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Results of the iSTEP Program on Integrated Search for Taiwan Earthquake Precursors

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The question of earthquake predictability has been hotly debated in the earthquake science community for some time. The answer to which begs for another question, "Are there credible earthquake precursors?" Intrigued by these questions and encouraged by instrumental observations of conspicuous ionospheric and geomagnetic disturbances before the disastrous 1999 Chi-Chi earthquake, we decided to undertake an integrated Search for Taiwan Earthquake Precursors, called the iSTEP program. The multidisciplinary program includes five major components aimed at identifying potential seismological, geomagnetic, geodetic and ionospheric precursors, and at performing rigorous statistical testing of any identified precursors. Since the program's inception in April 2002, encouraging results have been obtained. These includes precursory P wave travel-time changes six years before the Chi-Chi earthquake, identifiable geomagnetic changes two years before M≧6 earthquakes, consistent ionospheric anomalies three days before M≧5 earthquakes. We have also developed high-resolution radar interferometric methods for monitoring crustal deformation. A method for forecasting aftershock distribution on the basis of stress transfer has also been successfully tested on the Chi-Chi earthquake sequence. Taking advantage of frequent earthquakes and additional geomagnetic and ionospheric instruments we are hopeful about identifying more earthquake precursors and developing relevant physical mechanisms in the coming years of the iSTEP program.