Forecasting earthquake by the satellite remote sensing

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Forecasting earthquake by the satellite remote sensing is a creative method which was first researched and exploited in 1989 by seismologists of China including the first author in the paper. It is the one which the research team formed by the authors of this paper is furthering exploration. The primary rationale of this method is: using the thermal infrared anomaly and premonitory earthquake cloud, which generally appeared in pregnant earthquake area in the impending period before earthquake and is produced by atmosphere-ground temperature anomaly increase caused by seismic tectonic activity, and is received by satellite exploration apparatus, to forecast short-term and impending earthquakes by means of exploring the corresponding relationship between the time-space dynamics of infrared abnormal and the three factors of earthquake. The basic features of infrared abnormality of impending earthquake are as follows:(1)Isolation of infrared anomaly form and localization of infrared anomaly distribution.(2)Paroxysm of infrared anomaly appearance and durative of infrared anomaly existence.ąąInfrared anomaly of Earthquakes(Ms>6) generally lasts 4 to 12 days or even longer.(3)Becoming belt of anomaly spatial distribution and close relativity between active fault zone and anomaly spatial distribution.(4)Migration of anomaly region and time stages of anomaly evolvement: Original temperature increase – fortified temperature increase – pinnacle temperature increase – attenuation – earthquake occurrence(5)Relative stability of the anomaly of earthquake symptoms(6)Region of anomaly area and notability of temperature enhancement. Anomaly area of earthquake(Ms>5) can reach 10 to 100km2 or more. Temperature of anomaly is generally higher than background temperature by 4 degree centigrade to 6 degree centigrade. The Cumulative of temperature increase can be higher by 10 degree centigrade. Area and range of anomaly has positive correlation with magnitude, but varies with time and space. The Basic thought of the new method is: the seismic geology as the basis, the premonitory earthquake cloud as the leading factor, Satellite infrared anomaly temperature as the dominant factor, the ground temperature as the assistant factor, the astro-tidal-triggerring as the inducing factor, analysis and decision-making by computer as the main means. Utilizing the basic thought and analyzing system mentioned above, we have contrasted and analyzed infrared images and ground temperature data of 108 earthquakes which occurred in the East (Ms>5) and West (Ms>6) of China. We also analyzed NCEP anomaly temperature images and affixation tectonic stress caused by astro-tidal-triggerring of the 60 earthquakes which occurred home (Ms>5.5) and abroad (ms>7) since June of 2003. The statistics show that over 65%

of the cases had the obviously abnormal dynamics before the quake, and 31.7% are not very obvious, while no abnormal symptoms only possesses 2%. It indicates that the method has feasibility and universal adaptability. We also find that over 90% of the big earthquakes occur on the pinnacle of absolute value of astro-tidal-triggerring stress. It indicates that the affixation tectonic stress acted on active faults in a critical stage is an important external factor to trigger earthquake. On the basis of the thought and method, we carried out an impending forecast of Taiwan earthquake on September 21,1999 and its aftershock, and Yunnan earthquake on January 15, 2000 in China. We also conducted a short-term of several world-shocking big earthquakes, such as the Iran earthquake (Ms7.0) on December 26,2003, Indonesia earthquake (Ms8.9) on December 26,2004,Pakistan earthquake (Ms7.6) on October 8,2005,Japanese earthquake (Ms6.5) on October 19,2005 and the Md7.6 Banda Sea earthquake on January 27,2006. All these studies suggest indicated that integrated analysis method-the seismic geology as basis, the premonitory earthquake cloud as the leading factor, Satellite infrared anomaly temperature as the dominant factor, the astro-tidal-triggerring as the inducing factor, is a promising new weapon to predict short-term and impending earthquakes.