

Pilot Balloon Observations, 2015 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 and are released daily during burning season at the Central Oregon Agricultural Research Center between 10:30 am and 3:30 pm. In addition, releases at potential burn sites also occur to allow more accurate decision making under marginal conditions. The PIBAL is essential to minimizing adverse smoke impacts on local communities.

Introduction

The PIBAL program began in 1998, and incorporates weather balloon data with information received 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 the Jefferson County Smoke Management Coordinator with real time wind patterns, wind speed and wind direction information to ensure decisions are being made with the most complete and accurate information available.

Materials and Methods

The 2015 nine-week field burning season began July 27th and continued through September 25th. Daily balloon releases occurred on demand throughout the day during this period. 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. PIBAL Analyzer, a software program developed by the Oregon Department of Agriculture (ODA), analyzes PIBAL information which includes three components. 1) 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; 2) the Hodograph, which charts the wind direction; 3) the Profile page, graphs the wind speed. PIBAL soundings are entered into the PIBAL Analyzer and transmitted to the Jefferson County Smoke Management website for use by the Smoke Management Program Coordinator. The Coordinator then uses this data in conjunction with the daily aircraft soundings and the ODA Weather Center forecast to determine field burning status for the day.

Results and Discussion

During the open field-burning season farmers burned a total of 7,680 acres, this included 5,135 acres of grass and 2,545 acres of wheat. There were 1,880 less acres burned than in 2014. This variance included an increase of 235 acres of grass burned and a decrease of 2,115 acres of wheat burned than in 2014. The 2015 burn season was unusual in that wheat fields were harvested slightly earlier than average causing more acres to be ready to burn during the first two weeks of the season.

Daily balloon releases in late morning and throughout the day were used to refine weather forecasts. The PIBAL provided the only method to detect the stable air layers and was a valuable tool for determining the mixing height for smoke during the optimal burn times. It was also particularly helpful on marginal burn days to assist the Smoke Management Coordinator in making decisions when conditions were either changing or hard to discern. It is on marginal days when conditions are unclear; the most exists for smoke intrusion into populated areas. In addition, 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 2015 season.