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**http://www.nationalgeographic.com/xpeditions/images/pixel_ghost.gifWEBSITE**: http://www.nationalgeographic.com/xpeditions/lessons/15/g912/tornadotech.html  
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| **Tornadoes and Technology**  Overview:  Students will learn the basics about how tornadoes are formed, and where and when they are most likely to occur. They will then study the current research on tornadoes and explore how scientists are trying to predict them. They will learn about the equipment ["storm chasers"](http://www.nationalgeographic.com/outthere/profile_storms.html) use to study tornadoes, and will develop their own research plans.  Connections to the Curriculum:  Geography, earth science  Connections to the National Geography Standards:  Standard 7: "The physical processes that shape the patterns of Earth's surface"  Standard 15: "How physical systems affect human systems"  Time:  Two to three hours  Materials Required:   * Computer with Internet access * Wall map of North America or the world   Objectives:  Students will   * learn the basics about tornadoes: where, when, and how they occur; * explore the current research about tornadoes; * study the equipment being used to try to predict tornadoes; and * write a research plan for the further study of tornadoes.   Geographic Skills:  Asking Geographic Questions  Acquiring Geographic Information  Answering Geographic Questions  Analyzing Geographic Information  S u g g e s t e d   P r o c e d u r e  Opening:  Tornadoes can occur anywhere on the earth, at any time, and can range from minor to catastrophic. Severe tornadoes are most prevalent, however, in the spring and early summer in an area of the United States referred to as "tornado alley." Show students this [map of tornado alley](http://www.windows.ucar.edu/tour/link=/earth/Atmosphere/tornado/agri_map.html&edu=elem&file=/new) from the Storm Prevention Center. This area is vulnerable because of its unique geographic characteristics: as cool, dry air sweeps down from the north, it meets up with warm, humid air pushing up from the south. While tornado formation is a very complicated process, this combination sets the basic requirements for frequent thunderstorms, lightning, hail, and tornadoes.  While most tornadoes are weak and do minimal damage, large, powerful tornadoes can be devastating to property and human life. Unlike hurricanes, tornadoes are very difficult to predict; meteorologists are usually able to give a warning only minutes before a tornado strikes, leaving little time for people to evacuate or get to a safe place. Scientists are working hard using new technologies to try to find ways to predict tornadoes that will give people enough time to prepare for the sometimes deadly storms.  Development:  Have students read through the National Severe Storms Laboratory's [TornadoesNature's Most Violent Storms](http://www.nssl.noaa.gov/NWSTornado) to learn about tornado formation, the different types of tornadoes, and tornado myths. This should give students a good background to study the technology being used to predict tornadoes.  To learn more about the technology that has been used to track severe storms and predict tornadoes, ask students to form small groups and use the following Web sites to begin their tornado research:  [National Geographic: Out There—Inside the Tornado](http://www.nationalgeographic.com/outthere/profile_storms.html)  [National Geographic: Nature's Fury—Tornadoes](http://www.nationalgeographic.com/eye/tornadoes/tornintro.html)  [National Severe Storms Laboratory: Severe Storms Research](http://www.nssl.noaa.gov/%7Eerik/www/SSR)  [National Severe Storms Laboratory: VORTEX—Unraveling the Secrets](http://www.nssl.noaa.gov/noaastory)  [Storm Prediction Center: The Online Tornado FAQ](http://www.spc.noaa.gov/faq/tornado)  [The Tornado Project: Things That Have Been Deliberately Placed in the Path of an Oncoming Tornado](http://www.tornadoproject.com/cellar/curiosity.htm)  [The Online Storm Chasing FAQs](http://www.stormtrack.org/library/faq)  Students should also read at least two of the following National Geographic News stories:  [On the Trail of Storm Chasers—Scientists Pursue Causes of Tornadoes](http://www.nationalgeographic.com/news/2001/05/0514_stormchasing.html)  [Storm Chasers Motivated by Quest for "Perfect Data Set"](http://www.nationalgeographic.com/news/2001/05/0529_Stormchaser2.html)  [Storm Chasers Face the Powerful Forces of Nature](http://www.nationalgeographic.com/news/2001/06/0611_stormchaser3.html)  [Chasers Intercept Tornado on Final Day of Storm Season](http://www.nationalgeographic.com/news/2001/07/0702_Stormchaser4.html)  As students work together to explore these Web sites, ask them to take notes on the following questions:   * Why is it so important to be able to accurately predict tornadoes? * What are some of the problems researchers face when trying to predict tornadoes? Why is it so difficult? * What are some of the technologies that have been used to track storms and predict tornadoes? Which ones were unsuccessful, and why? Which technologies do scientists think are going to prove most useful in the future? * What have researchers learned about tornadoes so far, and what do they hope to learn in the future? How will technology help?   Closing:  Bring the class back together as a group and discuss what students have learned. Were students surprised by how difficult it is to "chase" a storm? How long do they think it will be before scientists learn all they need to know about tornadoes? How will this change the way tornadoes are predicted?  Suggested Student Assessment:  Tell students they have just won a huge grant to develop a prediction model for tornadoes, and will be working in pairs as research teams. In each team, one student will be responsible for explaining in detail the research that has been done so far by scientists trying to predict tornadoes. The other student will be in charge of writing a research plan explaining how the team would go forward, based on past researchers' experiments and results. Together, the report should explain the history and future of tornado research.  Extending the Lesson:   * Have students discuss or write essays about whether or not they would like to be storm chasers. What do they think a day in the life of a storm chaser would be like? What would be the best parts about it? What would be the worst? * Have students design their own technology to learn about tornadoes. Students should be as creative as they wish, but provide a detailed explanation, including drawings, of how their designs work.   Related Links:  [National Geographic: Forces of Nature](http://www.nationalgeographic.com/forcesofnature) [National Geographic: Natures FuryTornadoes](http://www.nationalgeographic.com/eye/tornadoes/tornintro.html) [National Geographic: Out ThereInside the Tornado](http://www.nationalgeographic.com/outthere/profile_storms.html) [National Severe Storms Laboratory: Tornadoes](http://www.nssl.noaa.gov/researchitems/tornadoes.shtml) [Storm Track](http://www.stormtrack.org) [The Tornado Project](http://www.tornadoproject.com) |