Promoting the Interaction and Communication Between ICG and the Global Navigation Research Community

Professor Haitao WU

Academy of Opto-electronics, Chinese Academy Of Sciences

and

China Satellite Navigation Office Academy Exchange Center

CONTENTS

1

BACKGROUND

BACKGROUND

Academic exchange is an important part of scientific research.

Researchers can preset their achievements and get comments and recognitions from their colleagues.

is a way of life for the academic career

It is also a method of knowledge generation, promoting the development of research, talent cultivation, R&D and innovation.

is the exchange of information, its ultimate goal is to make scientific information, ideas to get communication and exchange

BACKGROUND

Tens of thousands R&D staff are working in the field of GNSS, covering all aspects including theoretical research, methodology study, technology development and application.

Academic exchange also plays a critical role in the design, project rollout and application of complex systems like GNSS.

In many countries, GNSS suppliers conduct academic activities together with dedicated academic institutions

they are great contributions

2

Academic Exchange Activities Of GNSS System Providers

main academic exchange platforms

U.S.A

ION

ENC

EUROPE

RUSSIA

MISNF

MSNS

GERMANY

CHINA

CSNC

main academic exchange platforms

AMERICA

ION The Institute of Navigation

◆ **Host：**

The Institute of Navigation（ION）

◆ **Introduction：**

The Institute of Navigation (ION) is the world's premier non-profit professional society dedicated to the advancement of the art and science of positioning, navigation and timing (PNT). Founded in 1945, it serves a diverse community including those interested in air, space, marine, land navigation, and position determination.

main academic exchange platforms

AMERICA

ION The Institute of Navigation

ION Meetings For GNSS

January

- International Technical Meeting (ITM)

Spring

- Pacific PNT
- IEEE/ION Position Location and Navigation Symposium

Summer

- IEEE/ION Position Location and Navigation Symposium

September

- ION GNSS Meeting (ION GNSS+)

Winter

- Precise Time and Time Interval Meeting (PTTI)

main academic exchange platforms

RUSSIA

MISNF Moscow International Navigation Forum

◆**Host：**

GLONASS/GNSS Forum Association

◆**Aims：**

To introduce Russia’s achievement in GLONASS and relevant application policy to the international community; to analyze technology development and market trend in satellite positioning in Russia and the global market, including different types of autonomous transportation systems; to discuss the development of satellite navigation products and services as well as the possibility of international cooperation in the field of satellite navigation.



main academic exchange platforms

EUROPE

ENC European Satellite Navigation Conference

◆ **Host：**

European countries take turns to host

◆ **Introduction：**

The European Navigation Conference is an annual congress organized by different European institutes each year. The ENC is a unique opportunity to meet all the key players in the navigation area. It is renowned for its high-level scientific activities highlighted during the conference and the wide range of topics covered.

...

main academic exchange platforms

EUROPE

ENC European Satellite Navigation Conference

◆Main Topics：

- GNSS Positioning
- Status of GNSS
- GNSS Receiver and Antenna Technologies
- Space Based Augmentation
- GNSS Vulnerabilities
- Precise positioning (PPP, RTK)
- Time and Frequency Transfer
- Indoor and Urban Navigation
- ...

main academic exchange platforms

Germany

MSNS Munich Satellite Navigation Summit

◆**Host：**

Organizer

The Universitaet der Bundeswehr Muenchen, ISTA, Institute of Space Technology and Space Applications

◆**Introduction：**

The Munich Satellite Navigation Summit is an conference with global impact dealing with satellite navigation now and in the future.

main academic exchange platforms

Germany

MSNS Munich Satellite Navigation Summit

◆ Main Topics：

- Implementation of the European satellite navigation system Galileo
- Modernization of the US Global Positioning System (GPS IIF, GPS III)
- Status and modernization of the Russian Global Satellite Navigation System GLONASS
- Developments of new global and regional systems like the Chinese COMPASS, the Japanese QZSS and the Indian IRNSS
- Space Based Augmentation systems (SBAS)
- Legal issues of privacy devices and GNSS re-transmitters
- Getting the centimeter on global scale (Precise Point Positioning)

…

main academic exchange platforms

CHINA

CSNC China Satellite Navigation Conference

- **Host：** Academic Exchange Center of China Satellite Navigation Office (CSNO-AEC)

- **Introduction：**







CSNC is an open platform for academic exchanges that aim at

- enhancing academic innovation to promote cooperation and exchanges in the field of satellite navigation
- strengthening technological innovation to accelerate engineering construction of satellite navigation systems
- intensifying theoretical innovation to facilitate theory progress of satellite navigation
- reinforcing application innovation

Host Cities

中国卫星导航学术年会
China Satellite Navigation Conference

Since 2010, CSNC has been successfully held for seven times in:

- Beijing
- Shanghai
- Guangzhou,
- Wuhan
- Nanjing
- Xi’an
- Changsha

Each year, CSNC has a designated theme:

2010 — Cooperation and exchange, sharing of Beidou

2011 — Design of Beidou's future

2012 — Beidou, on the way of application

2013 — Beidou application-opportunities and challenges

2014 — Beidou application-innovation, integration and sharing

2015 — Openness, connection and win-win

2016 — Smart sensing, smart perception

Topics of 12 sessions

中国卫星导航学术年会
China Satellite Navigation Conference

- S01 Application technology of satellite navigation system
- S02 Navigation and location-based services
- S03 Satellite navigation signal and signal processing
- S04 Satellite orbit determination and clock correction
- S05 Precise positioning technology
- S06 Atomic clock and time-frequency technique
- S07 Satellite navigation augmentation technique
- S08 Test and Assessment Technology
- S09 User terminal technology
- S10 Multi-sensor fusion navigation technology
- S11 PNT system and navigation technologies
- S12 Policies and regulations, standards and intellectual properties

In the seven years

3139

papers were called in by the sessions

669

invitation reports delivered

1774

oral presentations delivered

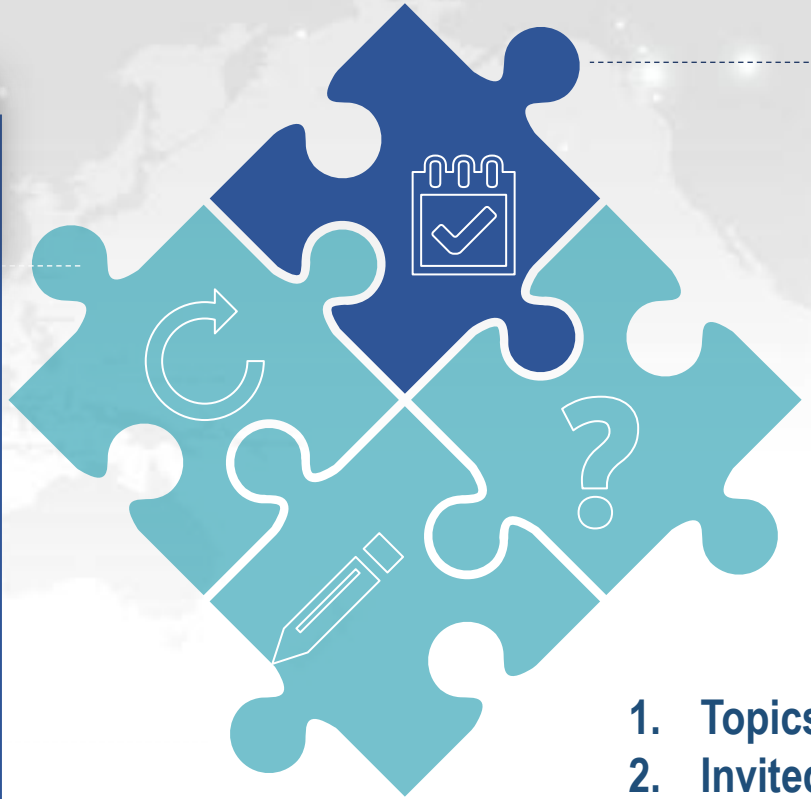
227

young authors of outstanding paper awarded

16508

Representatives attended

Activities of CSNC

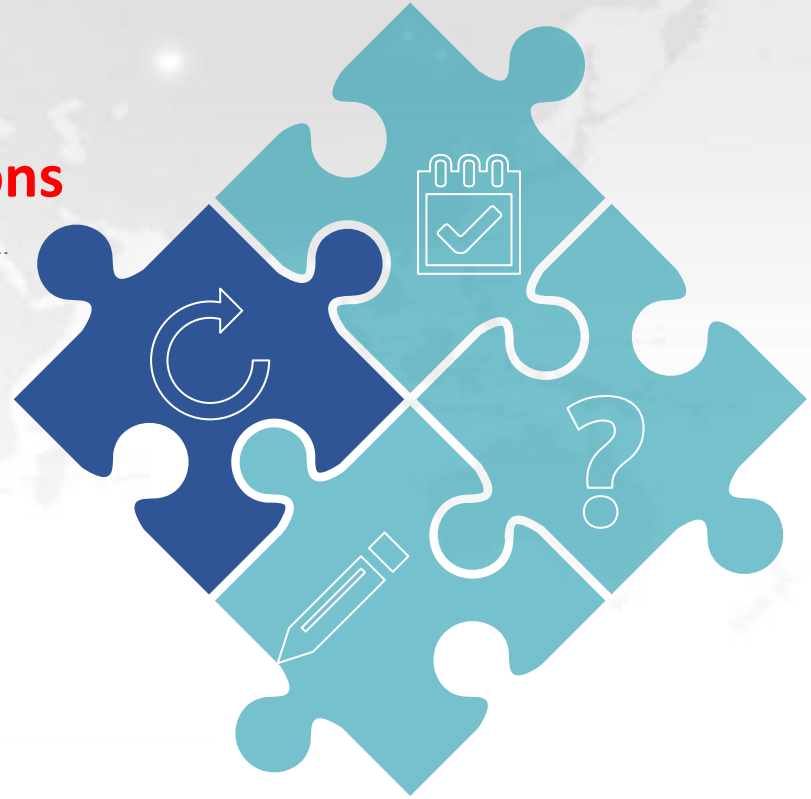


Academic exchanges

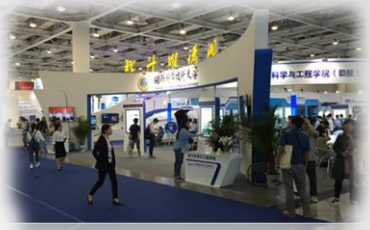
1. Topics of 12 sessions
2. Invited reports
3. Special reports
4. oral presentations
5. Paper publishing

Activities of CSNC

Exhibitions

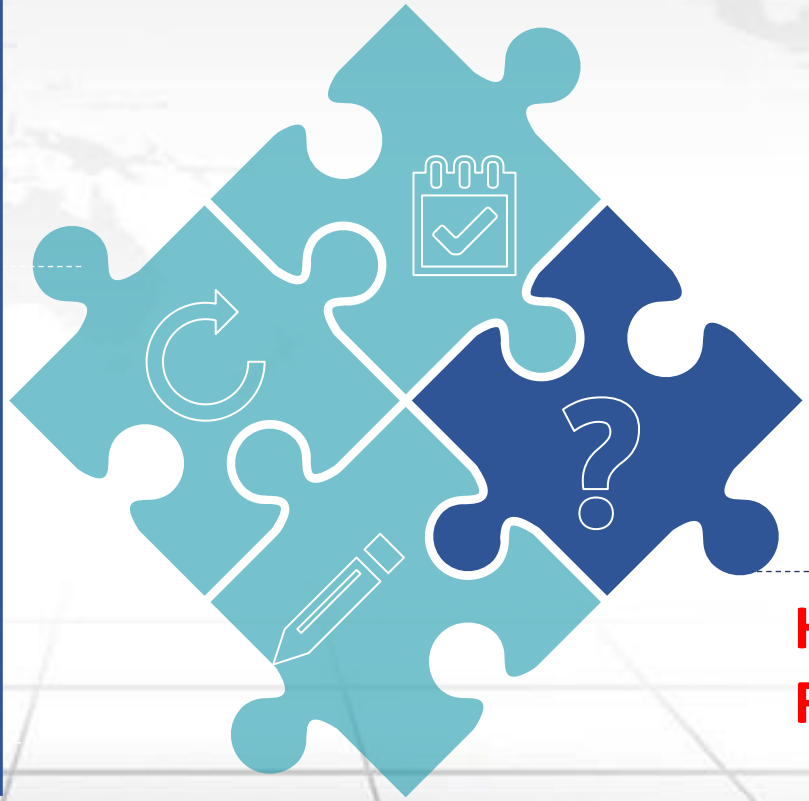


1. New technique and products
2. Exhibition of system achievements
3. Open to the public



Activities of CSNC

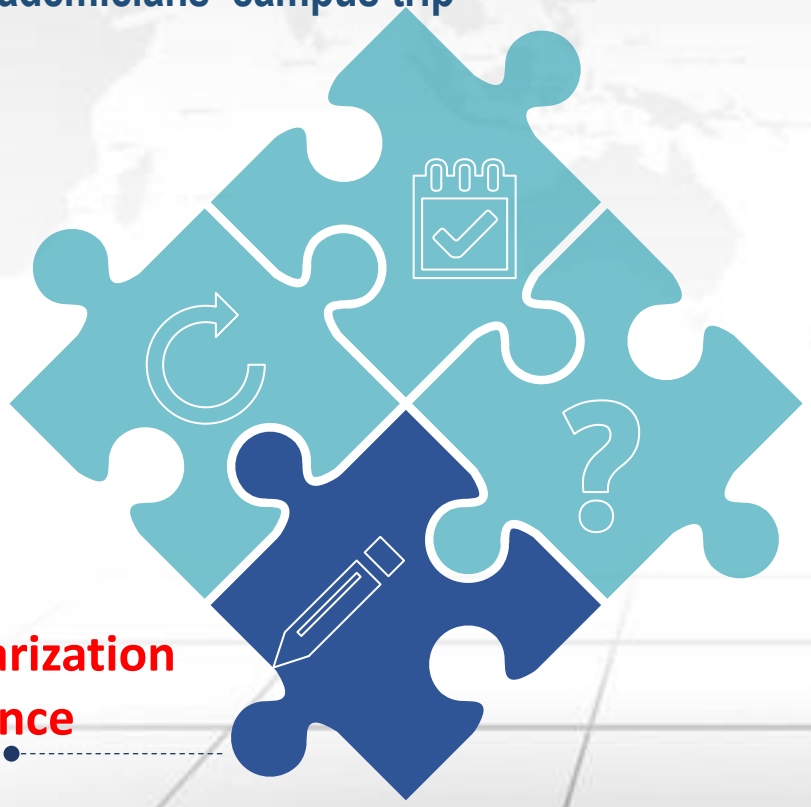
1. GNSS administerial officials' reports
2. Invitation reports of conference
3. Application Industrialization Forum



High level Forums

Activities of CSNC

1. “Beidou Cup” China Adolescents Science & Technology Invention Contest
2. Technology training courses; Scientific popularization courses and science and technology summer camps
3. Academicians’ campus trip



Popularization of science

CSNC-ION Joint Panel

CSNC-ION Joint Panel has been held four years during the CSNC.

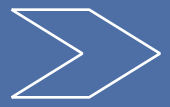
2012/ 2013/ 2014 /2016

The Value of Academic Exchanges for GNSS

Value of Academic Exchange Activities for GNSS

- It efficiently converges domestic GNSS-related academic exchange resources
- Positively faces the urgent demands of GNSS systems construction
- Deeply activates the exchange and innovation atmosphere of GNSS academics
- Intensively encourages GNSS systems to engage in international academic activities
- Promotes and popularizes satellite navigation-related knowledge in a comprehensive way

VALUE



Value of Academic Exchange Activities for GNSS

Academic conference serves as an occasion for open exchanges. It can promote academic innovation and lead to theoretical breakthroughs in satellite navigation; realize application innovation and encourage scientific development in the field; and enable a coordinated development in aviation, aerospace, surface and underwater navigation technologies in militaries, public sector and higher education institutions.

For example: in The 3rd International Geodetic Symposium on Satellite Doppler Positioning in 1983, Hatch, R. published the paper of "The synergism of GPS code and carrier measurements" which has aroused great interest from the academic community. This has ushered in a wave of related studies and strongly promoted the hardware development of multi-channel satellite navigation receivers.

It efficiently converges domestic GNSS-related academic exchange resources

Value of Academic exchange Activities for GNSS

Positively faces the urgent demands of GNSS systems construction

The academic exchange platform should cover the following aspects: GNSS policy interpretation, the analysis of current situation and development trend for GNSS, the theory and best practice for GNSS application, the introduction on the newest products from GNSS software & hardware manufacturers and the latest development in satellite navigation system construction. The platform serves as an information exchange center, aiming to promote a sound development for all GNSS systems.

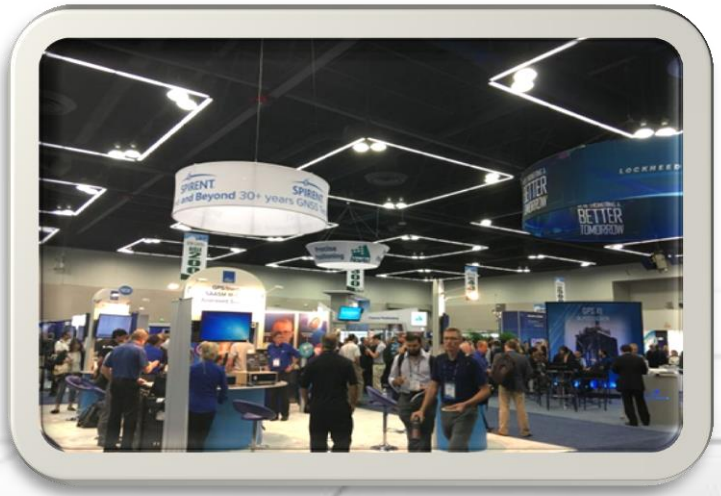
Value of Academic Exchange Activities for GNSS

Deeply activates the exchange and innovation atmosphere of GNSS academics

The academic exchange platform should be application-centered, future-oriented, project-based, talent-supported with a global vision and the aim to serve the public. It is platform for presentation, communication, technology promotion, enabling an interactive experience for GNSS application. It is a platform for innovative idea introduction, technology & product exhibition, and enhanced interaction among enterprises, academic institutions, talents and the public so as to promote an in-depth understanding towards GNSS system.

Value of Academic Exchange Activities for GNSS

The events of academic exchange platform include product exhibitions and high-end forum. It examines the landscape of global GNSS industry from aspects like policy, technology, R&D and domestic and overseas industrial development, effectively enhancing crossover innovation within the sector and inspiring innovation convergence in GNSS.



Intensively encourages GNSS systems to engage in international academic activities

Value of Academic Exchange Activities for GNSS

Promotes and popularizes satellite navigation-related knowledge in a comprehensive way

The academic platform disseminates GNSS system knowledge among the public, explores new ways for idea exchange, and builds itself into a platform for the younger generation. It welcomes students from high schools and colleges to participate in innovation contests, encourages scientists and education experts to enhance their capacity for innovation training and education and promotes the cultural and technological exchanges among students. By doing this, the platform will play a critical role to enhance technological innovation capability so as to add more dynamics to the field.

4

Academic Exchange is an Important Task of ICG WG-C

ICG WG-C: main purpose and task

Main Purpose

The Working Group C on information dissemination and capacity-building had continued to develop a programme on GNSS applications and reiterated the importance of deploying instruments for the international space weather initiative (ISWI), developing a GNSS education curriculum, as well as the application of GNSS in various areas to support sustainable development. In that respect, the ICG Information Centres established in the Regional Centres for Space Science and Technology Education affiliated to the United Nations would play a relevant role.

ICG WG-C: main purpose and task

Main Task

ICG WG-C agrees upon three priorities.

- Capacity building and GNSS supporting activities in Southeast Asia: ICG C agrees that the activities since 2014 including capacity building, education and other supporting events should continue and expand.
- Supporting the development of the ICG Information Centers established in the Regional Centers for Space Science and Technology Education and affiliated to the UN: ICG C insists that all ICG members should be encouraged to exchange education material, booklets and other printing material via emails through regional centers.
- Cooperation demonstration and GNSS user center: ICG C believes that the cooperation demonstration between each user information center that owns user links and contact information and suppliers of GNSS should be further developed and put on to ICG's information portal.

consensus reached at the ICG-C

The 10th meeting
1 - 6 November 2015 , Colorado, the US

Report #6.
The following report was presented and fully discussed :
(a) Report on International Exchange and Training Center of Beidou , by J. Weng of Beihang University, China;…

Suggestion for committee resolution : International academic exchange projects have drawn the best practice in the sector. It has exerted a positive impact on individual and industrial development, stimulate innovation and brings closer different countries and regions. First-hand experience is fully utilized to promote education and research in the field. Therefore, conducting research and study in different environment will reveal new and positive challenges for the sector. This is especially true for the Regional Centers for Space Science and Technology Education affiliated to the UN.

ICG WG-C should prioritize academic exchange

Academic exchange is an integral component in activities related to GNSS. It can incentivize and contribute significantly to GNSS development, which is worth paying attention to.

To step up academic exchange can strengthen and promotes ICG WG-C's business scope and enrich its role in ICG.

The latest academic achievement will be presented on ICG platform to enable interactions between researchers in the field and ICG.

Proposals

Proposals

Proposals Contents

- To establish a task force for academic exchange within WG-C
- To enhance cooperation among CSNC, ION, MISNF, MSNS and ENC and to promote dynamic interaction on ICG platform.
- To present the most recent research achievement of each academic group in ICG WG-C
- To propose suggestions for future research proceeding from common perspective as well as that of ICG and to win attention from the organizers of important academic conferences.
- To invite internationally important academic institutions or organizers of important academic conferences to participate the ICG meetings.

Proposals

1 To establish a Task Group for academic exchange within WG-C

Academic Exchange Task Group

- To enhance cooperation among CSNC,ION,MISNF,MSNS and ENC and to usher in dynamic interaction on ICG platform
- To present the most recent research achievement of each academic on WG C
- To propose suggestions for future research proceeding from common perspective as well as that of ICG and to win attention from the organizers of important academic conferences

Proposals

2 **To enhance cooperation among CSNC, ION, MISNF, MSNS and ENC and to usher in dynamic interaction on ICG platform.**

- CSNC, ION, MISNF, MSNS and ENC should take up a global vision.
- CSNC, ION, MISNF, MSNS and ENC have jointly organized panels.
- Such cooperation should be further enhanced and expanded.
- WG C can become the platform to enhance cooperation among multiple stakeholders.

Proposals

3 To present the most recent research achievement of each academic group in WG-C

Academic exchange platform plays a positive role in creating a favorable environment for technology exchange and academic development in global navigation sector and have contributed fruitful research achievements.

It is suggested that organizers of each important academic conference to introduce the newest and most significant research result to WG-C.

Let more researchers know about excellent R&D achievements through ICG platform.

Proposals

4

To propose suggestions for future research proceeding from common perspective as well as that of ICG and to win attention from the organizers of important academic conferences.

ICG view

- ITU proposes research proposals based on global telecom needs to ensure a sound development for telecom technology.
- WG-C leads the research activities in GNSS and attracts the attention from academic activity organizers
- The proposals are non-mandatory
- The proposals shall not intervene academic freedom and the free exchange of ideas.

Proposals

5

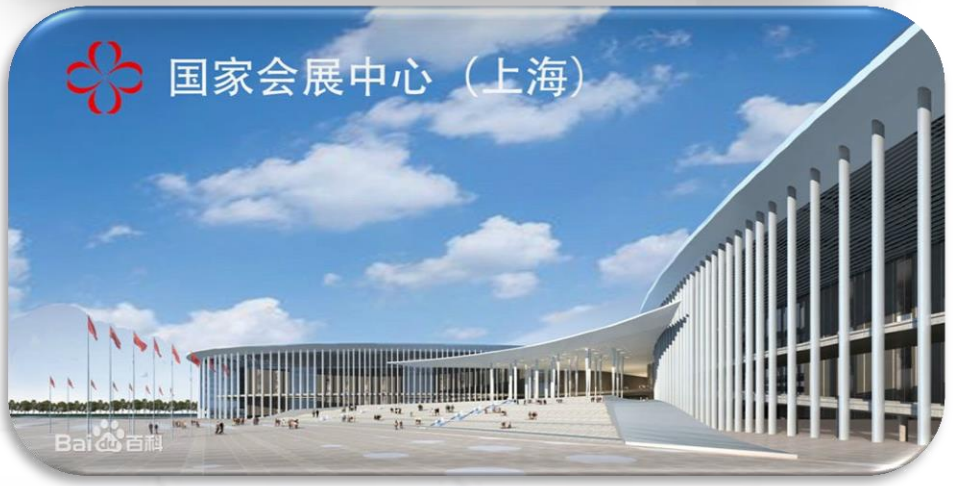
To invite internationally important academic institutions or organizers of important academic conferences to participate the ICG meetings.

Welcome
CSNC2017

中国卫星导航学术年会
China Satellite Navigation Conference

SHANG HAI

23-25,MAY,2017



Thank you for your attention!