

Pilot Balloon Observations, 2016 Jefferson County Smoke Management

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Abstract

Pilot Balloon (PIBAL) observations are a major component of the daily decision-making process used in managing open field burning of grass seed and wheat fields in Jefferson County. PIBALs are used to track upper level wind direction and speed. They are released daily from the Central Oregon Agricultural Research Center between 10:30 am and 3:30 pm. Releases at potential burn sites allow for more accurate decision-making under marginal conditions. The PIBAL is essential in minimizing adverse smoke impacts on local communities.

Introduction

The PIBAL program began in 1998, and incorporates the weather balloon data into information the Jefferson County Smoke Management Coordinator receives from the Oregon Department of Agriculture (ODA) Weather Center. PIBAL data compiled with Real-Time Weather Data, courtesy of the US Bureau of Reclamation AgriMet Network, can be found on the Jefferson County Smoke Management website. The objective is to provide real time wind patterns, wind speed and wind direction information for the Smoke Management Coordinator to determine whether burning will be allowed.

Materials and Methods

Daily balloon releases occurred on demand throughout the day. The release times and locations were requested by the Smoke Management Coordinator. Air temperature, relative humidity, and surface wind direction and speed are documented at the time of the PIBAL release using the AgriMet weather station at the Central Oregon Agricultural Research Center. Wind directions and speeds are determined at one-minute intervals for a period of ten minutes using an observation Theodolite System and a twenty-six inch diameter helium filled balloon (PIBAL). The PIBAL is used to verify the forecast for the upper level wind direction, speed and mixing height. The software program, PIBAL Analyzer, developed by the Oregon Department of Agriculture (ODA) analyzes PIBAL information, which includes three components. The first is the PIBAL Sounding, a spreadsheet translating the azimuth (azimuth are angles used to define the apparent position of an object in the sky, relative to a specific observation point) and elevation readings from the wind direction and average wind speed. The second is the Hodograph, which charts the wind direction. The Profile page, the third component, graphs the wind speed. The PIBAL soundings are entered into the PIBAL Analyzer and transmitted to the Jefferson County Smoke Management website for the Smoke Management Program Coordinator. The Coordinator then uses this data in conjunction with the daily aircraft soundings and the ODA Weather Center forecast as well as the ODA's Air Quality Monitor to determine the field burning status for the day.

Results and Discussion

During the open field-burning season, which began Monday, July 25th and ran through Friday, September 23rd. Farmers burned a total of 6,900 acres, which included 5,490 acres of grass and 1,410 acres of wheat. This was 780 acres less than the previous year. There were 355 more acres of grass burned this year. There was 1,135 less acreage of wheat burned than the year before. The 2016 burn season winds were unlike most years we had prevailing transport and surface winds that consistently came from the Northeast, which made it difficult for burning this year.

Daily balloon releases in the late morning and throughout the day were used to refine the weather forecast; it was a valuable tool for determining the mixing height for smoke during the optimal burn times. The PIBAL provided the only method to detect the stable air layers. The PIBAL is particularly helpful on marginal burn days to assist the Smoke Management Coordinator in making the decision whether to allow burning when conditions were either changing or hard to discern. It is on these marginal days, when the conditions are unclear, that the most risk for smoke intrusion into populated areas exists. Using the PIBAL at the site of the potential burn prior to making the final decision has proved to be a valuable tool again during the 2016 season.