2. In looking for EQ precursors (supposing be aperiodic) annual variation should be well studied and reduced.

3. Causes of annual variation may be a) the change of electrical conductivity in the Earth's interior, forming induction vectors; b) seasonal variation of the external source parameters leading to deflection from T—C model. c) superposition of seasonally variable parts of the last terms in equation (3).

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High Rayleigh Number Mantle Convectionon GPU

© D. Sanchez[1], D. Yuen[1], G. Wright[2], G. Barnett Jr.[3], 2010

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The performance, potential growth, availability, and affordability of GPUs has made them attractive to scientists for many years. Although historically cumbersome and difficult to use for scientific software, the introduction and refinement of high-level development tools, such as CUDA, have made GPU computing accessible. With the advent of architectures, such as NVIDIA's Fermi, which explicitly cater to scientists by enabling more memory, faster access to that memory, and better double-precision support than ever before, members of the computational world are finding GPU difficult to ignore.

Using finite-difference methods with second-order accuracy in space and third-order accuracy in time, we investigate 2D and 3D thermal convection at the infinite Prandtl number limit, at resolutions on the order of 1000×2000 2D and 400×400×200 3D grid points. Our CUDA code makes extensive use of

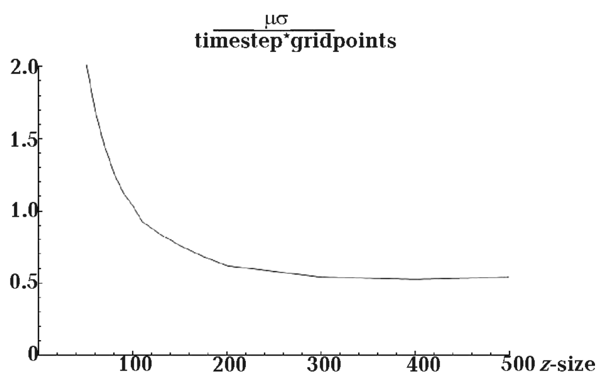

Fig. 1. Performance scaling with grid size on Tesla C1060.

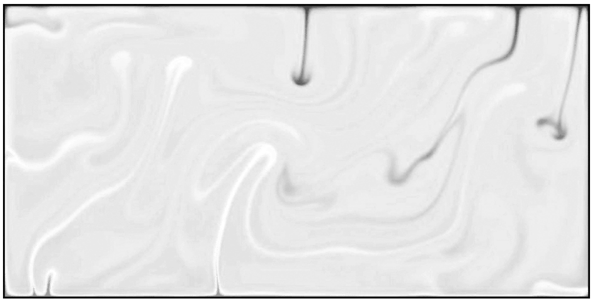

Fig. 2. 2D mantle convection at a Rayleigh number of 10^9.

highly-optimized CUBLAS routines, allowing us to unlock a significant fraction of GPU's performance. This performance has enabled us to study the behavior of high Rayleigh number simulations, on the order of 10^9, in 2D and 10^7 in 3D over sufficient time scales to see evidence of flow-reversal (Fig. 1).

We compare our CUDA code's performance with Jacket-accelerated Matlab code and CPU-only Matlab code across the Tesla C1060, Tesla C2050, and GTX 480 (Fig. 2).

Observation and analysis of ULF data associated with M_b=4.5 Koyna-Warna (India) earthquake

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In recent years ULF (Ultra Low Frequency) emission is detected during the seismic activity and this emission is recognized as one of the most promising candidate for earthquake prediction. In this paper, we present measurements of magnetic field anomalies detected for moderate earthquake that occurred on 29 July, 2008 having magnitude (M_b) 4.5. The ULF observation system uses three-component induction coil magnetometer and it has been installed at Shivaji University Kolhapur (16.40°N, 74.15°E), India.

Data of moderate earthquake have been analyzed using spectral density and polarization methods [Hattori et al., 2002a, b]. Long term data analysis shows that, two anomalous enhancements in intensity of magnetic field were observed about two and one months before the earthquake. Short term data analysis shows that, maximum enhancement in intensity of magnetic field was prominent within ±1 hours around the main shock time and it started to be observe four to five days before the earthquake. The enhancement in intensity of magnetic field is examined in terms of space magnetic pulsation and ULF emission associated with earthquake by using polarization parameter [Hayakawa et al., 2007; Sharma et al., 2008] and planetary index (K_p). It is concluded that there is no relation between enhancements in intensity of magnetic field and geomagnetic activity.

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