

# Improved wildfire smoke modeling, AIRPACT-Fire, for enhanced communication of human health risk

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## INTRODUCTION:

The AIRPACT-Fire project, seeks to demonstrate delivery of enhanced wildfire-related air-quality (AQ) Forecast (and Nowcast) results.

## BACKGROUND:

- AIRPACT-5 forecasts air-quality for the Pacific & Inland Northwest Region, using WRF, SMARTFIRE, BlueSky, SMOKE and CMAQ (Figure 1).
- WRF-Sfire is a coupled atmospheric-wildfire behavior model that runs at very high resolution (Figure 2).

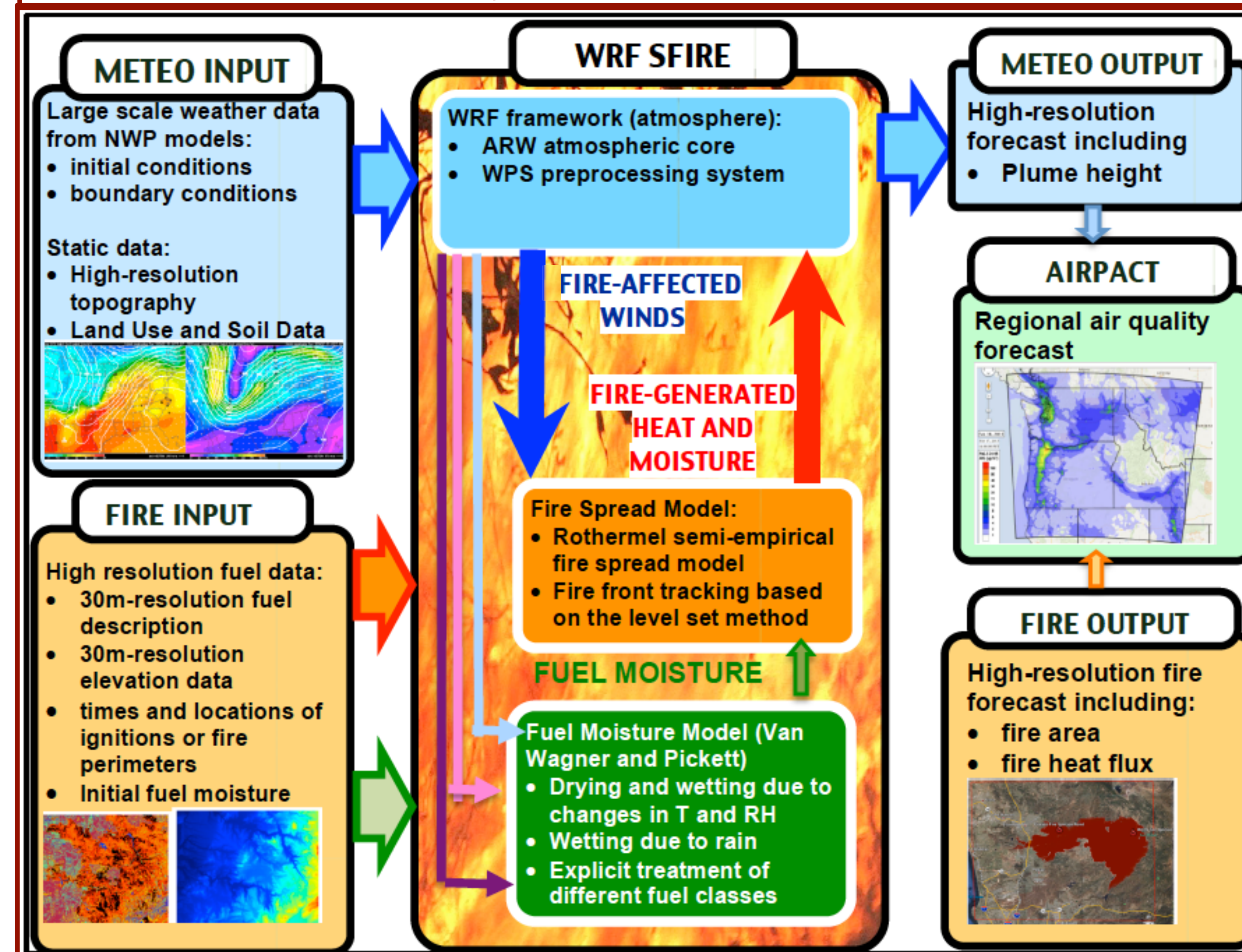
## DELIVERABLES:

- AIRPACT-Fire will incorporate results from WRF-Sfire wildfire simulations (Figure 3) into the AIRPACT5 forecasting framework to deliver wildfire smoke AQ Forecasts and Nowcasts, and related products.
- Target audiences include the public and AQ and medical professionals.
- Messaging will be delivered to the target audiences by via the web, smart-phones, emails and/or SMS texts.

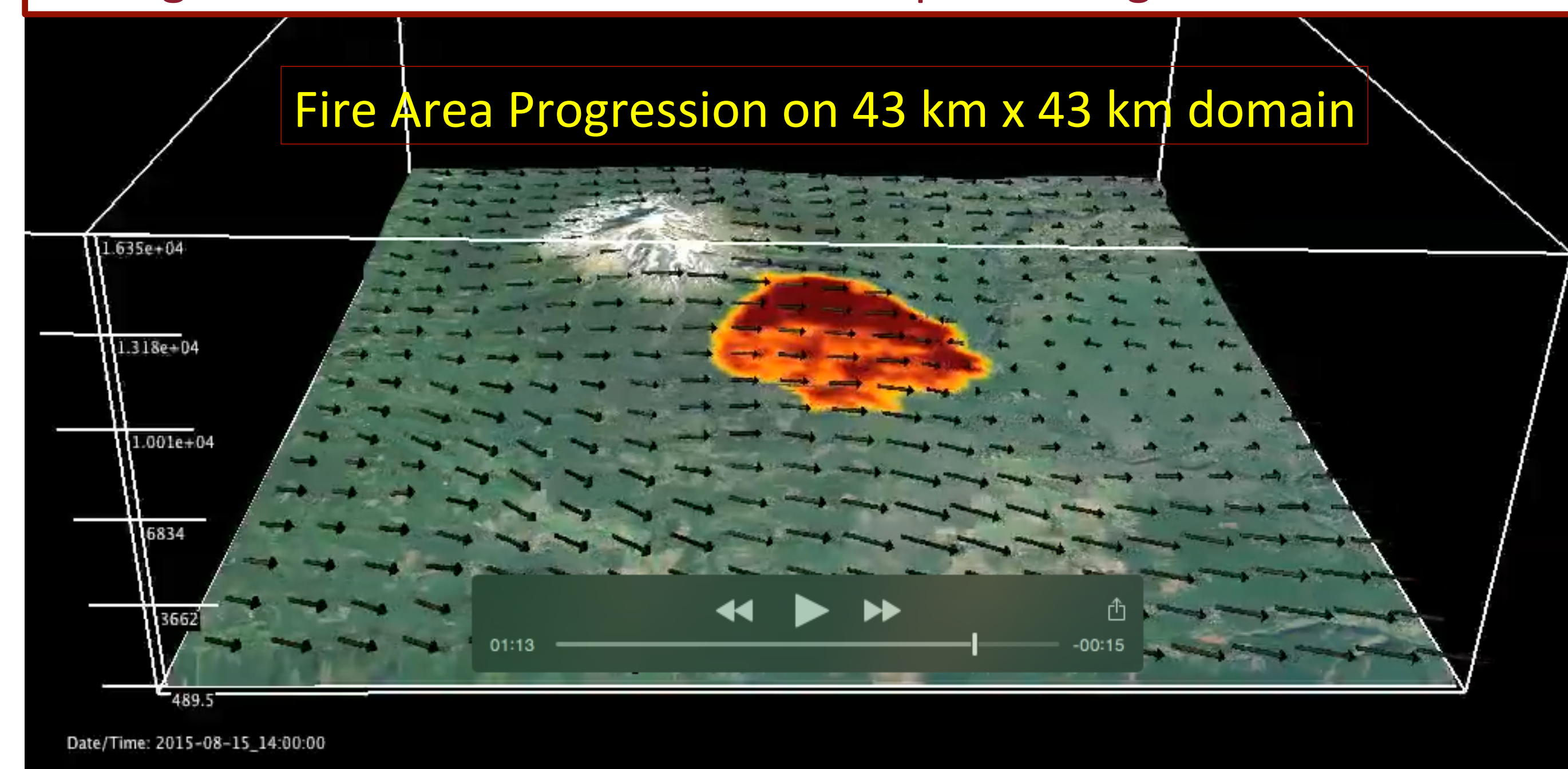
Along with WRF-Sfire, AIRPACT-Fire will include:

- Visual Range (VR) explored through a linked smart phone app and on-line co-laboratory providing for collection and comparison of VR estimates, VR derived from digital imagery, VR from monitors and VR from model results (Figure 4).

**Figure 2.** WRF-SFire models coupled atmosphere and fire behavior and results are up-scaled for use in AIRPACT.



**Figure 3.** WRF-SFire model provides highly detailed, time resolved fire progression and heat flux results, as seen here for the Cougar Creek Fire of August 2015, SE of Mt. Adams. Next step is up-scaling detailed fire info into emissions processing for AIRPACT.



**Figure 4.** Visual Range Co-laboratory and Smart Phone App support exploring the value of Visual Range for estimating Air Quality, offering the possibility of using direct human observations of visibility to estimate air quality (PM2.5 or Air Quality Index). A smart phone (Android) app has been developed for capturing landscape scenes photographically and uploading these to a web site.



Additional developments planned to follow:

- \* Smoke Forecasting mapping into Projection of Health Care Demand.
  - Review of literature is being conducted on association of wildfire smoke with respiratory and cardiovascular emergency department visits.
  - Develop Smart phone and Web apps for use by health care managers for projecting health care demand based on wildfire smoke forecasts
- \* Smart Phone Apps, Text Messages and Web Apps for enhanced communication of wildfire smoke health risks, targeted to vulnerable populations.

## CONCLUSION (STATUS):

- Current effort focuses on up-scaling of WRF-SFire results for Cougar Creek Fire for testing in AIRPACT for August 2015.
- Visual Range Smart Phone App and Website are nearly ready for beta testing.
- Other apps planned to follow.

AIRPACT-Fire is funded by The Joint Fire Science Program, for 2015-2018. Visual Range and Website development by WSU EECS students: Justin Baird, Ryan King, Michael Sheremet, Brian Soto and Luke Weber.

**Figure 1.** AIRPACT PM2.5 for 2 PM PT, August 15, 2015 with the Cougar Creek Fire selected for WRF-SFire simulation circled.

