

# 895: Automatic Detection of Stationary Waves in the Venus Atmosphere Using Deep Generative Models

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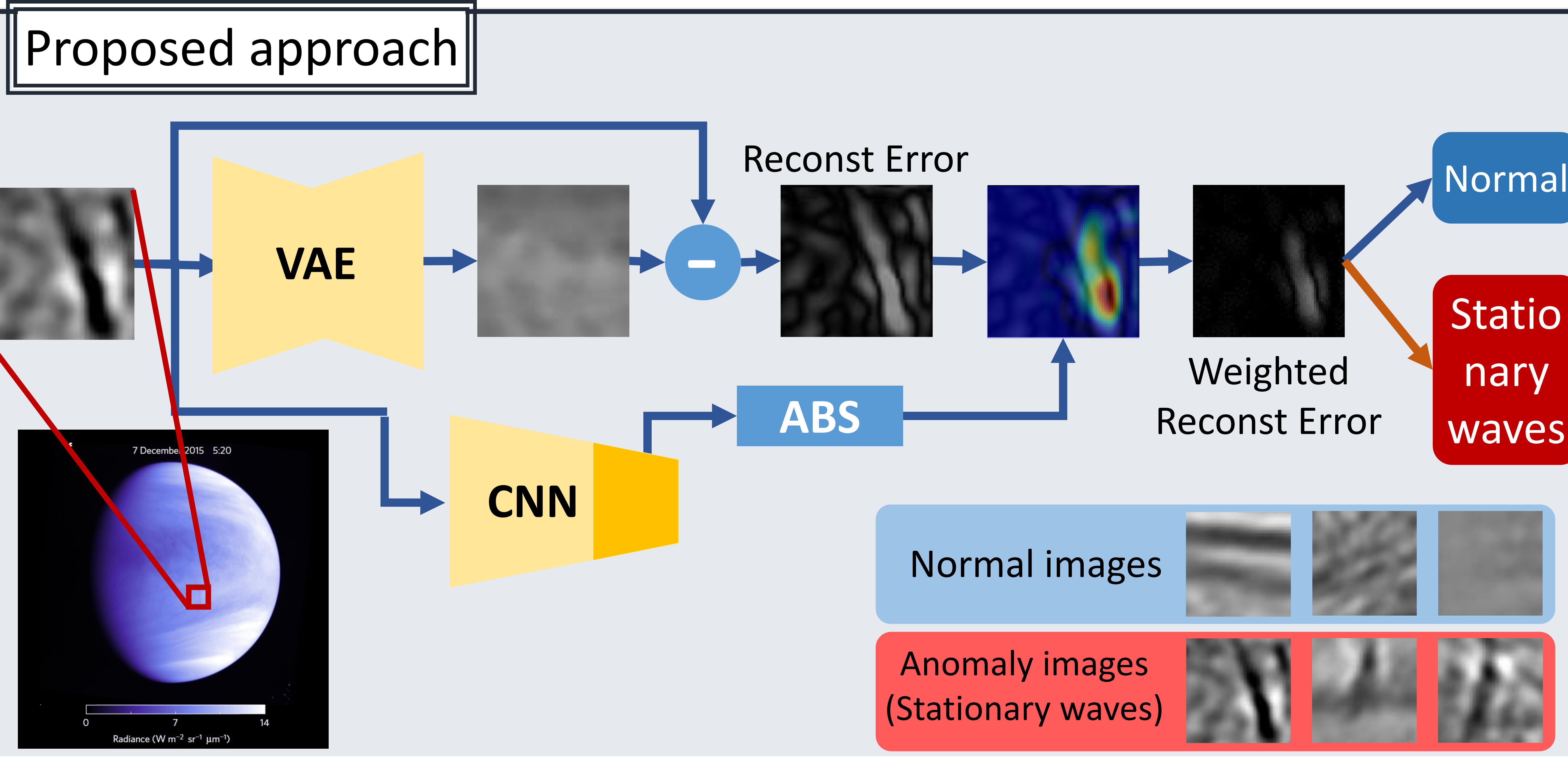
- 1. Automatically detect anomaly structures in **Venus clouds** using VAE
- 2. Focus on **important regions** in images using **Grad-CAM**
- 3. Detects anomaly with high accuracy (**.910** (AUROC, with Grad-CAM))

Background

Anomaly detection in planetary science domains are still done by the human eye

Automatically detect stationary waves [Nature2017] in Venus clouds using **VAE** and **Grad-CAM** [ICCV2017]

- Can **visually** offer reasoning behind the detection result
- Reduce ambient noises by using Grad-CAM



Experiment

Detection of stationary waves on the Venus cloud top

- Dataset: ultraviolet (283 nm) images taken from Venus Climate Orbiter Akatsuki
- Anomaly images: Stationary waves observed by [Kitahara et al., 2019].

\* Only 3 anomaly images were used during training.

Normal class: cloud images that do not contain stationary waves  
Anomaly class: stationary waves (vertical scar)

	AUROC
VAE-based[1]	.901
CNN[2]-based	.865
VAE + Attention	<b>.910</b>

[1] J. an et al., (2015) [2] ResNet (K. He et al., (2016))