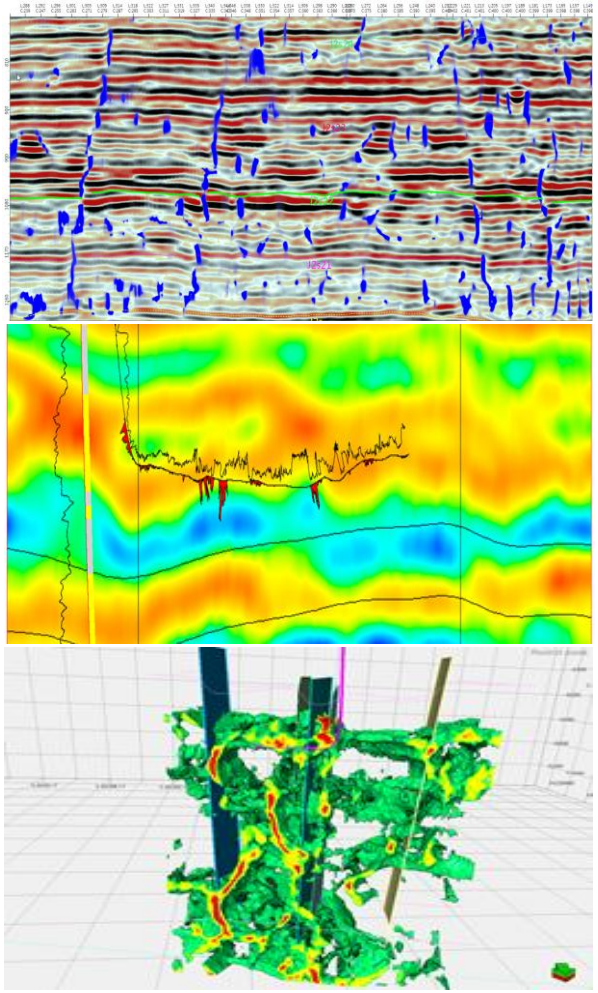
- Three-dimensional seismic fine interpretation
- Fine processing of 3D seismic data and reservoir prediction, fine delineation of fractured solution
- Fracture prediction by fine fracture carving of wellbore and combination of seismic and logging
- 3D geological modelling with a focus on sand contact relationships and spatial spread
- Geomechanical studies and 3D mechanical modelling
- Integration of geological and engineering desserts and dessert selection
- Horizontal well deployment optimization

Problem solving: well deployment optimisation issues

Application scenario: well deployment studies in oil and gas field capacity building, development adjustment and development evaluation

Application Examples :

- Shale gas well implementation plan optimization, real-time tracking and comprehensive effect evaluation in Changning area
- Evaluation of high quality reservoirs and selection of development targets for Southwest Jinhua tight gas
- Integrated risk-based turnkey coalbed methane well deployment and geological engineering in the Niuchang Block, Liupanshui, Guizhou



2、Integration of geology and drilling engineering to optimise drilling design, ensure high quality reservoir drilling encounter rate and drilling speed up

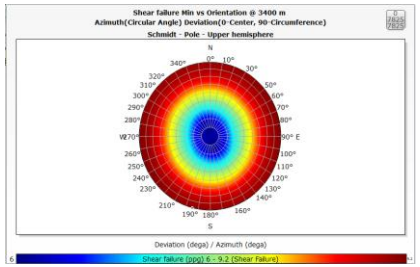
- Optimisation of drilling engineering process parameters and implementation plan
- Optimisation of horizontal well trajectories for integrated geological engineering
- Geo-engineering integrated fine guidance: digital rock chip logging and CT scanning

Problem solving: Long drilling cycle and low drilling encounter rate in horizontal wells

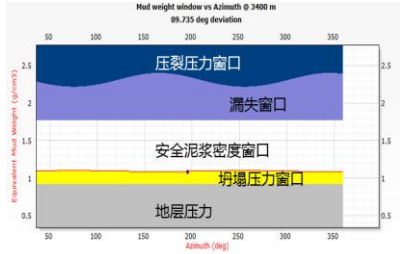
Application scenario: Tarim ultra-deep wells, Southwest shale gas wells, Ordos tight oil and gas

Application Examples :

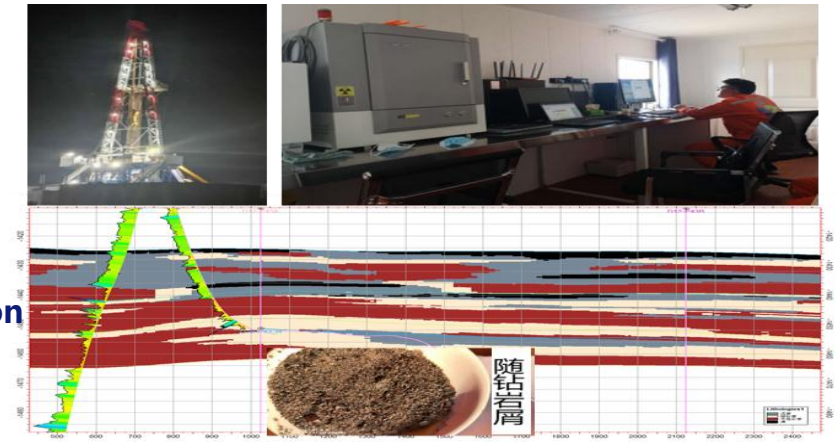
- Optimisation of drilling process and technical support for Tarim drilling operations
- Analysis of the geomechanics and well wall stability of the BZ rescue well in Tarim Oilfield
- Integrated risk-based turnkey geological engineering for paleogas reservoirs on the Daniu
- Geological follow-up guidance support for the G1P1 well in Sanshui Basin



防止井壁垮塌的最小泥浆密度



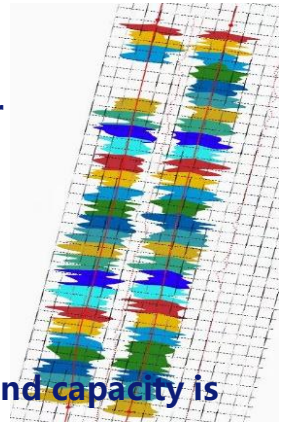
不同走向的安全泥浆密度窗口



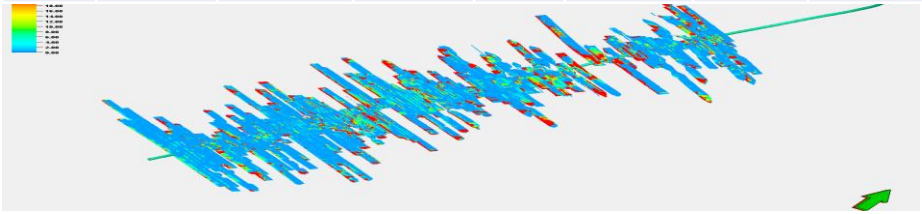
ANTON 安東

3. Combining geology and fracturing engineering to optimise seam network fracturing technology

- Integrated fine segmentation and clustering design for geological engineering
- Real-time fracturing tracking and optimization



Construction grade	Hydraulic seam Web length	Average hydraulic seam height	Average inflow capacity	Number of clusters	Strength of fluid used (m^3/m)	Sanding strength (t/m)	Construction Displacement(m^3 /min)
	m	m	md.m				
1	173	48	49	10	30	1.98	14
2	155	45	26	12	26.79	1.62	16

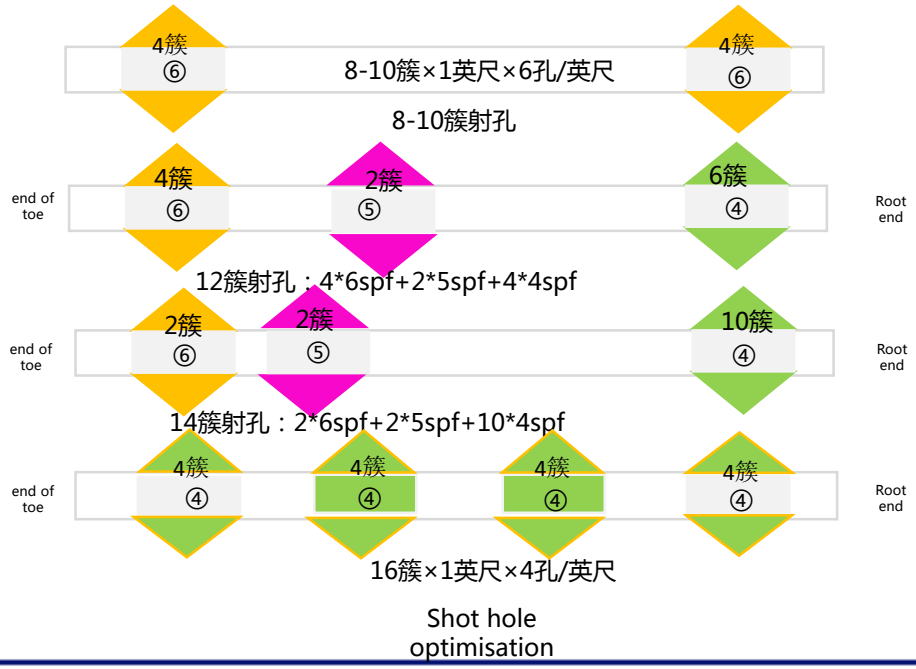


Problem solving: Fracturing fracture control volume is small and capacity is limited

Application scenario: Southwest, Ordos, Xinjiang, Bohai Bay horizontal well segmentation fracturing

Application Examples :

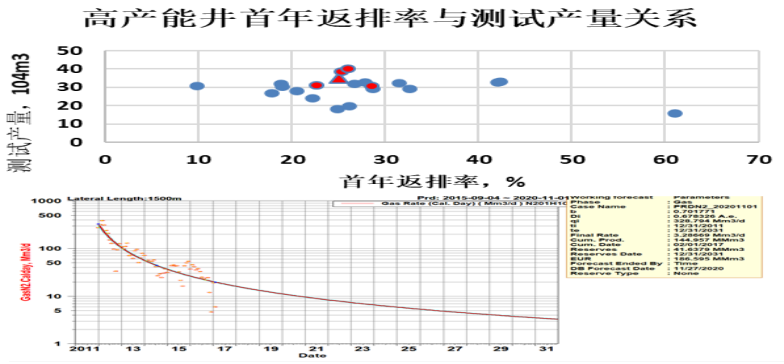
- Fine Fracturing Technology Service for Shale Gas Wells in Changning Area
- Shale gas well implementation plan optimization, real-time tracking and comprehensive effect evaluation in Changning area
- 2020 Shu Nan Lu 203H4-1 and 6 other wells dessert technical services
- Geological Services for Acid Fracturing of Oil Wells in Hafaya Field, Iraq

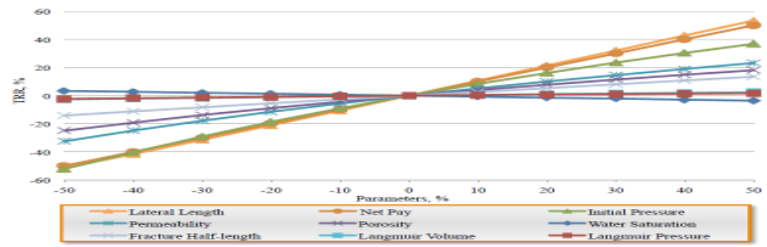


ANTON 安東

4. Combine geology and reservoir engineering to clarify the main control factors affecting production and lay the foundation for new well optimization

- Production dynamics tracking and production effectiveness evaluation
- Technical policy optimization
- Rational production system study





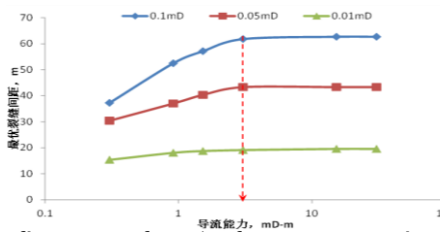
Sensitivity of technically recoverable reserves to various parameters to determine policy thresholds

Problem solving: High production factors in oil and gas wells are unclear and difficult to EUR maximise

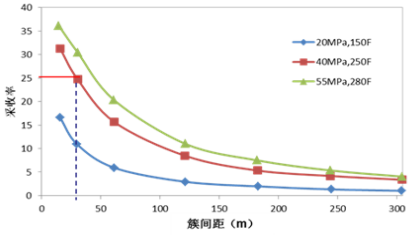
Application scenario: Mid to late stage oilfield development

Application Examples :

- Study on the main control factors of high production of Huang202 shale gas in Chongqing and the development and deployment method
- Shale gas well implementation plan optimization, real-time tracking and comprehensive effect evaluation in Changning area



Influence of main fracture conductivity on optimal cluster spacing



Effect of cluster spacing on gas reservoir recovery

ANTON 安東

5. Combine geology with oil and gas extraction and well repair to release formation water locks and unlock oil and gas well capacity

- Analysis of single well production dynamics
- Hydrolocker Preferred
- Optimisation of the waterlock implementation programme

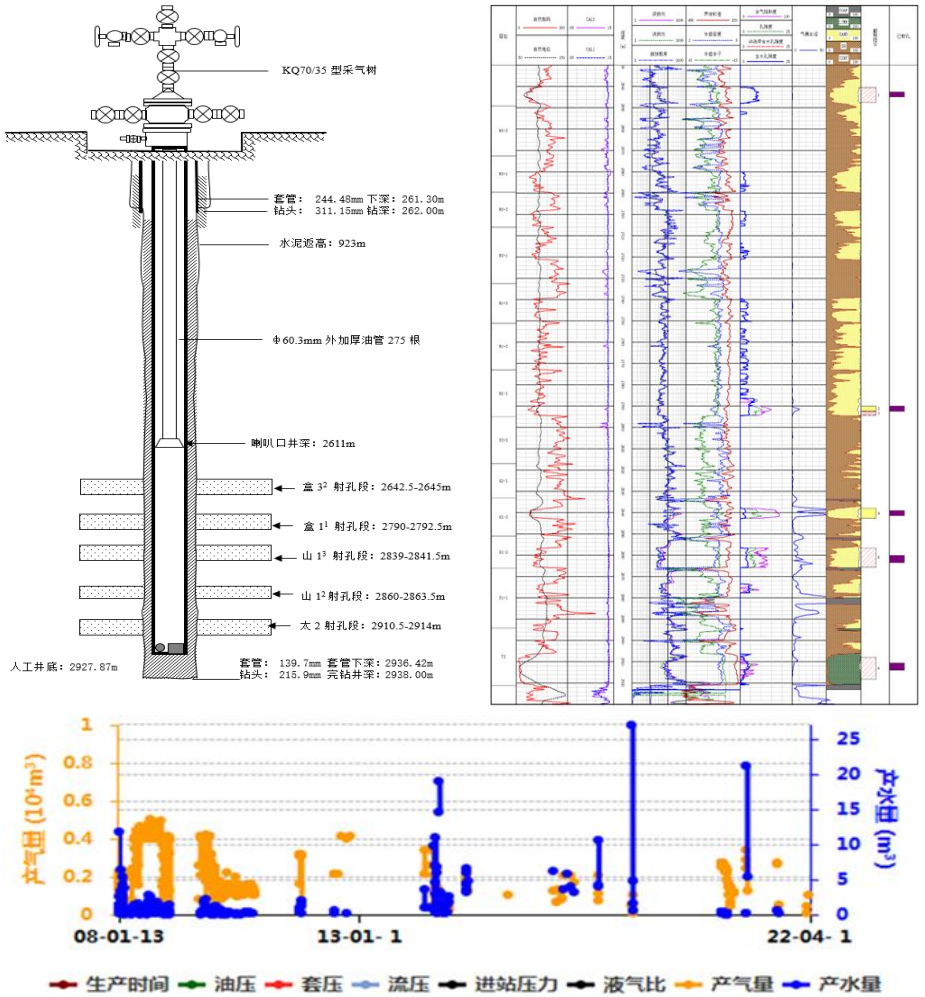
Problem solving: Oil and gas well unable to produce due to water lock

Application scenario:

Erdos tight oil and gas, Southwest tight oil and gas

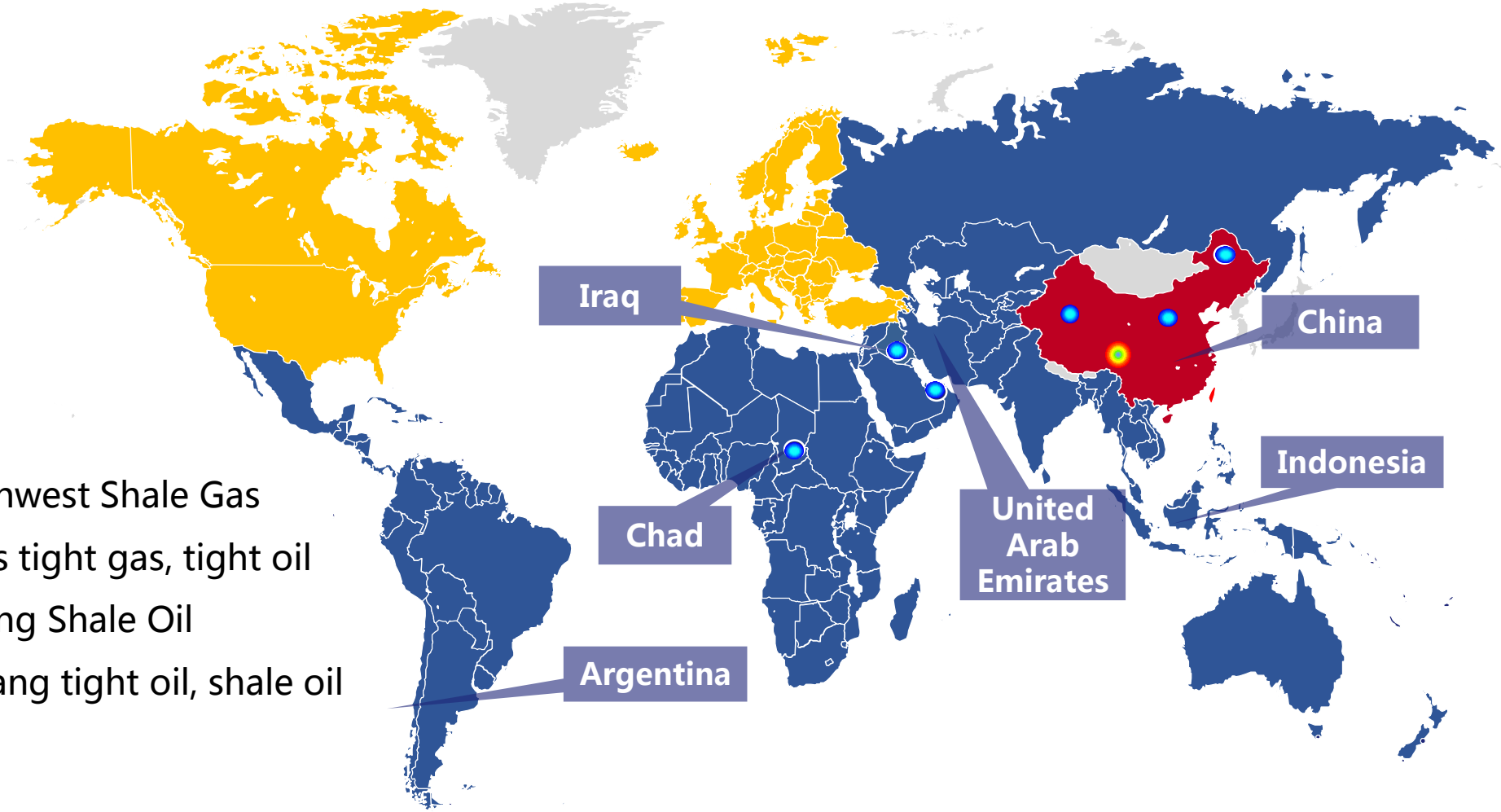
Application Examples :

- Dawoodi 2022 unlocked water lock and other old well digging services
- Weiyuan shale gas well unlocking service



ANTON 安東

Key markets: shale oil and gas, tight oil and gas and other unconventional oil and gas fields; sandstone and carbonate rock inefficient oil and gas reservoirs



- Southwest Shale Gas
- Erdos tight gas, tight oil
- Daqing Shale Oil
- Xinjiang tight oil, shale oil
- ……

CONTENTS

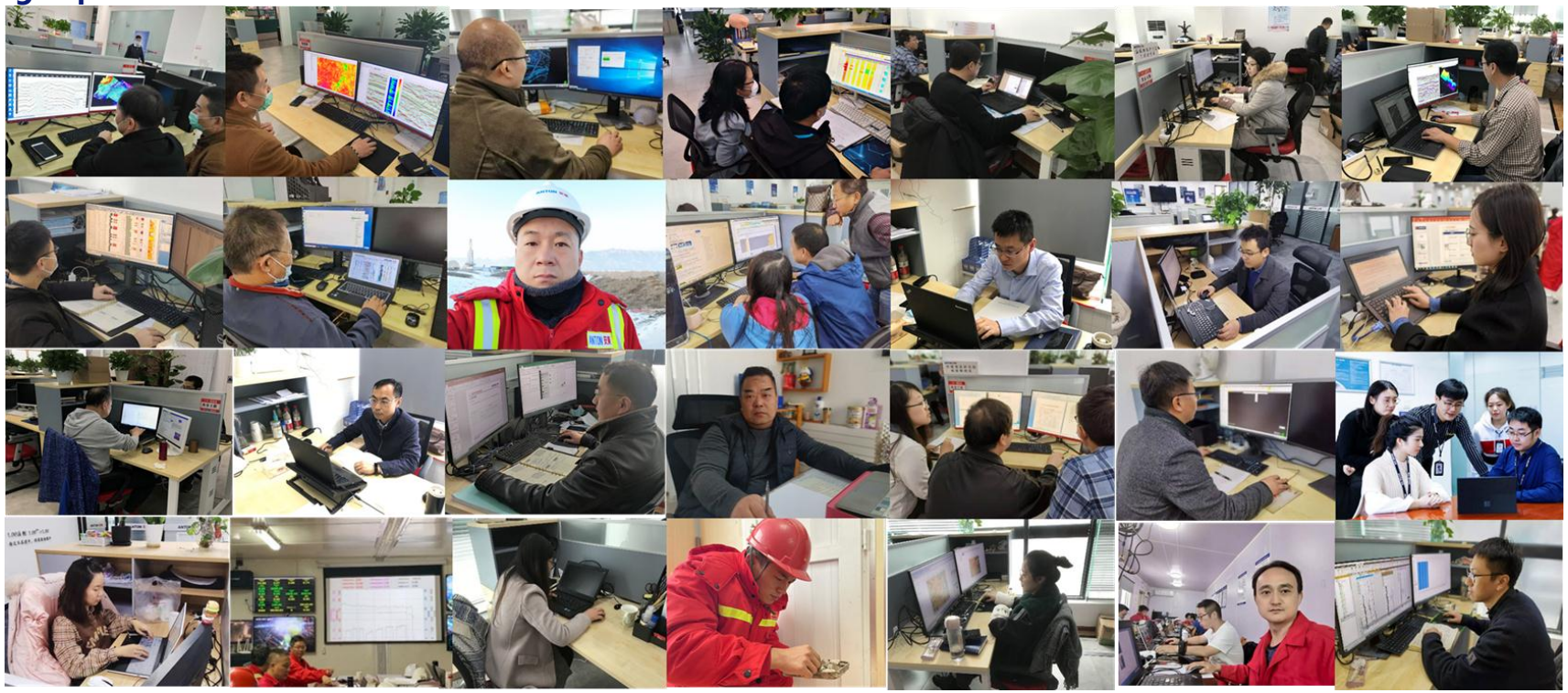
Industry-leading experience in geo-engineering services

- Well-established geo-engineering organisation with over 10 years of combined global experience in geo-engineering of multiple reservoir types
  - ✓ In 2010, the first shale gas horizontal well in China, Wei201H1, was fractured as a turnkey project, setting records for the largest number of fractured sections, highest pumping pressure, largest amount of fluid used in a single well, largest construction displacement and longest continuous construction time in China.
  - ✓ In 2019, it helped drill Asia's deepest onshore well, Rotation 1, with a depth of 8,882m and acid pressure testing, which produced 133.46 cubic metres of crude oil and 48,700 cubic metres of natural gas per day, marking a major breakthrough in sub-salt ultra-deep exploration in the Tarim Basin

•III. Service capacity

ANTON 安東

- **High level geo-engineering services team**
- **Current team of 96 members (1 post-doc, 2 PhD, 26 MSc)**
- **Covers seismic interpretation, reservoir inversion, geomechanics, 3D geological modelling, oil and gas well engineering, numerical simulation, production dynamics, reservoir modification, drilling and other disciplines**
- **Most of the experts are from PetroChina, Sinopec, Shell, Schlumberger and other companies, and the key technical staff have more than 20 years of working experience**



A wealth of technical cooperation resources

- ✓ Cooperation with petroleum institutions such as China University of Petroleum and Southwest Petroleum University
- ✓ Collaboration with international oil service companies such as Schlumberger
- ✓ Cooperation with private companies with special oil and gas reservoir service capabilities

Schlumberger

北京金海能达科技有限公司
Beijing JinhaiNengda Solutions Ltd

CHINA UNIVERSITY OF PETROLEUM 1953 中国石油大学

SOUTHWEST PETROLEUM UNIVERSITY 1958 西南石油大学

SEISER 赛思尔能源科技(北京)有限公司

PEGETE GROUP, INC. 中恒利华石油技术研究所

III. Service capacity

ANTON 安東

Strong in-house research and development capabilities

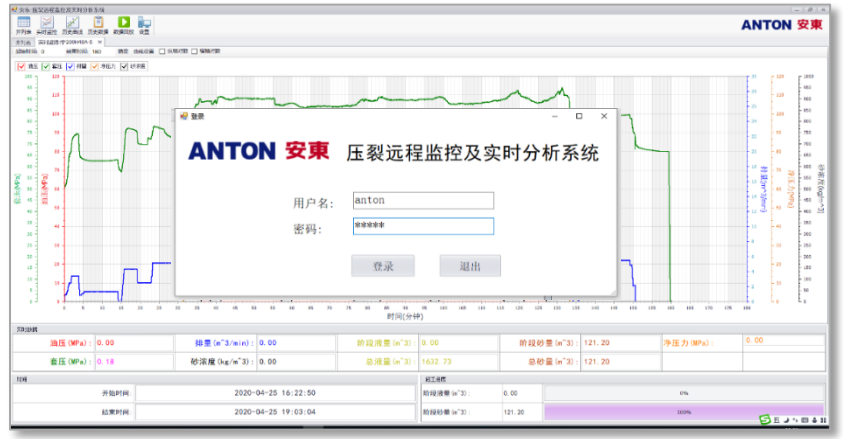
- ✓ Established Anton Research Institute in 2008, dedicated to independent technology development
- ✓ State-certified high-tech enterprise
- ✓ 2006 Ministry of Personnel approved the establishment of a post-doctoral workstation
- ✓ 7 technology centres designed worldwide
- ✓ Over 600 patents granted in total

ANTON 安東

A combination of world-class software and hardware

- ✓ Integration of Petrel and other international advanced professional software core algorithms, targeted development of Anton's own software system
- ✓ World-class geological testing, fracturing monitoring and digital core rock chip equipment

Software name	Software usage
Petrel	Seismic data interpretation, geological modelling, geomechanical modelling, fracture simulation
Eclipse	Numerical simulation of oil reservoirs
OFM	Single well and reservoir analysis
Pipesim	Multi-phase flow steady state simulation
FracproPT	Fracturing optimization design
Stimplan	Fracturing evaluation
FOC	Fracturing remote monitoring and real-time analysis system
Resform	Integrated geological mapping



ANTON 安東

A model of efficient and harmonious development of people and the environment

Thank you!

帮助别人成功... ...

www.antonoil.com