

**Cray customers**

**are amazing.**

HPC User Forum – Chris Lindahl, Product Marketing Director, Supercomputing

# Amazing transparency.

University of Illinois at Urbana-Champaign researchers Wendy K. Tam Cho and Yan Liu are restoring fairness to electoral district boundaries.

**CRAY**



An aerial photograph showing a flooded residential area. A large yellow house is surrounded by a yellow ring, indicating it is the focus of the forecast. The surrounding area is flooded, with water reflecting the sky and surrounding trees. A red barn is visible in the upper left, and a boat is in the water to the right of the yellow house. The text "Amazing forecasts." is overlaid in blue on the left side of the image.

Amazing forecasts.

NOAA, NCAR, and  
NCEP are saving lives  
and protecting property  
through accurate and  
timely flood forecasts

CRAY

## Amazing clarity.

Sverre Brandsberg-Dahl and the team at PGS are generating high-resolution 3-D seismic images that more accurately locate oil and gas resources.

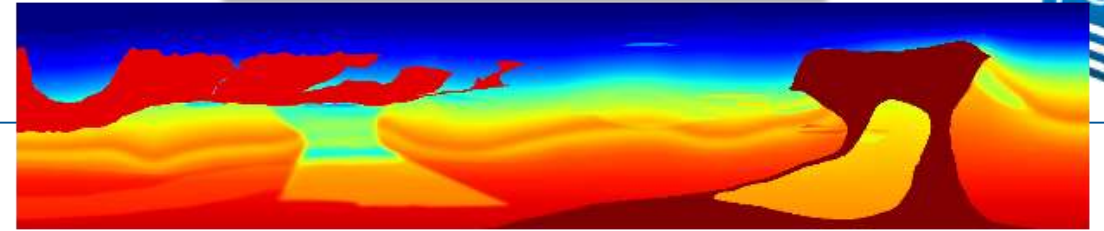
**CRAY**



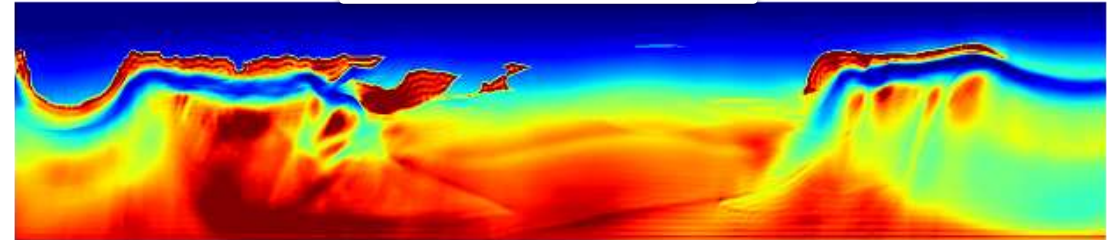
# A Smarter Machine

$$\min_m \left( \underbrace{\|F(m) - d\|^2}_{\text{data misfit}} + \lambda \left( \underbrace{\|Q \nabla(m - m_r)\|_{L^1}}_{\text{weighted TV}} + \underbrace{\int_W P \cdot \nabla(m - m_r)}_{\text{Steerable Variation}} \right) \right)$$

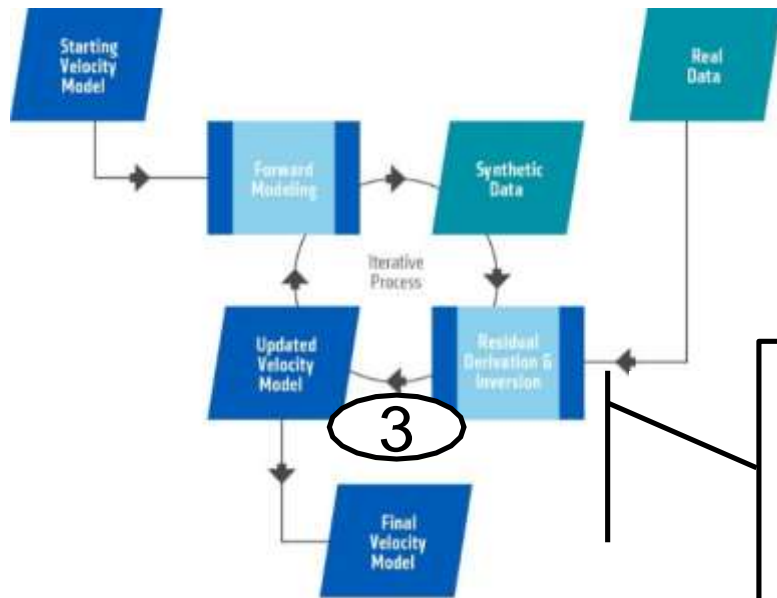
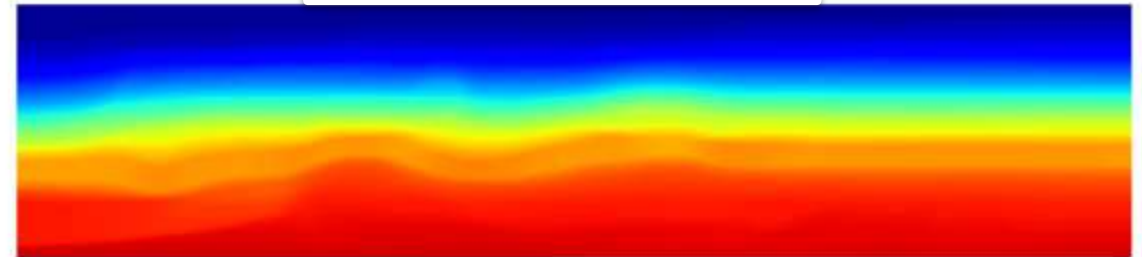
“Ground truth” Benchmark



Conventional FWI



With Machine Learning



**Abel for Machine Learning**  
 A multi-dimensional, ill-posed optimization problem that is far from automated and requires lots of skilled resources' intervention — sometimes more art than science in many cases....  
**Implement state-of-the-art Machine Learning on Abel**

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