The U.S. EPA has developed a balloon-lofted, ~10 kg instrument pack for sampling open burning (OB) and open detonation (OD) events for pollutants. The instrument pack, termed the "Flyer," and its accompanying maneuverable balloon system, are intended to sample OB/OD plumes to determine pollutant emission factors. The balloon Flyer operates with one to three tethers attached to winches and ATVs. The location, both vertical and horizontal, of the Flyer can be maneuvered by two tethers (1000 feet each) or, optionally, controlled by winches attached to the two ATVs. The two ATVs typically can operate 150 to 1000 feet apart. The Flyer consists of lightweight, battery-powered instruments suitable for continuous emission monitoring, grab sampling, and data logging. O2, SO2, NOx, and CO are analyzed using a chemical cell system, CO2 is analyzed using a non-dispersive infrared system, and total aromatic hydrocarbons are analyzed using a photoionization detector. Filter sampling, personal impactors, and continuous PM2.5 monitors are used for particle sizing and collection for metal analysis. Sorbents allow for volatile and semi-volatile determinations. Data are logged for analysis and concurrent flow and C measurements allow for emission factor determinations via the carbon balance method.The Flyer system is being applied to determination of emission factors from open burning of forests and agricultural systems as well as open burning and detonation of military ordnance. The system is intended to provide more accurate emission factors than possible by ground-based sampling.