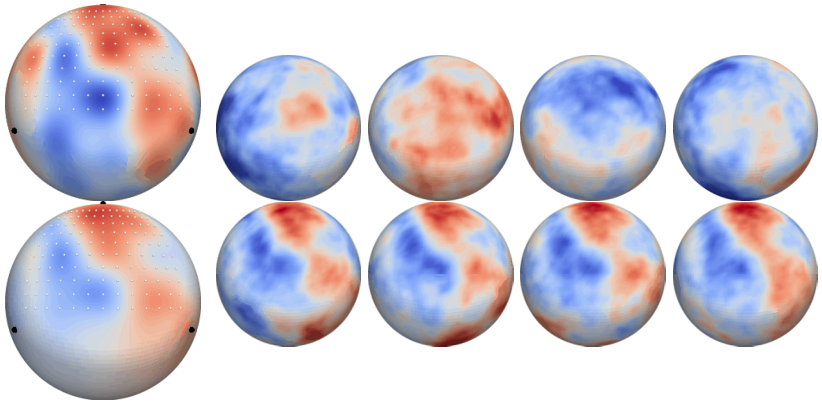
Quantification of Uncertainty in Extreme Scale Computations (QUEST)

SAND2012-2603C



Application of a low-rank based algorithm to the solution of a large-scale statistical inverse problem in global seismology. – O. Ghattas, UT

Novel/Main Ideas

Provide an interoperable suite of hardened software for both forward and inverse UQ, including prototyping and production scenarios.

Develop adapted stochastic representations with respect to arbitrary measures, and adaptive goal-based non-intrusive sampling strategies.

Use low-rank approximation of the likelihood Hessian to accelerate extreme scale stochastic Newton solutions in Bayesian inference.

Impact

- **Establish and demonstrate the effective utility of UQ in the computational science enterprise at the exascale**
- **Advance the state of the art in UQ for handling high-dimensional complex models of physical systems**
- **Enhance understanding of computed physical systems behavior over ranges of their uncertain inputs**
- **Enhance utility of exascale computations for decision support**

Lead: Habib N. Najm, Sandia National Laboratories
hnnajm@sandia.gov www.quest-scidac.org

Milestones/Dates/Status

	Scheduled	Actual
• Conduct first QUEST UQ tutorial at SIAM UQ2012	APR 2012	APR 2012
• Improve DAKOTA, QUESO, GPMSA interoperability	OCT 2012	
• Develop adaptive stochastic representations with respect to arbitrary measures	APR 2013	
• Extend stochastic Newton MCMC algorithm to large-scale inverse problems on petascale supercomputers	SEP 2013	