Using several data sources for offshore wind resource assessment

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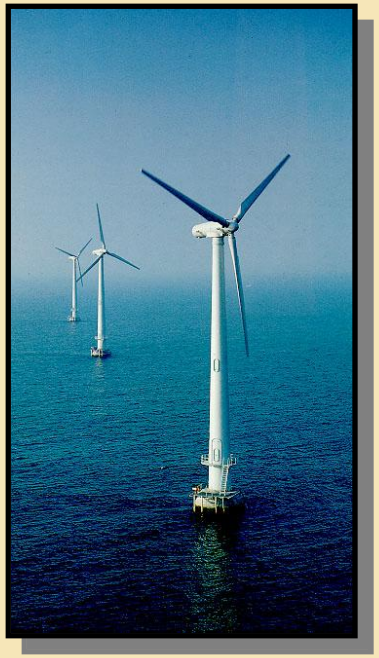


Resource Assessment

- **Nowadays**
  - *Mast installed on prospected area, models*
  - *Discrete measurements, statistics and extrapolation*

→ ***Costly and uncertainties in coastal areas***

- **Remote sensing as resource assessor**
  - *Global vision and high - resolution analysis*
    - measurements of local variations of the resource
  - *Available spaceborne instruments (all weather, all time instruments)*
    - Altimeters
    - Scatterometers
    - Synthetic Aperture Radars

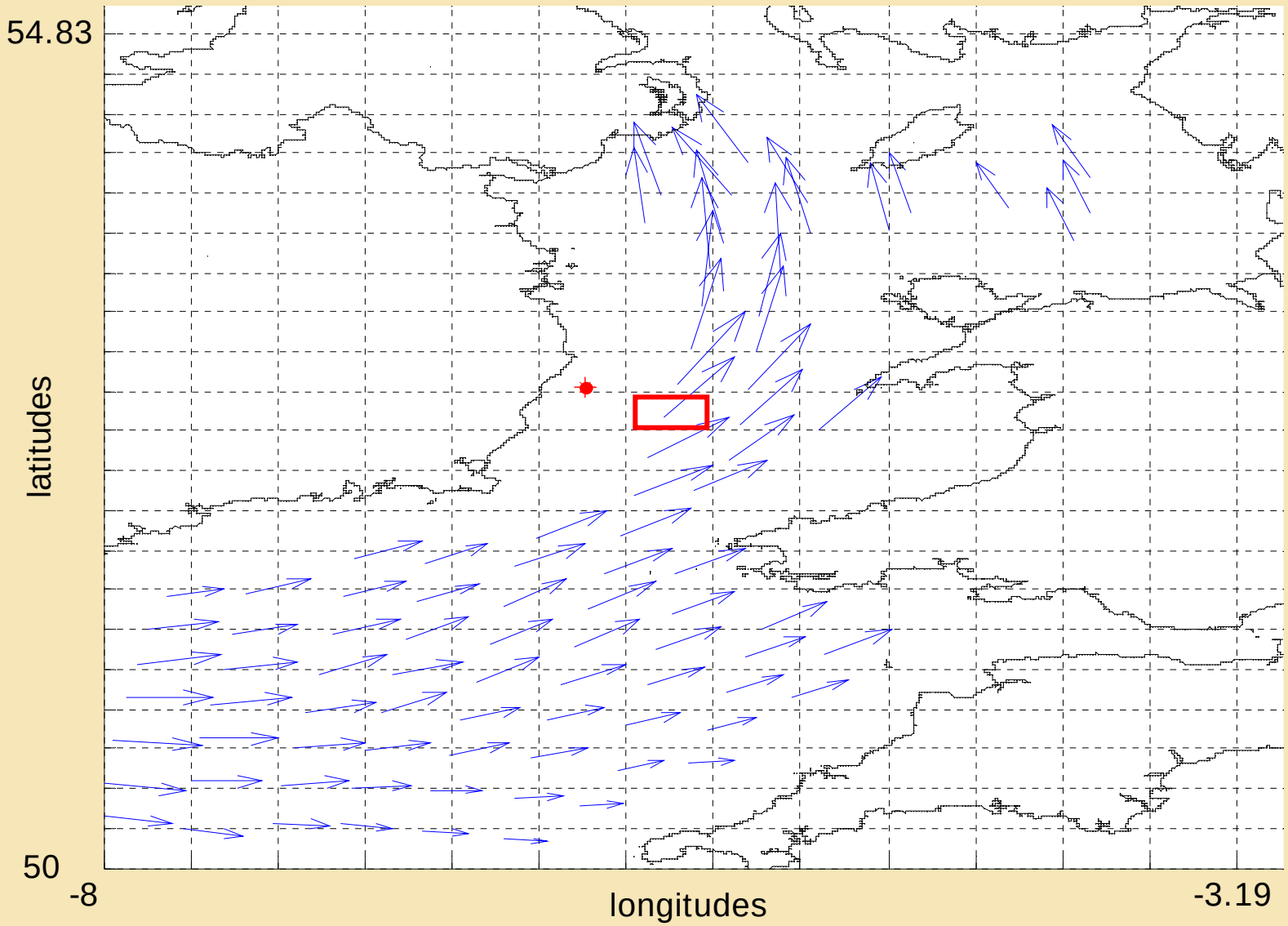
Altimeters

Satellite	Swath width (km)	Repeat cycle (days)
Geosat	1.7	17
ERS–1	1.7	35
Topex/Poseidon	2.2	10
ERS–2	1.7	35
Geosat follow-on	2	17
Jason–1	2.2	10
ENVISAT	1.7	35

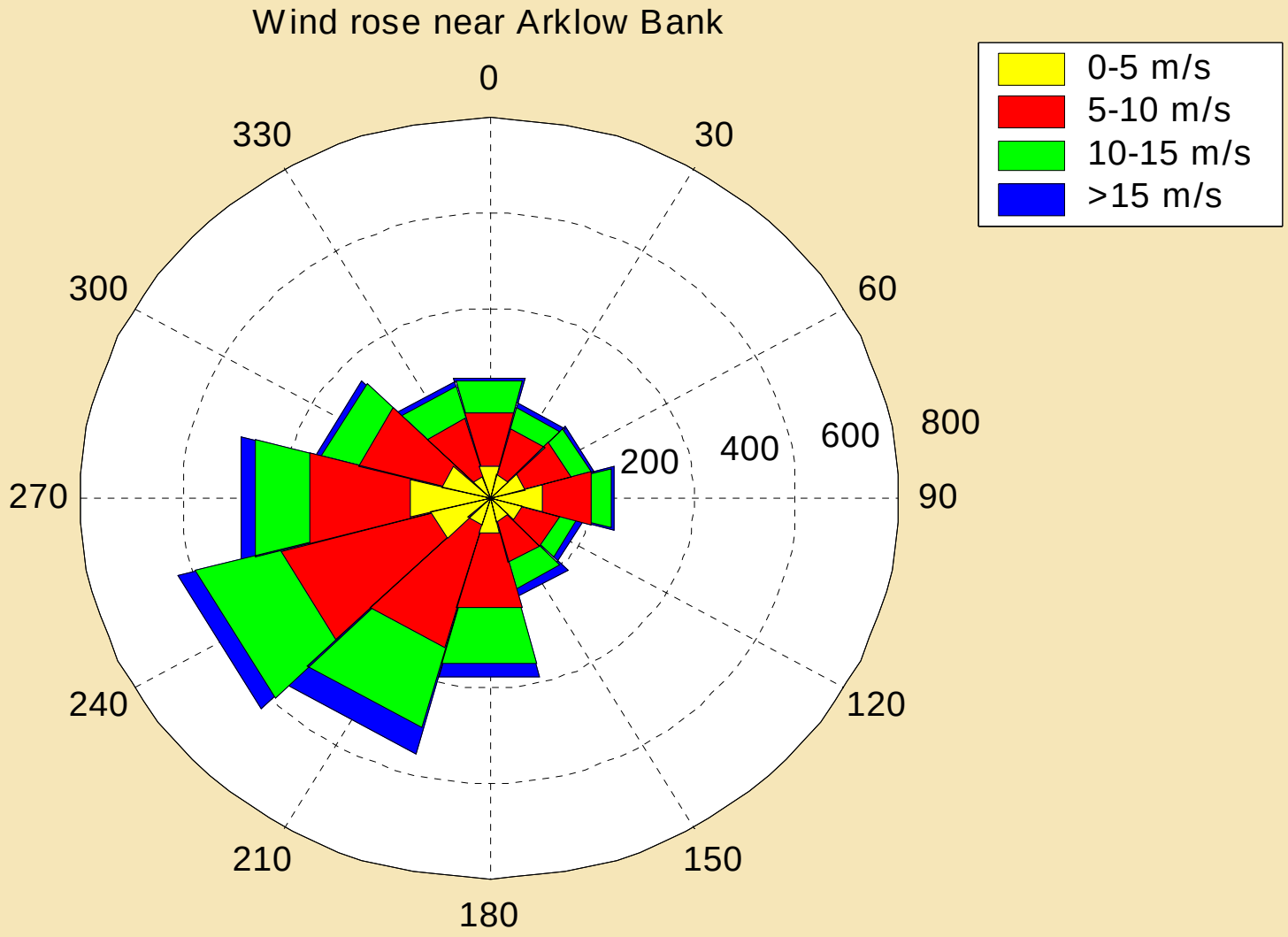
Scatterometers

Satellite	Swath width (km)	Resolution (km)	Repeat cycle (days)	Temporal Coverage
ERS–1	500	50	35	August 1991 - June 1996
ERS–2	500	50	35	March 1996 - January 2001
ADEOS	2*600	25/50	41	September 1996 - June 1997
QuikSCAT	1800	50	4	July 1999 - now
ADEOS–2	1800	50	4	April 2003 - October 2003

Scatterometers



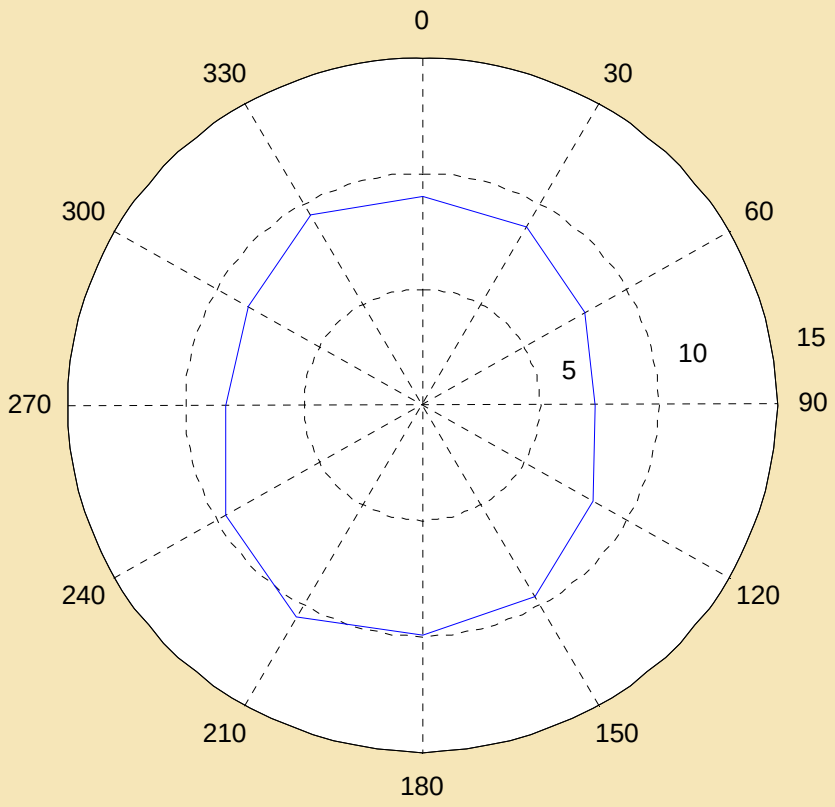
Scatterometers



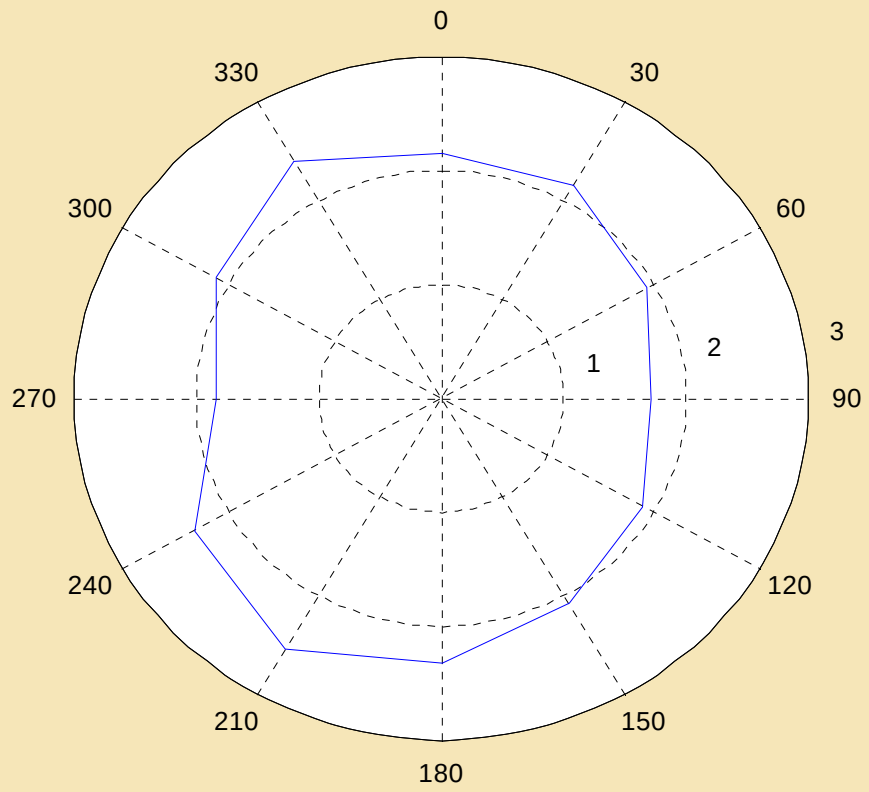
Temporal coverage : from 17-JUL-1999 to 04-FEB-2005 (4024 measurements)

Scatterometers

Weibull scale parameter



Weibull shape parameter

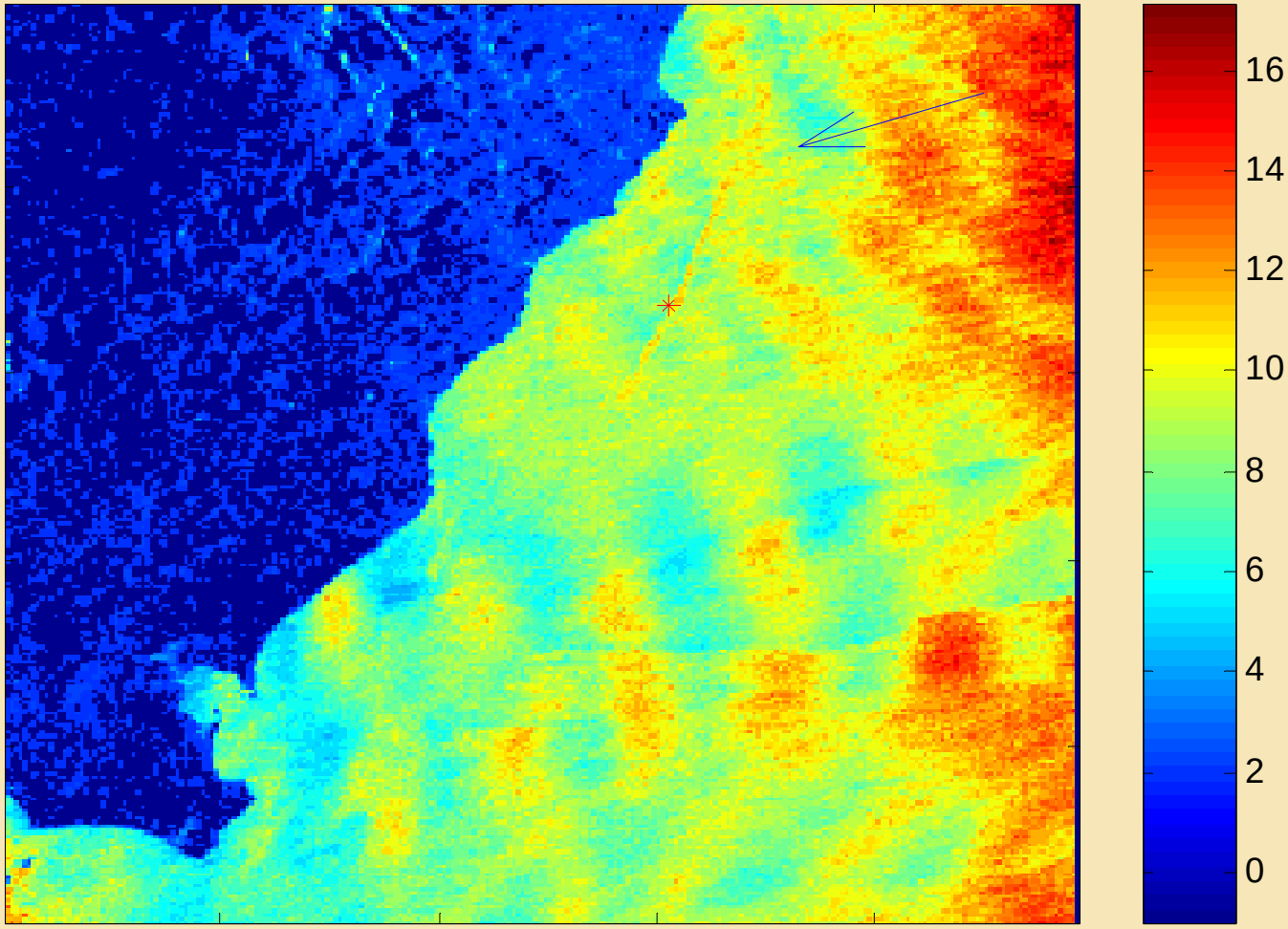


Synthetic Aperture Radars

Satellite	Swath width (km)	Resolution (m)	Repeat cycle (days)
ERS–1	100	30	35
JERS–1	75	18	44
ERS–2	100	30	35
RADARSAT	100-170	10	24
ENVISAT	100	30	35

Synthetic Aperture Radars

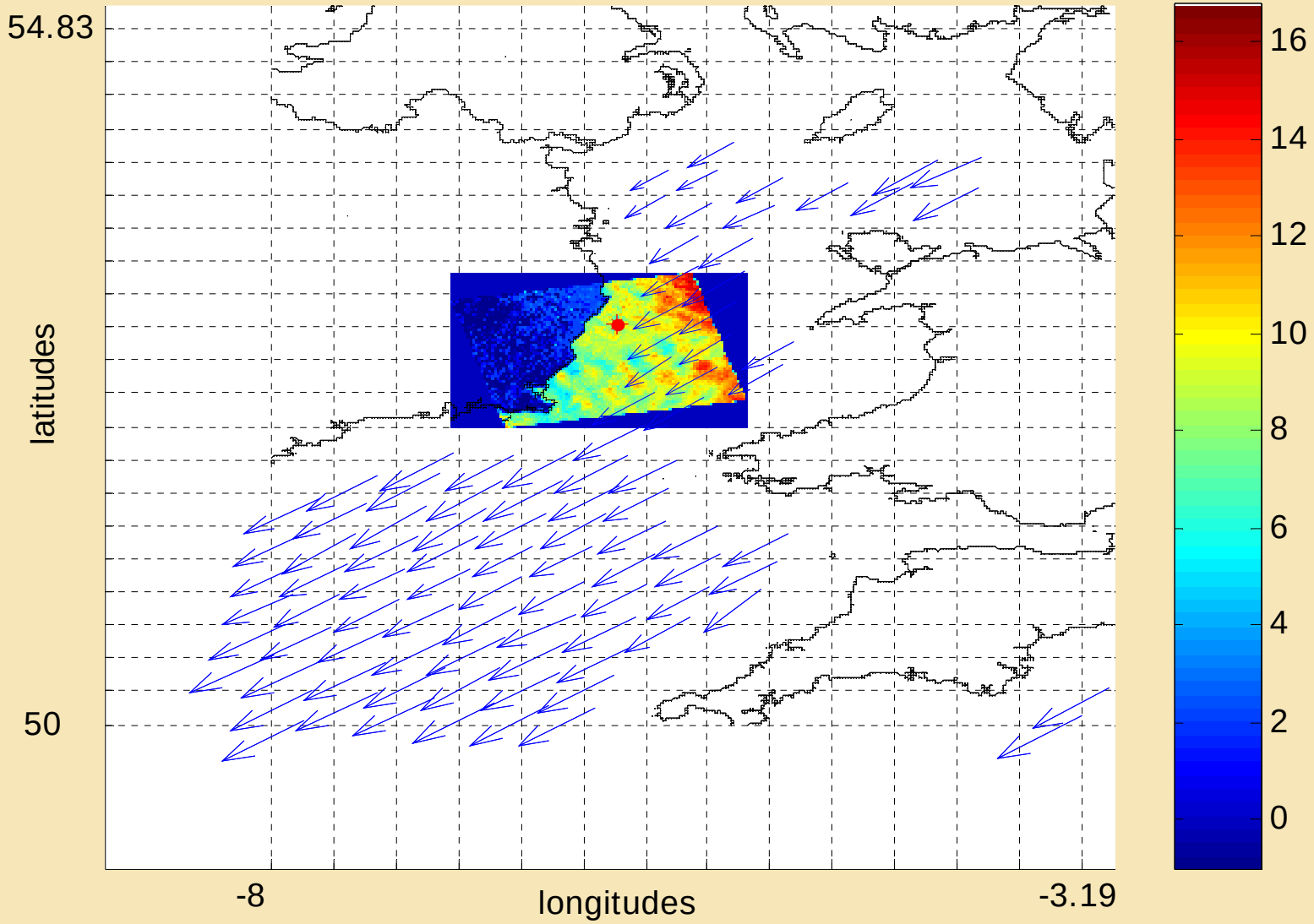
19-APR-2003 22:25



Wind speed (m/s)

Synthetic Aperture Radars

19-APR-2003 SAR 22:25 SCATT 18:26



Conclusions on available data

- **SAR**
  - *Sufficient spatial resolution*
  - *Low temporal sampling*
  - *Covers interest areas*

- **Scatterometers**
  - *Low spatial resolution*
  - *Sufficient temporal sampling*
  - *Far of interest areas*

Data fusion

- **Data fusion**
  - *Temporal repetitiveness ensured by scatterometers*
  - *Spatial variability given by SAR*

- **Data alignment**
  - *Transfer scatterometer data to interest area*
    - Use of CFD models?
    - Statistical methods?
  - *Improving data coherence*

- **Spatial high resolution synthesis**
  - *SAR for typical local scale behavior*
  - *Scatterometers for low resolution statistics*