



## PROFILES IBSE Teaching/Learning Materials for Teachers

compiled by the PROFILES Working Group of the Freie Universität Berlin – Germany

### Junior Climatologists Required! “How can we avoid global climate change?” Reflexions on Air Pollution, Tornadoes & Global Climate Change



### A Module for Science Instruction – especially Chemistry – for Grades 8 to 10

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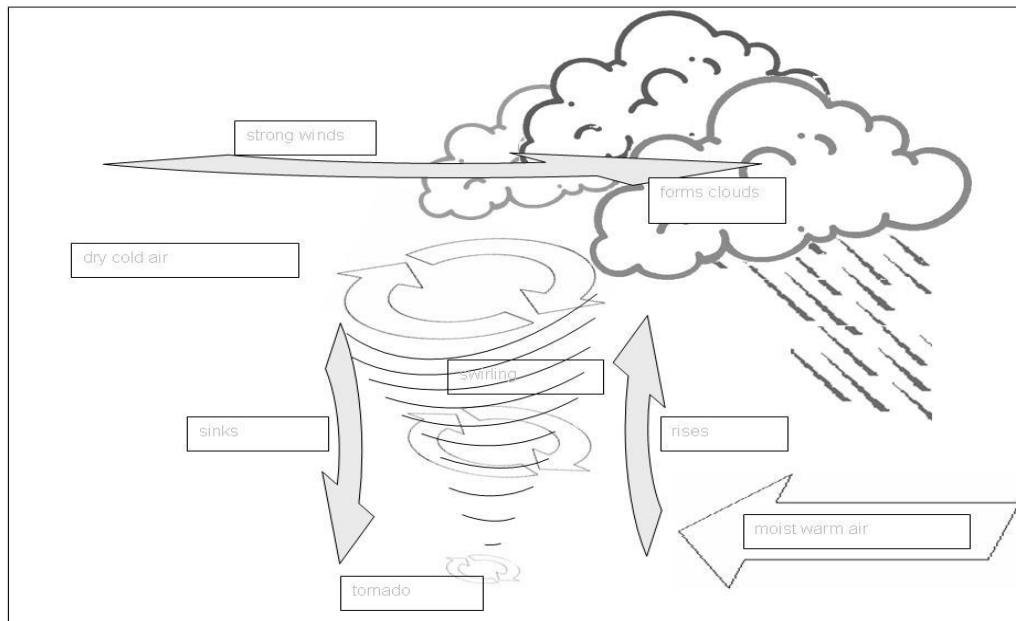
### Module Content

In the PROFILES module “Junior climatologists required! – How can we avoid global climate change? – Reflections on air pollution, tornadoes and global climate change” the young students will have the opportunity to obtain information which will help to explain complex processes using simple and reliably working scientific experiments. One central aim of this module is that the children experience the fact that scientific work does not only include conducting experiments but also includes looking for information and working with sources. A further substantial part of scientific work is being amazed by and marvelling at things. This, in turn, calls for questions to be raised and assumptions to be formulated as well as for creative planning of possible experimental setups.

We want to achieve a sensitisation for climate-related questions in the students, thereby offering them the opportunity to partake in decision-making process as an active member of society. To be able to act responsibly and to have an influence on something requires judgment of situations, data and facts. In this module we want to show the young students that scientific knowledge and competencies lay the valuable and essential groundwork for judging appropriately and acting effectively.

## Additional Material

The following diagram can be found in the materials for students.



To be able to fully understand the formation of tornados, the following elementary aspects could need to be clarified: the formation of wind and closely related to that the aspect of air pressure as well as air pressure differences (warm and cold air, altitude differences). The students can carry out the experiments described in the student materials of this module and then, in an evaluation process, collect all the observations and explanations of the experiments which, on their own, could not explain the formation of a tornado:

1. If very moist air cools down the water vapour condenses and air pressure sinks,
2. Warm air rises upwards,
3. Warm air is less dense than cold air and therefore has lower air pressure,
4. Air pressure decreases with a rise in altitude,
5. Wind is formed through compensation of air pressure differences.

Afterwards, a large poster or transparency of the above diagram can be shown to the students with no labels filled in. The students should then be able to fill in the missing words and so explain tornado formation.



## References

- Streller, S. (in print): Viel Wirbel um Tornados. In: PdN/ChidSch.  
Umweltbundesamt: Globaler Klimawandel – Tatsachen, Risiken, Handlungsmöglichkeiten.  
Geörg, J., Karch, C.: Globale Zusammenhänge verstehen. In: Unterricht Chemie 78, 2003, S. 27-31.  
Mathias, E.: Schülerversuche zum Kohlenstoffkreislauf. In PdN Biologie 5, 44.Jg., 1995, S. 34-35.  
Muckenfuß, H.: Experimentieren in der Wetterkunde. In: Unterricht Physik 42, 1997, S. 13-21.  
Muckenfuß, H.: Experimente zur Wetterkunde. In: PdN Physik 7, 53 Jg., 2004, S. 31-36.  
Obermann, H.: Tornado in der Flasche. In: Praxis Geographie 9, 2000, S. 26-29.  
[www.stormvideo.com](http://www.stormvideo.com) (Zugriff, 24.4.2006, 15:43 Uhr).  
<http://www.spiegel.de/wissenschaft/erde/0,1518,408488,00.html> (Zugriff 22.4.06, 12: 56 Uhr).  
Umweltbundesamt: Klimaänderung – Festhalten an der vorgefassten Meinung? 2005.  
Brauner, K.: Vernichtung und Erneuerung durch Waldbrände. Unterricht Biologie 279, 2002, S. 20-24.  
<http://www.top-wetter.de/lexikon/t/tornado.htm> (Zugriff, 25.4.2006, 11:05 Uhr).

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[www.parsel.eu](http://www.parsel.eu).