DOCUMENTATION OF STATION/AGENCY MAGNITUDE PROCEDURES

(Modified from the SUMMARY OF IASPEI MAGNITUDE WORKING GROUP RECOMMENDATIONS ON DETERMINING EARTHQUAKE MAGNITUDES FROM DIGITAL DATA, updated version 2011; see http://www.iaspei.org/commissions/CSOI/Summary_WG-Recommendations_20110909.pdf)

This document is to outline the procedures adopted by seismological agencies to compute magnitudes of seismic events.

Agency Name: Station Géophysique de LAMTO

Please list the magnitudes computed and corresponding phase type analyzed in the table below (example provided). Add as many rows as required.

Magnitude type (nomenclature used at the agency)	Full name	Wave type analyzed
mb	Short-period body-wave magnitude	P-waves
ML	Short-period body-wave magnitude	Sg / Sn waves
Ms	Long-period surface wave magnitude	R waves

For each magnitude type computed at the agency, please specify:

1. The equations that are used for calculating each magnitude type and
a: specify if distance is measured as epicentral distance or hypocentral distance;

For all magnitudes:
Mag= log10(amplitude/period) + magcoef(station) + magcorrection (distance)

Where magcoef(station) is a correction depending on the station
And magcorrection(distance) is a correction depending on the distance station- epicenter

b: specify the distance range for which the equation is applied;

ML 100 km – 1800 km

Mb up to 110 degrees
Ms no conditions

c: specify restrictions on hypocentral focal-depth, if any.

None

2. Is any signal-to-noise ratio criterion applied to the analyzed signal?

No

3. Specify the software used (such as SeisComp, Antelope, Seismic Handler, Seisan, SAC, in-house developed programs) to perform the analyses for magnitude computation.

Onyx / Locgse

4. If the agency is computing magnitudes not based on some amplitude/period measurement (e.g., moment magnitude Mw) please summarize the details of the technique used. For example, is Mw obtained with a centroid moment tensor, W-phase and/or spectral fitting technique?

Not applicable

5. Other restrictions on the calculation of a specific magnitude. For example, is the magnitude measured only for earthquakes of a certain size, as defined by an independent measure of earthquake size? Also, are specific magnitudes computed only for seismic events occurring in specific areas?

Not applicable

Detailed questions on the magnitudes based on amplitude/period measurements:

6. How the network (event) magnitude and corresponding uncertainty is obtained? For example, is the network magnitude an arithmetic/trimmed mean, median value of the single station magnitudes?

Median value of the stations magnitudes, interactively measured

7. Units of the reported amplitudes. Specify if amplitudes are reported in units of trace-amplitude motion instead of ground motion.

Amplitudes are in nm

8. Time-window in which the amplitude measurement is made for the phase type analyzed. For example, for body wave magnitudes, is the time window a flexible time-interval between the P onset and the PP onset or a fixed time window after the first P onset (e.g. 5 s, 10 s or other)? Similarly, for the surface wave magnitudes, is the time window considered a time-interval spanned by waves having group-velocities between, e.g., 3.2 and 4.0 km/s or is always the maximum velocity amplitude, respectively (A/T) max in the whole surface-wave train in a wide range of periods be measured? If so, give the range of periods.

The magnitude is interactively measured on the maximum amplitude of the wave train in the period range corresponding for each magnitude.
Ms between 17-23 s period

9. Orientation of seismograph (horizontal or vertical) from which the measurement is made. For example, is Ms computed using both horizontal and vertical components? Specify also if, as for example might be the case for ML, data from each of the two horizontal components at a single station are used, are data from each component treated as a separate observation in the network magnitude computation, or are the two components first averaged into a station magnitude, which is then treated as a single observation in the network magnitude computation?

All amplitudes / period measured on vertical componant

10. Describe the amplitude-response, filter characteristics, or transfer-function of the seismograph or simulated seismograph through which the amplitude measurement is made. For example, is the IASPEI recommended standard Wood-Anderson seismometer simulation filter with the parameters according to Uhrhammer and Collins (1990) used to compute ML?

For mb and Ml, filtering between 0.3 and 7 Hz, Butterworth order 2

11. Details of measuring amplitude:
a: For example, does the amplitude correspond to 0.5*(peak-to-trough amplitude), where "peak-to-trough amplitude" corresponds to difference between a maximum positive excursion and a maximum negative excursion of the trace, or is the amplitude instead measured as the

maximum absolute excursion from the "zero" position of the seismograph trace?

The amplitude is peak to trough measured on a whole period on the biggest value after the phase onset. The maximum and minimum of the signal is automatically taken within the period.

b: for example, if the amplitude corresponds to 0.5*(peak-to-trough amplitude), are the "peak" and "trough" respectively the absolute maximum and absolute minimum values of the entire wave-group, or are they the adjacent peak and trough corresponding to the maximum trace excursion that is associated with a single zero-crossing?

The peak and trough belong to the same undulation, the period being measured on that wave period.

c: for example, are displacement amplitude(A) and period(T) measured at the time of maximum A or at the time of the maximum of the quotient (A/T)?

The amplitude and period are measured at the time of the maximum amplitude.

12. Details of measuring period. For example, is it the time between the neighboring peaks, respectively troughs or twice the time span measured between the largest peak and adjacent trough at which the double amplitude has been measured?

The period is measured between two neighboring peaks or two neighboring trough or two neighboring 0 crossing, depending on what is the clearer.

13. To what part of a phase the amplitude-measurement time refers. For example, is the amplitude-measurement time the time of the zero-crossing associated with a peak-to-adjacent trough measurement or is it the time of an absolute maximum or absolute minimum?

The amplitude-measurement time refers to the beginning of the measurement on the signal as a period can be measured from the 0 crossing to the next 0 crossing or from the maximum to the next maximum or minimum to the next minimum of a wave period.

Finally, please add publications as well as internal reports or web links that can be quoted to describe the magnitude procedures adopted at the agency and/or any other relevant information which may not have been included in the questions above.