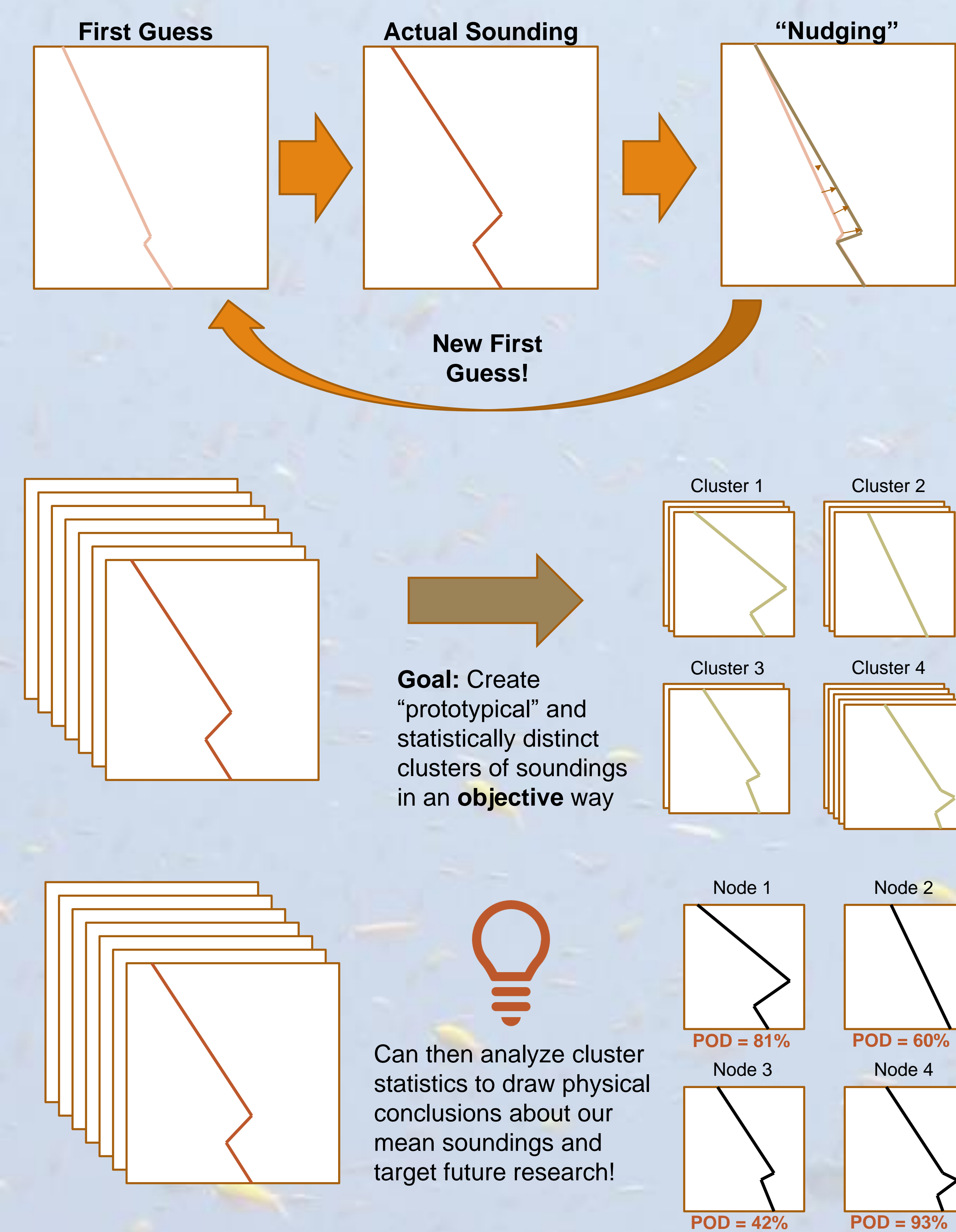


EnSOMble Forecasting: Leveraging Self-Organizing Maps for Tornado Threat Modelling

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Self-Organizing Maps (SOMs)



SOM of our Initial Results



The NSSL-WRF EnSOMble

- 10-member ensemble with perturbed initial conditions and lateral boundary conditions serving as the sole variation between members.
- Forecasts are initialized daily at 0000 UTC and run to 36 h.
- Ensemble forecasts available from 02/2014 – 02/2018.

Ensemble Member	ICs/LBCs	Microphysics	PBL	Radiation	Land-surface
1	00Z NAM	WSM6	MYJ	RRTM/Dudhia	Noah
2	00Z GFS	WSM6	MYJ	RRTM/Dudhia	Noah
3	21Z em_ctl	WSM6	MYJ	RRTM/Dudhia	Noah
4	21Z nmb_ctl	WSM6	MYJ	RRTM/Dudhia	Noah
5	21Z nmb_p1	WSM6	MYJ	RRTM/Dudhia	Noah
6	21Z nmm_ctl	WSM6	MYJ	RRTM/Dudhia	Noah
7	21Z nmm_n1	WSM6	MYJ	RRTM/Dudhia	Noah
8	21Z nmm_p1	WSM6	MYJ	RRTM/Dudhia	Noah
9 (2015)	21Z nmb_n1	WSM6	MYJ	RRTM/Dudhia	Noah
10 (2015)	21Z nmb_p2	WSM6	MYJ	RRTM/Dudhia	Noah
11 (2014)	21Z em_n1	WSM6	MYJ	RRTM/Dudhia	Noah
12 (2014)	21Z em_p1	WSM6	MYJ	RRTM/Dudhia	Noah

- This SOM is generated from deterministic NSSL-WRF
- Can test if other ensemble members have similar node structure
- Are there any nodes unique to particular members?
- Are any nodes dominated by a specific time of year or time of day? What about region?
- Create SOMs using environmental variables and see what the resultant UH swaths look like
- Categorizing environments by STP and 0-1 km SRH environments produces larger differences in UH by node than categorizing by SBCAPE or SBCIN

SOMmary: Moving Beyond Proof-of-Concept

Quality Control
Identify "problem nodes" that indicate failure of the object identification technique

Verification
Realtime and post-hoc identification of anomalous model performance

Forecasting
Flag unreliable model predictions in real-time and provide context for model forecasts

Model Improvement
Target systemically poor performance by scenario or ensemble member