**ECORD Summer School**  
Subseafloor fluid flow and gas hydrates

**Venue:** MARUM, University of Bremen, Germany

**September 12 – 23, 2011**

<table>
<thead>
<tr>
<th><strong>Monday</strong></th>
<th><strong>September 12</strong></th>
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<tbody>
<tr>
<td>09:00 - 09:45</td>
<td><em>Welcome and introduction to the Summer School, Gerhard Bohrmann, Dierk Hebbeln</em></td>
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<tr>
<td><strong>Fluid flow at continental margins</strong></td>
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<tr>
<td>09:45 - 10:45</td>
<td>Fluid flow at active continental margins; <em>Erwin Suess</em></td>
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<tr>
<td>10:45 - 11:15</td>
<td>Coffee break</td>
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<tr>
<td>11:15 - 11:45</td>
<td>Continuation <em>Erwin Suess</em></td>
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<tr>
<td>11:45 – 13:00</td>
<td>Fluid flow at passive continental margins; <em>Gerhard Bohrmann</em></td>
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<tr>
<td>13:00 - 14:30</td>
<td>Lunch</td>
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<td>14:30 - 15:30</td>
<td><em>IODP and ECORD: Structure and objectives and an introduction to &quot;Virtual ship&quot;; Ulla Röhl and Jochen Erbacher</em></td>
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<tr>
<td>15:30 - 16:00</td>
<td>IODP Core curation; <em>Walter Hale</em></td>
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<td>16:00 - 16:30</td>
<td>Tea break</td>
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<tr>
<td>16:30 - 17:30</td>
<td>Guided tour through MARUM and IODP Bremen Core Repository (BCR)</td>
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<td>17:45</td>
<td>Icebreaker party</td>
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<table>
<thead>
<tr>
<th><strong>Tuesday</strong></th>
<th><strong>September 13</strong></th>
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<tbody>
<tr>
<td><strong>Fluid flow at continental margins</strong></td>
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<tr>
<td>09:00 - 09:15</td>
<td>Review of previous day’s material by participants</td>
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<tr>
<td>09:15 - 10:30</td>
<td>Biology and chemosynthetic life at cold seeps; <em>Heiko Sahling</em></td>
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<td>10:30 - 10:45</td>
<td><strong>Photo shooting:</strong> Group photo of all participants</td>
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<tr>
<td>10:45 - 11:15</td>
<td>Coffee break</td>
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<tr>
<td>11:15 - 12:45</td>
<td>Fluid flow of mud volcanoes; <em>Tom Feseker</em></td>
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<tr>
<td>12:45 - 14:00</td>
<td>Lunch</td>
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<tr>
<td>14:00 - 15:00</td>
<td>Presentations by participants</td>
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<tr>
<td>15:00 - 15:45</td>
<td><strong>Virtual ship: Marine heat flow measurements – introduction to laboratory exercise #1; Tom Feseker</strong></td>
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<tr>
<td>15:45 - 16:15</td>
<td>Tea break</td>
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<tr>
<td>16:15 - 17:00</td>
<td><strong>Virtual ship: Gas hydrates – introduction to laboratory exercise #2; Thomas Pape</strong></td>
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<tr>
<td>17:00 - 17:45</td>
<td><strong>Virtual ship: Core description – introduction to laboratory exercise #3; Mahyar Mohtadi</strong></td>
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**Wednesday**

**September 14**

**Gas hydrates**

09:00 - 09:15  Review of previous day’s material by participants
09:15 - 10:00 Basics in gas hydrates, gas chemistry, stability and phase boundaries; Gerhard Bohrmann
10:00 - 10:45 Seismic evidence for gas hydrates; Michael Riedel
10:45 - 11:15 Coffee break
11:15 - 12:00 25-years marine gas hydrate research; Erwin Suess
12:15 - 12:45 Methane hydrate budgets by modeling; Matthias Haeckel
12:45 - 14:00 Lunch
14:00 - 15:00 Presentations by participants
15:00 - 15:30 Tea break

**Virtual ship**

Heat flow, gas hydrates, and visual core description

Three groups of 8 students rotate for three laboratory sessions

Laboratory #1: Heat flow (Tom Feseker)
Laboratory #2: Gas hydrates (Thomas Pape)
Laboratory #3: Core description (Mahyar Mohtadi)

15:30 - 18:00 Virtual ship - first laboratory session - laboratory #1 to #3

**Thursday**

**September 15**

**Gas hydrates**

09:00 - 09:15  Review of previous day’s material by participants
09:15 - 10:45 Gas hydrate-pore water interactions, isotopes and gas hydrate carbonates Erwin Suess
10:45 - 11:15 Coffee break
11:15 - 12:45 Production tests and CO₂ exchange in methane hydrates; SUGAR project; Matthias Haeckel
12:45 - 14:00 Lunch
14:00 - 15:00 Presentations by participants
15:00 - 15:30 Tea break
15:30 - 18:00 Virtual ship - second laboratory session - laboratory #1 to #3

**Friday**

**September 16**

**Gas hydrates**

09:00 - 09:15  Review of previous day’s material by participants
09:15 - 10:00 Past climate change, PETM; Erwin Suess
10:00 - 10:45 Drilling gas hydrate in India, Korea; Michael Riedel
10:45 - 11:15 Coffee break
11:15 - 12:00 Advanced seismic methods to detect gas hydrates; Michael Riedel
12:00 - 12:45 Quantification of methane hydrates in sediments; Gerhard Bohrmann
12:45 - 14:00 Lunch
14:00 - 15:00 Presentations by participants
15:00 - 15:30 Tea break
15:30 - 18:00 Virtual ship - third laboratory session - laboratory #1 to #3
## September 17

09:00 - 09:15  | Review of previous day’s material by participants  
09:15 - 10:45  | Presentations by participants  
10:45 - 11:15  | Coffee break  
11:15 - ~13:00 | Presentations by participants  

**Afternoon free**

## September 18

Free time to explore Bremen

## September 19

**September 19**

06:00 - 20:00  | Full day research cruise with R/V ALKOR to seeps in the Baltic Sea;  
*Gerhard Bohrmann*

## September 20

**September 20**

**Hydrogeology of the ocean crust**

09:00 - 10:30  | Fluid rock interactions of the oceanic lithosphere; *Nils Jöns*  
10:30 - 11:00  | Coffee break  
11:00 - 12:30  | Hot Vents/Energy and mass transport at hydrothermal vent fields; *Katja Schmidt*  
12:30 - 14:00  | Lunch  
14:00 - 15:30  | Virtual ship: Introduction to downhole logging; *Sarah Davies*  
15:30 - 16:00  | Tea break  
16:00 - 16:45  | Virtual ship: Deriving heat flow from Bottom Simulating Reflectors – introduction to laboratory exercise #4; *Heiner Villinger*  
16:45 - 17:30  | Virtual ship: Pore water sampling – introduction to laboratory exercise #5; *Luzie Schnieders*

## September 21

**September 21**

**Hydrogeology of the ocean crust**

09:00 - 09:15  | Review of previous day’s material by participants  
09:15 - 10:45  | Biogeochemistry and fluid flow; *Verena Heuer and Tim Ferdelmann*  
10:45 - 11:15  | Coffee break  

**Subseafloor fluid flow and deep biosphere**

11:15 - 12:45  | Hydrothermal circulation at ridge flanks and seamounts; *Heiner Villinger*  
12:45 - 14:00  | Lunch  

**Virtual ship**

14:00 - 14:45  | Virtual ship: Physical properties - introduction to laboratory exercise #6; *Michael Riedel*  
14:45 - 15:15  | Tea break  

**Virtual ship**

Heat flow from BSRs, pore water sampling, and physical properties

Three groups of 8 students rotate for three laboratory sessions

Laboratory #4: Heat flow from BSRs (Heiner Villinger)  
Laboratory #5: Pore water sampling (Luzie Schnieders)  
Laboratory #6: Physical properties (Michael Riedel, Holger Kuhlmann)

15:15 - 17:45  | Virtual ship - fourth laboratory session - laboratory #4 to #6
Thursday

09:00 - 11:30 Virtual ship - fifth laboratory session - laboratory #4 to #6
11:30 - 13:00 Lunch break
13:00 - 14:30 Hydrogeology of the ocean crust
CORKs: Monitoring fluids in the ocean crust; Heiner Villinger
14:30 - 15:00 Tea break
15:00 - 17:30 Virtual ship - sixth laboratory session - laboratory #4 to #6
17:45 Farewell party at the Café Unique

Friday

09:00 - 10:30 How to write an IODP proposal; Ulla Röhl et al.
10:30 - 11:00 Coffee break
11:00 - 12:00 How to write an IODP proposal - continued
12:00 - 12:30 Summer School debriefing, award for the best student presentation, and farewell

ECORD Mission Specific Platforms