In recent years it has become accepted that earthquake source can attain significant Non-Double-Couple (NDC) components. Among the driving factors of deviation from the double-couple (DC) mechanism there are the opening/closing of fracture networks and the activation of pre-existing faults by pore fluid pressure perturbations. This observation makes the thorough analysis of source mechanism by means of moment tensor inversion (MTI) the key to understand the seismogenic process. The main difference between the upper- and lower mantle stresses is a result of two main tectonic processes: the isostatic gravitational load on the upper mantle and the coseismic stress redistribution during the occurrence of an elastic rupture. The common sources of tectonic stress are the change in the mean Earth radius and the secular growth of the crust. We examined the moment tensors of induced microseismicity recorded in the Val d’Agri basin (Southern Italy) focusing our attention on the NDC component. In the present paper we study the full seismic moment tensor of induced microseismicity recorded in the Val d’Agri basin (Southern Italy) focusing our attention on the NDC component. Swarm-type shallow seismicity is induced by a high rate wastewater disposal well of the giant Val d’Agri field (the largest in onshore Europe) and by an artificial lake characterized by severe seasonal level oscillations. Preliminary results reveal a significant NDC component for most earthquakes.

**CM2 INJECTION WELL**

For the best MT inversion (CM2 values 0.0, 0.6), we produce the source type plots (Shardt et al., 1989). Because the mean stress distribution is quite homogeneous, NDC is significant for most events. Most of sources fall in %ISO- and %ISO+ zones, and only a small portion in DC and ISO+ zones (Fig.2A). The constrained DC solutions obtained for single MT inversion (Fig.2B) are coherent with the local stress orientations and the water level. But, thanks to borehole monitoring data (C1, C2, and C3; respectively), the few NDC component detected in the reservoir storage (e.g., following the injection tests performed at Pertusillo Lake). We observe a slight decrease of %NDC and %ISOabs from the closest (C1) to the farthest (C3) cluster, as expected. Pertusillo Lake.

**NON-DOUBLE-COUPLE COMPONENT ANALYSIS OF INDUCED MICROEARTHQUAKES IN THE VAL D’AGRI BASIN (ITALY)**

**Tectonic Setting & Val d’Agri Oilfield**

The Val d’Agri (VDA) is a Quadrilateral structured basin in the Southern Apennines (Italy), unique characterized by a complex tectonic evolution (Fig.1). The upper crust is dominated by a complex network of N-S and E-W faulting, overriding the Inner Apulia Platform (IAP). The faulted basin is as a result of two main tectonic phases: NW-SE trending Quaternary normal faults along the IAP and NE-SW fault system and bound the VDA basin (detected in the seismic section in Fig. 1C). Structural data and stress indicators displayed along the bounding normal faults. The source mechanisms are consistent with a N-S-NW trending maximum horizontal stress field, consistent with the regional NW-SE extension. The high seismic hazard of the area is testified by historical and recent seismicity (Mw 0.5-3.0), whereas instrumental seismicity is characterized by a low occurrence rate of events with ML ≥ 0.2. The activity of the VDA reservoir DIC and IIS is due to fracture systems at various scales. Wastewater associated to hydrocarbon production is reinjected into the reservoir storage (e.g. 80 Mm3). This seismicity is interpreted as induced by pore fluid pressure diffusion (ML<3) has been observed since 2001 at 2-5 km depth within the IAP and related to severe seasonal water level variations (e.g., following the injection tests performed at Pertusillo Lake). We observe a slight decrease of %NDC and %ISOabs from the closest (C1) to the farthest (C3) cluster, as expected. Pertusillo Lake.

**Data & Methodology**

The dataset includes microseismicity microseismic activity related to the injection tests performed at Pertusillo Lake which includes 516 earthquakes with M 0.3-0.6. The injection tests performed at Pertusillo Lake are characterized by both the injection and the shut-off phase. The injection test occurred from December 1st to December 23rd 2010, while the shut-off phase lasting from December 24th to February 14th 2011. After the injection, the injection pressures were reduced to reservoir pressure and maintained for an extended period of time (2011-2013). In the injection phase, the injection pressure varied between 10.4 and 25 bars. Pertusillo Lake is located in the northern part of the VDA. Pertusillo Lake is an artificial lake characterized by severe seasonal level oscillations. The maximum water level is 18 m and the reservoir storage is between 70% and 90%.

**Conclusions**

1. Both IIS and RIS show a significant %NDC component. The events with NDC > 25% are 66% for IIS seismicity and range from 70% to 88% for the three clusters of RIS seismicity.

2. Normal-faulting regime prevails, but reverse-faulting are also present for both IIS and RIS. Most reverse-faulting events have %ISO+.

3. %NDC tend to increase with MW for IIS.

4. %ISO and %ISO+ tend to increase with MW for both IIS and RIS.

5. %NDC for IIS tend to increase with time (e.g. following the injection tests performed at higher rate and pressure).

6. IIS with largest %NDC are observed in correspondence of peaks in injection pressure.

7. Source mechanism of IIS is clearly controlled by injection operations (i.e., opening/closure of fractures by fracture pressures). Local stress rotation caused by pore-pressure perturbations?

8. NDC components do not correlate with seismic activity of the Val d’Agri basin. But results are preliminary and further analysis will be performed using an extended eqtensor.