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Analysis of infrasound waves generated by the May 2012 earthquake sequence in Northen Italy.

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In May 2012 a 5.9 ML earthquake occurred in Northern Italy with the sequence of major quakes (Ml>5.4) clearly felt in Northern and Central Italy. Almost 2000 earthquakes, with local magnitude ranging between 1 and 5.9, were recorded in one month, and were typically associated with shallow (<10 km) inverse faults.

We present analysis of pressure waves generated by these earthquakes and recorded at epicentral distances of ∼200 km southward, at the large (1.4 km) aperture AMT array in Central Italy, and of ∼300 km westward, at the small (130 m) aperture CHA array, operating in the northwestern Italian Alps mostly for snow avalanche monitoring. Infrasound is recorded for events with varying magnitude (Ml >4) and depth (5-15 km), and appears to be composed both of epicentral infrasound, produced at the source, and secondary infrasound, produced by the shaking of topography around the source.

The robust infrasound dataset and the optimal recording condition, with downwind propagation to the CHA array, allow to carefully investigate the origin of the infrasonic radiation. The relationship between infrasonic emission and earthquake source parameters such as magnitude, depth, focal mechanism and directivity, are analyzed for small-to-moderate magnitude earthquakes.

Given the large distance among IMS infrasonic arrays, the relationship between infrasound and earthquakes is not well documented yet and mainly restricted to ML>7 earthquake, and thus still debated. Accordingly, the present study, that integrates within the FP7 ARISE design study project (Atmospheric dynamics Research InfraStructure in Europe), represents a unique opportunity to investigate such a topic given the robust seismological constraints and optimal infrasound records. In particular this study integrates in the WP4 of the project that evaluates the civil applications of the future ARISE infrastructure to reduce and mitigate natural hazards.