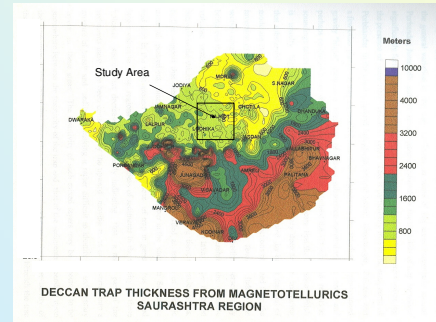


# Study of Geological CO<sub>2</sub> Sequestration in Basalt Formations of Western India

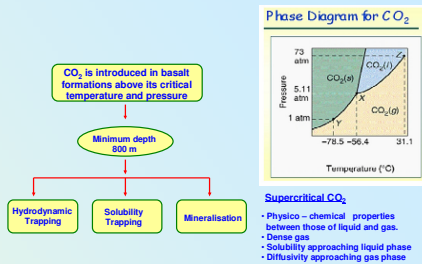
## Objective

Study of Basalt Formations of Western India for environmentally safe and irreversible long time storage of CO<sub>2</sub>.

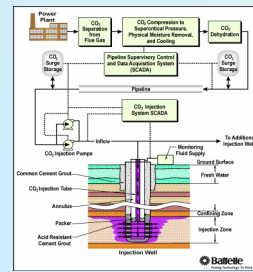
## Area of Study



## CO<sub>2</sub> Storage in Basalt Formations



## Schematic of CO<sub>2</sub> injection



## Mineralization reactions in basalt formations

$CO_2(g) \rightarrow CO_2(aq)$   
 $CO_2(aq) + H_2O \rightarrow HCO_3^- + H^+$   
 $(Ca, Mg, Fe)_2Si_2O_7 + 2H^+ + (2-x)H_2O \rightarrow x(Ca, Mg, Fe)^{2+} + yH_2SiO_4(aq)$   
 $(Ca, Mg, Fe)^{2+} + HCO_3^- \rightarrow (Ca, Mg, Fe)CO_3 + H^+$

**Induction Time for Calcite Precipitation**

Depth (m)	t <sub>1/2</sub> (d)
800	31, 664
900	38, 822
1000	42, 879
1100	48, 1044
1200	58, 1207
1300	67, 1379

Lab. scale & geo-chemical modeling studies by Battelle, PNWL, USA

Calcite deposition on basalt

- Basalt is rich in Ca, Mg & Fe Silicates
- Mineralisation reaction rate is fast on geological time scale
- Mineralisation is appeared to be controlled by mixing behaviour of CO<sub>2</sub> and not by kinetics of the reactions

## Significance

This study, first of its kind in India will help to evaluate the basalt formations as a potential medium for long-term, irreversible CO<sub>2</sub> storage. The multi-institutional, multi-national approach will improve our understanding and expertise on CO<sub>2</sub> storage in basalt formation.

## Project Partners

