

DustWatch report for week ending 28 September 2009

Hello and welcome to this week's report. I guess the previous week can be summed up with a couple of quotes:

"It was bigger than Ben Hur!" John Leys in *The Australian* newspaper, page 1.

"I have never seen or experienced anything like it. You have to be 60 years plus to have seen a dust storm as bad as this!" Nigel Lawrence, Broken Hill.

More on the events below, but firstly we would like to thank DustWatchers who helped maintain the DustWatch Node equipment and those who phoned with their observations and sent emails and photos. As a result of this effort, DustWatch was perfectly placed to answer questions from the media, general public, parliament, and concerned organisations (e.g. QANTAS), and many dust researchers were approached by the media for information. John Leys (south-eastern co-ordinator of DustWatch) did over 25 interviews and Dr Craig Strong (northern coordinator of DustWatch at Griffith University) did 20 plus interviews which provided information to the public.

The DustWatch Node network of 27 dust concentration sensors worked brilliantly. When we combined these data with that from the Bureau of Meteorology (Figure 1) and the MODIS Rapid Response Project websites, we quickly built a picture of what happened.

Last week, there were three major dust storms:

- the first hit Canberra on 22 September;
- "Red Dawn" hit Sydney (Figure 2) and Brisbane on 23 September; and
- the third hit Sydney and Brisbane on 26 September.

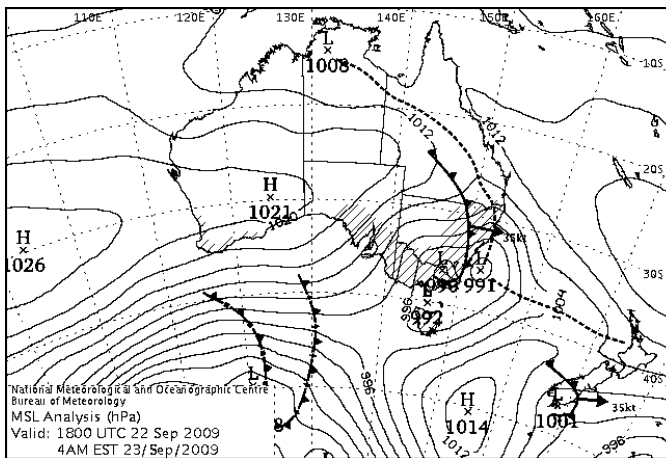


Figure 1. Synoptic chart for Wednesday 4am 23 September



Figure 2. Sydney tower in the Red Dawn (Photo: Louise Goggin)

These events were driven by strong winds with wind speeds in excess of 70 km/h. For the Red Dawn event, winds associated with a cold front and low pressure trough were recorded in the western part of NSW with speeds between 80 and 100 km/h (Figure 2).

Figure 3 shows the hours of dust at each DustWatch Node on the day of the Canberra dust storm (22 September) and the Red Dawn dust storm (23 September). The most noticeable features are:

- On 22 September, the highest number of dust hours were in a band from Temora to Tibooburra with little dust in the far south-west and the north-east of the State.
- On 23 September, it was the north of the state with the highest number of dust hours.
- On 24 September, only Tibooburra had dust (seven hours).
- At time of writing, the data for 25 to 27 September had not been processed.

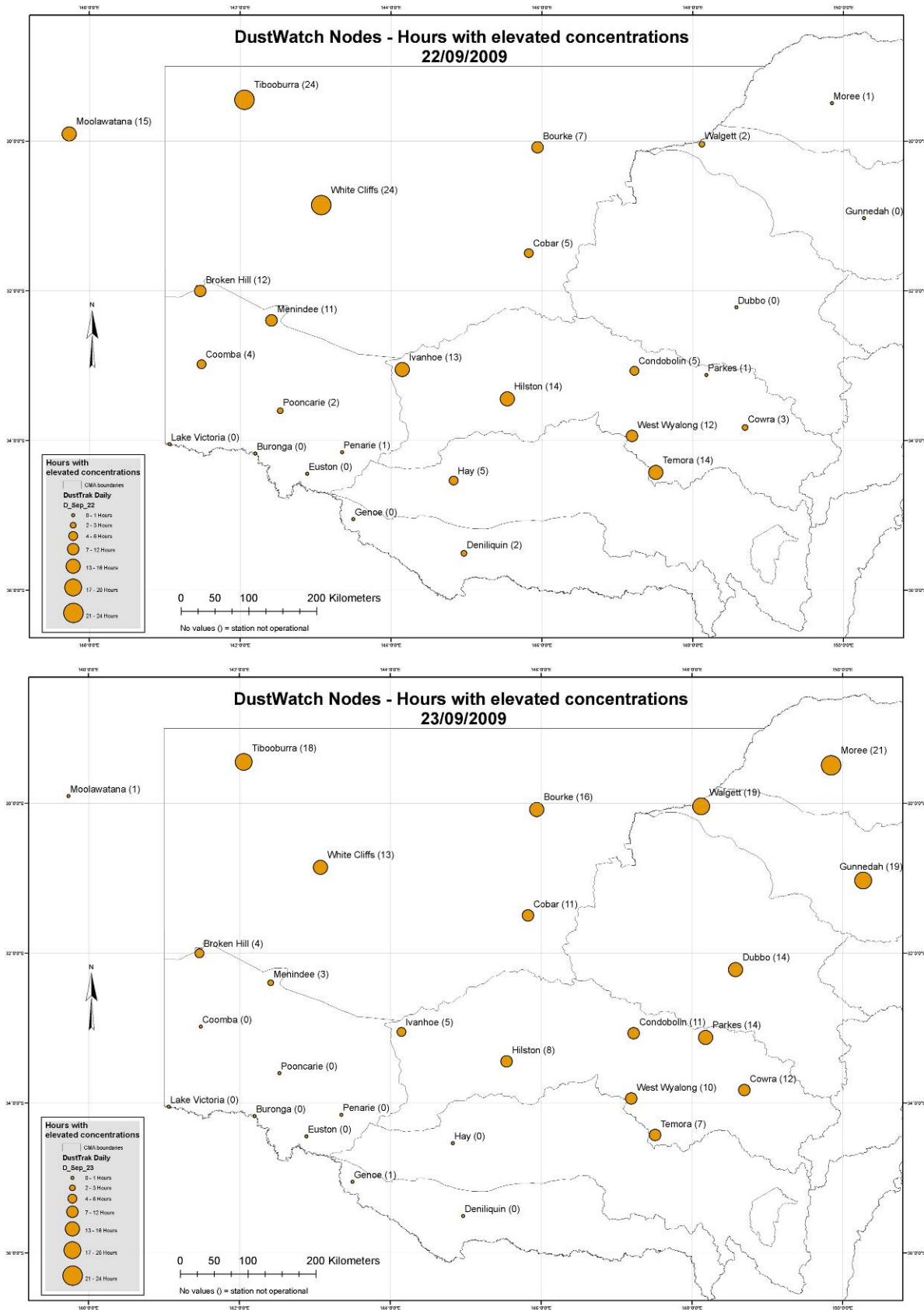


Figure 3. Hours of dust recorded on 22 and 23 September 2009 at each DustWatch station

DustWatch (south-eastern section) is funded by the Lower Murray Darling, Lachlan, and Murray CMAs and the Department of Environment, Climate Change and Water NSW. Support from NSW inland CMAs, Griffith University and the Bureau of Meteorology is gratefully acknowledged.

The source areas of these large dust storms were spread over a huge area in South Australia, Queensland and NSW. In general there were three major source areas:

- Lake Eyre Basin (LEB)
- Channel Country of south-western Queensland
- north-western NSW.

These events would have been much larger if it was not for the changes that have occurred in land management practices over the last decade. Not all of the landscape in these areas is emitting dust. Reports from Audrey Sheehan at Moolawatana Station in the lower Lake Eyre Basin indicate that raised dust was only coming off areas with inadequate soil cover.

Mr Glen Gale South Australian Dept Water Land and Biodiversity Conservation (DWLBC), Land Management Manager, provided some information about the South Australian portion of the Lake Eyre Basin (LEB). The LEB is the driest part of South Australia and comprises conservation reserves (not grazed by stock, 40% of the Basin) and pastoral leases (60% of the Basin) which have been drought-declared and subject to Exceptional Circumstances support for past eight years. Much of the pastoral land has been destocked or has reduced stock numbers due to on-going dry conditions. There are several programs that promote good land management and feral animal control programs conducted by the South Australian Arid Lands NRM Board in collaboration with land managers, the Department for Environment and Heritage and DWLBC.

There are similar NRM programs in western NSW and south-western Queensland. The MODIS images (Figures 3 and 4) indicate that only some parts of the landscape are eroding. For example, the Bullo overflow on the NSW/ Queensland border east of Tibooburra.

The MODIS images for Tuesday 22 September (Figure 4) shows two features:

- the dust plume extending off the NSW coast east of Canberra and back into central NSW; i.e. the Canberra dust storm
- the dust emission in the north east of South Australia that travelled east to Sydney and Brisbane in the largest dust storm DustWatch has monitored since it started in 2002; i.e. Red Dawn.

For the Canberra dust storm, dust was emitted on Monday 21 September from the lower Lake Eyre Basin and travelled in a fairly confined plume south over Ivanhoe, Hillston and Temora into Canberra on the afternoon of 22 September. As this dust was leaving the coast, a second dust storm was starting in the north east of South Australia (Figure 4) that would lead to the Red Dawn event (Figure 5).

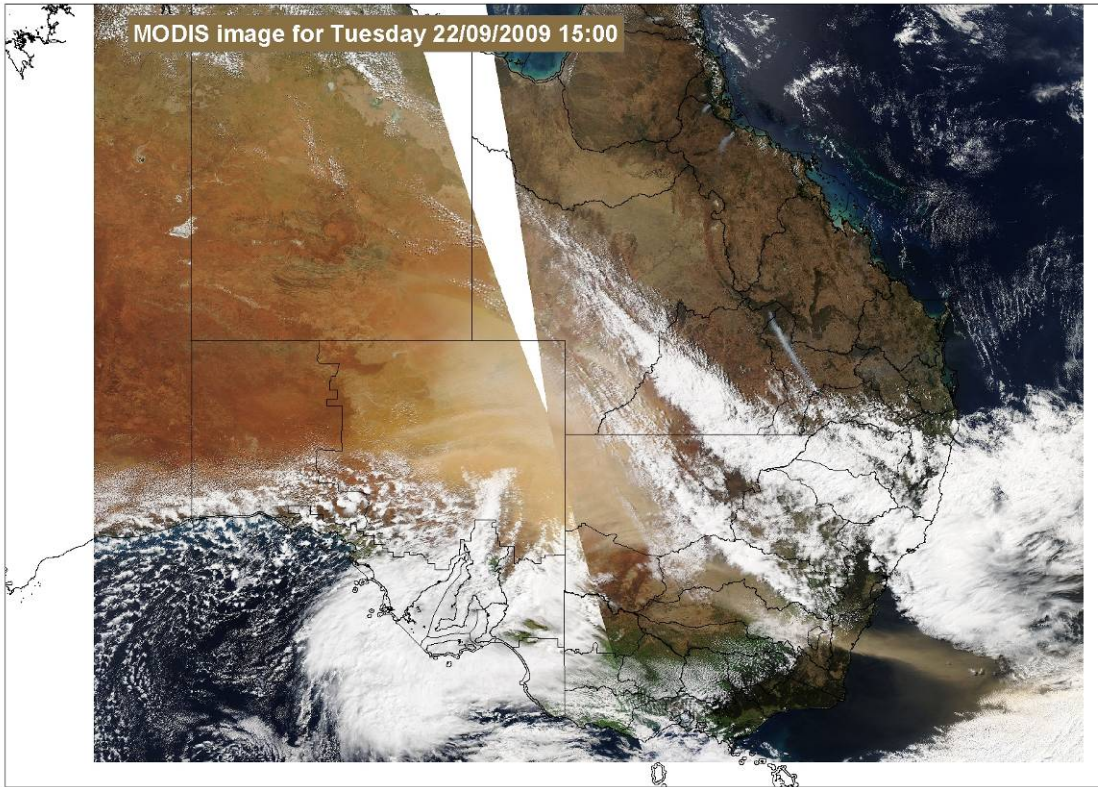


Figure 4. MODIS image showing dust passing through Canberra and off the NSW coast. At the same time dust is being emitted in the Lake Eyre Basin and western NSW. This dust would later pass through Sydney on 23 September

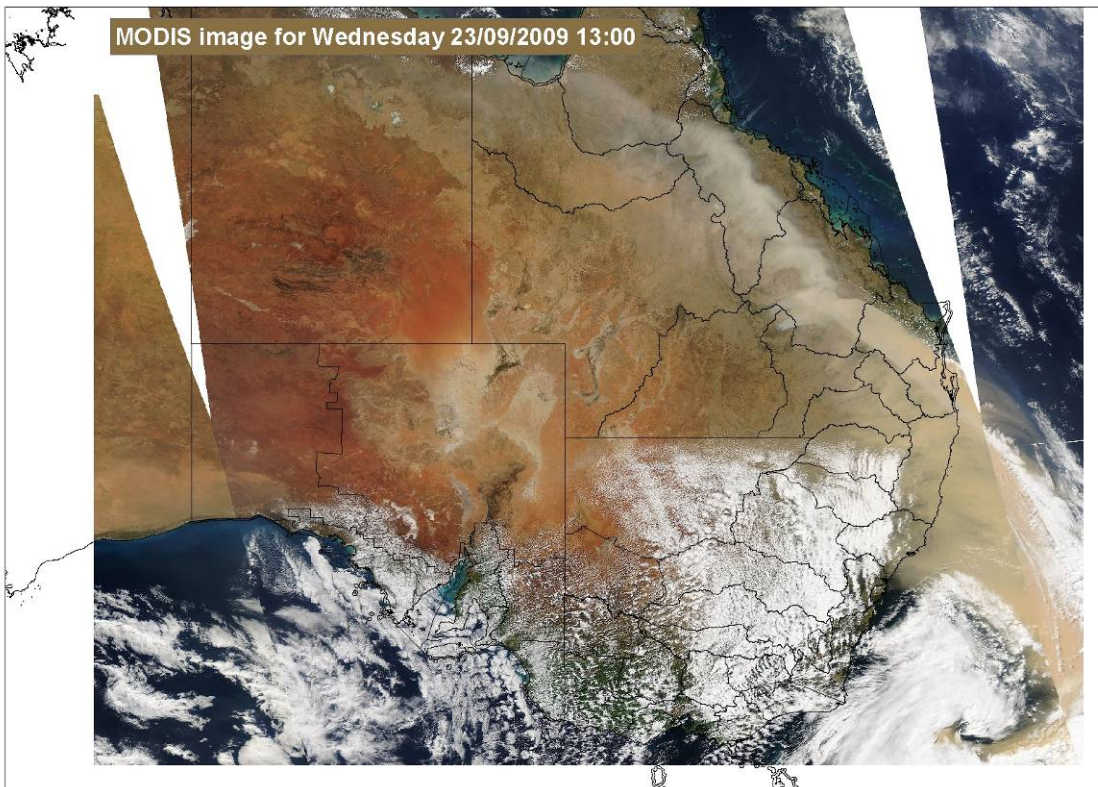


Figure 5. MODIS image showing dust plume from Gulf of Carpentaria to off NSW Victorian border.

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The last big dust storm to traverse south eastern Australia was on 23 October 2002 (Figure 6 left hand image). This event led to the establishment of DustWatch in NSW. The October 2002 event had 4million tonnes of soil in the air on the morning of 23 October 2002. The Red Dawn event (Figure 6, right hand image) had a similar pattern to the earlier dust event but the plume was longer, wider and denser. It will take some time to calculate how much soil was in Red Dawn but it is likely to be substantially larger than the 2002 event.

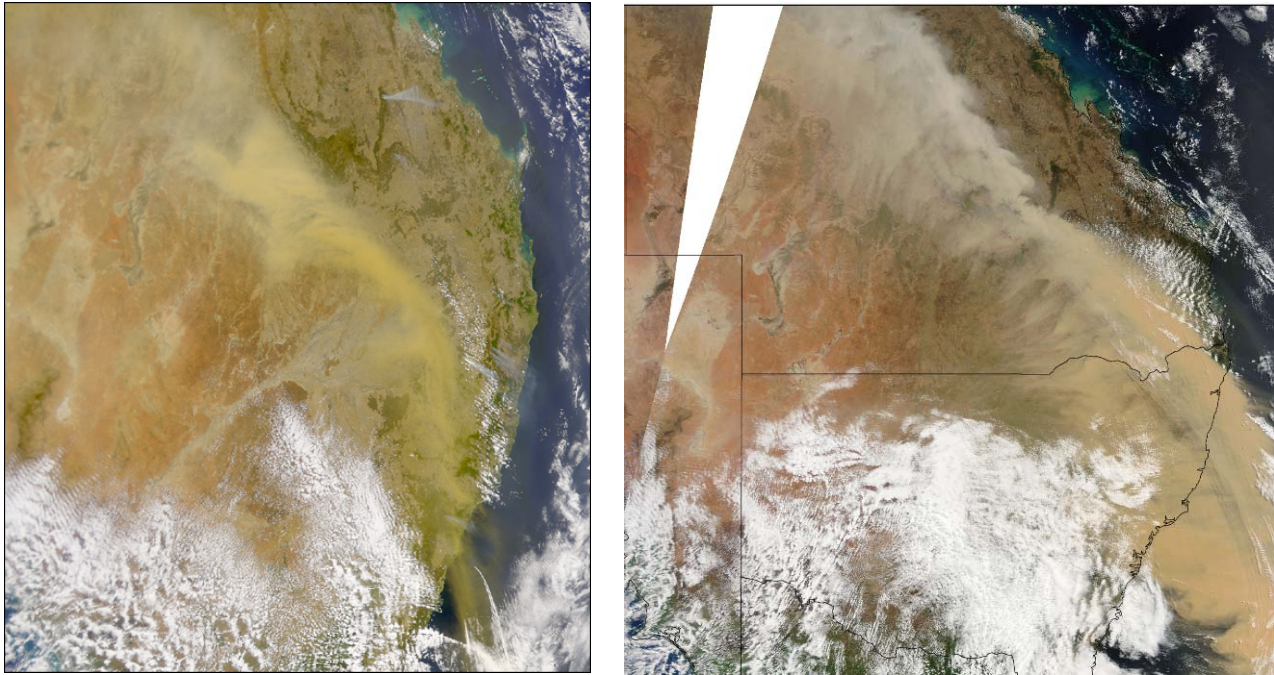


Figure 6. 23 October 2002 event (image on left) and 23 September 2009 event (Red Dawn) (image on right)

The event of Saturday 26 September (Figure 7) is not discussed here but was of a lower magnitude and extent than the Red Dawn event; more like the 2002 event.

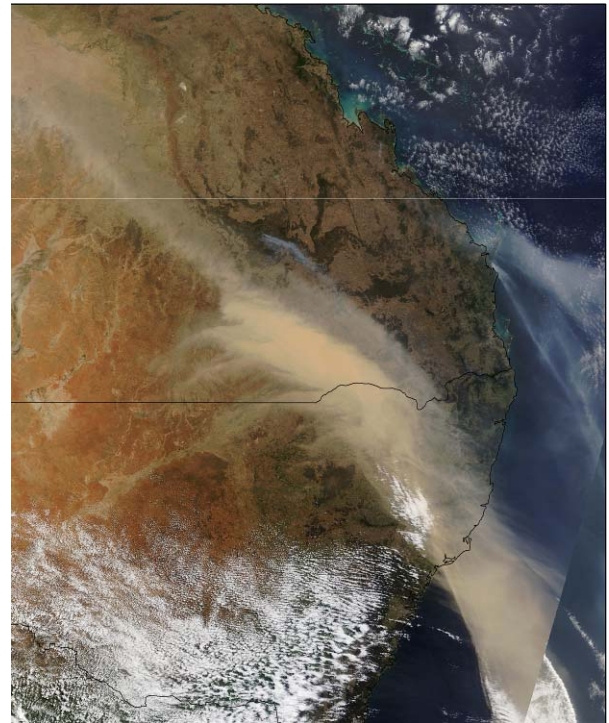


Figure 7. MODIS image for event of Saturday 26 September

The dust storms of the last week have had both on-site and off-site impacts. On-site impacts have included:

- soil and nutrient is lost resulting in lower soil productivity
- carbon release to the atmosphere, and
- soil degradation where subsoils with constraints to plant growth have been exposed.

Off-site impacts include:

- reduced air quality in urban areas;
- interruption to transport, ferries, airlines and road traffic;
- disruption to electricity supply;
- clean up costs (e.g. washing of cars and buildings);
- increased health costs associated with respiratory disease;
- crop damage;
- dust deposition to oceans that raises nutrient and iron contents; and
- changes in atmospheric radiation forcing.

These dust storms have had a major impact on the landscape and the community. Dust storms are part of the Australian environment, resulting from the interaction of climate and land management. The climate has been very dry for the last seven years in NSW. New records for temperature duration and maximums have been continually set.

A recent report from Bureau of Meteorology (Timbal, 2009, CAWCR Research Letters, Issue 2) states that, for the last 12 years, the drought is not 'prolonged', but is a significant shift in rainfall patterns across south-eastern Australia, due to climate change. The report is at http://www.cawcr.gov.au/publications/researchletters/CAWCR_Research_Letters2.pdf.

The current predictions for Australia from the *Climate Change in Australia: Technical Report 2007*, by CSIRO and the Bureau of Meteorology through the Australian Climate Change Science Program (<http://www.csiro.au/resources/ps3j6.html>) indicate that due to projected decreases in rainfall and increases in evaporation, soil moisture is likely to fall over much of southern Australia and droughts are forecasted to increase. These factors may contribute to a higher frequency of dust storms.

In conclusion, it has been a big week for DustWatch. What makes DustWatch interesting and informative is the collaborative effort of many DustWatchers and organisations that fund and provide the program with information. Thank you for your support and interest.

John Leys, Stephan Heidenreich and Mike Case
The DustWatch Team (south-eastern section)

Acknowledgements:

The MODIS image is courtesy of MODIS Rapid Response Project at NASA/GSFC. This project would not be possible without the assistance of all the DustWatchers who provide observations and help with maintenance of the instruments at the DustWatch stations. We gratefully acknowledge their contribution.

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