Leak Testing the DMT Cloud Condensation Nuclei Counter for Deployment on Pressurized Aircraft

0 00000

David J. Delene and Gökhan Sever Atmospheric Sciences Department University of North Dakota



King Air 200 Saudi Arabia Spring 2009









Airborne Data Set

Quality Control - The process of conducting tests to check that measurements are being made correctly and accurately.

Quality Assurance - The process of reviewing a data set to eliminate (replace with missing value codes) measurements that are invalid due to known problems.





Quality Control – Leak Testing

In my experience, every time that the DMT CCN Counter is shipped, it develops leaks that are sufficient for operation on pressurized aircraft.



Pump Housing

One location of leak problems is the pump housing.

Don't try to tighten the metal fitting on the pump housing.





Hard Places to Find Leaks



Saudi Arabia Spring 2009 (last leak found)



Leak Amount for Aircraft Deployment

"5. Allow pressure to stabilize and monitor how fast the sample pressure rises. Typically 2 mb or less per second is good."

- CCN Operator Manual Rev D page 45.

March 22, 2009 Saudi Arabia

Down to 450 mb, climb to 500 mb took 311 seconds.

50 mb / 311 s = 0.16 mb/s



Ascent Profile 17 March 2009

Optical Aerosols (0.1-3 um) Cloud Condensation Nuclei (0.6 %)



Ascent Profile 17 March 2009



Descent Profile 9 April 2009

Dust (1-3 um) Optical Aerosols (0.1-3 um) Cloud Condensation Nuclei (0.6 %) Condensation Particle





26 March 2009



26 March 2009



Conclusions

- A leak rate of 2 mb/s is insufficient for aircraft deployment of the DMT CCNC. Instead the leak rate should be on the order of 0.16 mb/s.
- When the CCN Counter is leaking, it does not seem possible to determine if a leak is present from house keeping parameters only indication is from unrealistic spike in the concentration.
- Need to conduct quality assurance on any DMT CCN Counter airborne data set.

Acknowledgments

The participation of the University of North Dakota in the spring 2009 Saudi Arabia field project was funded by the Kingdom of Saudi Arabia through a contract with Weather Modification Inc (WMI).

Thanks to Terry Krauss, Jeff Tilley, Gökhan Sever and Robert Mitchell for support during the Spring 2009 Saudi Arabia project field project.

Thanks for Listening

Any Questions