



China's Commercial Earth Observation Sector

NOAA Advisory Committee on Commercial Remote Sensing (ACCRES)

A Euroconsult Report

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Presentation conducted via video link from Hong Kong

DISCUSSION AGENDA

Agenda

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A deep-dive analysis of the current Chinese space ecosystem and future expected evolutions

China Space Industry

INTRODUCTION

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- Euroconsult is the global leader in space and satellite industry consulting.
- HQ in Paris, offices in Montreal, Toulouse, Washington DC, Tokyo, Hong Kong
- Host of World Satellite Business Week, a leading space and satellite conference, and publisher of the **China Space Industry Report**



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COMMERCIALIZATION IN THE CHINESE CONTEXT

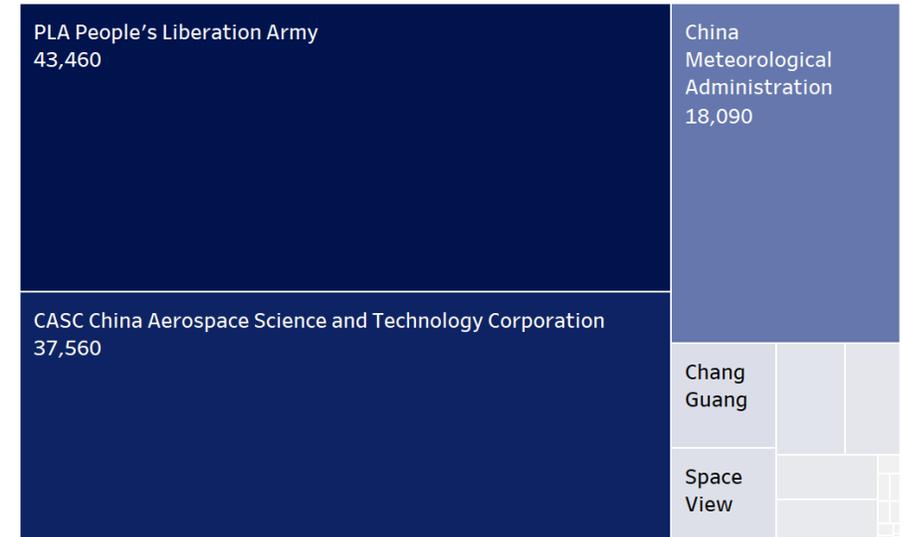
- "Commercial company" in China: one that has a mandate to make money.
- What is not commercial? → The "National Team" (国家队)
- Why the distinction, and when did it come about?
- Is it a clear distinction? → **No**
- Other stakeholders: provincial governments, city governments, universities, research institutes, etc.

Variable	"Commercial"	"National Team"
End goal / mandate	Make money, develop novel technology more quickly than National Team	Provide foundation for space sector, create jobs, enhance national power
Funding source	Mixed ownership. CAS spinoffs, private investors, venture capital, provincial governments	Wholly state-owned, usually ultimately by SASAC
Customers	Provincial and city governments, private companies	National government programs
Technology	Developed internally, oftentimes with help from SOEs. Focus on niche tech.	Developed internally with focus on large projects.

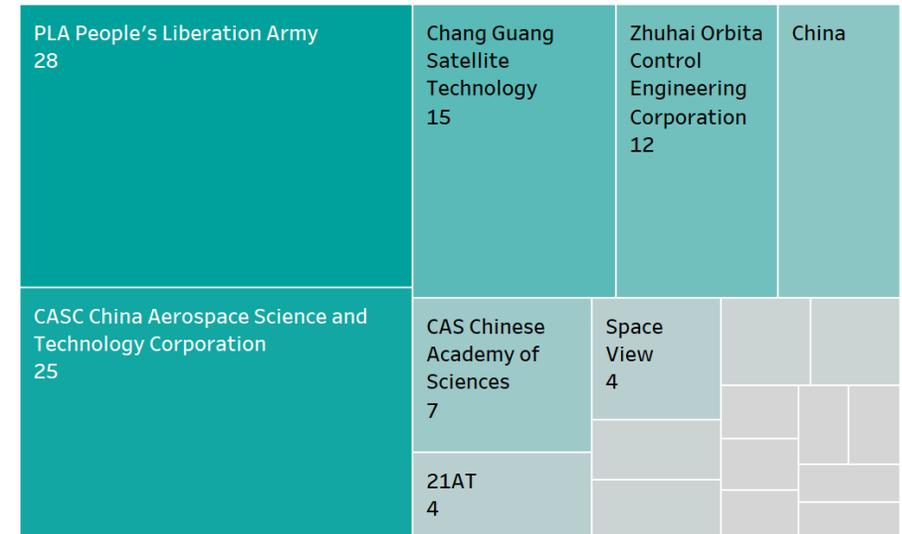
CHINA EO PROGRAM: OVERVIEW

- Rapid rollout of EO satellites from China in past decade, driven by CHEOS which started launching in 2013
- Pace of launch has accelerated—roughly 9 CHEOS satellites to be launched in 2020.
- China’s space ambitions have been growing more broadly
- Recent changes in Chinese EO sector structure—CASC re-organization to put more emphasis on EO/give EO program more autonomy
- EO aligns with multiple government policies, and this has been enabler of cooperation with other stakeholders

EO operators in China (size: launch mass of active satellites in kg)



EO operators in China (size: number of active satellites)



2014-2020 trends

For the Chinese Earth Observation Industry



44

Number of EO satellites launched by commercial Chinese companies since 2014.



50-100

Approx. price in RMB per km² for 0.5m resolution data (\$7-14), compared to RMB 15-30 for 1m resolution.



2,703x

Level of oversubscription for PIEsat's IPO (i.e., if selling 100 shares, there was demand for 270,300 shares)



1,250

Mass, in kg, of Charming Globe's largest EO satellite, which represents the largest privately-built satellite in China.



700M

Approximate top-line revenues (in RMB) for EO data sales in China in 2019

\$170M

Amount paid by 21AT for 3x DMC-3 satellites manufactured by SSTL and launched in 2015.

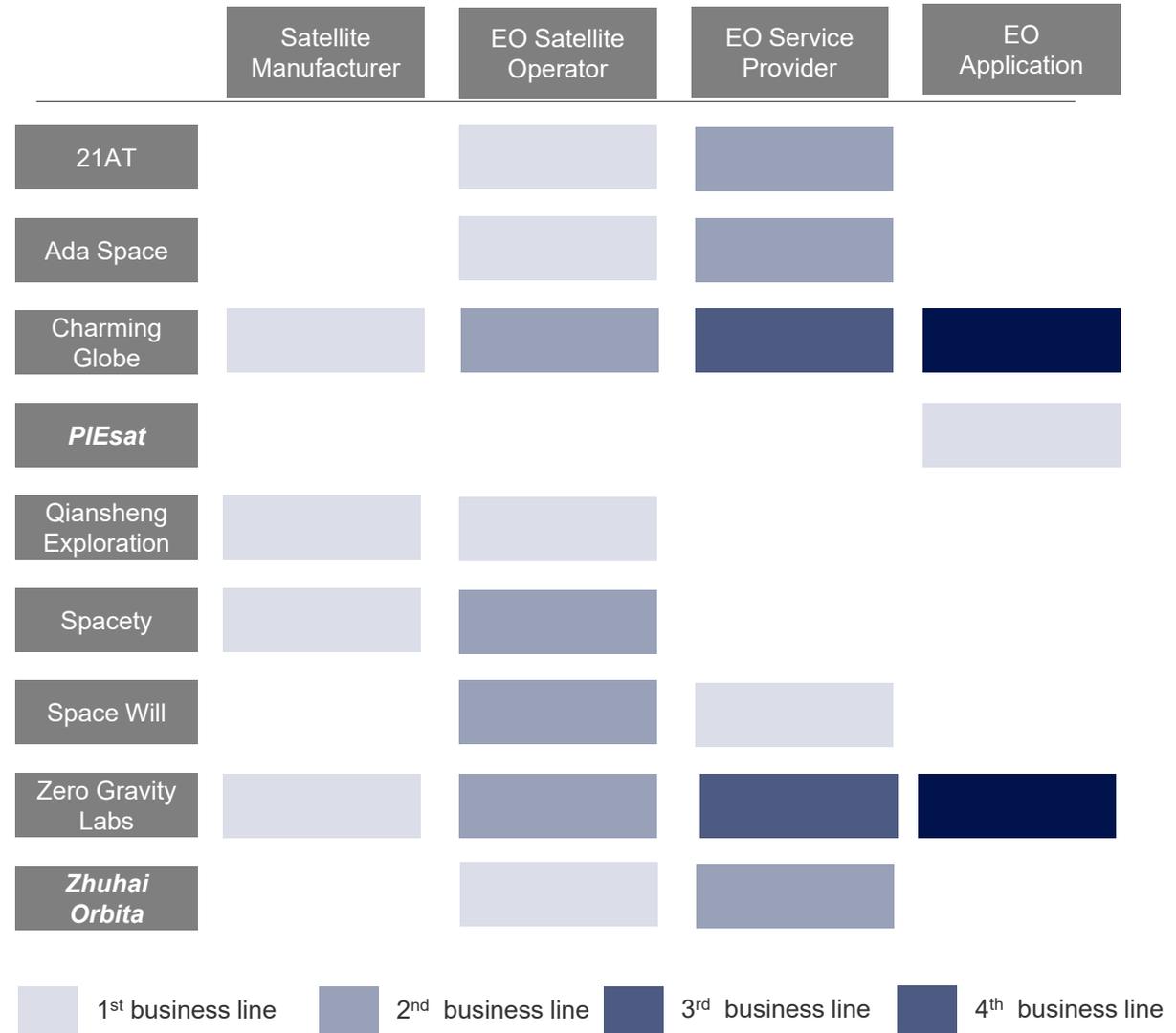
Value chain expansion. New companies have entered the sector. Commercial companies have created "Data Alliances", for example one between Shenzhen Aerospace DFH HIT, ZeroG Labs, Spacety, and Qiansheng Exploration.

Broadening of the EO industrial base. Commercial companies such as MinoSpace, Spacety, and Charming Globe can produce sophisticated EO satellites of >150kg

Finally, **the civil side of the market has involved more openness of data.** In November 2019, the CNSA rolled out a platform for the sharing of data collected by the 16m multispectral cameras of the Gaofen EO satellites.

CHINA COMMERCIAL EO INDUSTRY COMPOSITION: KEY EO PLAYERS

- Variety of companies have entered the sector in the past 5 years.
- Due to uncertainty about regulatory developments, companies tend to straddle multiple parts of the industry, and are adept at pivoting when regulatory environment dictates it
- All but PIEsat operate their own satellites
- Separate to these companies is another layer of "application-specific companies", of which there are >10.
- Also several companies that manufacture EO satellites but do not operate them (MinoSpace).
- Most companies are "commercial", but have various ties to the state



Source: Euroconsult

CHINA COMMERCIAL EO OPERATOR CASE STUDY: CHARMING GLOBE (CGSTL)

DATA FOCUS		
Satellites	Resolution (in m)	Swath (in km)
Jilin GXA	0,72	11.6
Jilin Lincao-1/2	5	110
Jilin ShiPin – 03 ~ 08	0.92	11
Jilin Gaofen-02A/B	0.75	40
Jilin Gaofen - 03 ~ 08	1.06	18.5
Jilin GaofenKF-01	0.75	136
Jilin Guangpu – 01 / 02	100~150	110
VAS FOCUS		
Portfolio	“Satellite Data Mall”, “mass-market EO business”. Broad variety of verticals, primarily government but also commercial customers.	
INDUSTRY FOCUS		
Key partnerships	<ul style="list-style-type: none"> Bilibili—CGSTL manufactured and operates satellite Huawei—collaboration on EO data portal development 	
Notable investments	Oct. 2018 CG completed a 250M RMB (\$40M) funding round, valuing the company at 4B RMB (US\$650M).	\$ 40M
	Apr. 2020 CG states that they will finish the 138-satellite constellation in 2023, 7 years earlier than originally planned.	≈ \$ 3 M * 138
	Oct. 2018 Charming Globe moved into Charming Globe Space Information Park, the biggest R&D center of any private EO satellite manufacturer in Asia.	Not Known

Company Description

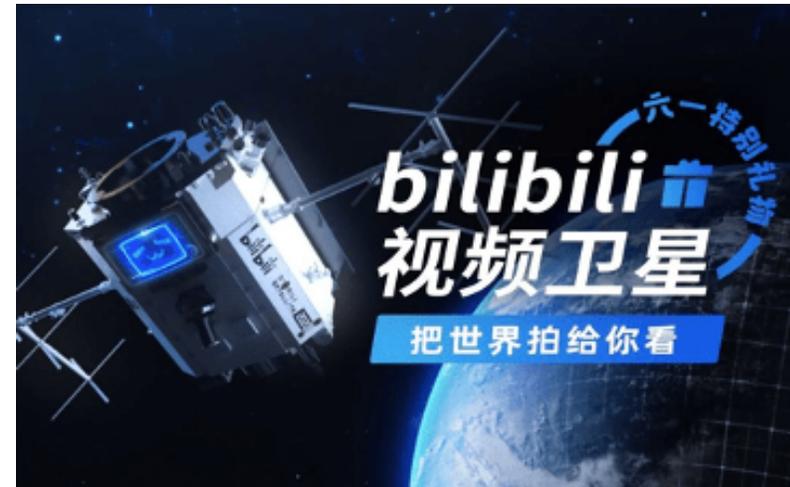
Charming Globe (CGSTL) is a “commercial” spinoff from CAS, based in Changchun. CGSTL is one of the few companies in Chinese commercial space where the employees own significant equity. CGSTL is vertically integrated, acting as a satellite manufacturer and EO satellite operator. CGSTL has ~15 satellites in orbit in its Jilin-01 constellation.

Future Evolution

CGSTL plans a constellation of 138 satellites by 2023. As of 2020, the company has mastered batch manufacturing, having launched up to 9x satellites simultaneously. They were hiring between 117-150 positions for 2021, most of which are engineers.

Value Proposition and Positioning

CGSTL aims to provide cost-competitive EO data and analytics in a “user-friendly” way. The company’s website offers users easy-to-search EO data, and they have partnered with mass-market companies such as Bilibili to reach a broader audience.



CHINA COMMERCIAL EO INDUSTRY SUPPORTING INFRASTRUCTURE: BIG TECH

Big Tech Involvement in Chinese EO Industry

	Summary	EO Initiatives
Alibaba 阿里巴巴	"Amazon of China". Largest e-commerce and cloud player, market cap of \$800B.	"Cloud Planet Engine" EO data platform w/ focus on natural disasters/weather monitoring. Company claims that platform is already world's largest EO platform, with resolutions of 0.5m, 1m, 2m, 5m, and more. Partners include Maxar, Charming Globe, and others.
Huawei 华为	Major telecom equipment manufacturer, total revenues of \$120B in 2019.	Partnership with CNSA Group on Earth Observation (CNSA-GEO), an EO platform that aims to share Gaofen-1/6 data initially, with more satellites to follow. Platform aims to spread data internationally.
SenseTime 商汤	Largest AI company in China w/ valuation of \$7B, 2019 projected revenues of \$750M indicated 200% growth y-o-y.	SenseEarth platform online tool for browsing and interpreting EO imagery, open to public.
Tencent 腾讯	Media, gaming, cloud, and social network company with large investment portfolio. Market cap of \$700B.	"WeEarth" project, partnership w/ Satellogic (Tencent investment), CASIC, and others. Project aims to use Tencent's cloud capabilities to integrate data from Satellogic, Haiyang, and other satellites.

Source: Euroconsult Research

China's tech giants have significant influence in the broader economy. Companies such as Alibaba and Tencent have used their reach and technological prowess to diversify into many different industries, including recently EO.

-WeEarth Project: Tencent, Satellogic, and CASIC Haiyang cooperating to bring data from >300 EO satellites to a variety of industries via Tencent Cloud.

-Cloud Planet Engine: powered by Alibaba, EO data platform with focus on natural disasters.

-CNSA-GEO: platform for free 16m resolution data from Gaofen-1 and Gaofen-6. The platform is spearheaded by CNSA, but powered by Huawei Cloud.

-SenseEarth: platform managed by SenseTime, an AI startup, for browsing EO imagery, open to the public.

CHINA COMMERCIAL EO INDUSTRY SUPPORTING INFRASTRUCTURE: LOCAL/PROVINCIAL GOVERNMENTS

Several of China's commercial EO companies have close relationships with local or provincial governments.

- As an investor
 - Jilin Government
 - Guangdong Government
- As a customer
 - Many/various
- As something in-between
 - Qingdao Gaofen Research Center / CGSTL
 - Wuhan University and Jiahe Info
- While government involvement tends to be ad-hoc, it is nonetheless an important factor when understanding resources being devoted to the EO sector.



Asia's largest EO satellite manufacturing facility, Changchun, Jilin Province



Satellite manufacturing facilities at Wuhan Aerospace Industrial Base, Wuhan, Hubei Province

Future Trends

Chinese Earth Observation market Future Trends



Internationalization

- Of data distribution
- Of partner network
- Of industry more generally



Diversification of data sources and solutions

- More satellites
- More sensors on the ground
- Greater integration of EO with other space infrastructure



Big tech

- Big Tech is bigger in China than in the US, as a % of economy and as a startup investor. Expect to see more integration of EO with Big Tech.



Mass market access

- Area where China has a lead. Space is cool, and people are paying for it
- Moving forward, likely to see more emphasis on mass-market applications

Moving forward, the Chinese EO industry will become **larger, more diverse, and more international.**

We expect to see a continued **interplay of commercial space companies, SOEs, Big Tech, and local governments** occurring in China domestically. As China exports of its tech ecosystem more broadly, we expect EO data to be a component of that system.

Most likely, Chinese EO constellation operators and service providers will continue to diversify their product line towards a broader market. This could see some **China-specific applications**, or applications that are first developed in China (Bilibili Sat) and then exported.

Data sources will increase, as China launches more EO satellites, and also rolls out more terrestrial sensors, and increasingly integrates these data sources with one another.

CONCLUSIONS AND SUMMARY

- China undeniably has a lot of EO infrastructure already in place, with more on the way. Broad variety of SOEs, commercial companies, and hybrids are developing a suite of EO technologies.
- The dividing line between “commercial” and “National Team” is not always clear, and it is also not always significant, insofar as most companies in the space sector in China are ultimately under a high degree of government control.
- With space more broadly becoming a hotter topic for Chinese regulators, we expect to see increased policy support for space sector growth, which will likely extend to EO.
- From a business model perspective, China has taken an approach of launch first, develop business later. This has led to financial difficulties for some companies in the sector. Moving forward, businesses are likely to adapt.
- Given China’s glut of EO data, internationalization will become a key topic.



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