

# HEAD IN THE CLOUDS, FEET ON THE GROUND

**C**irrus clouds, stratus clouds, cumulus clouds – since ancient times, people have gazed skyward and pondered fluffy wisps of white and angry, gray thunderheads.

Utah State University Goldwater Scholar Jodie Barker-Tvedtnes looks beyond the Earth's visual atmosphere to the mesosphere, where the highest clouds, polar mesospheric clouds or PMCs, form at the edge of space.

"PMCs are ice clouds that form in the summer months near the extremely cold mesopause region – some 50 miles above the earth," says Barker-Tvedtnes, physics major and Willard L. Eccles Undergraduate Research Fellow. "From the ground, these noctilucent or 'night-shining' clouds are only visible during twilight hours at high latitudes."



USU Goldwater Scholar Jodie Barker-Tvedtnes and daughter Kalila marvel at the wonders of the night sky. While juggling studies and family responsibilities, Barker-Tvedtnes revived Utah State's Society of Physics Students chapter.

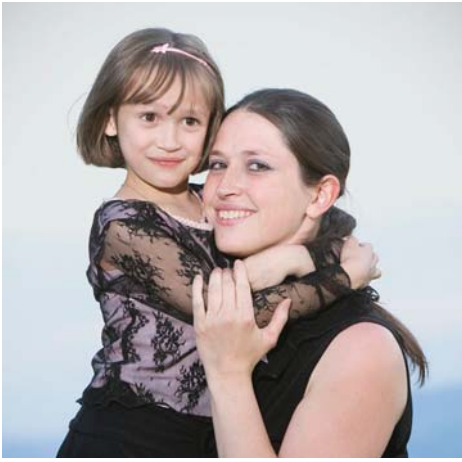
In addition to her previous academic accolades, Barker-Tvedtnes' was honored with a 2008 Outstanding Student Award for Undergraduate Research from the Society for Physics Students. One of just three undergrads in the nation honored with the award, she receives an all-expenses-paid trip to the International Conference of Physics Students in Cracow, Poland, in August 2008.

"I'm very excited about this honor and the opportunity to meet with physics students from around the world," says Barker-Tvedtnes, who has been invited to present her research on noctilucent clouds in Poland and at the national SPS meeting in spring 2009.

She spent five weeks in Alaska in summer 2007 studying the elusive formations with faculty

mentor Mike Taylor and fellow students. Taylor is a member of NASA's science team for the Aeronomy of Ice in the Mesosphere or "AIM" mission.

NASA launched the AIM satellite into orbit April 25, 2007, to collect information on how and why PMCs form. During their summer trip, Taylor and his student team



#### AWARDS AND PRESENTATIONS:

Goldwater Scholar, 2008  
Outstanding Student Award for Undergraduate Research  
from the Society of Physics Students, 2008  
Goldwater Honorable Mention, 2007  
Willard L. Eccles Undergraduate Research Fellowship, 2007-08  
USU Presidential Transfer Scholarship, 2005

#### Presented research at:

Regional physics conferences, 2006, 2007  
USU's Undergraduate Research Showcase, 2008

Barker-Tvedtnes, one of just three undergraduates in the nation to receive the Society of Physics Students' 2008 Outstanding Student Award for Undergraduate Research, studies the mesosphere's mysterious noctilucent clouds.

captured data from two field sites, located about 30 miles apart on the tundra of eastern Alaska and western Canada, to compare with data received from the AIM satellite.

"We became nocturnal," Barker-Tvedtnes says, although, because of the latitude of the areas in which the team was working, it never became completely dark.

"Starting at midnight each day, we'd have about five hours of twilight," she says. "We'd spend those hours tracking PMCs across the horizon and photographing the formations with digital and video cameras."

Back in Logan, Barker-Tvedtnes is comparing the ground-based data with information captured by the satellite. She has presented her research in a number of forums, including regional physics conferences and USU's 2008 Undergraduate Research Showcase. Following graduation in spring 2009, she plans to continue her studies at the graduate level and conduct research in upper atmospheric physics at a government or academic institution.

"Jodie is a 'power house' of activity and capability," Taylor says. "She's an excellent leader, displays exceptional poise and has a strong experimental aptitude."

He notes that, while tackling a significant academic load and research efforts, Barker-Tvedtnes revived Utah State's Society of Physics Students chapter. In addition to offering gatherings and field trips for students, the chapter conducts community outreach projects,

including the chapter's popular stargazing parties on the USU quad.

"The chapter was essentially dormant when I arrived on campus," says Barker-Tvedtnes, who began her undergrad career at Salt Lake Community College and entered Utah State after receiving a Presidential Transfer Scholarship. "But when I learned about the opportunities SPS offered – national scholarships, projects, activities – I worked with faculty and fellow students to get it going again."

Barker-Tvedtnes' dedication is all the more remarkable considering she's a single mom, juggling work, research and study with the care of her 7-year-old daughter, Kalila.

Balancing responsibilities is a challenge, the Salt Lake City native admits, but receiving the Willard L. Eccles fellowship has afforded her the opportunity to spend time in the lab and have greater control of her schedule.

"My work allows me the flexibility to conduct research while my daughter is in school and keep my evenings free for her," Barker-Tvedtnes says. "I've also appreciated the support from my professors. They really make an effort to involve students in undergraduate research."

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