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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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The lunar coordinate system

月球空间坐标系

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Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules. This standard and its application by the National Standardization Technical Committee on Space Sciences (SAC/TC312) centralized. This standard was drafted. National Astronomical Observatories. The main drafters of this standard. Li Chunlai, Ren Xin, Liu Jianjun, clever Mou, Wang Fenfei.

Moon spatial coordinate system is used to describe the space inside surface of the moon, the moon's interior or a lunar space environment or some object of study Location information of a set of protocols, including the origin, size and orientation with time and the evolution of a series of protocols, algorithms and constants and so on. Since the 1950s, humanity has entered the lunar space probe era, has completed flew over the moon, lunar orbiter probe, Moon Hard landing and a soft landing probe, as well as manned lunar sample return missions, etc., to obtain the mass of lunar exploration data, so that human-to-month Ball deepening understanding. "Around, fall back" is the first phase of China's lunar probe programs, the successful launch of Chang E series detectors and scientific Probe on the moon to carry out a global and comprehensive probe, rich lunar exploration results. Engineering requirements lunar exploration activities, the moon Detection data processing, integrated data applications and scientific research, are required to detect these data under a unified system of space coordinates expressed, But also unique, and with international practice, therefore, to formulate a unified standard lunar space coordinate system, regulate the use of lunar exploration data, It is necessary. The standard for lunar exploration and data processing system to coordinate the various requirements, refer to the information at home and abroad, standardized definitions Related lunar coordinate system conversion

and the relationship between them can be used for lunar exploration data acquisition, data processing and scientific research. in Choice of terminology as much as possible with existing data coordination, while maintaining the relative independence and integrity of this standard, for the same term, with tight, Accurate principle to the definition of the relevant standards and specifications to maintain the unity and coordination. Moon spatial coordinate system

1 Scope

China's national standard for the lunar coordinate system. It specifies the coordinate systems used to describe positions on the surface of the Moon, within its interior and in the space around it, together with the associated constants, algorithms and conventions. A coordinate system for the Moon is a set of agreements: where the origin is, how the axes are oriented, how that orientation changes with time, and which constants and algorithms are used to relate one frame to another. None of those are discoverable facts; they are conventions, and they only work if everyone uses the same ones. Since the 1950s humanity has flown past the Moon, orbited it, crash-landed on it, soft-landed on it and returned samples from it, and each of those missions produced data referred to whatever frame its operators used. China's own programme - the orbit, land and return phases, and the Chang'e series that carried them out - produced a large body of global and detailed lunar data, and that data has to be combinable with earlier results and with what comes next. That is the engineering requirement behind this standard, and it is a practical one rather than an academic one. A lander's target is chosen from orbital imagery, its descent is guided by navigation referred to a frame, and the sample it returns is located by a position: if the imagery, the navigation and the position are expressed in frames that differ by a kilometre, the mission lands somewhere other than where it was aimed. The standard therefore fixes the reference frames, the rotation model that relates a body-fixed frame to an inertial one, the reference surface and the datum from which heights are measured, and the constants and transformations used between them. Issued on 17 December 2013 and in force since 15 May 2014.

This standard specifies the lunar exploration and data processing related to the coordinate system, including the origin of the coordinate system, scale, orientation and play with time It becomes a series of protocols, algorithms and constants, and define the conversion between the relevant coordinates. This standard applies to lunar exploration data acquisition, data processing and scientific research.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1 Reference ellipsoid referenceellipsoid One kind of celestial body size, shape and expression measurements closest to deal with the outcome and use, and has certain

parameters of the rotating ellipsoid. [

GB/T 14911-2008, the definition 2.14]

2.2 Reference ellipsoid long radius major radius of reference ellipsoid The length of the semi-major axis of the reference ellipsoid (a). [

GB/T 17159-1997, the definition 4.8]

2.3 Reference ellipsoid short radius minor radius of reference ellipsoid Reference ellipsoid short axis length (b). [

GB/T 17159-1997, the definition 4.9]

2.4 Reference ellipsoid surface of reference ellipsoid Reference ellipsoid surface.

2.5 Precession Earth's rotation axis in space instantaneously changing the long-term direction of movement. [

GB/T 17159-1997, the definition 3.22]

2.6 Nutation Earth instantaneous rotation axis in space, changing the direction of cyclical movement. [

GB/T 17159-1997, the definition 3.23]

2.7 Celestial sphere For the surface projection positions of celestial bodies and the virtual space to a point as the center and radius of the sphere of infinite length. [

GB/T 17159-1997, the definition 3.4]