The authors of Paper 10125 present some interesting data on the PD magnitudes and how they change with hydrogenerator operating conditions. We have considerable experience going back to the 1990s with both experimental and commercial continuous on-line PD monitoring systems, which have now been installed on more than 5500 generators and motors [1]. When connected to the station computer, such systems allow the easy review of the effect of generator operating conditions on PD and PRPD patterns. Review of such data has allowed us to draw the following conclusions:

- There is a natural variation of PD magnitude of +/- 25% that occurs even when all the generator operating and environmental factors are apparently the same. Thus smaller changes do not imply that the change is caused by anything related to winding condition.
- Humidity must also be monitored, since it affects the PD activity in the stator endwinding.
- When there is a single dominant stator winding aging process, the effect of load, winding temperature, ambient humidity on PD activity can be very helpful to identify the root cause of the aging process (Table 1). When 2 or more aging processes are occurring at the same time, the effect of generator operating conditions on PD activity is much less useful.
- If the PD activity is low for the voltage rating of the generator, then generator operating and environmental conditions have little effect on the PD activity – thus controlling the effect of operating conditions is not required to obtain a valid trend over time.
- We have never seen a causal relationship between PD activity and bearing vibration. That is, changes in PD do not cause a change in bearing vibration, and vice versa. We are not aware of any physical process that could connect the two. Perhaps the results the authors found are just a coincidence, or perhaps the bearing vibration is causing some rolling element discharging, which is being detected as stator PD by their system?

Aging Process	Operating Condition Effect		
	Load	Temperature	Humidity
poor impregnation	None	neg.	none
degraded PD suppression coatings	little	pos.	neg.
loose coils in slots	pos.	little	neg.
endwinding separation	none	little	neg.
thermal	none	neg.	none
thermomechanical	none	neg	none
contamination	none	little	variable
metallic debris	none	none	neg.

Table 1: Summary of the effect of generator operating conditions of the PD magnitude (neg. means as the condition increases, the PD decreases; pos. means as the condition increases the PD magnitude also increases.

Reference

1. G.C. Stone et al, “Experience with continuous on-line PD monitoring of hydrogenerator stator winding insulation”, CIGRE Paper A1-203, 2006.