Output Variables – The PALMS Calculation – Version R4

This document describes the outputs of the main PALMS calculation, version R4. This result set can be exported as a CSV file, used to generate a KML file, or used as the input to other calculations.

The PALMS calculation processes the GPS data to detect trips and locations. It merges accelerometer and heart rate data (if available) by synchronizing the timestamps. From the merged datasets, it estimates mode of travel, detects bouts for physical activity and sedentary behavior, and estimates energy expenditure.

The resulting dataset is exported by participant id, by date, by interval running from midnight (00:00:00) to midnight (23:59:59). Intervals are typically 5, 10, 15, 20, 30, 60 seconds.

The format of the exported CSV file is as follows:

Column	Description	Type	Format
identifier	Participant identifier	String	
dateTime	Date and Time of day in 24 hour format	String	yyyy-mm-dd hh:mm:ss.0 Note: millisecond value is always set to zero.
dow	Day of Week	Integer	1 – Monday 7 – Saturday values <= 5 -- weekdays values > 5 -- weekends
lat	Latitude of participant's location at this time	Decimal	Degrees decimal -180.0, -180.0 if unknown
lon	Longitude of participant's location at this time	Decimal	Degrees decimal -180.0, -180.0 if unknown
ele	Elevation of location (in meters)	Integer	Can be negative
duration	Duration of epoch (in seconds)	Integer	
distance	Distance traveled during the epoch (in meters)	Integer	0 – no max
speed	Speed of travel during the epoch (in Km per hour)	Decimal	0.0 – 9999.0
bearing	Direction of travel as computed between the previous fix and the current fix	Integer	0 – 355 0 = north
bearingDelta	Change in direction	Integer	-180 – 180 Positive value – clockwise change in direction Negative value – counterclockwise change

elevationDelta	Change in elevation during epoch (in meters)	Integer	Can be negative
fixType	Classification of GPS fix Note: this field may contain multiple values separated by + sign. Beginning with version R4, information in this column can be found as integers in other individual columns. String information is duplicated here for backwards compatibility.	String	Possible values: *unknown* -- no GPS data *firstfix* – first GPS location reported *lastfix* – last GPS location reported *lonefix* – fix that is both a first fix and last fix. Occurs when GPS acquires fix and immediately loses it. *lastvalidfix* – location reported is that of the lastfix *outdoors* – GPS is outdoors (estimate based on SNR) *indoors* – GPS is indoors *invehicle* – GPS is in a vehicle (estimate based on SNR and speed) *stationary* – participant is stationary *startpoint* – starting point of a trip *midpoint* – mid point of a trip *pausepoint* – participant paused in the mist of a trip *endpoint* – ending point of a trip

			clustered – point was within a location's buffer and reassigned the coordinates of the location. *clustered_center* – point is the center of the location cluster *inserted* – previous coordinates were inserted into this epoch. Occurs when GPS epoch is greater than desired epoch. *raw* – fix was not processed or classified.
fixTypeCode	Integer values representing fix types as described above.	Integer	-1 – unknown 0 – invalid 1 – valid (raw) 2 – first fix 3 – last fix 4 – last valid fix 5 – lone fix 6 – inserted fix
iov	Indicates if GPS was indoors, outdoors or in vehicle	Integer	-1 – unknown 0 – outdoors 1 – indoors 2 – in vehicle
tripNumber	Current number assigned to this trip. Numbers assigned sequentially as trips are detected.	Integer	0 indicates trackpoint is not part of a trip. >0 – point is part of a trip. -1 indicates unknown
tripType	Indicates trips start points, end points, pauses points, etc.	Integer	0 – stationary 1 – start point 2 – mid point 3 – pause point 4 – end point
tripMode	Estimated Mode of Transportation when moving within a trip	String	Possible values: *Pedestrian* *Bicycle* *Vehicle*

			Stationary -- Participant is a one location *Unknown* --No GPS data present
tripMOT	Estimated Mode of Transportation	Integer	-1 – unknown 0 – stationary (not in a trip) 1 – pedestrian 2 – bicycle 3 – vehicle
locationNumber	Participant's location at end of epoch	Integer	Current number assigned to location. Numbers assigned sequentially as locations are detected. -1 indicates unknown location
locationClusterFlag	Indicates if a point was clustered Point was within a specified radius of the location and its coordinates were changed to that of the location's center.	Integer	0 – not clustered 1 – point was clustered 2 – point is center of location cluster