Project no. **217551**

Acronym: **CarboSchools+**

Project title: **European network of regional projects for school partnerships**

Instrument: **CSA**

Theme: **Science in Society: SiS-2007-2.2.1.1**

**Deliverable reference number: D 2.2**

**Deliverable Title:** Report from school projects of 2008-2009 academic year

Contractual Date of Delivery: 1st July 2009

Actual Date of Delivery: 30 August 2009

Work package: 2

Organisation name of lead contractor for this deliverable (Partner): MPI-BGC

Deliverable prepared by Philippe Saugier & Susanne Hermsmeier / Contributors: all regional coordinators

Start date of project: 1/1/08 Duration: 36 months

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**Project co-funded by the European Commission within the 7th Framework Programme**

<table>
<thead>
<tr>
<th>Dissemination Level</th>
<th>PU</th>
<th>PP</th>
<th>RE</th>
<th>CO</th>
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<td>PP</td>
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<tr>
<td>RE</td>
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<tr>
<td>CO</td>
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</tr>
</tbody>
</table>

PU: Public

PP: Restricted to other programme participants (including the Commission Services)

RE: Restricted to a group specified by the consortium (including the Commission Services)

CO: Confidential, only for members of the consortium (including the Commission Services)
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Overview Regional Projects

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<th>Pages</th>
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</thead>
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</tr>
<tr>
<td>Groningen, Netherlands</td>
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<tr>
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<tr>
<td>Bergen, Norway</td>
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<td>Aquitaine, France</td>
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<td>Tuscany, Italy</td>
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<td>Catalunya, Spain</td>
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<td>Île de France, France</td>
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<td>Cluj-Napoca, Romania</td>
<td>26</td>
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Project Presentations

<table>
<thead>
<tr>
<th>Institution</th>
<th>Number of Projects</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPI-BGC, Jena, Germany</td>
<td>4</td>
<td>27-30</td>
</tr>
<tr>
<td>TSN, Norwich, U.K.</td>
<td>2</td>
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</tr>
<tr>
<td>RuG, Groningen, Netherlands</td>
<td>3</td>
<td>32-34</td>
</tr>
<tr>
<td>IFM-Geomar, Kiel, Germany</td>
<td>7</td>
<td>35-41</td>
</tr>
<tr>
<td>UiB, Bergen, Norway</td>
<td>2</td>
<td>42-43</td>
</tr>
<tr>
<td>INRA, Bordeaux, France</td>
<td>7</td>
<td>44-50</td>
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<tr>
<td>CNR-IBIMET, Firenze, Italy</td>
<td>4</td>
<td>51-54</td>
</tr>
<tr>
<td>PCB-LRC, Barcelona, Spain</td>
<td>5</td>
<td>55-59</td>
</tr>
<tr>
<td>CNRS-LSCE, Paris, France</td>
<td>5</td>
<td>60-67</td>
</tr>
</tbody>
</table>
**Overview of numbers of direct participants (planned, total project duration)**

<table>
<thead>
<tr>
<th>Regional projects</th>
<th>MPI</th>
<th>TSN</th>
<th>RuG</th>
<th>IFM-GEO.</th>
<th>CEA-LSCE</th>
<th>UiB</th>
<th>INRA</th>
<th>CNR</th>
<th>CRL-PCB</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of participating scientists/technicians</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>40</td>
<td>10</td>
<td>6</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>10</td>
<td>93</td>
</tr>
<tr>
<td>No. of participating teachers</td>
<td>5</td>
<td>2</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>30</td>
<td>20</td>
<td>138</td>
</tr>
<tr>
<td>No. of participating students</td>
<td>100</td>
<td>50</td>
<td>500</td>
<td>250</td>
<td>600</td>
<td>200</td>
<td>100</td>
<td>400</td>
<td>800</td>
<td>300</td>
<td>3300</td>
</tr>
</tbody>
</table>

NB - these numbers indicate an estimation of the total amount of participants that the regional projects aim to have involved by the end of the project cycle (2 school years). They show the objective that each partner will endeavour to reach.

**Overview of numbers of direct participants (realised, first 18 months)**

<table>
<thead>
<tr>
<th>Regional projects</th>
<th>MPI</th>
<th>TSN</th>
<th>RuG</th>
<th>IFM-GEO.</th>
<th>CEA-LSCE</th>
<th>UiB</th>
<th>INRA</th>
<th>CNR</th>
<th>CRL-PCB</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of participating scientists/technicians</td>
<td>14</td>
<td>2</td>
<td>4</td>
<td>20</td>
<td>12</td>
<td>8</td>
<td>21</td>
<td>8</td>
<td>16</td>
<td>-</td>
<td>95</td>
</tr>
<tr>
<td>No. of participating teachers</td>
<td>5</td>
<td>2</td>
<td>8</td>
<td>9</td>
<td>39</td>
<td>6</td>
<td>25</td>
<td>5</td>
<td>12</td>
<td>-</td>
<td>111</td>
</tr>
<tr>
<td>No. of participating students</td>
<td>53</td>
<td>30</td>
<td>87</td>
<td>82</td>
<td>571</td>
<td>100</td>
<td>198</td>
<td>97</td>
<td>119</td>
<td>-</td>
<td>1337</td>
</tr>
</tbody>
</table>

Overall, the number of scientists & teachers planned for the whole project duration is almost reached at M18. On the other hand, the average size of the students groups involved in T-S partnerships is much smaller than expected, since the total number of students directly participating is so far much less than half of the total planned.

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1. CarboSchools projects initiated by individual scientists outside structured regional projects
2. Not estimated at this stage
# Regional Project Report for the Schoolyear 2008-2009

**Jena, Germany**

## Events:

<table>
<thead>
<tr>
<th>Event and Venue</th>
<th>Date</th>
<th>Activity</th>
<th>Type of Event</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute visit (MPI-BGC, Jena)</td>
<td>17.09.2008</td>
<td>Talk &quot;Kohlenstoff-Flüsse in Ökosystemen – was passiert eigentlich im Boden?“ + Institute tour</td>
<td>Institute visit by school class (Martin-Luther-Gymnasium, Eisenach)</td>
<td>25 students, 1 scientist</td>
</tr>
<tr>
<td>Regional CarboSchools activity (Jena)</td>
<td>30.09.2008</td>
<td>Presentation of two school-projects by CarboEurope scientists</td>
<td>Teacher training course</td>
<td>10 teachers, 5 Scientists</td>
</tr>
<tr>
<td>CarboEurope Meeting (Jena)</td>
<td>30.09.2008</td>
<td>Public alks by CarboEurope Scientists</td>
<td>Outreach activity during CarboEurope Meeting</td>
<td>10 (general public and students), 3 scientists</td>
</tr>
<tr>
<td>Launch SchoolCO2web (Carl-Zeiss-Gymnasium, Jena)</td>
<td>10.11.2009</td>
<td>Set up of equipment at school, connection to the European network</td>
<td>SchoolCO2web</td>
<td>1 teacher, 2 scientists, RC</td>
</tr>
<tr>
<td>School visit (Elisabeth-Gymnasium, Eisenach)</td>
<td>26.01.2009</td>
<td>Talk “Treibhauseffekt und Klimawandel: Fakten und Folgen” (scientist) + CS project presentation (RC)</td>
<td>School project week</td>
<td>~ 40 students and 7 teachers, 1 scientist, RC</td>
</tr>
<tr>
<td>CS project presentation (MPI-BGC, Jena)</td>
<td>25.02.2009</td>
<td>Oral presentation to scientists of the BGC Systems Department</td>
<td>Inhouse project presentation</td>
<td>15 scientists, RC</td>
</tr>
<tr>
<td>CS project presentation (Thüringen Forst, Gotha)</td>
<td>18.03.2009</td>
<td>Oral presentation</td>
<td>Preparatory workshop for the “Waldjugendspiele”</td>
<td>RC</td>
</tr>
<tr>
<td>Event Description</td>
<td>Date</td>
<td>Activity Details</td>
<td>Audience Details</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Klimaforschung für Mädchen &amp; Jungs (MPI-BGC, Jena)</td>
<td>23.04.2009</td>
<td>Two projects with experiments and hands-on activities for students</td>
<td>Girls’Day 2009, 36 students, 1 teacher, 11 Scientists</td>
<td></td>
</tr>
<tr>
<td>Max-Planck-Schüler Kolleg (MPI-BGC, Jena)</td>
<td>05.05.2009</td>
<td>Presentations by Scientists + visit of the Science Express</td>
<td>Forschungsexpedition Deutschland, Science Express in Jena, ~50 students, 2 Scientists</td>
<td></td>
</tr>
<tr>
<td>Classroom activity (Carl-Zeiss-Gymnasium, Jena)</td>
<td>12.05.2009</td>
<td>&quot;Baum &amp; Klima&quot;: Presentation + hands-on activities</td>
<td>Scientists work with students in school, 10 students, 2 scientists</td>
<td></td>
</tr>
<tr>
<td>CS project presentation (University of Erfurt)</td>
<td>06.06.2009</td>
<td>Posters, SchoolCO2web clip, info material, networking</td>
<td>7. Thüringer Bildungssymposium, Educators, teachers, RC</td>
<td></td>
</tr>
<tr>
<td>Thementag „Klima &amp; Energie“ (Pavillon NawaRo, Jena)</td>
<td>10.06.2009</td>
<td>Climate workshop with students, CO2- and albedo measurements</td>
<td>Thüringer Klimaschutzwochen (02.-24.06.2009), 15 students, 3 teachers, RC</td>
<td></td>
</tr>
<tr>
<td>Klimaexkursion (MPI-BGC, Jena)</td>
<td>23.06.2009</td>
<td>Institute tour: scientists present laboratories</td>
<td>Thüringer Klimaschutzwochen (02.-24.06.2009), 12 students, 2 teachers, 3 Scientists, RC</td>
<td></td>
</tr>
<tr>
<td>SchoolCO2web presentation (MPI-BGC, Jena)</td>
<td>17.06.2009</td>
<td>CZG-Students present SchoolCO2web activities to scientists</td>
<td>Informal meeting + exchange session, 5 students, 2 teachers, 10 scientists</td>
<td></td>
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</tbody>
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**Outputs (Materials)**

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<td>CarboSchools – Regional Project Jena</td>
<td>will be available on the regional website</td>
</tr>
<tr>
<td>Project</td>
<td>Worksheet</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Video clip</td>
<td>Collecting, analyzing and showing CarboSchools Data will be available soon</td>
<td></td>
</tr>
<tr>
<td>Website</td>
<td>SchoolCO2web user interface</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>Treibhaus Erde</td>
<td></td>
</tr>
<tr>
<td>Worksheet (Einführung)</td>
<td>Der Strahlungshaushalt der Erde</td>
<td></td>
</tr>
<tr>
<td>Experiment + Worksheet</td>
<td>Modellversuch Treibhauseffekt</td>
<td></td>
</tr>
<tr>
<td>Experiment + Worksheet</td>
<td>(Modell)Versuch Albedoeffekt</td>
<td></td>
</tr>
<tr>
<td>Experiment + Worksheet</td>
<td>Modellversuch CO2-Löslichkeit in Wasser</td>
<td></td>
</tr>
<tr>
<td>Quiz</td>
<td>Kleines Atmosphärenquiz</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>“Ich sehe was, was du nicht siehst – Forschen mit Satellitenbildern”</td>
<td></td>
</tr>
<tr>
<td>Übung + Worksheet</td>
<td>Bildbetrachter (Einführung zur Benutzung von ENVI)</td>
<td></td>
</tr>
<tr>
<td>Übung + Worksheet</td>
<td>Erkunde ein Satellitenbild I</td>
<td></td>
</tr>
<tr>
<td>Übung + Worksheet</td>
<td>Überwachte Klassifikation</td>
<td></td>
</tr>
<tr>
<td>Übung + Worksheet</td>
<td>Erkunde ein Satellitenbild II</td>
<td></td>
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<tr>
<td>Übung + Worksheet</td>
<td>Erkunde ein Satellitenbild III (Scatterplot, Vegetationsindex NDVI)</td>
<td></td>
</tr>
<tr>
<td>Experiment 1 + Worksheet</td>
<td>Erkennen unterschiedlicher Landoberflächen in Abhängigkeit der räumlichen Auflösung</td>
<td></td>
</tr>
<tr>
<td>Experiment 2 + Worksheet</td>
<td>Testen der visuellen Interpretation mit einer überwachten Klassifikation</td>
<td></td>
</tr>
<tr>
<td>Experiment 3 + Worksheet</td>
<td>Berechnung des NDVI</td>
<td></td>
</tr>
</tbody>
</table>
Other Activities/Projects:

1. Long-term individual student projects (Seminarfacharbeiten)
   - „Der Stickstoffkreislauf in der Landwirtschaft“
     Authors: Aaron Grasemann, Alexander Staupendahl (Carl-Zeiss-Gymnasium, Jena)
     Advisor: Annette Freibauer
   - „Untersuchung von CO2 und anderen Spurengasen in Luftproben in Jena zur Bestimmung des Einflusses verschiedener lokaler, anthropogener Emittenten auf die CO2-Konzentration in der städtischen Atmosphäre“ (Arbeitstitel)
     Authors: Danny Schumann, Patrick Hirschligau, Philipp Gärtner, Robert Hoffmann (Integrierte Gesamtschule Grete Unrein)
     Advisors: Armin Jordan, Christian Rödenbeck
   - „Untersuchung von Luftproben im Raum Jena – ein Vergleich unterschiedlicher Methoden zur Messung von CO2“
     Authors: Johanna Maier, Julia Sowade, Kai Schäferlein (Orlatal-Gymnasium, Neustadt a.d. Orla)
     Advisor: Armin Jordan

2. Networking/cooperations
   - Thüringer Klimaschutzwochen 02.-24.06.2009 (http://www.klimaschutzwoche-thueringen.de/info/index.shtml)
     in cooperation with BIOBETH, Institut für Geographie der FSU Jena - AG Regionalklima und Nachhaltigkeit, Heinrich-Böll-Stiftung Thüringen e.V.
   - Schüler [U]nternehmen Forschung – Physics meets Carbon Cycle Science
     cooperation between Otto-Schott-Gymnasium, Carl-Zeiss-Gymnasium, MPI-BGC (CarboSchools), Technologie- und Innovationspark Jena
   - Schülerlabor Chemiedidaktik der FSU Jena
   - Bioenergie-Region Jena-SHK
   - Thüringen Forst (Internetportal Wald & Klima)
Overlap Teacher Scientist Partnership (TSP) project and Carboschools project

Overlap of projects

The events and outputs mentioned in this project report are co-funded from the TSP project, a Comenius 2.1 project within the Socrates programme. The TSP project and the Carboschools project overlap in many aspects, like setting up a measuring network for schools and organizing projects for students. Since the TSP project started before the Carboschools project, some longer projects already started before the beginning of the Carboschools project. These projects are:

- The development of the module “measuring and interpreting” by teachers. This module is meant for the new high school subject Nature, Life and Technology. The first preparations for this module started in September 2007. The module will be finished in September 2009
- The development of a CO₂ box for doing small experiments on photosynthesis, respiration and combustion. In school year 2007 – 2008 a test box was developed and tested by teachers. It was also used for demonstration of photosynthesis to two groups of students.

Distribution of person months and costs over both projects

Person months

Equipment

The total budget available for equipment for the TSP project was € 1950,-, which has been used for equipping one school with a CO₂ meter and a weather station. The costs for purchasing equipment within the Carboschools project during the first 18 months of the project were € 3367.45 (see table 3.1), which has been used for buying a pc and for gas measurement instruments for schools.

International meetings of both projects combined

There were moment when the international meetings of both projects were combined. The first one was in Norwich, from 9.3.2008 to 12.3.2008. This meeting was financed from the WP1 budget, because this was the kick-off meeting for the Carboschools project (milestone 1.1). The second one was in Pistoia, from 25.4.2009 to 30.4.2009. We attended this meeting with 7 persons. From the TSP budget, € 2039.80 was used for travel costs for 4 persons. The travel costs for the other 3
persons, the hotel costs for 7 persons and the congress costs were paid for by the Carboschools budget, € 3862,-.

## Events

<table>
<thead>
<tr>
<th>Type of activity</th>
<th>Date</th>
<th>Place</th>
<th>Description</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student project</td>
<td>25.08.2008 - 16.02.2009</td>
<td>various</td>
<td>Two students did a profile project with the data of the SchoolCO₂ web. They wrote a report*, called &quot;The influence of external factors on the levels of CO₂ in the air&quot;. At the start, prof. Harro Meijer and the RC visited the school to discuss with the students and teacher what they wanted to do. In September, the students and their teacher visited the lab of the CIO* to calibrate their meter.</td>
<td>2 students, 2 scientists, 3 teachers, RC</td>
</tr>
<tr>
<td>Meeting</td>
<td>12.09.2008</td>
<td>IDO*, RuG*, Groningen</td>
<td>Discussion about the progress of the module “measuring and interpreting” for the new school subject Nature, Life &amp; Technology. It's half way done, but some expertise is needed on Excel and statistics. Prof. Harro Meijer answered questions of the group and the new tool for downloading measurements of the SchoolCO₂ web was demonstrated. We decided to develop a manual for the CO₂ box, with building instructions and different experiments. We decided to postpone the work of the carbon footprint, because the teacher who was working on it was really busy for a few months. We made an allocation of tasks.</td>
<td>6 teachers, 2 scientists, RC</td>
</tr>
<tr>
<td>Meeting</td>
<td>10.10.2008</td>
<td>IDO, RuG, Groningen</td>
<td>We discussed the possibilities of color filters, to filter specific bands from a light source. With these filters, a lamp and the CO₂ box, it might be possible to show that plants photosynthesize just within two limited bands of the light spectrum. There are some difficulties with keeping the light intensity constant. We might ask this to prof. Kees Hummelen, who is an expert on solar cells.</td>
<td>5 teachers, 1 scientist, RC</td>
</tr>
<tr>
<td>Meeting</td>
<td>14.11.2008</td>
<td>IDO, RuG, Groningen</td>
<td>We didn’t get in contact with Kees Hummelen. What made it also difficult to work on the CO₂ box was the fact that the box was lent to a school for a project, so we couldn’t test during the meeting. We talked about the progress of the two students who did a profile project on the CO₂ data of their school. Also, one teacher told that two other students from the Lauwerscollege in Buitenpost were working with CO₂ measurements.</td>
<td>3 teachers, 1 scientist, RC</td>
</tr>
<tr>
<td>Meeting</td>
<td>05.12.2008</td>
<td>IDO, RuG, Groningen</td>
<td>We talked about the progress of the NLT module. It was almost finished and due to be tested in January. Again, no progress on the CO₂ -box. There were just a few teachers attending this meeting.</td>
<td>2 teachers, RC</td>
</tr>
<tr>
<td>Excursion</td>
<td>22.12.2008</td>
<td>Measurement tower CIO, Hornhuizen</td>
<td>A teacher, two PhD students and the RC visited the professional measurement tower of the CIO in Hornhuizen.</td>
<td>1 teacher, 2 PhD students, RC</td>
</tr>
<tr>
<td>Meeting</td>
<td>Date</td>
<td>Location</td>
<td>Description</td>
<td>Participants</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td></td>
<td>19.01.2009</td>
<td>IDO, RuG, Groningen</td>
<td>The group working on the NLT module finished a first version. This module is being tested by a school. We discussed the plans to make a small module about working with the measurements of the SchoolCO$_2$web, based on the NLT module, modules written by pre-service teachers and the Carbonschools booklets. We talked about the CO$_2$ box, developments with these box have stopped a few months ago. One of the teachers wants to make a new CO$_2$ box, but cheaper and easier to make than the test box. Because we didn't make much progress on developing material about the carbon footprint, we decided to make an appointment with dr. René Benders of the IVEM*.</td>
<td>9 teachers, 1 scientist, RC</td>
</tr>
<tr>
<td></td>
<td>06.02.2009</td>
<td>IVEM, RuG, Groningen</td>
<td>We visited dr. René Benders. He gave a demonstration of the DOMUS model, a model for laymen to calculate the energy use of all kinds of processes and products.</td>
<td>6 teachers, 1 scientist</td>
</tr>
<tr>
<td></td>
<td>04.03.2009</td>
<td>Greijdanus high school, Zwolle</td>
<td>A teacher on this high school tested the NLT module. In addition the RC gave a presentation on the SchoolCO$_2$web.</td>
<td>25 students, 1 teacher, RC</td>
</tr>
<tr>
<td></td>
<td>13.03.2009</td>
<td>IDO, RuG, Groningen</td>
<td>We evaluated the process of writing the NLT module.</td>
<td>6 teachers, RC</td>
</tr>
<tr>
<td></td>
<td>17.04.2009</td>
<td>IDO, RuG, Groningen</td>
<td>A congress of the NVON was organized at the RuG. Prof. Harro Meijer gave a presentation on climate change and processes which influence local atmospheric CO$_2$ levels. In addition the RC gave a presentation on the SchoolCO$_2$web.</td>
<td>50 teachers, 1 scientist, RC</td>
</tr>
<tr>
<td></td>
<td>25.04.2009 - 27.04.2009</td>
<td>Pistoia, Italy</td>
<td>During the congress, the students who wrote their profile project gave a poster presentation to students, scientists and teachers from all over Europe. The RC made a general poster to present the SchoolCO2web.</td>
<td>2 students, 2 teachers, 1 scientist, RC</td>
</tr>
<tr>
<td></td>
<td>15.05.2009</td>
<td>IDO, RuG, Groningen</td>
<td>The CO$_2$-box had been transported back to the CIO. Two pre-service teachers were designing a manual with demonstrations for the CO$_2$-box. One of them attended the meeting, to discuss his plans with the teachers. We did some testing with the CO2-box.</td>
<td>6 teachers, RC, pre-service teacher</td>
</tr>
<tr>
<td></td>
<td>28.05.2009</td>
<td>IDO, RuG, Groningen</td>
<td>60 students and four teachers of the Gomarus College visited the university. They attended a presentation of prof. Harro Meijer and the RC gave a workshop on working with the CO$_2$ data in Excel. They also got a tour through the Science Linx Science Center.</td>
<td>60 students, 1 scientist, 4 teachers, RC</td>
</tr>
<tr>
<td></td>
<td>10.06.2009</td>
<td>Van Hall Institute, Leeuwarden</td>
<td>The RC and one of the teachers who wrote the NLT module presented the NLT module “measuring and interpreting” and working with data of the SchoolCO$_2$web.</td>
<td>15 teachers, RC</td>
</tr>
</tbody>
</table>
This was the last meeting of the year. During this meeting, 9 teacher groups (including the CO2-group) presented to each other what materials they designed and which activities they did last year.

**Outputs**

**Educational materials**

<table>
<thead>
<tr>
<th>Type of material</th>
<th>Author(s)</th>
<th>Title + description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report</td>
<td>Lisanne Karbaat, Arianne Anker: students of the Maartenscollege in Haren</td>
<td>The influence of external factors on the levels of CO2 in the air: report on the research the students did (Dutch)</td>
<td>Shortly on regional website</td>
</tr>
<tr>
<td>Module</td>
<td>Jochem van Kammen: mathematics teacher at the Willem Lodewijk Gymnasium in Groningen Martine Lemstra: geography teacher at the Stellingwerfcollege in Oosterwolde</td>
<td>Measuring and interpreting: this module is meant for the new high school subject Nature, Life and Technology. It teaches students how to do precise measurements and how they can use statistics to get useful information out of a large dataset. The measurements of the SchoolCO2web are used as the main context. This module is almost finished. (Dutch)</td>
<td>After official national certification in the next months it will be available on the regional website</td>
</tr>
<tr>
<td>Presentation</td>
<td>Menno Keij</td>
<td>SchoolCO2web: general presentation on research of CO2 in Europe, the SchoolCO2web and the fluctuations of local atmospheric CO2 levels (English &amp; Dutch)</td>
<td>Shortly on regional website and Carboschools website</td>
</tr>
<tr>
<td>Presentation</td>
<td>Harro Meijer</td>
<td>Climate and greenhouse gases: an overview of the influence of greenhouse gases on the climate and insight into the research methods behind (English &amp; Dutch)</td>
<td>Shortly on regional website and Carboschools website</td>
</tr>
<tr>
<td>Poster</td>
<td>Lisanne Karbaat, Arianne Anker:</td>
<td>The influence of external factors on the levels of</td>
<td>Shortly on Carboschools website</td>
</tr>
<tr>
<td>Type of material</td>
<td>Author(s)</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------</td>
<td>-------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Poster</td>
<td>Menno Keij</td>
<td>CO$_2$ in the air: this poster gives an overview of the research the students did (English)</td>
<td>SchoolCO$_2$ web in the Netherlands (English)</td>
</tr>
<tr>
<td>Manual</td>
<td>Rinskje Klooster, David Swieringa: pre-service teachers</td>
<td>Manual CO$_2$ box: this manual describes how you can make a CO$_2$ box for doing demonstrations in the classroom on respiration, photosynthesis and combustion (Dutch)</td>
<td>Shortly on regional website</td>
</tr>
<tr>
<td>Workshop (movie, pdf presentation)</td>
<td>Menno Keij</td>
<td>Correlations with Excel and data of the SchoolCO$_2$ web: a workshop to introduce students of 15 years and older into simple correlations using Excel and the data of the SchoolCO$_2$ web. The movie shows how to give the workshop, the pdf presentation is needed during the workshop (English)</td>
<td>Shortly on Carboschools website</td>
</tr>
<tr>
<td>Video tutorials (WP3)</td>
<td>Menno Keij</td>
<td>A set of 5 video tutorials, explaining how to import data from a *.csv file into Microsoft Excel and how to find interesting information from the SchoolCO$_2$ web data using correlations and filtering</td>
<td><a href="http://www.carboeurope.org/education/schoolCO2web">http://www.carboeurope.org/education/schoolCO2web</a> or <a href="http://www.youtube.com">http://www.youtube.com</a>, search term &quot;schoolco2web&quot;</td>
</tr>
</tbody>
</table>

**Regional Carboschools website and webpages**

<table>
<thead>
<tr>
<th>Type of material</th>
<th>Author(s)</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional website</td>
<td>Menno Keij</td>
<td>Regional website if the SchoolCO$_2$ web (Dutch)</td>
<td><a href="http://www.rug.nl/sciencelinx/schoolco2web/index">http://www.rug.nl/sciencelinx/schoolco2web/index</a></td>
</tr>
<tr>
<td>Website for internal use (WP3)</td>
<td>Henk de Vries: technician of the SchoolCO$_2$ web, CIO</td>
<td>The purpose of this website is to give technical support to the partners of the SchoolCO$_2$ web and to document the specifications of all the stations</td>
<td><a href="http://fwn-school-co2-net.hosting.rug.nl/">http://fwn-school-co2-net.hosting.rug.nl/</a></td>
</tr>
</tbody>
</table>
Press coverage

<table>
<thead>
<tr>
<th>Type of magazine</th>
<th>Author(s)</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVOX</td>
<td>Menno Keij</td>
<td>An article about the SchoolCO$_2$web was published in the NVOX. The NVOX is a national magazine, published by the NVON, the Dutch Society for Science Education (Dutch)</td>
<td>Shortly on regional website</td>
</tr>
</tbody>
</table>
Regional Project Report for the School Year 2008-2009  
Kiel, Germany

Events:

<table>
<thead>
<tr>
<th>Event and Venue</th>
<th>Date</th>
<th>Activity</th>
<th>Type of Event</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaT-Working Symposium (IFM-GEOMAR, Kiel, Germany)</td>
<td>28 – 29 Nov. 2008</td>
<td>Demonstration of CO₂ Experiments by Pupils</td>
<td>Regional event; students presented their projects in ppt presentations, posters and experiment demonstrations</td>
<td>ca. 350 (students, teachers, scientists and guests)</td>
</tr>
<tr>
<td>CarboOcean Meeting (Dourdan, France)</td>
<td>Dec. 2008</td>
<td>Presentation of Kiel Regional Project by Arne Körtzinger; Poster presentation by Tobias Steinhoff</td>
<td>CarboOcean Scientists Meeting</td>
<td></td>
</tr>
<tr>
<td>Project Presentation (IFM-GEOMAR, Kiel, Germany)</td>
<td>16 Jan. 2009</td>
<td>Oral presentation of group projects</td>
<td>Part of a CO₂ course for students</td>
<td>23 (Students, teacher and scientists)</td>
</tr>
<tr>
<td>School Open House (Gymnasium Wellingdorf, Kiel, Germany)</td>
<td>27 Feb. 2009</td>
<td>Demonstration of experiments</td>
<td>Pupils demonstrated experiments for parents and younger children</td>
<td>ca. 100 (parents, teachers, younger pupils)</td>
</tr>
</tbody>
</table>
### Outputs (Materials)

<table>
<thead>
<tr>
<th>Material</th>
<th>Titles</th>
<th>Availability</th>
</tr>
</thead>
</table>
| Experiments on CO₂ in the Atmosphere | 1. The role of water in regulating the temperature of the atmosphere  
2. The effect of clouds on air temperature  
3. How does CO₂ affect the temperature of the atmosphere?  
4. What happens when CO₂ in the air increases? | (in German) http://nat-meer.ifm-geomar.de/ (Summer 2009)          |
| Experiments on CO₂ in the Ocean | 1. What is pH?  
2. What happens to the ocean when CO₂ in the air increases?  
3. The buffering capacity of seawater  
4. How do temperature and salinity affect the ability of the ocean to take up CO₂?  
5. How does temperature affect the pH of the ocean?  
6. The role of carbonate in the buffering capacity of seawater. | (in German) http://nat-meer.ifm-geomar.de/ (Summer 2009)          |
| Experiment | Carbon dioxide fertilisation of marine microalgae (*Dunaliella* sp.) cultures                                                                                     | (in English) http://nat-meer.ifm-geomar.de/                        |
| Experiment | Ein Tank zur Modellierung der Thermohalinen Zirkulation  
Modellversuch: Der Golfstrom im Klimawandel                     | (in German) http://nat-meer.ifm-geomar.de/                        |
| Worksheet | Protokolle zum Herunterladen zur CO₂-Messung mit dem Handmessgerät IAQ-Calc 7535                                                                                       | (in German) http://nat-meer.ifm-geomar.de/                        |
| Poster | CarboSchools Regional Project Kiel, Germany                                                                                            | (in English) Attachment                                           |
| Poster | „Experimente zur Erderwärmung“                                                                                                                             | (in German) http://nat-meer.ifm-geomar.de/                        |
Other Projects:

1. Long-term individual student projects on CO₂ Cycle and Ocean Acidification:
   - „Influence of ocean warming and acidification on cold water corals“ by Chantal Jacobsen, Humboldt Schule - (with 2 scientist advisors)
   - „CO₂ uptake of different species of phytoplankton“ by Cornelia Knieling, Gymnasium Wellingdorf - (2 scientist advisors)
   - „When the ocean gets acidic“ by Jantje Weber, Gymnasium Altenholz - (with 1 scientist advisor)

2. Teacher Training - 29 Nov. 2008

   A Teacher Training workshop was offered as part of the program of the NaT-Working student symposium held in November 2008. Fifteen teachers participated in the workshop. The teachers were trained on the use of the equipment contained in the „CO₂ Kit“ (see below) and were shown experiments which they can do with their students using the kit.

3. Experiment Kits

   Equipment to be lent to teachers or schools for their CO₂ projects was purchased or co-financed (in cooperation with other projects).
   - „CO₂ Kit“ – for measuring CO₂ and other experiments relevant to the CO₂ Cycle; includes a CO₂ sensor, digital thermometers, infra-red lamps and pH meters.
   - „Plankton Kit“ – for CO₂ fertilisation experiments; includes equipment for phytoplankton cultures and chlorophyll measurements.
4. Radio Interview

In connection with a children’s radio program production, three pupils (5th and 6th grades) were invited to visit the laboratory of a scientist at IFM-GEOMAR who works on cold-water corals. They were shown around his laboratory and his coral cultures and were given an introduction to his research and the effects of ocean acidification on these organisms. The radio reporter who accompanied this visit later interviewed the pupils on their views on global warming and asked them how they think they could contribute to stopping climate change.

**Drawbacks:**

Two projects did not go through as planned, which was disappointing but nevertheless instructive for future planning:

„Enrichment course“ – „Out of the Greenhouse into the Ocean - Where to with the CO₂?“ - a special 6-month course offered to talented students from 14-15 years old, as part of the „Enrichment Program“ of the city of Kiel. The course was cancelled due to a too small number of registrations. It did not become clear whether the topic and the announcement were not attractive enough, or if the general problem of motivating this particular age group had its effects.

„Student Project on lowering CO₂ emissions at school“ - The students who were interested in getting this activity off the ground were also the student representatives of their school. Unfortunately, in addition to their responsibilities like regular meetings with the headmaster and representing the student body in varied events, the organisation of several additional school activities (e.g. Christmas Bazaar and Sports Day) were delegated to them. Consequently, the students lacked time as well as support from the school and other students to realise this project.
Events:

<table>
<thead>
<tr>
<th>Event and Venue</th>
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<th>Activity</th>
<th>Type of Event</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bjerknes Getaway Seminar, Geilo, Norway</td>
<td>28.01.2008</td>
<td>Talk (Experiences from a Norwegian CarboSchools project, by Skjelvan, Volbers)</td>
<td>Internal scientific and social gathering</td>
<td>80</td>
</tr>
<tr>
<td>Danish Summer course on global climate change, Bergen</td>
<td>06.06.2008</td>
<td>Talk (CarboSchools – European network of school partnership project on climate change research, by Skjelvan, Volbers)</td>
<td>Danish summer school participants on field trip to Bergen</td>
<td>30</td>
</tr>
<tr>
<td>CARBOOCEAN annual meeting, Paris, France</td>
<td>10.12.2008</td>
<td>Talk (CarboSchools activity in Bergen, by Volbers, Falck, Skjelvan)</td>
<td>Scientific meeting</td>
<td>100</td>
</tr>
<tr>
<td>EPOCA Training Workshop on The Fundamentals of carbon biogeochemistry, Bergen</td>
<td>26.02.2009</td>
<td>Talk (Education and outreach, by Skjelvan)</td>
<td>Training workshop</td>
<td>50</td>
</tr>
<tr>
<td>Subject pedagogical day for teachers, Bergen</td>
<td>06.02.2009</td>
<td>Talk (Den marine karbonsyklusen – treng vi vite noko om den? by Skjelvan)</td>
<td>Talks (in Norwegian) for teachers</td>
<td>60</td>
</tr>
<tr>
<td>Climate debate</td>
<td>30.04.2009</td>
<td>Talks, questions, debate</td>
<td>Scientist - student exchange</td>
<td>ca. 60 (students, teachers, researchers)</td>
</tr>
</tbody>
</table>
## Outputs (Materials)

<table>
<thead>
<tr>
<th>Material</th>
<th>Titles</th>
<th>Availability</th>
</tr>
</thead>
</table>
| Experiment instruction for ship cruise | 1. Salt, temperature and content of carbon in the ocean.  
2. Is the fjord a sink or a source for atmospheric carbon? | (in English) [http://nat-meer.ifm-geomar.de/CarboSchools/WP5/CS_Materials/CS_is_080711.doc](http://nat-meer.ifm-geomar.de/CarboSchools/WP5/CS_Materials/CS_is_080711.doc) |
| Poster | CarboSchools – CARBOOCEAN's and CarboEurope's combine initiative to educate secondary school students in latest marine and terrestrial carbon cycle research | (in English) |
| Poster | CarboSchools in Bergen, Norway (presented at Pistoia CS meeting) | (in English) sent to Philippe |

## Press coverage

<table>
<thead>
<tr>
<th>Event</th>
<th>For whom, what</th>
<th>Press</th>
</tr>
</thead>
<tbody>
<tr>
<td>One day cruise, fjords off Bergen</td>
<td>7th grade primary school, part of their participation in a national research contest &quot;Nysgjerrigper&quot;</td>
<td>Article in local newspaper Bygdanytt, &quot;Nysgjerrigerar på tokt&quot;, 20.03.2009</td>
</tr>
</tbody>
</table>
Regional Project Report for the Schoolyear 2008-2009
Aquitaine, France

Events

<table>
<thead>
<tr>
<th>Event and Venue</th>
<th>Date</th>
<th>Activity</th>
<th>Number and details of participants</th>
<th>Associated outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLOBE annual meeting, Bülach, Switzerland</td>
<td>14-17 April</td>
<td>Presentation of CarboSchools</td>
<td>32 GLOBE country coordinators and teachers 1 CarboSchools RC (SH)</td>
<td>CarboSchools presentation, activities flyer, visiting card Detailed notes of the meeting</td>
</tr>
<tr>
<td>CarboSchools Aquitaine and GLOBE joint end of school year conference</td>
<td>5 June</td>
<td>Powerpoint presentations of school project results and activities by the pupils, presentations given by scientists, demonstrations, posters</td>
<td>230 people, mainly pupils with their teachers, 3 scientists 6 CarboSchools schools and 1 GLOBE school</td>
<td>Programme (attachment) CarboSchools banner Presentations by the pupils available on the regional website</td>
</tr>
</tbody>
</table>

Outputs

Educational materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Created by</th>
<th>Content contributors</th>
<th>Titles</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson plan, powerpoint presentation, worksheets</td>
<td>SH</td>
<td>SH</td>
<td>English lesson: An introduction to dendrochronology</td>
<td>attachment</td>
</tr>
<tr>
<td>Powerpoint presentation</td>
<td>SH, Denis Loustau</td>
<td>SH, Denis Loustau (DL), Marc Jamous</td>
<td>An introduction to the handheld CO2 sensor and atmospheric CO2 concentrations</td>
<td></td>
</tr>
<tr>
<td>Powerpoint presentation, worksheets</td>
<td>SH</td>
<td>SH, DL</td>
<td>How to calculate CO2 fluxes in a closed chamber (between plant and atmosphere, soil and atmosphere etc)</td>
<td><a href="http://www.carboschools-aquitaine.org/ressources/">http://www.carboschools-aquitaine.org/ressources/</a></td>
</tr>
</tbody>
</table>
Worksheet
SH
SH, Virginie Moureau (PhD student)
For a school visit to an INRA experimental site
attachment

Booklet
SH
Marc Jamous
Activities to get started
Shortly on regional website

Regional CarboSchools websites and web pages

<table>
<thead>
<tr>
<th>Material</th>
<th>Created by</th>
<th>Content contributors</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional website</td>
<td>Tovo Rabemanantsoa (webmaster), SH</td>
<td>SH, CarboSchools pupils and teachers, other</td>
<td><a href="http://www.carboschools-aquitaine.org">www.carboschools-aquitaine.org</a></td>
</tr>
<tr>
<td>Web page for the EPHYSE unit (INRA) website</td>
<td>Anne-Marie Bouchon (webmaster)</td>
<td>SH</td>
<td><a href="http://www.bordeaux-aquitaine.inra.fr/ephyse/les_recherches/projets/carboschools">http://www.bordeaux-aquitaine.inra.fr/ephyse/les_recherches/projets/carboschools</a></td>
</tr>
<tr>
<td>School website</td>
<td>CS project teachers, Sainte Marie de la Bastide School</td>
<td>Project teachers and pupils</td>
<td><a href="http://carboschools.smb33.org">http://carboschools.smb33.org</a></td>
</tr>
</tbody>
</table>

Other promotional material

<table>
<thead>
<tr>
<th>Material</th>
<th>Created by</th>
<th>Content contributors</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CarboSchools Aquitaine flyer (school year 2008)</td>
<td>SH</td>
<td>SH</td>
<td><a href="http://www.carboschools-aquitaine.org/ressources">http://www.carboschools-aquitaine.org/ressources</a></td>
</tr>
<tr>
<td>CarboSchools activities flyer</td>
<td>SH</td>
<td>All RCs</td>
<td>Shortly on regional website</td>
</tr>
<tr>
<td>Invitation to apply for the school year 2009</td>
<td>SH</td>
<td>SH</td>
<td><a href="http://www.carboschools-aquitaine.org">www.carboschools-aquitaine.org</a></td>
</tr>
<tr>
<td>CarboSchools presentation for GLOBE</td>
<td>SH</td>
<td>SH, CS team</td>
<td>attachment</td>
</tr>
<tr>
<td>CarboSchools Aquitaine booklet (presented to the county council)</td>
<td>SH</td>
<td>SH, DL</td>
<td>attachment</td>
</tr>
</tbody>
</table>

Press coverage
Various newspaper articles about the Max Linder School CarboSchools activities (attachment)
Regional Project Report for the School year 2008-2009. Tuscany, Italy

Events:

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
<th>Details</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Festa della Geografia in Poppi</td>
<td>8 June 2009</td>
<td>Demonstration of the hand-on activity related to the meteorology of Casentino Valley</td>
<td>Ca.200 (guests, students, teachers..)</td>
</tr>
<tr>
<td>Science week at school</td>
<td>16-23 March 2009</td>
<td>School event: pupils demonstrated their experiments and activities on CO2 properties and soil respiration</td>
<td>Ca.500 (students, teachers, guests....)</td>
</tr>
<tr>
<td>Conference: “Scuola e Ricerca vs. Effetto Serra”</td>
<td>16 Dec. 2008</td>
<td>Seminar on Green House Effect and Global Change and presentation of the activities run in Italy including the project “School-C02net”</td>
<td>Ca. 100 among students, teachers and local authorities</td>
</tr>
<tr>
<td>La festa della Geografia in Florence</td>
<td>12-15 Nov. 2008</td>
<td>Regional fair; experiments with pupils and dissemination campaign with leaflets</td>
<td>Hundreds (students, teachers, free access to other people....)</td>
</tr>
</tbody>
</table>

Outputs (Materials)

<table>
<thead>
<tr>
<th>Material</th>
<th>Titles</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands- on activity (seminar &amp; protocol)</td>
<td>Photosynthesis I measure it! Hands- on activity on gas exchanges between plants and atmosphere (measurements of gas exchanges between leaves and atmosphere)</td>
<td>Protocol (in Italian &amp; English) <a href="http://web.fi.ibimet.cnr.it/carboschools/">http://web.fi.ibimet.cnr.it/carboschools/</a></td>
</tr>
<tr>
<td>Hands- on activity</td>
<td>The soil’s breath.</td>
<td></td>
</tr>
</tbody>
</table>
### Other Projects:

1. Experiments on CO2 properties and Green House Effect in a Naturally enriched area
2. Hands-on activity about the effects of high level of CO2 in atmosphere on plant growing
Regional Project Report for the Schoolyear 2008-2009  
Barcelona, Catalunya, Spain  
Laboratori de Recerca del Clima – Parc Científic de Barcelona (LRC-PCB)

Events

<table>
<thead>
<tr>
<th>Event and Venue</th>
<th>Date</th>
<th>Activity</th>
<th>Type of Event</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project presentation at Secció de Ciències Naturals del Museu de Mataró</td>
<td>3 April 2008</td>
<td>Presentation of the project</td>
<td>Scientific talk and presentation of the educational project (for non-formal education) to open public.</td>
<td>ca. 30 participants</td>
</tr>
<tr>
<td>Project presentation at Escola Pia Santa Anna in Mataró</td>
<td>21 April 2008</td>
<td>Presentation of the project</td>
<td>Scientific talk and presentation of the educational project (for formal education) to teachers and pupils from Escoles Pies.</td>
<td>ca. 70 participants including students and teachers</td>
</tr>
<tr>
<td>Project presentation at Science Park in Barcelona</td>
<td>9 October 2008</td>
<td>Presentation of the project</td>
<td>Scientific talk and presentation of the educational project to scientists working in the Science Park in Barcelona.</td>
<td>ca. 20 participants, mostly scientists from different research fields</td>
</tr>
<tr>
<td>1st Carboschools-Catalunya CO₂ Workshop. Aula Magna de la Facultat de Biologia de la Universitat de Barcelona.</td>
<td>17 June 2009</td>
<td>Oral and poster presentation of projects carried out during the scholar year</td>
<td>Students who participate in different projects in collaboration with scientists from LRC-PCB expose the results obtained to other students, teachers and scientists.</td>
<td>ca. 200 participants, including students, teachers and scientists</td>
</tr>
</tbody>
</table>
### Outputs (Materials)

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>PowerPoint</td>
<td>Presentation of the project „Measurement of atmospheric CO\textsubscript{2} along a transect running from higher to lower altitude“: scientific background, educational benefits and procedure</td>
<td>(in English) <a href="http://www.carboschools.cat/pdf/activity_web.pdf">http://www.carboschools.cat/pdf/activity_web.pdf</a></td>
</tr>
<tr>
<td>Poster</td>
<td>CarboSchools Regional Project</td>
<td>(in English) <a href="http://www.carboschools.cat/pdf/carboschools_poster.pdf">http://www.carboschools.cat/pdf/carboschools_poster.pdf</a></td>
</tr>
</tbody>
</table>

### Websites and news

<table>
<thead>
<tr>
<th>Center/Website</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Research Laboratory (LRC-PCB):</td>
<td>Launch of the CarboSchools Regional website</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.carboschools.cat">www.carboschools.cat</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escola Sant Gervasi:</td>
<td>News on website: Description of the project that the students of the school were going to participate during the 2008-09 scholar year.</td>
<td>(in Catalan) Attached document <a href="http://www.carboschools.cat/pdf/2008_10_StGervasi.pdf">2008_10_StGervasi.pdf</a></td>
</tr>
<tr>
<td><a href="http://www.santgervasi.org">www.santgervasi.org</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.cemporda.org">www.cemporda.org</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IES Martí i Pol:</td>
<td>News on website: Description of the project that the students of the school were going to participate during the 2008-09 scholar year.</td>
<td>(in Catalan) Attached document <a href="http://www.carboschools.cat/pdf/2009_01_IESMart%C3%ADPol.pdf">2009_01_IESMartíPol.pdf</a></td>
</tr>
<tr>
<td>phobos.xtec.cat/iesmarti-pol/joomla/</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.pcb.ub.cat">www.pcb.ub.cat</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.cemporda.org">www.cemporda.org</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escola Sant Gervasi: <a href="http://www.santgervasi.org">www.santgervasi.org</a></td>
<td>News on website: Report of the 1st Carboschools-Catalunya Workshop where students presented the results obtained during the project to other schools that also participate in the project</td>
<td>mpordà.pdf</td>
</tr>
</tbody>
</table>
## Events (organised and/or implicating the regional coordinator):

<table>
<thead>
<tr>
<th>Event and Venue</th>
<th>Date</th>
<th>Activity</th>
<th>Type of Event</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting of <em>objectif CO₂</em> project (Lycée de Saint-Cyr, France)</td>
<td>18 May 2009</td>
<td>Presentation of works on school by pupils, round-table around scientists’ life.</td>
<td>Regional event about school works</td>
<td>ca. 460 (students, teachers, scientists and guests)</td>
</tr>
<tr>
<td>CarboOcean Meeting (Dourdan, France)</td>
<td>10 Dec. 2008</td>
<td>Teachers formation in French on ocean acidification</td>
<td>Teachers formation</td>
<td>12 (8 teachers and 3 scientists)</td>
</tr>
<tr>
<td>Teacher formation (University of Paris 6, France)</td>
<td>6 Nov. 2008</td>
<td>Formation to the use of Excel, with examples relative to carbon cycle</td>
<td>Teachers formation</td>
<td>22 (teachers, trainer, RC)</td>
</tr>
<tr>
<td>Meeting: <em>The Ocean in a High-CO₂ World</em> (Monaco)</td>
<td>9 Oct 2008</td>
<td>Teachers and scientists formation</td>
<td>Scientists and teachers meeting</td>
<td>45 (teachers from Monaco and Nice area, scientists, RC of Île de France)</td>
</tr>
<tr>
<td>Réunion préparatoire d’un projet sur le cycle du carbone (University of Paris 6, France)</td>
<td>10 Jun 2008</td>
<td>Teachers meeting</td>
<td>Preparation of a school network for the next scholar year</td>
<td>30 teachers</td>
</tr>
<tr>
<td>EGU meeting (GIFT) (Vienna, Austria)</td>
<td>April 2008</td>
<td>Teachers formation</td>
<td>Experiments realized by teachers about carbon cycle with a CO₂ sensor</td>
<td>68 European teachers</td>
</tr>
</tbody>
</table>
# Outputs (Materials and activities)

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td>Production of a new CarboSchools website</td>
<td><a href="http://www.carboschools.org">http://www.carboschools.org</a> (in 9 languages)</td>
</tr>
<tr>
<td>Experiments on global temperature</td>
<td>1. Works with data of France and global surface temperature (Excel files)&lt;br&gt;2. Works on an experimental model of global temperature regulation, realised with very useful material.</td>
<td><a href="http://cycleducarbone.ipsl.jussieu.fr/content/view/24/5/">http://cycleducarbone.ipsl.jussieu.fr/content/view/24/5/</a> (in French)&lt;br&gt;<a href="http://cycleducarbone.ipsl.jussieu.fr/content/view/25/5/">http://cycleducarbone.ipsl.jussieu.fr/content/view/25/5/</a> (in French)</td>
</tr>
<tr>
<td>Experiments on CO₂ fluxes</td>
<td>1. Measurements of CO₂-air concentration on different locations&lt;br&gt;2. Measurement of variation of CO₂-air concentration with plants in little greenhouses&lt;br&gt;3. Measurement of variation of CO₂-air concentration above sea-water with high or low pCO₂</td>
<td><a href="http://cycleducarbone.ipsl.jussieu.fr/content/view/7/5/">http://cycleducarbone.ipsl.jussieu.fr/content/view/7/5/</a> (in French)</td>
</tr>
<tr>
<td>Experiments on ocean acidification</td>
<td>1. Different ways to acidify sea-water&lt;br&gt;2. Measurements of an acidification due to a high CO₂-atmosphere&lt;br&gt;3. Effects on life by observing evolution of a clam shell</td>
<td><a href="http://cycleducarbone.ipsl.jussieu.fr/content/view/7/5/">http://cycleducarbone.ipsl.jussieu.fr/content/view/7/5/</a> (in French)</td>
</tr>
<tr>
<td>Works on data about Carbon cycle</td>
<td>1. Estimation of CO₂ amount in atmosphere from atmospheric measure on 1958 and Human emissions from 1958 to 2006&lt;br&gt;2. Comparing with real atmospheric CO₂ measure between 1958 and 2006&lt;br&gt;3. Estimation of natural sinks&lt;br&gt;4. Prediction of the atmospheric CO₂ evolution for the next century with the help of IPCC scenarios and precedent work</td>
<td>Pdf files in annexe, in French and English. These documents were sent to a lot of teachers.</td>
</tr>
<tr>
<td>CO₂ sensors</td>
<td>22 CO₂ sensors were distributed into 25 secondary schools of the area all along the scholar year.</td>
<td></td>
</tr>
</tbody>
</table>
Activities in Cluj-Napoca, Romania

In Cluj-Napoca, Romania the partners involved in Carboschools project are The National Institute for Research and Development of Isotopic and Molecular Technologies, “Emil Racovita” National College and “Nicolae Balescu Highschool. In the frame of this partnership, 50 students (25 from each school) participated in different activities of this project. These activities consisted of seminars given by scientists followed by discussions with students and teachers. Also, the researchers helped students to perform by themselves CO₂ concentrations measurements using the research laboratory infrastructure. A very important part of activities was related to real experiments in order to identify and measure CO₂ in different locations (school and institute yard, street, classrooms, parks). In the same time the scientists involved in this project, supported the students to process the experimental data and to prepare their own presentations/ seminars for different social/scientific events. The students were not only informed about what a scientific career means or how important the climate change issues are, but they had the possibility to live this experience and also to know researchers daily activity.

Dr. Dana Alina Magdas
National Institute for Research and Development of Isotopic and Molecular Technologies
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400293, Cluj-Napoca, Romania
Tel.: +40 264 584037 ; Fax: +40 264 420042
E-mail: amagdas@itim-cj.ro
SchoolCO2web

Number of participating schools: 1

- Teachers: 3
- Scientists: 2
- Students: 7

Activities:
- set-up of instruments and trouble shooting with teachers
- students program a user-friendly webinterface for the CZG SchoolCO2web data
- they present their work to scientists and discuss further development

Duration of Project

- Nov
- Feb
- May
- Aug

involvement

low

high
Treibhaus Erde

Teachers: 1
Scientists: 7
Students: 19

Activities:
- introduction by scientist (earth’s radiation balance)
- hands-on experiments with scientists (green-house effect, albedo effect, CO2-solubility in water)
- MPI-BGC tour (weather station + CO2-sensor, 14C-laboratory)

Duration of Project
9:00 April 23rd 14:30

Students from 2 different schools
Ich sehe was, was du nicht siehst – Forschen mit Satellitenbildern

Teachers: 0
Scientists: 3
Students: 17

Activities:
- Introduction to remote sensing; why & how
  MPI-BGC scientist use this tool
- Students learn how to use ENVI software
- PC-exercises/experiments for students
  with satellite images

Duration of Project
9:00 April 23rd 14:30
Baum & Klima

Activities:
- introduction: what are annual rings, why do we find narrow and wide rings, how do scientists get samples,?
- methods of sampling
- work on tree discs and wood samples

Number of participating schools: 1

Duration of Project

12:00 12.05.2009 13:00
CarboSchools in the UK: 18 month report

**Schools:** 2  
**Scientists:** 2  
**Students:** 30

Partnership links:  
University of East Anglia (UEA)

CO₂ web: technical assistance, UEA

**Activities:**
- Environment Week in Spring term
- Discussions with scientists on the big issues related to Global Environmental Change, driven by increases in world population over the last 50 years. Changing but exciting times linking to science relevant to Global Change
- Installation of equipment for school CO2 web followed by training

**City of Norwich School**

**Diss High School**

Sept 08  Dec 08  Mar 09  Jun 09
The influence of external factors on the levels of $\text{CO}_2$ in the air

Activities

- Designing and carrying out own research
- Calibrating a $\text{CO}_2$ sensor at the lab of the CIO
- Investigating whether factors like vegetation or gases from exhaust pipes have an influence on the local $\text{CO}_2$ measurements
- Writing a report and making a poster
- Presenting the poster in Pistoia at the students conference

Duration of Project

- Sept
- Dec
- Mar
- Jun

# participating schools: 1

- Teachers: 3
- Scientists: 2
- Students: 2
Module “measuring and interpreting”

# participating schools: 1

- Teachers: 1
- Scientists: 1
- Students: 25

Activities

- A module of 40 hours for the new high school subject Nature, Life and Technology
- Students learn how obtain precise measurements and how to use statistics to get useful information from a large dataset
- The measurements of the SchoolCO2web are used as the main context
- The regional coordinator (scientist) came to the school to give a presentation about the research of CO2 in Europe, the SchoolCO2web and the fluctuations of local atmospheric CO2 levels

Duration of Project

Sept  Dec  Mar  Jun
Presentation and workshop on the SchoolCO$_2$web at the university

# participating schools: 1

Teachers: 4
Scientists: 1
Students: 60

Activities

- Presentation of Prof. Harro Meijer on climate change and research on carbon dioxide
- Correlations with Excel and data of the SchoolCO$_2$web: a workshop to introduce students into simple correlations using Excel and the data of the SchoolCO$_2$web

Duration of Project

Sept Dec Mar Jun
The Carbon Cycle - Global Change - Climate Change - Impact on the Ocean: a Project Course

Activities:
- in-depth literature research on various carbon-related topics
- discussion of materials with scientific tutors
- ppt presentation of research topics
- written reports on research topics

Participating school: Gymnasium Wellingdorf

Teachers: 1
Scientists: 10
Students: 14
After-School Marine Science Course: “The Ocean and CO₂: What has one to do with the other?”

Teachers: 1

Scientists: 1 coordinator 2-3 guest lecturers

Students: 14

Activities:
- simple experiments and games which demonstrate basic principles of CO₂ cycle
- visits to labs of scientists working on CO₂ topics
- demonstration of experiments at Open Day

Participating school: Gymnasium Wellingdorf
Individual Student Practicals

Teachers: 0
Scientists: 2
Students: 2

Activities:
- assisting in the development of materials and experiments for the CarboSchools library
- web search for suitable materials for the CS Library
- assessing the links listed in the CS library

Participating school: Städtisches Gymnasium-Bad Segeberg
Simulating the Atmosphere’s CO₂ Concentrations – A Classroom Activity

Teachers: 1  Scientists: 1  Students: 2 (active) 23 (passive)

Activities:
- students measure the CO₂ concentration inside the classroom under different conditions (e.g. lighting candles, putting in plants, etc.)
- 2 active students present the results to the entire class
- demonstration and hands-on experiments on school’s Presentation Day

Participating school: Gymnasium Wellingdorf
GLOBE meets CarboSchools

Activities:
- in addition to on-going atmospheric measurements, the students also measure CO₂ in the atmosphere during the different seasons using hand-held CO₂-sensors
- the students participate in short ship cruises to compare CO₂ concentrations on land and above the water

Participating school: Max-Planck Schule
Science Camp – Mesocosm Experiments on Ocean Acidification

Activities:
- the students participated in the science camp for university students to do mesocosm experiments on ocean acidification in the Baltic Sea

Participating school: Isarnho Schule
Researching about the Climate Problem through Experiments and Technology

Activities:
- an interdisciplinary (chemistry, physics, biology and geography) approach to understanding the climate problem
- visit to a coal power plant and to the city incinerator plant to compare differences in heat generation
- performance of different experiments related to the CO₂ problem

Participating school: Isarnho Schule

- Teachers: 4
- Scientist: 1
- Students: 20
CarboSchools Bergen, in upper secondary school
Marine sciences with emphasis on carbon cycle

Teachers: 4
Scientists: 6
Students: 86

Activities:
- scientists gave presentations on marine carbon cycle and climate research
- discussion on the topics in the classrooms
- cruises on the fjord where different experiments were performed
- analyses of water samples in the scientists’ lab
- data management (correction, calculation)
- interviews of scientists
- climate debate between scientists and students from all schools
- writing reports, presenting research topic and results

Number of participating schools and classes: 3 and 4
1. Bergen Katedralskole (biology, technology and research), age 17-18
2. Bjørgvin videregående skole (geosciences), age 18-19
3. Danielsen videregående skole (technology and research, age 18-19)

Duration of project
Sept -08 - Dec -08 - Mar -09 - Jun -09
CarboSchools Bergen, in primary school
Marine sciences with emphasis on physical oceanography

Teachers: 2
Scientists: 2
Students: 14

Activities:
- students contacted scientists
- scientist gave presentations on marine topics like ocean pressure and density
- discussion on the topics in the classrooms
- a cruise on the fjord where different experiments were performed
- collecting data
- writing report and submitting it to the Research Council in Norway, as a participation in the science in schools competition “Nyskjerrigper”
- ppt presentation of research topic

Number of participating schools and classes: 1 and 1
1. Fotlandsvåg skule, age 12-13

Duration of project
Sept -08  Dec -08  Mar -09  Jun -09
**School:** Collège Branne  
**Project title:** Carbon and water

*Number of participating classes:* 1  
*Disciplines:* biology and geology, maths  
*Age of pupils:* 13 - 14  
*Type of project:* class of volunteers, integrated into curriculum

**Activities:**
- introduction to climate change and impacts in the Aquitaine region, notably on its rivers, by the teachers
- conference and discussions with scientists on these topics
- boat trip and laboratory visits
- experimentation: with and without a scientist
- data analysis and manipulation with Excel, with and without scientist
- reports of work carried out for the school CarboSchools website
- ppt presentation of research topics at the end of school year

CarboSchools Aquitaine conference

**Duration of Project**

<table>
<thead>
<tr>
<th></th>
<th>Sept</th>
<th>Dec</th>
<th>Mar</th>
<th>Jun</th>
</tr>
</thead>
</table>

**Teachers:** 2  
**Scientists:** 4  
**Students:** 20
**School:** Lycée La Sauque  
**Project title:** $CO_2$ flux of Lycée la Sauque - tree, forest, different soils, different ecosystems (meadow v lawn) pupils, means of transport

<table>
<thead>
<tr>
<th>Number of participating classes:</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disciplines:</strong></td>
<td>biology and geology, physiques and chemistry</td>
</tr>
<tr>
<td><strong>Age of pupils:</strong></td>
<td>15-16</td>
</tr>
<tr>
<td><strong>Type of project:</strong></td>
<td>extra-curricular project work (5 different projects)</td>
</tr>
</tbody>
</table>

**Activities:**  
• in-depth literature research on various carbon-related topics  
• conference and discussions with a scientist on these topics  
• experimentation: entirely thought up and carried out by the pupils  
• analysis of the results with a scientist  
• ppt presentation of research topics at the end of school year CarboSchools Aquitaine conference

**Teachers:** 10  
**Scientists:** 2  
**Students:** 50

**Duration of Project**

Oct | Dec | Mar | Jun
**School:** Lycée Sainte Marie Bastide

- **Number of participating classes:** 1
- **Number of projects:** 1
- **Disciplines:** biology and geology, physics and chemistry
- **Age of pupils:** 15-16
- **Type of project:** partially integrated into the curriculum

**Activities:**
- conference and discussions with scientists on climate change and the greenhouse effect
- experimental site visit
- study of the mechanics of some sensors used on the site
- experimentation guided by a scientist
- data analysis and manipulation with Excel, with a scientist
- reports of work carried out for the school CarboSchools website
- ppt presentation of research topics at the end of school year

**CarboSchools Aquitaine conference**

**Duration of Project**

- **Sept**
- **Dec**
- **Mar**
- **Jun**

**Involvement**

- **Students:** 35
- **Scientists:** 3
- **Teachers:** 2

- **involvement**
  - high
  - low
School: Lycée Max Linder

Number of participating classes: 1
Disciplines: biology and geology, physics and chemistry
Age of pupils: 15-16
Type of project: multi-disciplinary, integrated into the curriculum

Activities:
• conference and discussions with scientists on climate change and the greenhouse effect
• experimental site visit
• in depth study of the mechanics of some sensors used on the site
• installation of CO₂ sensor and weather station for SchoolCO2web
• data analysis and manipulation with Excel (dendrology, SchoolCO2web, remote sensing…)
• Study of the economical, social, political and juridical aspects of climate change
• developing language skills (English and Spanish) via the subject of climate change
• organisation of a CarboSchools exhibition day (stands, posters, workshops, etc)
• ppt presentation of research topics at the end of school year CarboSchools Aquitaine conference

Duration of Project

Sept  Dec  Mar  Jun
### School: Lycée Max Linder  
### Project: gas exchange between air and water

- **Number of participating classes:** 1  
- **Disciplines:** biology and geology, physics and chemistry  
- **Age of pupils:** 16-17  
- **Type of projects:** a teacher guided personal project (curriculum integrated)  
- **Activities:**  
  - Experimentation  
  - Production of a poster and a report.

### School: Lycée Max Linder  
### Project: Application for EcoSchools

- **Number of participating classes:** 1  
- **Disciplines:** biology and geology, physics and chemistry  
- **Age of pupils:** 16-17  
- **Type of projects:** a teacher guided personal project (curriculum integrated)  
- **Activities:**  
  - School audit  
  - Application procedures  
  - Production of a report.

---

**Duration of both projects**

- Sept  
- Nov  
- Jan  
- Mar  
- Jun

**Ecoschools project accepted 25 June 2009**

<table>
<thead>
<tr>
<th>Teachers: 2</th>
<th>Scientists: 1</th>
<th>Students: 2</th>
</tr>
</thead>
</table>

- **High involvement**  
- **Low involvement**
School: Lycée des Graves

Number of participating classes: 1
Disciplines: biology and geology, physics and chemistry
Age of pupils: 15-16
Type of project: integrated into curriculum

Activities:
• conference and discussions with scientists on climate change and the greenhouse effect
• experimental site visit
• in depth study of the mechanics of some sensors used on the site
• data analysis and manipulation with Excel (dendrology, SchoolCO2web, remote sensing…)
• developing English language skills via the subject of climate change
• ppt presentation of research topics at the end of school year

CarboSchools Aquitaine conference

Duration of Project

Oct Dec Mar Jun

Teachers: 2
Scientists: 3
Students: 18
School: Lycée Condorcet

Number of participating classes: 1
Disciplines: biology and geology, physics and chemistry
Age of pupils: 15-16
Type of project: integrated into curriculum

Activities:
• conference and discussions with scientists on climate change and the greenhouse effect
• experimental site visit
• dendrochronology and related fieldwork
• atmospheric CO₂ measurements
• ppt presentation of research topics at the end of school year
CarboSchools Aquitaine conference

Duration of Project
Oct Dec Mar Jun

Teachers: 3
Scientists: 4
Students: 35
Atmospheric CO$_2$ concentration at school

Number of participating schools: 1

Activities:
- in-depth literature research on carbon-related topics
- ppt presentation of research topics to the students
- discussions between students and scientists on these topics
- hands-on activities on CO2 concentration in atmosphere in urban environment using a portable IRGA gas analyzer and experiments on chemical and physical properties of CO2

Duration of Project

Sept  Dec  Mar  Jun

Teachers: 1
Scientists: 2
Students: 25

Involvement
The Soil Breaths: Soil as source or sink of carbon?

Activities:
- in-depth literature research on soil sequestration of carbon dioxide and soil respiration
- teacher and the scientist discuss about the evolvement of the project
- ppt presentation about gas exchanges between soil and atmosphere and role of agriculture on carbon sequestration.
- hands on activities on soil respiration (using an IRGA gas analyzer) on soil cover by grass, pines and without vegetation

Number of participating schools: 1

Duration of Project:
- Sept
- Dec
- Mar
- Jun

Teachers: 1
Scientists: 2
Students: 18
The Photosynthesis of plant
What happen at the leaf during the photosynthesis?

Activities:
- in-depth literature research on photosynthesis and gas exchange by the leaves
- teacher and the scientist discuss about the evolvement of the project
- lesson to the students with a ppt presentation about photosynthesis, gas exchanges in green alive leaves and role of vegetation on the green house effect.
- hands on activities on photosynthesis measurements with the CIRAS-1 device.

Number of participating schools: 1

Teachers: 1
Scientists: 2
Students: 14

Duration of Project

Sept Dec Mar Jun
Green House Effect *in loco*: Bossoleto and its natural CO2 springs as school laboratory

Activities:
- Multidisciplinary visit to the Bossoleto doline (geology, botany and CO2 properties explanations)
- Running of experiments testing the presence and the properties of CO2 and the green house effect using simple tools (thermometers, baloons, candles)
- Hands on activity testing the effect of CO2 on plant growing: barley is seeded in 10 pots, 5 of them left in the naturally CO2 enriched air of Bossoleto and 5 at school.

Number of participating schools: 1

Duration of Project

Number of participating schools: 1

Teachers: 2
Scientists: 2
Students: 40
Measuring atmospheric CO₂ concentration along a transect at different sites in Barcelona at different times of the day

Number of participating schools: 1

Activities:
- Atmospheric CO₂ measurements at different sites within Barcelona, covering different land uses and altitudes, at different times of the day (morning-evening)
- Discussion of results obtained with scientists

Duration of Project:
- Sept
- Dec
- Mar
- Jun

Teachers: 1
Scientists: 3
Students: 1
Measuring atmospheric CO₂ concentration along transects from seashore up to summits of the Catalan Maritime Range every 3 weeks

Number of participating schools: 3

Activities:
- Conference about Carbon Cycle and Climate Change by a scientist
- Atmospheric CO₂ measurements along horizontal transects from the Mediterranean Coastline up to the top of a mountain of the Catalan Maritime Range. Transects are measured every 3 weeks, simultaneous in the three locations (Cap de Creus, la Conreria and Collserola)
- Discussion of results obtained between students, teachers and scientists
- Presentation of results (slide presentation + poster) in a workshop with other participant schools

Duration of Project

- Sept
- Dec
- Mar
- Jun
Measuring atmospheric CO₂ concentration along a transect in the two sides of a mountain

Number of participating schools: 2

- Teachers: 2
- Scientists: 4
- Students: 20

Activities:
- Conference about Carbon Cycle and Climate Change by a scientist
- Atmospheric CO₂ measurements along a horizontal transect covering the two sides of a mountain.
- Discussion of results obtained between students, teachers and scientists
- Presentation of results (slide presentation + poster) in a workshop with other schools

Duration of Project:
- Sept
- Dec
- Mar
- Jun
Measuring atmospheric CO₂ concentration along a transect in the Llobregat river’s Delta

Number of participating schools: 1

Activities:
- Conference about Carbon Cycle and Climate Change by a scientist
- Atmospheric CO₂ measurements along a transect in the Llobregat river’s Delta
- Discussion of results obtained between students, teachers and scientists
- Presentation of results (slide presentation + poster) in a workshop with other schools

Duration of Project:
Sept Dec Mar Jun
Measuring atmospheric CO₂ concentration along a transect in the Congost’s canyon

Number of participating schools: 1

Activities:
- Conference about Carbon Cycle and Climate Change by a scientist
- Atmospheric CO₂ measurements along a transect in the Congost’s canyon

Duration of Project

Sept  Dec  Mar  Jun

Projects: 5
Participating schools: 23

Teachers: 39
Scientists: 12
Students: 571

Pupils age: 11-16

Graph: Température en France métropolitaine entre 1901 et 2008
Project 1: Objectif CO₂

Participating schools: 19

Teachers: 32
Scientists: 10
Students: 475

Pupils age: 15-16

Activities:
- Works on data
- Measurements of atmospheric CO₂
- Experiments on carbon cycle (fluxes, exchanges between biosphere, hydrosphere, atmosphere and cryosphere, estimation of amount in reservoirs...)
- Forecasting of CO₂ emission and regulation by natural carbon sinks and sources
- Laboratory visits
- Production of a PowerPoint presentation that was common of 19 schools
- Oral presentation in front of pupils and scientists (more than 450 participants)
- Production of posters
- Round table with scientists about career and day-life

Duration of the project

Sept Oct 15 May 19 Jun
Objectif CO$_2$
List of schools: name and city

Lycée Louis Bascan, Rambouillet
Lycée La Bruyere, Versailles
Lycée Rene Cassin, Arpajon
Lycée Francois-Joseph Talma, Brunoy
Lycée Robert Doisneau, Corbeil-Essonnes
Lycée Vallee de Chevreuse, Gif-sur-Yvette
Lycée Marguerite Yourcenar, Morangis
Lycée Jean Baptiste Corot, Savigny-sur-Orge
Lycée Emmanuel Mounier, Chatenay-Malabry
Lycée Jacques Monod, Clamart
Lycée Paul Lapie, Courbevoie
Lycée Leonard De Vinci, Levallois-Perret
Lycée Alfred Kastler, Cergy-Pontoise
Lycée Galilee, Cergy-Pontoise
Lycée Gustave Monod, Enghien-Les-Bains
Lycée Charles Baudelaire, Fosses
Lycée Simone De Beauvoir, Garges-Les-Gonesse
Lycée Fragonard, L’Isle Adam
Lycée Camille Pissarro, Pontoise
Project 2: Évolution du CO$_2$ atmosphérique

Activities:
- Works on data
- Experiments on carbon cycle (fluxes, exchanges between biosphere, hydrosphere and atmosphere)
- Forecasting of CO$_2$ emission and regulation by natural carbon sinks and sources
- Production of PowerPoint presentations
- Oral presentation in front of the classroom

Participating school: 1
Lycée René Descartes, Champs sur Marne

Teachers: 3
Scientists: 1
Students: 18

Pupils age: 15-16
Project 3: Evolution des concentrations de CO₂ en lien avec les activités humaines

Activities:
- Works on data
- Measurements of atmospheric CO₂
- Construction of materials for experiments on carbon cycle (greenhouses, weather forecast station, air column...)
- Experimentation on carbon cycle
- Laboratory visits
- powerPoint presentations during “science festivals”: this school won a local festival and took part in the national final in Paris.

Pupils age: 11-15

Participating schools: 1
Collège Louis Lumière, Marly le Roi

Teachers: 1
Scientists: 3
Students: 14

Duration of the project

Sept Oct
Project 4: La température à la surface de la Terre

Activities:
- Works on data
- Experimentation on global temperature regulation
- Production of posters

Participating schools: 1
Lycée Camille Claudel, Palaiseau

Teachers: 2
Scientists: 1
Students: 36

Pupils age: 15-16

Duration of the project

Sept May 11
Jun 8
**Project 5: Régulation de la température à la surface de la Terre**

- **Activities:**
  - Works on data
  - Experimentation on global temperature regulation
  - Production of posters

- **Duration of the project:**
  - Sept 25 to Nov 8

- **Participating schools:**
  - Lycée du Parc de Vilgénis, Massy

- **Involvement:**
  - Teachers: 1
  - Scientists: 1
  - Students: 28

- **Pupils age:** 15-16
Scientists who worked on projects

Alphabetical order:

Laurent Bopp, LSCE
Philippe Bousquet, LSCE-UVSQ
Marc Delmotte, LSCE
Céline Dimier, LOCEAN
Hervé Le Treut, IPSL
Valérie Masson-Delmotte, LSCE
Nicolas Metzl, LOCEAN
Isabelle Pinson, LSCE
Michel Ramonet, LSCE
Gilles Ramstein, LSCE
Céline Ridame, LOCEAN
Léonard Rivier, LSCE

Regional coordinator

Marc Jamous, LSCE